7 Market Anomalies Every Investor Should Know

By

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7 Reasons You Haven't Received Your Tax Refund

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It is generally a given that there are no free rides or free lunches on Wall Street. With hundreds of investors constantly on the hunt for even a fraction of a percent of extra performance, there are no easy ways to beat the market. Nevertheless, certain tradable anomalies seem to persist in the stock market, and those understandably fascinate many investors.

While these anomalies are worth exploring, investors should keep this caution in mind: Anomalies can appear, disappear, and reappear with almost no warning. Consequently, mechanically following any sort of trading strategy can be risky, but paying attention to these seven moments could reward sharp investors.

Key Takeaways

- Market anomalies can be great opportunities for investors.

- Anomalies should influence but not dictate a trading decision.
- Proper research of a company's financials is more important for long-term growth.
- Most market anomalies are psychologically driven.
- There is no way to prove these anomalies, since their proof would flood the market in their direction, therefore creating an anomaly in themselves.

1. Small Firms Tend to Outperform

Smaller firms (that is, smaller capitalization) tend to outperform larger companies. As anomalies go, the small-firm effect makes sense. A company's economic growth is ultimately the driving force behind its stock performance, and smaller companies have much longer runways for growth than larger companies.

A company like Microsoft (MSFT) might need to find an extra $10 billion in sales to grow 10%, while a smaller company might need only an extra $70 million in sales for the same growth rate. Accordingly, smaller firms typically are able to grow much faster than larger companies.

2. January Effect

The January effect is a rather well-known anomaly. Here, the idea is that stocks that underperformed in the fourth quarter of the prior year tend to outperform the markets in January. The reason for the January effect is so logical that it is almost hard to call it an anomaly. Investors will often look to jettison underperforming stocks late in the year so that they can use their losses to offset capital gains taxes (or to take the small deduction that the IRS allows if there is a net capital loss for the year).1 Many people call this event "tax-loss harvesting."

As selling pressure is sometimes independent of the company's actual fundamentals or valuation, this "tax selling" can push these stocks to levels where they become attractive to buyers in January. Likewise, investors will often avoid buying underperforming stocks in the fourth quarter and wait until January to avoid getting caught up in the tax-loss selling. As a result, there is excess selling pressure before January and excess buying pressure after January 1, leading to this effect.

3. Low Book Value

Extensive academic research has shown that stocks with below-average price-to-book ratios tend to outperform the market. Numerous test portfolios have shown that buying a collection of stocks with low price/book ratios will deliver market-beating performance.

Although this anomaly makes sense to a point—unusually cheap stocks should attract buyers' attention and revert to the mean—this is, unfortunately, a relatively weak anomaly. Though it is true that low price-to-book stocks outperform as a group, individual performance is idiosyncratic, and it takes very large portfolios of low price-to-book stocks to see the benefits.

4. Neglected Stocks

A close cousin of the "small-firm anomaly," so-called neglected stocks are also thought to outperform the broad market averages. The neglected-firm effect occurs on stocks that are less liquid (lower trading volume) and tend to have minimal analyst support. The idea here is that as these companies are "discovered" by investors, the stocks will outperform.

Many investors monitor long-term purchasing indicators like P/E ratios and RSI. These tell them if a stock has been oversold, and if it might be time to consider loading up on shares.

Research suggests that this anomaly actually is not true—once the effects of the difference in market capitalization are removed, there is no real outperformance. Consequently, companies that are neglected *and* small tend to outperform (because they are small), but larger neglected stocks do not appear to perform any better than would otherwise be expected. With that said, there is one slight benefit to this anomaly—though their performance appears to be correlated with size, neglected stocks do appear to have lower volatility.

5. Reversals

Some evidence suggests that stocks at either end of the performance spectrum, over periods of time (generally a year), do tend to reverse course in the following period—yesterday's top performers become tomorrow's underperformers, and vice versa.

Not only does statistical evidence back this up, but the anomaly also makes sense according to investment fundamentals. If a stock is a top performer in the market, odds are that its performance has made it expensive; likewise, the reverse is true for underperformers. It would seem like common sense, then, to expect that the overpriced stocks would underperform (bringing their valuation back in line) while the underpriced stocks outperform.

Reversals also likely work in part because people expect them to work. If enough investors habitually sell last year's winners and buy last year's losers, that will help move the stocks in exactly the expected directions, making it something of a self-fulfilling anomaly.

6. Days of the Week

Efficient market supporters hate the "days of the week" anomaly because it not only appears to be true, but it also makes no sense. Research has shown that stocks tend to move more on Fridays than Mondays and that there is a bias toward positive market performance on Fridays. It is not a huge discrepancy, but it is a persistent one.2

On a fundamental level, there is no particular reason that this should be true. Some psychological factors could be at work. Perhaps an end-of-week optimism permeates the market as traders and investors look forward to the weekend. Alternatively, perhaps the weekend gives investors a chance to catch up on their reading, stew and fret about the market, and develop pessimism going into Monday.

7. Dogs of the Dow

The Dogs of the Dow are included as an example of the dangers of trading anomalies. The idea behind this theory was basically that investors could beat the market by selecting stocks in the Dow Jones Industrial Average that had certain value attributes.

Investors practiced different versions of the approach, but there were two common approaches. The first is to select the 10 highest-yielding Dow stocks. The second method is to go a step further and take the five stocks from that list with the lowest absolute stock price and hold them for a year.

It is unclear whether there was ever any basis in fact for this approach, as some have suggested that it was a product of data mining. Even if it had once worked, the effect would have been arbitraged away—for instance, by those picking a day or week ahead of the first of the year.

To some extent, this is simply a modified version of the reversal anomaly; the Dow stocks with the highest yields probably were relative underperformers and would be expected to outperform.

The Bottom Line

Attempting to trade anomalies is a risky way to invest. Many anomalies are not even real in the first place, but they are also unpredictable. What's more, they are often a product of large-scale data analysis that looks at portfolios consisting of hundreds of stocks that deliver just a fractional performance advantage.

Challenging the High Dividend Yield Stock Narrative

What if you don’t believe $1 is worth $1?

Larry Swedroe

April 30, 2024

8 Min Read

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Many investors prefer cash dividends, especially those using a cash flow approach to spending. From the perspective of classical financial theory, this behavior is an anomaly. In their 1961 paper, *Dividend Policy, Growth, and the Valuation of Shares*, Merton Miller and Franco Modigliani famously established that dividend policy should be irrelevant to stock returns. As they explained, at least before frictions like trading costs and taxes, investors should be indifferent to $1 in the form of a dividend (causing the stock price to drop by $1) and $1 received by selling shares. This approach must be valid unless you believe $1 isn't worth $1. This theorem has not been challenged since, at least in the academic community.

That is why no asset pricing models include dividends as an explanatory factor in the cross-section of stock returns. The leading models include market beta, size, value, momentum, profitability and investment, but not dividends. Quality (betting against beta) is another factor that has been shown to have a premium that has been persistent, pervasive, robust and implementable. The traits of quality companies are low earnings volatility, high

margins, high asset turnover, low financial leverage, low operating leverage and low stock-specific risk.

Despite not being found to be an explanatory factor, a large, passionate, vocal community of investors strongly favor dividend-paying stocks, partly because they consider dividends as income when they are not. Simply put, income increases your net worth while dividends do not (as the company's value falls by the dividend amount). Instead of being income (except for tax purposes), they are simply a way for companies to return investor capital (versus a share buyback). For taxable investors, it's an inefficient way to return capital as taxes must be paid on the dividend.

With that said, the fact is that high-dividend paying stocks and growing-dividend stocks have outperformed the overall market. That fact helps explain the preference. However, the reason that dividends are not in any asset pricing model is that the research has found that it is not the dividends that matter in explaining returns but the other traits of the dividend payers. For example, high-dividend paying stocks tend to be value stocks, but using price-to-dividends produces the weakest value premium—price to other metrics such as earnings, cash flow and sales all produce higher value premiums.

Latest Research

To investigate if dividends are themselves economically informative or just provide a signal, Yin Chen and Roni Israelov, authors of the study "Income Illusions: Challenging the High Yield Stock Narrative," published in the March 2024 issue of the Journal of Asset Management, split stocks in their eligible universe into high-dividend and low-dividend groups (50% of stocks in each group) by their median dividend yield in the previous year and analyzed the impact of dividends on investment returns under two different settings. In the first setting, they compared the performance of the two other groups and tested if the high-dividend group has historically outperformed the low-dividend group. In the second setting, they applied a dividend-based portfolio adjustment to a few long-only factor portfolios to test the hypothesis that investors can benefit from restricting their selection of factor winners among high-dividend groups. Specifically, they penalized the target weight of low-dividend stocks in the portfolio regardless of their factor scores. If low-dividend stocks predict lower future returns in the factor portfolio, they should expect stronger performance under the new construction.

They analyzed market beta, size, value, profitability, investment (Ken French data library), and momentum and quality (AQR data library). Their sample covered the period January 1964 to December 2021, with data from CRSP and included the top 1,500 U.S. stocks. Here is a summary of their key findings:

The high-dividend portfolio dominated both in return and risk. It realized a 13.8% average annual return with 15.6% volatility. In comparison, the low-dividend portfolio realized lower returns (11.8%) with much higher volatility (21.9%). The higher return and lower volatility resulted in a 3.6% difference in compound annual growth rate. The high-dividend portfolio also had smaller drawdowns during market corrections. Despite the high-dividend stocks' outperformance in the full sample, investment in a long–short portfolio lost close to 1% per year between 2003 and 2021—the last 19 years of the sample. Most positive returns came from the middle 20-year period from 1983 to 2002.

The dividend spread negatively correlated with the market beta (−0.53) and size factors (−0.48), suggesting the high-dividend portfolio contains larger stocks with smaller market betas than those in the low-dividend portfolio. The spread was also positively correlated to the value (0.68), profitability (0.51), betting against beta (quality) factor (0.44) and investment factors (0.60). There was also a small negative correlation with momentum (-0.07). Thus, stocks without dividends tend to be growth stocks with lower profitability and more aggressive investment—stocks with those characteristics have underperformed the market.

	DIV	MKT	SMB	HML	RMW	CMA	UMD	BAB
DIV	1							
MKT	−0.53	1						
SMB	−0.48	0.28	1					
HML	0.68	−0.21	−0.02	1				
RMW	0.51	−0.19	−0.35	0.08	1			
CMA	0.60	−0.37	−0.09	0.67	−0.03	1		
UMD	−0.07	−0.16	−0.06	−0.22	0.08	−0.03	1	
BAB	0.44	−0.08	−0.01	0.31	0.29	0.30	0.19	1

This table reports the correlation among Dividend Spread and uses historical data from 1963 to 2021. The Dividend Spread is defined as the difference between the equal-weight high-dividend portfolios and the equal-weight low-dividend portfolios. Our investment universe is the top 1500 stocks by market capitalization. Each year, stocks are sorted into the high-dividend and low-dividend groups by the median dividend yield in the previous year. The historical data of stocks come from CRSP. The risk-free rate, MKT, SMB, HML, RMW, CMA and UMD return series are from Kenneth R. French Data Library. BAB return series come from the AQR Data Library

Consistent with financial theory and prior research, while the high-dividend group delivered higher returns than the low-dividend group, the outperformance was entirely explained by a set of common quantitative factors—after controlling for value, quality and defensive factors, the excess return of high-dividend over low-dividend turned negative. Compared to the single factor CAPM, the dividend spread portfolio produced a statistically

significant alpha of 4.8% (perhaps explaining its popularity). Against the Fama-French three-factor model, the alpha was still an impressive 2.4%, and the explanatory power almost tripled as the r-squared increased from 0.28 to 0.76. Including momentum had virtually no impact. Including profitability, the r-squared was increased to 0.84 and the alpha was reduced to a statistically insignificant 0.48%. Including all five Fama-French factors further increased the r-squared to 0.86 while turning the alpha to a statistically insignificant negative 0.60%. And, including the betting against the beta factor further reduced the alpha to a statistically significant -1.44%.

	(1)	(2)	(3)	(4)	(5)	(6)
Alpha	4.80%	2.40%	2.50%	0.48%	−0.60%	−1.44%
	[3.58]	[3.06]	[3.09]	[0.68]	[−0.99]	[−2.47]
MKT	−0.41	−0.22	−0.23	−0.21	−0.17	−0.17
	[−16.43]	[−14.56]	[−14.34]	[−16.19]	[−13.15]	[−14.77]
SMB		−0.44	−0.44	−0.33	−0.32	−0.34
		[−20.17]	[−20.16]	[−17.54]	[−17.75]	[−19.97]
HML		0.73	0.73	0.71	0.57	0.55
		[32.34]	[31.1]	[36.63]	[23.36]	[24.89]
UMD			−0.01			
			[−0.47]			
RMW				0.48	0.52	0.44
				[18.8]	[21.16]	[17.83]
CMA					0.33	0.26
					[9.05]	[7.38]
BAB						0.16
						[9.78]
Obs. No.	708	708	708	708	708	708
Adj. R^2	0.28	0.76	0.76	0.84	0.86	0.88

This table reports the coefficient estimates and annualized alpha of regressing the Dividend Spread on a set of common factors using historical data from 1963 to 2021. The Dividend Spread is defined as the difference between the equal-weight high-dividend portfolios and the equal-weight low-dividend portfolios. Our investment universe is the top 1500 stocks by market capitalization. Each year, stocks are sorted into the high-dividend and low-dividend groups by the median dividend yield in the previous year. The historical data of stocks come from CRSP. The risk-free rate, MKT, SMB, HML, RMW, CMA and UMD return series are from Kenneth R. French Data Library. BAB return series comes from the AQR Data Library

Tilting long-only factor portfolios toward high-dividend stocks had, in general, a negative effect on performance—the regression results showed that the dividend spread's outperformance was more than completely explained by a set of well-known factors and investors could have avoided incurring the negative excess returns if they had held a combination of these factors rather than investing in the dividend-based long-short

portfolio. For factors naturally correlated with dividend yield, the additional adjustment had little impact on gross performance but resulted in lower net returns due to the tax burden of dividend incomes (in taxable accounts). The dividend filter was too restrictive for the momentum factor, which is essentially uncorrelated with the dividend yield. This caused a large reduction in implementation efficiency and, hence, investment returns.

Considering the negative tax effect, the dividend-favored portfolios are even less desirable in terms of compound returns.

Exhibit 9 Net returns of factor-tilted portfolios under normal and dividend-favored construction. *Source* Center for Research in Securities Prices, French Data Library, AQR Data Library, Chen and Zimmermann (2022)

	Momentum		Value		Safety		Composite	
	Normal	Dividend Favored	Normal	Dividend Favored	Normal	Dividend Favored	Normal	Dividend Favored
Panel A: Net Return, No Liquidation Tax								
CAGR	11.54%	11.15%	11.53%	11.20%	10.14%	10.24%	11.46%	11.04%
Excess Return	8.31%	7.23%	7.94%	7.37%	5.87%	5.95%	7.23%	6.79%
Volatility	19.4%	15.2%	17.0%	15.5%	11.9%	11.8%	13.2%	12.8%
SR	0.43	0.47	0.47	0.48	0.49	0.50	0.55	0.53
CAGR Loss	−1.71%	−2.04%	−1.61%	−1.78%	−1.43%	−1.65%	−1.71%	−1.81%
Panel B: Net Return, Liquidation Tax								
CAGR	11.35%	10.99%	11.27%	10.96%	9.89%	10.00%	11.23%	10.83%
Excess Return	8.14%	7.09%	7.71%	7.15%	5.64%	5.73%	7.02%	6.60%
Volatility	19.4%	15.3%	17.1%	15.5%	12.0%	11.8%	13.2%	12.8%
SR	0.42	0.46	0.45	0.46	0.47	0.48	0.53	0.52
CAGR Loss	−1.90%	−2.20%	−1.86%	−2.03%	−1.68%	−1.89%	−1.94%	−2.02%

This table reports the after-tax net performance of long-only factor-tilted momentum, value, safety and the composite portfolios using historical data from 1963 to 2021. Our investment universe is the top 1500 stocks by market capitalization. Each year, stocks are sorted into the high-dividend and low-dividend groups by the median dividend yield in the previous year. The normal portfolios are constructed following the steps under section *A Practical Implementation of Factor Portfolios*, whereas the dividend portfolios are constructed in the same way, but with an underweight penalty to stocks in the low-dividend group. We assume both the long-term capital gains and dividends are taxed at 23.8% and the short-term gains are taxed at 40.8%. The transaction cost is assumed to be 6 bps. The signals we use to construct the value portfolio are from Chen and Zimmermann (2022). The historical data of stocks come from CRSP. The risk-free rates are from Kenneth R. French Data Library

Their findings led Chen and Israelov to conclude: “Our analysis suggests that investors who seek to achieve alpha should invest directly in a combination of these factors instead of holding high-dividend stocks.” They added: “All things considered, the dividend yield is just a poor proxy for a value, quality and defensive-based multi-factor strategy. Our analysis demonstrates that active investors should not constrain their portfolios based on dividend yields.”

Chen and Israelov’s findings are consistent with my own research. My February 3, 2023 article for Alpha Architect, “Should investors be indifferent to dividend impact on stock returns?” showed that over the period January 1979 to October 2022, the dividend premium in the U.S. stock market has had a negative alpha against both the Fama–French five-factor model and the Fama-French five-factor model with momentum.

	Russell 3000 Index	Payers	Non-Payers
CAPM			
Intercept	0.00	0.09	-0.15
t-stat (Intercept)	-0.04	2.06	-1.41
R^2	1.00	0.94	0.85
Fama-French 3 Factor			
Intercept	-0.01	0.04	-0.02
t-stat (Intercept)	-0.97	1.28	-0.27
R^2	1.00	0.98	0.94
Fama-French 5 Factor			
Intercept	-0.04	-0.09	0.16
t-stat (Intercept)	-3.77	-4.22	2.25
R^2	1.00	0.99	0.94
Fama-French 5 Factor with Momentum			
Intercept	-0.03	-0.09	0.16
t-stat (Intercept)	-3.08	-3.83	2.27
R^2	1.00	0.99	0.94

Investor Takeaway

Even without considering the negative tax implications of dividend-paying stocks (versus a stock that provides all of its returns in the form of capital gains), investors are better served by directly targeting factor exposures in their portfolio rather than using a dividend screen, which reduces the investable universe significantly, as only about 60% of stocks pay dividends. Thus, investors screening for dividends exclude about 40% of the eligible universe by number and about 20% of the total market capitalization. All else equal (such as factor exposures), by definition, a less diversified portfolio is less efficient.

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The end of the Bretton Woods system and the emergence of freely floating currencies have allowed the existence of systematic investing strategies in the currencies. Those FX strategies are already well-researched and are supported by academic work. Among them, the carry trade strategy is probably the most well-known in the currency market and also probably the most profitable one.
In the past decades, the daily volume in the currency market has increased nearly tenfold. The FX market is currently dominated by large and sophisticated investors. However, the idea of the carry trade strategy is really simple, strategy systematically sells low-interest-rates currencies and buys high-interest rates currencies trying to capture the spread between the rates. Moreover, considering a longer time frame, there is a low correlation between the returns of employing the carry strategy and the returns which could be gained from investing in more traditional asset classes such as equities and bonds. That makes a carry strategy a proven and profitable way how to diversify a portfolio. However, the investor must pay attention to the carry trade strategy's correlation with global financial and exchange rate stability.

Fundamental reason

Overall, in the academic literature, there is a consent that the foreign exchange carries trade anomaly works. For example, Acemoglu, Rogoff, and Woodford in the Carry Trades and Currency Crashes says "A "naive" investment strategy that chases high yields around the world works remarkably well in currency markets. This strategy is typically referred to as the carry trade in foreign exchange, and it has consistently been very profitable over the last three decades."
The academic theory says that according to the uncovered interest rate parity, carry trades should not yield a predictable profit because the difference in interest rates between two countries should be equal to the rate at which investors expect the low-interest-rate currency to rise against the high-interest-rate one. High-interest rate currency often does not fall enough to offset carry trade yield difference between both currencies, because the inflation is lower than that which was expected in the high-interest-rate country.
Additionally, the carry trade trading often weakens the currency that is borrowed, and the reason is simple -> investors convert the borrowed money into other high-yielding currencies. This causes additional price drift. Capturing those gains is possible by a systematic portfolio rebalancing.

The August of Our Discontent: Once More Unto the Breach?

August 7, 2017 - Cliff Asness

Topics - Factor/Style InvestingTrading

The August of Our Discontent: Once More Unto the Breach?

This month is the ten-year anniversary of the "quant crisis" or "quant quake" - that one week period in August 2007 when quantitative equity strategies like factor investing and statistical arbitrage suffered very large losses and then, in the next few weeks, made an almost full recovery. Given the current popularity of factor investing it seems a good time to review what happened that summer and discuss its relevance for today.

Following closely on the heels of the event, in September 2007, I did a write-up of what we thought happened. It took the form of an interview about the crisis with myself where I, with a lot of help from others at AQR, wrote the questions and the answers (I think you may catch me telling myself "that's a very good question"). Re-reading it today I think it holds up pretty well, though maybe it sounds a bit dated in places. So, I won't spend much time here reviewing the actual crisis other than to note that it was a true liquidity crisis, a trading "unwind." It was not some fundamental change. This is likely why it recovered so quickly (liquidity events are often highly temporal while "real" events are usually more lasting). Of course, "highly temporal" events can kill, so that isn't a dismissal, just a definition.

Let's agree that all-else-equal it would be nice to eliminate all strategies with big "left-tails" (i.e., strategies that can suffer statistically shocking down days or weeks.) We would all sleep better. But, all-else-is-not-always-equal. Some of those left-tailed strategies are pretty good. The obvious example is just getting long the stock market and earning the equity risk premium. It has a serious short-term left-tail1 (e.g., October 1987 and August 1998) but also has been a great long-term strategy. To achieve those long-term returns you do have to survive those left-tail events (survival as in staying solvent and invested but also not voluntarily throwing in the towel at the exact wrong time).2

To start, we need to separate the ongoing debate about factor valuations from the question of short-term crash risk. In general, and not just for factors, valuations and short-term crash risk have a tenuous relationship at best.3 Valuations have some predictive power for long horizon factor returns, more so for slower turnover factors (like the market itself and, to a lesser extent, the value factor) than for faster ones.4 But small sample sizes can make long-horizon inferences difficult to make with confidence. Separately, we have also shown that factor valuation today is not very extreme.5 This makes the question of whether valuation-based predictability "works" a pretty theoretical one right now. But, quite separate from valuation and the long-term outlook, because factor investing is so popular today, and the underlying strategies so well-known (at least in their basic forms), I've said as part of this, this, this, and this, that factor investing is now more vulnerable to short-term extreme turbulence (a polite euphemism for a few days of getting its butt absolutely kicked).

This is the crux. Short-term extreme movements are a function of lots of people trying to do the same thing at the same time.6,7 Of course many trying to do the same thing at the same time could itself be triggered by over-valuation. But, again, that link seems historically tenuous at best as value holds sway at the long- not short-term.8 Further, as we discussed back in September of 2007, factor valuations were not extreme going into that August cyclone, and thus weren't the trigger then either. Irrespective of the specific trigger, it's hard to imagine coordinated mass selling of a factor strategy occurring without it being well-known and widely implemented. That seems almost definitional.9 And, the factors were popular back in '07, similar to today.10

So the next question is what can trigger sharp selling of a popular well-known strategy even if it's not very over-priced? Well, lots of things. I won't pretend that predicting such conflagrations is even vaguely a science, and I'd note that we didn't predict the August of 2007 quake nor did anyone else, as far as I know.11 But we can identify a few of those things that can start the fire. For example, it could be something like a banking crisis, an abrupt regulatory change, or a loss of ability to maintain short positions. It could be triggered by poor performance if it's severe and abrupt enough to cause people to drastically reduce their desire to take risk in those strategies. It could particularly happen if there are large and sudden redemptions facilitated by investment terms linked to poor short term performance (for example, a structured product or fund with features that require immediate redemptions based on recent poor performance - we do think this combination contributed to the '07 crash). With all that said, we're still guessing. These are, by definition, rare and wild events. One of the only things we can be fairly certain about is that the next crisis won't be a repeat of the last but they probably will rhyme.

In discussing what might cause sharp selling of factor strategies, it is useful to discuss upfront some of the different ways quantitative factor investing is implemented. Many factor portfolios are still essentially traditional, long-only and implemented without leverage, designed to beat a benchmark by overweighting the stocks preferred by the factor or factors in question. The most famous version here is often called "smart beta" though we've argued before that is mainly a relabeling of something that's been around a great while. At the other end of the spectrum are factor portfolios held in long-short form, possibly long and short similar amounts (i.e., trying to be market-neutral). Removing market exposure from a factor reduces the risk per dollar of exposure and reduces the correlation of that factor with other factors in a portfolio, leading to significantly lower risk per dollar of exposure for the multi-factor portfolio.12 The resulting benefit is a better risk adjusted return but at the cost of being too low risk per dollar to matter much. Leverage

can, and often is, used to make such a market-neutral factor portfolio matter in the investor's overall portfolio. Thus, leverage is quite useful, but it also can be a new danger.

While we don't think anyone can reliably forecast specific events, we are more confident about what conditions make these liquidations more likely and, if they do occur, more severe. These speculations ultimately come down to who is betting on the factors and how (in what structures and with what rules - one example discussed above being structured products with specific forced redemption rules). For instance, it seems obvious that the higher the fraction of factor investors that use leverage, and the more leverage they use, the bigger the chance of another August 2007. In an unleveraged investment there are two people who can panic sell at the wrong time, the asset manager and the client. In a leveraged investment there is often a third interested party - the lender (who can often bring great pressure to bear.) On this front we take some comfort in noting that in 2017 versus 2007 it appears that far more of the factor world13 pursues these strategies without leverage (e.g., we think "smart beta" is the biggest area of growth and that is just very simple long-only, unlevered factor-based investing).14 It also seems clear that those using leverage are far more conservative (conservative = less leverage) than in 2007.15,16 All-in-all this is not an "all clear" by any means. But the factor investing world, at least in terms of the fraction of assets using leverage and, we'd guess more importantly, the actual amount of leverage employed where it's used at all, is more conservative than in 2007.17,18,19,20

An unheralded fact of the quant crisis of '07 was that from peak to trough of the factor drawdown, the S&P 500 was flat to up a bit.21,22 That is, even while losing big, quant factors were market-neutral during the quake. The overall market's lack of interest or reaction to the quant crisis in 2007 is important. It would be an interesting contest, and perhaps a future blog topic, to come up with the single biggest common investment error out there.23 But one candidate would surely be over-worrying about parts of your portfolio and not focusing on the whole. Granted sticking with a levered market-neutral quantitative factor investment process would be quite difficult through the '07 quake if that was 100% of your portfolio. But difficult at a 20% allocation? At 10%? At 5%? Sizing exposures such that you can stick with your investments through their worst times is a big part of long-term success. Conversely, sizing your investments such that you're near guaranteed to abandon them during really tough times is a recipe for near certain failure. I would wager that had they kept an overall portfolio perspective, few quant investors (outside of the all-quant firms themselves) were suffering enough to have had to take action at even the depths of 2007. But many might have panicked by viewing just their quant/factor sleeve in isolation - perhaps a lesson for next time (if there is a next time!).24

Another related difference between today and 2007, this one making now a scarier time, is that the financial media coverage and interest in factor investing is much higher than in 2007. That's pretty much a tautology with "more popular and more widely known." Again, August of 2007 went by relatively unnoticed outside of the quant world. I don't think that would be the case this time, even if markets as a whole are unaffected. In this case, the revolution will be televised. What kind of feedback loop that creates is a wild card I do worry about as, anecdotally, people seem to act less rationally the more headlines a topic garners.25

So, where does that leave us, the community of factor investors? I like to compare today to nearly thirty years ago when I first was introduced to and started studying value and momentum strategies. Well, since then, we have near thirty years of out-of-sample evidence that they work.26 ,27 This includes testing them in a whole lot of other places (geographies and asset classes) and times. We've added a few more good factors to the mix, but by no means have we populated a "zoo."28 And today, we even can invest in these factors at historically fairly normal pricing, for the most part.29 What we definitely do not have is an informational monopoly on them that protects us from the actions of other competing, or fleeing, capital. Unlike thirty years ago it's more likely that our short-term returns can be buffeted by the actions of other factor investors.30 This prospect is not just theoretical as we saw it happen, big time, ten years ago. To state the remarkably obvious, something that has happened before can happen again. In fact, I'd say it is likely to happen again at some time (hopefully, long after I'm gone).31 This is far from unique to factor investing - there isn't a widely known liquid investment strategy that isn't subject to the left tail of other investors' short-term actions.32 The stock market itself is, once again, the primary example of this fact.

So, what do we do with very good (imho!), but, as of today, widely-known strategies? We think, not shocking I know, you should still allocate to them but do so conscious of their known left tail. Investing while in denial of real possibilities is never a good strategy. But, you're not dissuaded from allocating to an S&P 500 index portfolio because a -10%, -20%, or worse day or week is possible, are you?33 Rather, you do know that can happen and plan for it, right?34 We think investors should collectively educate themselves about this possibility to minimize panic and maximize rationality should it happen. We think we should all structure our investments specifically thinking about these events, knowing this is part science and part art, to survive and even be able to take advantage of them. But, ultimately, if we believe these factors are real and priced reasonably (particularly in a world where many investments, like traditional stock and bond markets, are quite expensive), we should invest in them. We should just do it with open eyes and a plan.

Time for some final summary advice. Long-term investors who are pursuing unlevered factor tilts versus indices (this includes "smart beta") should steel themselves to ignore some possible short-term periods of large relative return differences vs. their benchmarks. Long-term investors pursuing market-neutral leveraged strategies should similarly steel themselves, but in this case for absolute (not versus benchmark) suffering. These investors in particular should think hard about August of 2007 and future similar possibilities when designing their portfolios and deciding how much to allocate to them. Finally, short-term investors unprepared for any such turbulence should eschew these factors and, instead, find a set of great strategies only they know about with thirty years of out-of-sample tests (and out-of-sample not just in time, but also in geography and asset class), with only a vanishingly small possibility of short-term crashes (as they are their secret), and yet are still reasonably priced today. Good luck with that!

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The Black-Scholes Hedging Strategy
and Its Variations

Fischer Black and Myron Scholes made famous dynamic hedging. The basic element of this strategy is the creation of a portfolio containing stocks along with written call options for that stock. When the ratio of stocks to written calls is in the proper ratio the value of the portfolio is independent of infinitesimal fluctuations in the price of the stock.

Let S be the current price of the stock and C the price of a call option on that stock with an exercise price of X and with a duration T for the stock and let r be the risk-free interest rate and σ the volatility of the stock price. Furthermore let h be the hedge ratio and V the value of the portfolio. If N is the number of shares of stock in the portfolio and M is the number of written calls then:

$$V = NS - MC$$
$$V = MhS - MC$$
$$V/M = hS - C.$$

When the stock price changes by an amount dS the price of the call changes by an amount dC. The change in the value of the portfolio is

dV = MhdS - MdC
if dV is to be zero then h must be such that
hdS - dC =0
h = ∂C/∂S,
this is called the *delta* of the call option.

Thus the proper hedge ratio for the portfolio is the delta of the option.

Consider a stock with a price of $100 and a volatility of 0.2. When the risk-free interest rate is 10% (0.1) the price of a one-year call with an exercise price of $100 based upon the Black-Scholes formula is $12.993.

If the stock price were to go to $110.50 the price of the call would go to 13.354 whereas if the stock price fell to $99.50 the call price would fall to $12.636. The difference of these two call price is approximately the delta of the call option at a stock price of $100.00; i.e., δ = 0.718.

Suppose an investor wanted to create a hedged portfolio involving 1000 written call options. The payment the investor would receive would be $12,993. Since the hedge ratio is).718 the investor would want to buy 718 shares of stock at $100 per share. This would require an outlay of $71,800. Since $12,993 is covered from the payment received for the written calls the investor would have to contribute an additional $58,807 for the portfolio. The value of the portfolio is $58,807 because $12,993 of the $71,800 in stock is offset by the negative value of the written calls.

Consider now what happens to the value of the portfolio if the stock price moves up to $100.50. The negative value of the written calls increases from $12,993 to $13,354. The value of the shares held increases from $71,800 to $72,159, an increase of $359. The increased cost of the written calls is $361, almost exactly offset by the increase $259 in the value of the stock.

If the stock price moves down to $99.50 there is a loss in the value of the stock of $359 but since the call price decrease to $12.636 the cost of the written calls has falled by $357, almost exactly offsetting the decrease in stock value.

Although the portfolio is perfectly hedged against small changes in stock price this is not true for large price changes. For example, suppose the price of the stock falls from $100 to $0. The value of the stock in the portfolio goes to zero. The price of a call goes down to essentially zero also so the portfolio has a value of zero, a drop from $58,807. So a price decrease of $100 produces a loss of $58,807.

On the other hand consider an increase of $100 to stock price of $200 per share. The value of the stock in the portfolio doubles from $71,800 to $143,600 but the price of the call rises to $109.091 and the cost of the written calls is $109,091 which leaves a net value of the portfolio of $34,509, a drop of $24,298 from its original $58,807 value. Thus portfolios that are perfectly hedged against small changes in stock price are vulnerable to losses from large increase or decreases in stock price.

An interest variation in the Black-Scholes hedging can be created by selling stock short and buy call options. The above number can be used to illustrate this strategies. Suppose the stock is sold short at $100 a share and the investor buys 1000 call options. In order to maintain a hedge ratio of 0.718 the investor would sell short 718 shares. The cash in the portfolio would be $71,800 from the short sale which would counterbalance the shares owed from the short sale. The investor would have to contribute $12,993 that the 1000 call options cost. The net value would then be $0. Now consider the consequences of a small increase in the stock price to $100.50. The cost of owed shares is increased by $359, but the value of the owned calls increases by $361 just about exactly offsetting the increased cost of satisfying the short sales. On the other hand if the stock price decreases to $99.50 the cost of the short sales decrease by $359 and the value of the owned calls decreases by (12,993-12,636)=$357, the two changes essentially offsetting one another.

If the stock price fell to zero there would be no cost for satisfying the short sales. Other other hand the value of the owned calls also falls to zero. But the portfolio has cash equal to the proceeds of the short sale of $71,800 so the gain in the value of the portfolio is $71,800. On the other hand if the price of the stock went to $200 per share then the cost of satisfying the short sales rises from the original $71,800 to $143,600. However the value of the owned calls increases to $109,091. Thus the value of the portfolio is $71,800 in cash minus $143,600 for the shares owed plus $109,091 from the owned calls for a net value of $37,291. This is a gain of $37,291 from the original $0 net value. Thus this hedged portfolio of short sales combined with call options is protected against changes in value due to small changes in prices but it functions like a straddle with respect of large increases or decreases in prices. This is an interest contrast with the standard Black-Scholes hedged portfolio that loses money with large price changes.

Put Hedged Portfolio

Consider a portfolio made up of shares and put options. Let N be the number of shares and M the number of put options. The value of a put option is denoted as P. Then the value of the portfolio is:

V = NS + MP
so a change in stock price of dS results in
dV = NdS + MdP.

If dV is to be zero then the hedge ratio h must be equal to to the negative of ∂P/∂S, the delta of the put option. Since the delta of a put option is negative the negative of a negative produces a positive hedge ratio. For the stock consider in the example involving written call options the value of a put for an exercise price of $100 is $3.92 and the delta of the put option at that price is 0.282. The reader will note that this is the complement of the delta for the call option; i.e. $\delta_{put} = 1.0 - \delta_{call}$. This follows from the put-call parity formula P = C +PVX - S since differentiation with respect to S gives:

∂P/∂S = ∂C/∂S - 1
so
- ∂P/∂S = 1 - ∂C/∂S

Suppose an investor buys 1000 put options. For a hedge ratio of 0.282 the investor would buy 282 shares of stock. The cost of the stock would be $28,200 and the 1000 put options $3902 for a total portfolio value of $32,102.

Suppose now that the stock price increases to $100.50. There would be a gain of $141 in stock value but since the value of a put goes down to $3.763 there would be a loss of $139 in the value of the puts. The two changes just about exactly offset one another. If the stock price falls to $99.50 there would be a loss of $141 in stock value but the value of a put increases to $4.045 and therefore there is a gain in put value of $143 which essentially offsets the loss in stock value.

For a large change in price, say from $100 to $0, the loss in stock value is $28,200 but the gain in put value is from $3,902 to $90,909, a gain of $87,007 for a net gain in portfolio value of 58,807. On the other hand if the share price increases to $200 the value of the stock doubles to $56,400 but the value of the puts goes down to $0. The value of the portfolio has increased from $32,102 to $56,400 for a net increase of $24,298. So large price changes bring substantial increases in the value of the portfolio.

A mirror image portfolio involving the short sale of stock with the sale of written puts would, with the right hedge ratio, be insulated against small price changes but large price changes would produce losses in portfolio value.

A Hedged Portfolio Without Stock Shares

Synthetic shares and short sales can be created with combinations of puts, calls and interest-earning bank accounts. The combination of one written put with exercise price X with one call with the same exercise price along with a bank account having a value of X on expiration day is equivalent to a share. Suppose this synthetic share is substituted for a share in a Black-Scholes hedged portfolio. If N is the number of synthetic shares, M the number of written calls then

V = N(C - P + (pvX)) - MC = (N-M)C - NP + NpvX)
and
N/M = h = ∂C/∂S.

The portfolio matching the first example would involve 1000 written calls with 718 synthetic shares which consist of 718 written puts and 718 owned calls. The net number of written calls would be 282 so the portfolio would consist of a bank account with a value equal to the exercise price of the put options on expiration day; i.e., $71,800. The payment received for the 718 written puts would be $2,802 and $3,664 for the 282 written calls. Therefore the portfolio would be roughly $78 thousand in bank accounts and 718 written puts and 282 written calls for a net value of $71,800.

If the price of the stock were to go to $100.50 the cost of the written puts would go to $2,702 a decrease of $100. The value of the written calls would go to $3,766 an increase of $102, an almost exact offset for the change in the value of the puts. Similarly a decrease in stock price brings a nearly exact offset and no net change in the value of the portfolio.

For a large price increase to $200 per share the effects are that the value of the puts go to zero and the value of the calls goes to $30,764 on the negative side because the calls are written calls. This means the cost of the written calls to the investor increased from $3,664 to $30,764, a loss for the portfolio holder of $27,100. This is only partially offset by the decline in the cost of the written puts from $2,802 to 0. The net loss on the portfolio as a result of the stock price increase is $24,298.

Likewise if the price of the stock fell by $100 to $0 the cost of the written put options would go to $65,273 and there would only be a $3,664 gain when the cost of the written calls went to zero. Thus the loss would be $61,609.

The mirror image portfolio would involve buying calls and puts. In the proper ratio this portfolio would be insulated against small price fluctuations but would gain from large price changes in either directions. This is a form of a straddle. By the put-call parity formula:

S = C - P + PVX.

Portfolio insurance

1 language

- Article
- Talk
- Read
- Edit
- View history

Tools

Appearance

hide

Text

Small

Standard

Large

Width

-

Standard

Wide

Color (beta)

-

Automatic

Light

Dark

From Wikipedia, the free encyclopedia

Portfolio insurance is a hedging strategy developed to limit the losses an investor might face from a declining index of stocks without having to sell the stocks themselves.[1] The technique was pioneered by Hayne Leland and Mark Rubinstein in 1976. Since its inception, the portfolio insurance strategy has been dubiously marketed as a *product* (similar to an insurance policy).[2] However, this is a misnomer as it is not a policy and there is no insurer of last resort.

This strategy involves selling futures of a stock index during periods of price declines. The proceeds from the sale of the futures help to offset paper losses of the owned portfolio.[3] This is similar to buying a put option in that it allows an investor to preserve upside gains but limits downside risk.[1] Portfolio insurance is most commonly used by institutional investors when the market direction is uncertain or volatile.

In practice, a portfolio insurance strategy uses computer-based models to analyze an optimal level of stock-to-cash ratios in various stock market conditions. Though the number of owned shares could stay the same, the total portfolio value changes with the market. As the market drops, a portfolio insurer would increase cash levels by *selling* index futures, maintaining the target ratio. Conversely, the same portfolio insurer might *buy* index futures when stock values *rise*. This combination of buying and selling of index futures is done in an effort to maintain the proper stock-to-cash ratio demanded by the portfolio insurance model or strategy.[4]

Contribution to the 1987 Stock Market Crash

[edit]

Both portfolio insurance and index arbitrage are commonly cited as two types of computer program trading which contributed to the stock market crash of October 19, 1987, also known as Black Monday.[5]

Though there is no debate that these two programs played a role in the crash, there seems to have been at least some debate as to the magnitude of their influence.[1] Later analysis that year by a Committee of Inquiry under the Chicago Mercantile Exchange brought forth supporting evidence that the market selloff was more heavily influenced by larger forces such as mutual funds, broker-dealers, and individual shareholders.[6]

Portfolio insurance has been roundly criticized over time as having been oversold in terms of its ability to protect the investor deploying it as a protection strategy. In its Preliminary Report, the Committee of Inquiry for the Chicago Mercantile Exchange outlined its criticism[2]:

"[S]ome members of the Committee believe that the purveyors of so-called "dynamic hedging" oversold these programs by marketing them as "insurance." There is no reason to believe, however, that the use of portfolio insurance will diminish now that the limitations of the insurance concept have been demonstrated."

In August of 2019, CNBC's Jim Cramer criticized portfolio insurance and the role it played during the 1987 crash.[

Statistical Arbitrage: Definition, How It Works, and Example

By

James Chen

Updated April 30, 2021

Reviewed by

Somer Anderson

seksan Mongkhonkhamsao / Getty Images

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7 Reasons You Haven't Received Your Tax Refund

Close

What Is Statistical Arbitrage?

In the world of finance, statistical arbitrage (or stat arb) refers to a group of trading strategies that utilize mean reversion analyses to invest in diverse portfolios of up to thousands of securities for a very short period of time, often only a few seconds but up to multiple days.

Known as a deeply quantitative, analytical approach to trading, stat arb aims to reduce exposure to beta as much as possible across two phases: "scoring" provides a ranking to each available stock according to investment desirability, and "risk reduction" combines desirable stocks into a specifically-designed portfolio aiming to lower risk. Investors typically identify arbitrage situations through mathematical modeling techniques.

Key Takeaways

- Statistical arbitrage is a group of trading strategies employing large, diverse portfolios that are traded on a very short-term basis.
- This type of trading strategy assigns stocks a desirability ranking and then constructs a portfolio to reduce risk as much as possible.
- Statistical arbitrage is heavily reliant on computer models and analysis and is known as one of the most rigorous approaches to investing.

Understanding Statistical Arbitrage

Statistical arbitrage strategies are market neutral because they involve opening both a long position and short position simultaneously to take advantage of inefficient pricing in correlated securities. For example, if a fund manager believes Coca-Cola is undervalued and Pepsi is overvalued, they would open a long position in Coca-Cola, and at the same time, open a short position in Pepsi. Investors often refer to statistical arbitrage as "pairs trading."

Statistical arbitrage is not strictly limited to two securities. Investors can apply the concept to a group of correlated securities. Also, just because two stocks operate in different

industries does not mean they cannot be correlated. For example, Citigroup, a banking stock, and Harley Davidson, a consumer cyclical stock, often have periods of high correlation.

Risks of Statistical Arbitrage

Statistical arbitrage is not without risk. It depends heavily on the ability of market prices to return to a historical or predicted normal, commonly referred to as mean reversion. However, two stocks that operate in the same industry can remain uncorrelated for a significant amount of time due to both micro and macro factors.

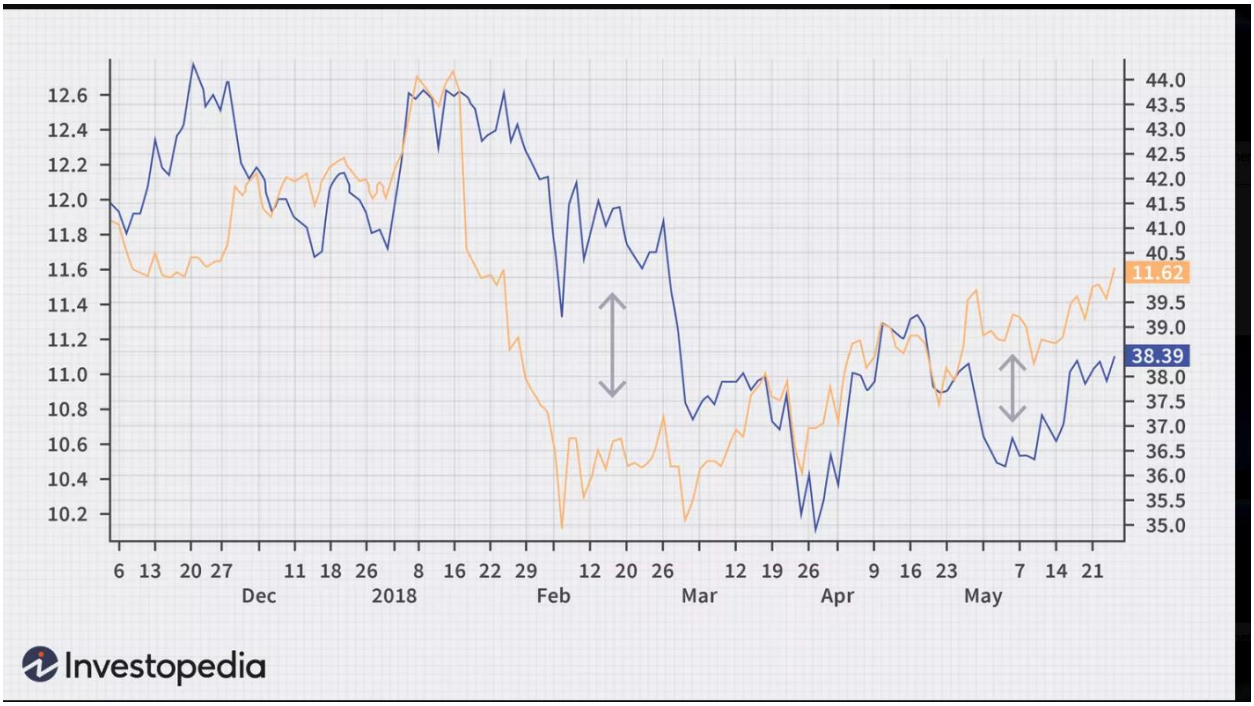
For this reason, most statistical arbitrage strategies take advantage of high-frequency trading (HFT) algorithms to exploit tiny inefficiencies that often last for a matter of milliseconds. Large positions in both stocks are needed to generate sufficient profits from such minuscule price movements. This adds additional risk to statistical arbitrage strategies, although options can be used to help mitigate some of the risk.

Simplifying Statistical Arbitrage Strategies

Trying to understand the math behind a statistical arbitrage strategy can be overwhelming. Fortunately, there is a more straightforward way to get started utilizing the basic concept. Investors can find two securities that are traditionally correlated, such as General Motors (GM) and Ford Motor Company (F), and then compare the two stocks by overlaying them on a price chart.

The chart below compares these two automakers. Investors can enter a trade when the two stocks get substantially out of sync with each other, such as in mid-February and in early May. For instance, traders would consider buying Ford in February and selling it in May in anticipation of its share price realigning with General Motor's share price. However, there is no guarantee of when the two prices will re-converge; therefore, investors should always consider using stop-loss orders when employing this strategy.

Image by Sabrina Jiang © Investopedia 2021



Pairs Trading for Beginners: Correlation, Cointegration, Examples, and Strategy Steps

Mean Reversion & Statistical Arbitrage

Aug 29, 2022 11 min read

By Chainika Thakar

A pairs trading strategy is one of the most popular strategies when it comes to finding trading opportunities between the two stocks that are co-integrated.

How do the stocks co-integrate? How to take advantage of their co-integration with a pairs trading strategy? This blog discusses it all as it covers:

- What is pairs trading?

What is pairs trading?

In a pairs trading strategy, usually, a pair of stocks is traded in a market-neutral strategy, i.e. it doesn't matter whether the market is trending upwards or downwards, the two open positions for each stock hedge against each other. The key challenges in pairs trading are to:

- Select a pair which will give you good statistical arbitrage opportunities over time
- Select the entry/exit points

Moreover, you can check out this informative video below to find out how pairs trading works.

History of pairs trading

Pairs trading was first introduced in the mid-1980s by a group of technical analyst researchers that were employed by Morgan Stanley. The pairs trading strategy uses statistical and technical analysis to seek out potential market-neutral profits.

Use ADF Test to find pairs to trade

10 min read

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What is the logic behind pairs trading?

In the case of a pairs trading strategy, the two stocks or the financial instruments need to be trending at a similar mean price and remain close to each other. But, on certain occasions, one of the instruments may go through a short period of deviation from another in terms of price.

In this short period, the trader can take the opportunity to go long on one of the financial instruments while shorting the other. The positions are based on the current market price of both the stocks and their standard deviation.

Essential terms used in pairs trading

Some of the essential terms that are used in pairs trading strategy are-

Correlation

Correlation is quantified by the correlation coefficient ρ, which ranges from -1 to +1. The correlation coefficient indicates the degree of correlation between the two variables.

The value of +1 means there exists a perfect positive correlation between the two variables, -1 means there is a perfect negative correlation and 0 means there is no correlation.

A perfect positive correlation is when one variable moves in either an upward or downward direction and the other variable also moves in the same direction with the same magnitude.

Whereas a perfect negative correlation is when one variable moves in the upward direction and the other variable moves in the downward (i.e. opposite) direction with the same magnitude.

The correlation coefficient for the two variables is given by:

Correlation(X,Y) = ρ = COV(X,Y) / SD(X).SD(Y)

where,
cov (X, Y) = the covariance between X & Y
SD (X) and SD(Y) = the standard deviation of the respective variables

If the correlation is high, say 0.8, traders may choose that pair for pairs trading. This high number represents a strong relationship between the two stocks. So if A goes up, the chances of B going up are also quite high.

Based on this assumption a market neutral strategy is played where A is bought and B is sold; bought and sold decisions are made based on their individual patterns.

Just looking at correlation might give you spurious results. For instance, if your pairs trading strategy is based on the spread between the prices of the two stocks, it is possible that the prices of the two stocks keep on increasing without ever mean-reverting.

Statistical Arbitrage: from A to Z

8 min read

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Spread = log(a) – nlog(b)

where 'a' and 'b' = prices of stocks A and B respectively

For each stock of A bought, you have sold n number of stocks of B.

Now, both 'a' and 'b' increase in such a way that the value of the spread decreases. This will result in a loss since stock A is increasing at a rate lower than stock B and you are short on stock B.

Thus, one should be careful of using only correlation for determining the pairs of the stocks while performing the pairs trading strategy.

Cointegration

The most common test for Pairs Trading is the cointegration test. Cointegration is a statistical property of two or more time-series variables which indicates if a linear combination of the variables is stationary.

Let us understand the statement above. The two time series variables, in this case, are the log of prices of stocks A and B. Linear combination of these variables can be a linear equation defining the spread:

As you know,

Spread = log(a) – nlog(b)

where 'a' and 'b' are prices of stocks A and B respectively.

For each stock of A bought, you have sold n stocks of B.

If A and B are cointegrated, the equation above is stationary. A stationary process has very valuable features which are required to model pairs trading strategies.

For instance, in this case, if the equation above is stationary, that suggests that the mean and variance of this equation remain constant over time.

So if we start with 'n', which is called the hedge ratio, so that spread = 0, the property of stationary implies that the expected value of spread will remain as 0. Any deviation from this expected value is a case for statistical abnormality, hence a case for pairs trading!

Z-score

Given a normal distribution of raw data points, the z-score is calculated so that the new distribution is a normal distribution with a mean of 0 and a standard deviation of 1. Having such a distribution ~ N(0, 1) is very useful for creating threshold levels.

For instance, in pairs trading, we have a distribution of spread between the prices of stocks A and B. We can convert these raw scores of spread into z-scores as explained below.

This new distribution will have a mean of 0 and a standard deviation of 1. It is easy to create threshold levels for this distribution such as 1.5 sigma, 2 sigma, 2.5 sigma, and so on.

The formula for z-score is as follows:

z = (x – mean) / standard deviation

where,
x = a raw data point
z = the z-score

Mean and standard deviation can be rolling statistics for a period of ‘t’ days or minutes or time intervals.

A must-watch video, that discusses Mean Reversion and Z-score, mean reversion principles which suggests that prices tend to move around the historical mean over time and z-scores can be used to identify the deviation from the mean and generate the appropriate trading signals.

Use ADF Test to find pairs to trade

10 min read

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Augmented Dickey Fuller Test

The augmented Dickey-Fuller test is an extension of the standard Dickey-Fuller test, which also checks for both stationarity and non-stationarity in the time series.

The main difference from the Dickey Fuller Test is that the Augmented Dickey Fuller test can also be applied to a large sized set of time series models. The large sized time series models can be more complicated and hence, the DF test was modified into the ADF Test. Also, the ADF Test works on the data with missing values.

Steps for pairs trading

Select stocks for pairs trading

For the pair of stocks to be traded in a pairs trading strategy, it is required that the time series is stationary. A stationary time series makes effective and precise predictions.

Also, a stationary time series means that the pair of stocks is co-integrated and can be traded together by generating trading signals. Hence, stocks are needed to be selected for performing the pairs trading.

Understanding Stationary Time Series is key to selecting the right stocks for pairs trading. When time series are stationary, they allow for accurate predictions and ensure the stocks

are co-integrated, making them ideal for generating reliable trading signals. Explore further to discover how this concept can enhance your pairs trading strategy.

For any pair of stocks, define the spread as below:

Spread = log(a) – nlog(b)

where ‘a’ and ‘b’ are prices of stocks A and B respectively.

Assumption: n, the hedge ratio is constant.

Calculate ‘n’ using regression so that spread is as close to 0 as possible. Hence, we regress the stock prices to calculate the hedge ratio.

Theory: In regression, we get a term called the residuals which represents the distance of observed value from the curve fitting line or estimated value. These residuals tell us how much the actual value of ‘spread’ deviates from 0 for the calculated ‘n’.

These residuals are studied so that we understand whether or not they form a trend. If they do not form a trend, that means the spread moves around 0 randomly and is stationary.

Run the Dicky Fuller test on the spread values inserting the value of ‘n’.

The Dickey Fuller test is a hypothesis test which gives a p-value as the result. If this value is less than 0.05 or 0.01, we can say with 95% or 99% confidence that the signal is stationary and we can choose this pair.

So far, we have discussed the challenges and statistics involved in selecting a pair of stocks for statistical arbitrage. By using the cointegration tests, we can say within a certain level of a confidence interval that the spread between the two stocks is a stationary signal. In other words, this signal is mean-reverting. The spread is defined as:

Spread = log(a) – nlog(b), where ‘a’ and ‘b’ are prices of stocks A and B respectively. For each stock of A bought, you have sold n stocks of B. n is calculated by regressing prices of stocks A and B.

Having already established that the equation above is mean reverting, we now need to identify the extreme points or threshold levels that when crossed by this signal, trigger trading orders for pairs trading.

To be able to identify these threshold levels, a statistical construct called z-score is widely used in pairs trading.

Statistical Arbitrage: from A to Z

8 min read

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Entry points

Let us denote the Spread as ‘s’. Thus,

Spread = s = log(a) – nlog(b)

Calculate z-score of ‘s’, using rolling mean and standard deviation for a time period of ‘t’ intervals. Save this as ‘z’.

Define threshold as anything between 1.5-sigma and 2-sigma. This parameter will change as per the backtesting results without risking overfitting data.

When z-score crosses an upper threshold, go SHORT:
Sell stock A
Buy stock B

When the z-score crosses the lower threshold, go LONG:
Buy stock A
Sell stock B

Maintain the hedge ratio to calculate the stock quantity.

We have now understood entry points in pairs trading. Now we will move on to the other end, exit points.

Defining Exit points

Stop loss

Stop loss is defined for scenarios when the expected outcome does not occur. For instance, if we chose entry signals at 2-sigma, we are expecting that the spread will revert back to the mean from this threshold. However, it is possible that the spread continues to blow up.

Say it reaches 2.5-sigma and you incurred losses. To prevent further losses, you place stop loss at say 3-sigma.

In addition to placing a predefined stop-loss criterion such as 3-sigma or extreme variation from the mean, you can check on the cointegration value. If the cointegration is broken

while the pair is ON, the strategy warrants cutting the positions since the basic hypothesis is nullified.

Take profit

It is defined as scenarios where you take profit before the prices move in the other direction. For instance, say you are LONG on the spread, that is, you have bought stock A and sold stock B as per the definition of spread in the article.

The expectation is that spread will revert back to the mean or 0. In a profitable situation, the mean would be approaching zero or very close to it. You can keep the take profit scenario as when the mean crosses zero for the first time after reverting from the threshold levels.

Use ADF Test to find pairs to trade

10 min read

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There can be many ways of defining take profits depending on your risk appetite and backtesting results.

What often works is your experience and a broad range of potent skill sets that allow you to grasp a hold of the complete scenario before jumping to conclusions. As we mentioned, your appetite for risk and backtesting results will work for you. Automation and practical applications are the keys here.

Let us take a recap of what we have understood so far. Pairs Trading is a trading strategy that matches a long position in one stock/asset with an offsetting position in another stock/asset that is statistically related. Pairs Trading can be called a mean reversion strategy where we bet that the prices will revert to their historical trends.

Pairs trading strategy

The first and foremost step of creating a pairs trading strategy is the co-integration of the pair. Once the pair of stocks is co-integrated, they can be considered for the pairs trading strategy. For finding out the co-integration, Augmented-Dickey Fuller Test is used.

In order to do the pairs trading, you must devise a trading strategy . Before implementing the strategy in the live market, you must observe all the parameters of the strategy such as maximum drawdown, the average positive trades, negative trades, the profit and loss, etc.

Advantages of pairs trading

The advantages of pairs trading are as under:

Mitigate Potential Losses and Risks

When the pairs trading strategy performs as per the trader's expectations, the potential losses are mitigated. It also helps in the mitigation of risks as the pairs strategy involves dealing with two securities so if one is underperforming then there are chances that the other absorbs the losses.

Good returns

Pairs trading strategy helps the trader to get good returns regardless of the conditions of the market. Hence, in the pair trading strategy, the traders earn good returns since the trader takes the opportunity when one of the stocks' price deviates from the mean.

Hedging

The best advantage of pairs trading is that the trader is completely hedged. Hedging is done in this strategy as the trader sells the overvalued security and purchases the undervalued security, thereby, limiting the chances of loss.

Use ADF Test to find pairs to trade

10 min read

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Disadvantages of pairs trading

The disadvantages of pairs trading are:

Reliance of the High Statistical Correlation

Pairs trading relies on the securities having a high statistical correlation. Most of the traders require a correlation of at least 0.80 which is very challenging to recognize.

High Commission

Some traders highly discourage pairs trading because of its higher commission charges. Sometimes even a single Pair trade requires a Pair trader to pay a commission which is nearly double the amount of the commission required in the standard trade.

Price Filling

The generation of profits in pairs trading involves relying on margins that are too less. The transactions are made in large quantities which shows the risk of filling the stock orders at the desired price when positions are open in a pair trading is high. Even a small difference in the purchase price or sale price of the security can prove significant as the volume of transactions is high.

Now that you have a better understanding of Pairs Trading. You can also learn more about Mean Reversion Trading Strategies to use market data and statistical concepts, here is a brief video. A must-do for all quant traders.

Conclusion

Pairs trading is a trading strategy that is based on the assumption that the highly correlated securities will come back to their neutral position after any divergence. This strategy can be incorporated into any kind of trading and in any market such as stocks, forex etc. It is extremely important that the evaluation of the correlation must be made carefully as any wrong assumption or prediction may result in the failure of the pairs trading strategy.

If you are a beginner and wish to explore more about pairs trading strategy, then you must get started with this learning track on mean reversion strategies which is apt for pairs trading as a beginner. It offers you several courses and helps develop proficiency in it.

Pairs trading and outranking: The multi-step-ahead forecasting case

Author links open overlay panelNicolas Huck [1]

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Abstract

Pairs trading is a popular speculation strategy. Several implementation methods are proposed in the literature: they can be based on a distance criterion or on co-integration. This article extends previous research in another direction: the combination of forecasting techniques (Neural Networks) and multi-criteria decision making methods (Electre III). The key contribution of this paper is the introduction of multi-step-ahead forecasts. It leads to major changes in the trading system and raises new empirical and methodological questions. The results of an application based on S&P 100 Index stocks are promising: this methodology could be a powerful tool for pairs selection in a highly non-linear environment.

Introduction

Pairs trading is one of Wall Street's quantitative methods of speculation which dates back to the mid-1980s. At this time, the first automated trading systems were developed by Nunzio Tartaglia, a Wall Street quantitative analyst at Morgan Stanley, and his group of mathematicians, physicists and computer scientists. Pairs trading was one of the key features of these systems. They generated hundreds of millions of dollars in profit until 1989 when the group disbanded. As underlined by Engelberg et al. (2008), financial economists have long been interested in understanding the profitability underlying various forms of statistical arbitrage because it is a way to question market efficiency and the behaviour of stock prices.

In its most common form, pairs trading involves forming a portfolio of two related stocks whose relative pricing departs from its "equilibrium" state. It is linked to co-integration (Bossaerts, 1988) and correlation in stock prices, mean reversion (DeBondt and Thaler, 1985), contrarian strategies (Jegadeesh and Titman, 1993) and also to the law of the one price. Pairs trading is one way to select and build stocks for a long/short dollar neutral portfolio. In reality, even such strategies require some outlay, if only to meet margin calls and brokerage fees.

By going long on the relatively undervalued stock and short on the relatively overvalued stock, a profit may be made by unwinding the position upon "convergence" of the spread. The success of pairs trading, especially statistical arbitrages, depends heavily on the modelling and forecasting of the spread time series. The ability to anticipate the "direction" of this spread is a key point. As observed in Leitch and Tanner (1995), the ability to forecast direction is essential for the success of trading strategies.

Whilst the strategy appears simple and has, in fact, been widely implemented by traders and hedge funds, owing to the proprietary nature of the area there has been a limited amount of published research until a recent burst of interest in the last few years. This includes several books on the subject (Erhman, 2006, Whistler, 2004). The key points of the empirical studies dealing with pairs trading are as follows: these strategies exhibit, at least according to the first studies, large and significant risk-adjusted returns which are not due exclusively to a short-term reversion phenomenon. The literature can be divided into three main categories according to the methodology they discussed to select and trade pairs:

- •

The distance approach.

- •

The modelling of mean reversion.

- •

Combined forecasts and Multi-Criteria Decision Methods (MCDM).

The first category of papers includes Andrade et al., 2005, Gatev et al., 1999, Gatev et al., 2006, Engelberg et al., 2008, Papadakis and Wisocky, 2008, Do and Faff, 2008.

The Gatev et al., 1999, Gatev et al., 2006 papers are the most cited papers on pairs trading. Like many traders, they envision a simple algorithm for choosing pairs. The rule follows the general outline of first “find stocks that move together” then “take a long short position when they diverge”. These two papers include a trading system and the management of a portfolio and consider a very large number of stocks using the CRSP database (about 2300 securities).

Gatev et al., 1999, Gatev et al., 2006 also show that pairs trading after costs can be profitable. The first version has been known for about 10 years and Do and Faff (2008), replicating the Gatev et al. (2006) methodology with more recent data, report that the results of this strategy are declining. Engelberg et al. (2008) indicate that the profitability of this strategy decreases exponentially over time. Furthermore, a large part of the profits can be made in the first 10 days.

This approach requires the selection and the trading steps to be parameterized in some way. It uses a simple standard deviation strategy to select and trade stocks. With daily data, they form pairs over a 12 month period and trade them over the next six months. Among the candidates chosen during the first stage, if prices diverge by more than two

standard deviations, a long/short position is open. As underlined by the authors, both the 12 month and six month periods are chosen arbitrarily.

The distance approach merely exploits the statistical relationship of a pair at a price level. As the approach is normative and economic free, it has the advantage of not being exposed to model mis-specification and mis-estimation. On the other hand, this strategy lacks forecasting ability: if a “divergence” is observed, the assumption is that prices should converge in the future because of the law of the one price. When equilibrium is reached or at the end of the six months trading period, the positions are closed out.

Two methodologies, coming from an econometric standpoint, attempt to model the expected mean reversion phenomenon.

The co-integration approach can be an attempt to parametrize pairs trading, by exploring the possibility of co-integration (Engle and Granger, 1987, Johansen, 1988). Works using this methodology include Vidyamurthy, 2004, Lin et al., 2006, Galenko et al., 2007.

Generally speaking, the framework is as follows: first, choose two co-integrated stock price series, then open a long/short position when stocks deviate from their long term equilibrium and finally, close the position after convergence or at the end of the trading period.

Consider two shares whose prices are integrated of order 1. Pit refers to the price[2] of the *i*th asset called A_i at time *t*.

If the share prices P1t and P2t are co-integrated, co-integration coefficients 1 and β exist so that a co-integration relationship can be constructed as follows:P1t-β,P2t=ϵt,where ϵ_t is a stationary process. When a divergence (based on the standard deviation of ϵ_t) from the equilibrium state is observed, the trading involves buying one share 1 and selling β shares 2 as in Lin et al. (2006). In that case, the strategy is not perfectly dollar neutral, which is a major difference compared to other frameworks.

A stochastic approach is used by Elliott et al., 2005, Do et al., 2006. In a continuous setting, the first of these articles models the difference between the two stock prices using a mean reverting Gaussian Markov chain model. The second studies the behaviour of the series at the return level.

Most of the time, this group of works suffers, from the financial and practical point of view, from the fact that the real data application, if there is one, considers only a very limited number of stocks. The articles based on distance criteria or on combined forecasts and MCDM propose fairly developed trading systems and the management of a portfolio over a period of many years. On the other hand, these mathematical approaches can provide

analytical results about the supposed speed of convergence of a given series, the first time passage or the optimal threshold for opening and closing positions.

The present article belongs to the third category of papers according to the segmentation given above and follows Huck (2009). This framework is general and flexible and can be seen as a sort of combined forecast which is specially designed for pairs trading. The combination of forecasts can be done using Multi-Criteria Decision Methods (MCDM). The approach used in Huck (2009), from a non-technical point of view, can be described as follows:

- •

Consider *n* stocks, n∗(n-1)2 different pairs can thus be formed.

- •

For each pair, forecast the difference of return the stocks should have at the end of the trading period.

- •

Define an anti-symmetric matrix of size *n*. Each element of the matrix will be the anticipated spread computed during the forecasting step.

- •

This matrix will be the input of an MCDM in order to rank stocks in terms of anticipated returns.

- •

The strategic behaviour is thus quite simple:

    - –

Firstly, buy the first stocks of the ranking and sell the last ones (for one stock that is bought, an equal dollar value of another stock is sold at the same time). All pairs have the same weight in the portfolio. The strategy is, by construction, dollar neutral.

    - –

Secondly, at the end of the trading period, close all positions.

    - –

If the ranking was relevant, a profit is made.

In brief, the method is based on three phases: forecasting, ranking and trading. This framework differs from the others on one key point: it has been developed without reference to any equilibrium model. This methodology is positive whereas most of the literature is clearly normative with reference to an equilibrium state. This approach is nevertheless complementary with other existing techniques. The framework discussed in this paper provides much more trading possibilities:

- •

Even if we know that prices “diverge” according to an equilibrium based strategy, which would indicate that a mean reversion phenomenon is expected in the short or in the long term, a forecasting based approach could indicate an expansion of the divergence in the short term.

- •

Furthermore, this approach could detect the “birth” of the divergence, as long as an equilibrium state exists, which is a trading opportunity the normative frameworks cannot consider.

The approach developed in this article is more short term oriented than the rest of the literature (the pairs may stay open for 50 or 100 days). It is not necessarily a problem because, as underlined in Engelberg et al. (2008), much of the profits come in the first 10 days.

Data snooping is a major concern in this type of study and will have an impact on the design of the method and on the trading system: for example, during the forecasting step, a unique specification of the forecasting method is used for the different information sets.

The main empirical conclusions of Huck (2009) were the following:

- •

This work, based on weekly data and limited to one step-ahead forecasts and to a one week holding period for each pair, shows that significant and positive spreads can be captured.

- •

The lower the number of pairs selected in the portfolio, the better the ability to anticipate direction and the excess return. The method could provide a tool for selecting some pairs among a large number of securities.

The contributions of the present article are multiple, being both methodological and empirical. Multi-step forecasts (up to four step-ahead) are performed. In this part of the methodology, we still consider weekly data which means the holding period may last for four weeks. The use of multi-step forecasts leads to important changes in the trading system: the management of the portfolio will be more complex and detailed. Closing thresholds are also introduced and positions can be unwound each day if a threshold is reached.

One conscious weakness of this paper is the absence of a direct comparison between our framework and, for example, the distance based approach. This is because the method discussed in this paper is still under development and we wish to focus on it: the introduction of multi-step forecasts is a serious improvement but more work needs to be done before a fully satisfactory framework can be produced. We are aware that the possible extensions briefly discussed in this paper (length of the trading period, forecast combination, etc.) will increase the complexity of the system, but we believe they are necessary before a relevant comparison/competition can be performed. The introduction of new elements will always be clearly justified from a trading, financial or methodological point of view in order to keep the system from being a black box.

The remainder of the paper is as follows: Section 2 describes the methodology and its different steps. The article focuses on the way some well-known techniques (Electre III and Neural Networks) can be part of a global pairs trading system. The application (data, trading system and performance indicators) is presented in Section 3. Results and comments are provided in Section 4. Section 5 concludes.

Section snippets

Methodology

Multi-criteria decision methods (Figueira et al., 2005a, Wallenius et al., 2008) are now used in various fields and are becoming increasingly popular in finance as underlined in different surveys (Zopounidis, 1999, Steuer and Na, 2003, Spronk et al., 2005, Xidonas and Psarras, 2009, Duygun Fethi and Pasiouras, 2010).

A multi-criteria decision making problem is concerned with the task of analysing a finite number of alternatives (A_1, A_2, ...), each of which is explicitly described in terms of

Design of the application

This section presents in detail the trading system developed in this article, based on the methodology introduced in the previous section. The aim is to establish:

- •

whether the strategy could be profitable even if some aspects have not yet been integrated;

- •

what might be a relevant design for the trading system and the problems during the implementation of the method;

- •

whether there is a relationship between performance and forecast horizon.

The data used are the returns of S&P 100 stocks

Results

The results are reported in Table 3, Table 4, Table 5, Table 6 and in two graphs: the first one provides historical indications concerning performance whereas the second gives details, day by day, of the cumulative return per pair captured by the different strategies. Each table focuses on a particular forecast horizon, *h*, from 1 to 4, which means the maximal holding periods of a pair go from 5 to 20 days.

Before detailing the results, the main comments are as follows:

- •

Twenty-three of the 24

Conclusion

This article deals with an equity long-short trading strategy called pairs trading. We extend the literature on a particular approach of pairs trading based on forecasting and multi-criteria decision methods. This framework remains very general, positive and flexible. It is defined without reference to any equilibrium model. The process can be divided into three steps: the forecasting of spread returns between all pairs; the ranking/selection of stocks/pairs; and the trading of pairs in real

Fast-moving Markets: Revisiting the August 2007 Quant Crunch in Real Time

Blog post

Anil Rao

August 2, 2017

When markets get volatile, stock prices can move very quickly in a short period. As we saw in the August 2007 "quant liquidity crunch"— now about to mark its 10-year anniversary — many quantitative equity managers could have benefitted from getting market insights in real time as they found themselves in crowded trades.One challenge for institutional investors is to find real-time data in order to respond to market events as they unfold. This need for transparency may be especially true where fund managers have exposure to factors that may experience high volatility in crisis periods. Real-time index levels can help them monitor fast-changing equity markets through the lens of factor returns.When we look back to the August 2007 liquidity crunch, what does the real-time tick data tell us?During the summer of 2007, stock prices were whipsawed as many quant managers struggled to raise cash to meet collateral requirements in their multi-strategy funds. However, while many fundamental long-short funds took it on the chin, broad U.S. equity market performance was basically flat in the early days of the crisis.However, that performance masks the volatility that took place during individual days. Looking at index-level performance on an intra-day level, the U.S. stock market ended the two-week period from July 27 to August 17 almost where it began, but it experienced a number of days with considerable intra-day reversals (see top panel of the exhibit below). Furthermore, the bottom panel shows that return volatility jumped during the first and last hour of each day during the crisis period, in contrast to the much lower intra-day volatility over the full year.

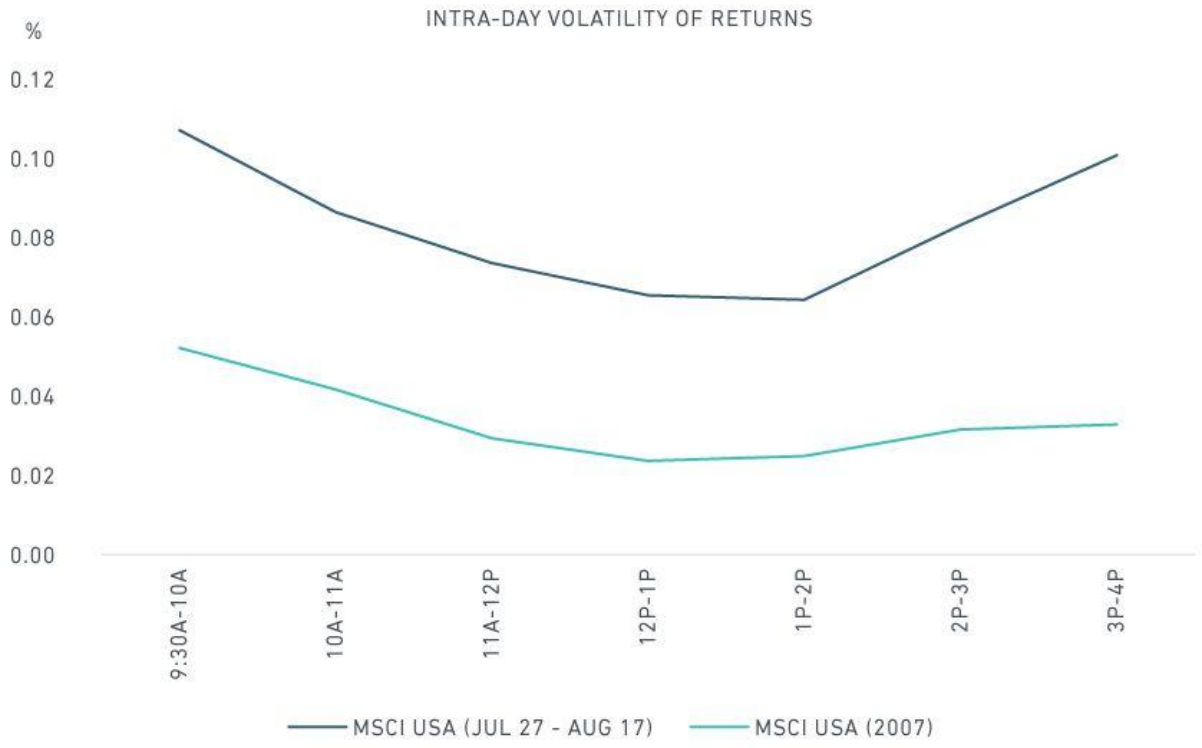
Intra-day data tells a different story than end-of-day data

Return volatility measured as the interquartile range of minutely returns within each hour

The crisis peaked during the week of August 6 as stress in mortgage markets triggered liquidity needs in multi-strategy funds. As a result, many managers of these funds unwound their equity positions (because they were the most liquid) in order to meet collateral requirements. Some factors were particularly hard hit: The MSCI US Total Market Model indicates that value, momentum and quality were the style factors with the largest drawdowns during August 2007.If quant managers had access to real-time returns of fundamental equity factors, they may have detected underlying stress in their strategies sooner.[1] Real-time factor returns, however, have not been readily available to investors.To gain more insight using factors, we use intra-day tick data on the MSCI Large Cap Value and MSCI Small Cap Value indexes to approximate factor returns. This approach allows us to trace how one common equity style — value — reacted in the weeks prior to the unfolding crisis. We make three observations from the two exhibits below that might have informed investor decisions had they had this information available at the time of the liquidity crunch.The top panel shows that investors holding small-cap value stocks suffered heavier losses than those holding large-cap value stocks during the three-week period from July 23 to August 17. Notably, small-cap value investors incurred several sharp drawdowns during the week of August 6, before recovering some of their losses with a morning rally on August 10.The selloff in small-cap value stocks began in late July – two weeks before the peak of the crisis. Large drops occurred during the mornings of July 23 and 24 (bottom panel).The

volatility of the factor surged on July 26, abated for two days, and then rose again the afternoon of July 31 and the morning of August 1. This was several days before the large price swings that would occur on August 7, 9 and the 17 (bottom panel).During the August 2007 quant liquidity crunch, institutional investors underestimated the speed and magnitude of losses – and subsequent reversals — that took place over very short periods. They also failed to appreciate how crowded certain investment styles had become. Using high-frequency indexes (both market capitalization-weighted and factor-based approaches) can help investors monitor events in real time.*The author thanks Peter Zangari for his contribution to this post.*

Lost in the crowd?MSCI Real Time Indexes HistoryMeasuring the impact of factors



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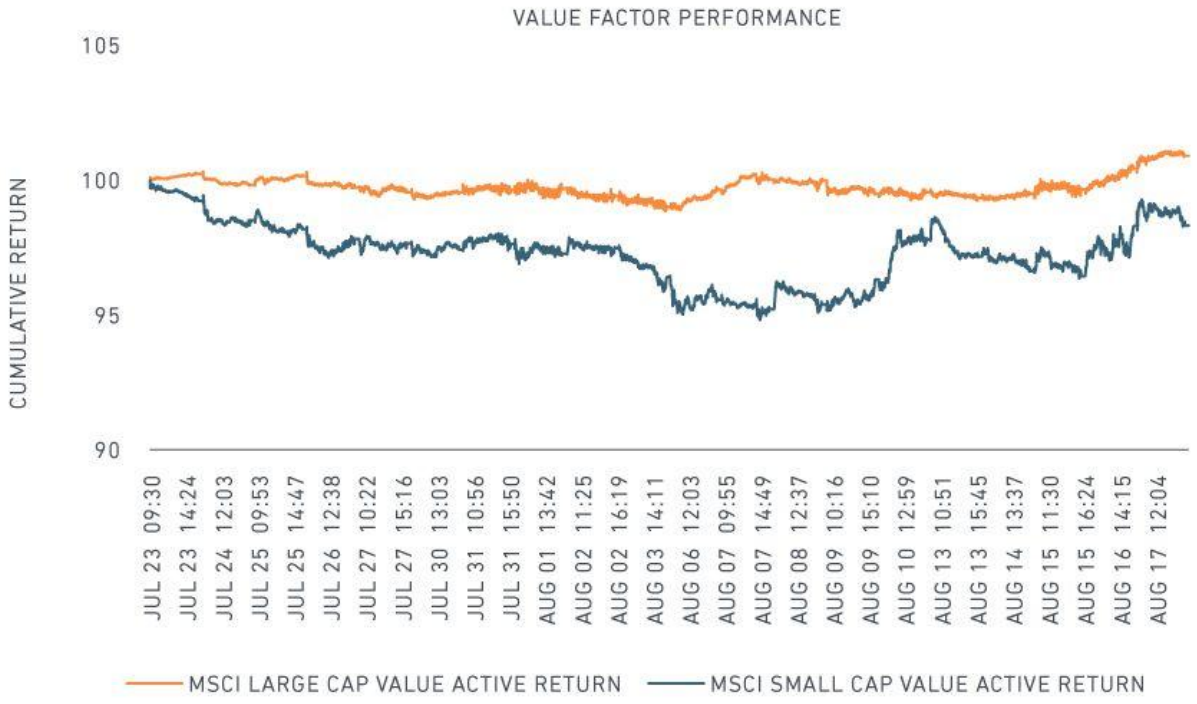
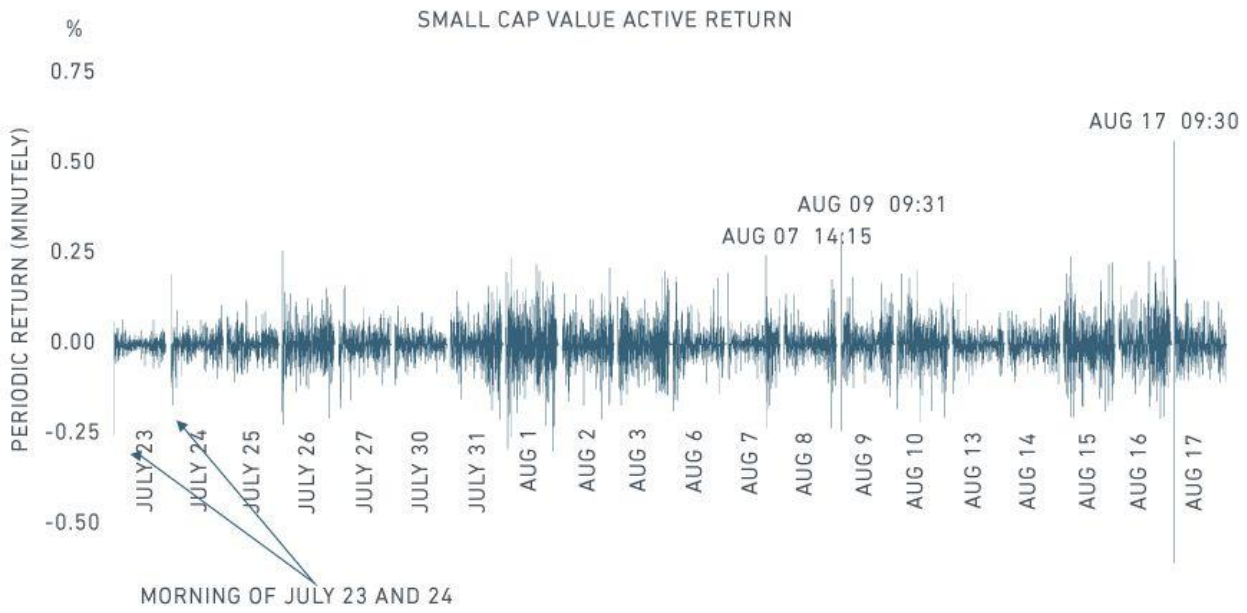
How Value reacted to the Quant Liquidity Crunch





During the August 2007 quant liquidity crunch, institutional investors underestimated the speed and magnitude of losses – and subsequent reversals — that took place over very short periods. They also failed to appreciate how crowded certain investment styles had become. Using high-frequency indexes (both market capitalization-weighted and factor-based approaches) can help investors monitor events in real time.

Volatility Arbitrage: What it is, How it Works

By

Lucas Downey

Updated July 14, 2022

Reviewed by

Thomas J. Catalano

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7 Reasons You Haven’t Received Your Tax Refund

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What Is Volatility Arbitrage?

Volatility arbitrage is a trading strategy that attempts to profit from the difference between the forecasted future price volatility of an asset, like a stock, and the implied volatility of options based on that asset.

Volatility arbitrage has several associated risks, including the timing of the holding positions, potential price changes of the asset, and the uncertainty in the implied volatility estimate.

Key Takeaways

- Volatility arbitrage is a trading strategy used to profit from the difference between the forecasted future price volatility and the implied volatility of options based on an asset, like a stock.
- An investor must be right about whether implied volatility is over-or under-priced when considering a trade.
- Suppose an underlying stock price moves faster than an investor assumed. In that case, the strategy will have to be adjusted, which depending on market conditions, could be impossible, or at the very least, expensive.
- If a trader thinks a stock option was underpriced because implied volatility was too low, they may consider opening a long call option combined with a short position in the underlying stock to profit off the forecast.
- A hedge fund trader might study volatility arbitrage to make trades.

How Volatility Arbitrage Works

Because options pricing is affected by the volatility of the underlying asset, if the forecasted and implied volatilities differ, there will be a discrepancy between the expected price of the option and its actual market price.

A volatility arbitrage strategy can be implemented through a delta-neutral portfolio consisting of an option and its underlying asset. For example, suppose a trader thought a stock option was underpriced because implied volatility was too low. In that case, they may open a long call option combined with a short position in the underlying stock to profit from that forecast. If the stock price doesn't move, and the trader is correct about implied volatility rising, then the cost of the option will increase.

Alternatively, if the trader believes that the implied volatility is too high and will fall, they may decide to open a long position in the stock and a short position in a call option. Assuming the stock's price doesn't move, the trader may profit as the option falls in value with a decline in implied volatility.

Important

A volatility arbitrage strategy is complex and carries risk for traders, but it can be implemented using a delta-neutral portfolio consisting of an option and its underlying asset.

Special Considerations

There are several assumptions a trader must make, which will increase the complexity of a volatility arbitrage strategy.

First, the investor must be right about whether implied volatility is over-or under-priced. Second, the investor must be correct about the amount of time it will take for the strategy to profit, or the time value erosion could outpace any potential gains.

Finally, if the underlying stock price moves more quickly than expected, the strategy will have to be adjusted, which may be expensive, or impossible depending on market conditions.

Fast Fact

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Four years after 'Volmageddon', new volatility ETFs to hit market

By Saqib Iqbal Ahmed

March 28, 20222:22 PM CSTUpdated 3 years ago

Traders work on the floor of the New York Stock Exchange (NYSE) in New York City, U.S., February 15, 2022. REUTERS/Brendan McDermid Purchase Licensing Rights, opens new tab

NEW YORK (Reuters) - Two new funds that let investors place bets on stock market gyrations are expected to launch this week, potentially filling the void left by the implosion of similar products four years ago.

The 1x Short VIX Futures ETF (SVIX) and 2x Long VIX Futures ETF (UVIX) have received regulatory approval to list and will start trading on Wednesday, said Stuart Barton, chief investment officer at Volatility Shares, the company releasing the ETFs.

The new ETFs will track the daily performance of two separate volatility futures indexes, one which rises when stock gyrations pick up and another that benefits from falling volatility.

Volatility-linked exchange traded products have a checkered track-record on Wall Street, with only eight of the 20 volatility ETFs ever launched still trading, according to Elisabeth Kashner, director of global fund analytics at FactSet Research Systems.

In February 2018, a volatility-tracking note called the VelocityShare Daily Inverse VIX Short Term ETN went bust amid a surge in market volatility in an event which was eventually dubbed “Volmageddon,” taking with it nearly $2 billion in investor assets.

"Historically, investors of all stripes have struggled to use volatility-tracking ETFs well," Kashner said.

The turbulence in February 2018 also prompted several volatility products to tweak their investment objectives to reduce risk. Since then, the combined assets in volatility-linked products has about halved to $2.69 billion, Kashner said.

Still, some investors who had been hurt by the XIV blowup said they are ready to trade the new ETFs.

"There is definitely demand from the retail community for another product," said Seth Golden, president of investment research firm Finom Group, who experienced a sharp decline in February 2018 due to the upheaval in volatility-tracking products and derivatives when XIV collapsed, though he did not own XIV shares.

Interest in volatility-related products has grown amid the stock market’s gyrations in recent weeks. One-month trading volume for ProShares Ultra VIX Short Term Futures ETF and the

ProShares Short VIX Short-Term Futures ETF, popular volatility-linked ETFs, stands at 72 million shares, up about 400% from a year ago, according to Refinitiv data.

00:05Recycled rubble brick could help build low carbon future

Volatility Shares' Barton said the new products have been designed to avoid the pitfalls that had affected older products, including the way the fund goes about buying or selling volatility futures to keep it in line with its benchmark.

The new fund's daily valuation will be calculated from the average futures prices over the last 15 minutes of the trading day, rather than just the futures settlement price, as in the case of XIV. In theory, that would reduce the funds' vulnerability to sophisticated investors anticipating how its rebalancing could impact futures prices, according to analysts.

XIV's vulnerability to investors trying to trade volatility futures in anticipation of the fund's rebalancing needs may have created imbalances some analysts believe led to the fund's undoing.

The new funds will limit their trading in volatility futures to no more than 10% of the volume during a given rebalancing period, and possibly extend the daily rebalancing period if it finds the market unusually volatile.

That would "go a long way to addressing the XIV-type situation," said Matt Thompson, managing partner at Chicago-based investment adviser Thompson Capital Management, which specializes in volatility trading, and plans to use the new ETFs.

A debut would come in the midst of a months-long period where worries over a hawkish pivot by the Federal Reserve and geopolitical certainty stemming from Russia's invasion of Ukraine have kept markets choppy.

The adoption of these products can often "pick up sharply after market drawdowns when volatility spikes," said Anand Omprakash, head of derivatives quantitative strategy at Elevation Securities.

The rise of retail traders as a force in markets may also boost demand for the products, analysts said, although some may not be eager to jump into volatility funds after getting hurt in the past.

"The audience is more limited than pre-Volmageddon, but growing again," Finom's Golden said.

Liquidity Provision Strategies

Written By

Dan Buckley

Updated

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Liquidity provision strategies are critical for the smooth operation of financial markets.

They involve various techniques and approaches to facilitate trading, reduce transaction costs, and improve market stability.

Key Takeaways – Liquidity Provision Strategies

- Market making
- HFT
- Arbitrage
- Algorithmic trading (various strategies)
- Dark pools
- Liquidity mining
- Central bank liquidity provisioning

Market Making

Market making involves continuously quoting buy and sell prices for financial instruments to provide liquidity.

Market makers earn a spread between the bid and ask prices.

Responsibilities of Market Makers

Market makers must provide liquidity even during market volatility, so that trades can occur without significant price disruptions.

Profit Mechanisms

Market makers profit from the bid-ask spread and often receive incentives or rebates from exchanges for their liquidity services.

Example of a Market Maker Trade

1. **Quoting Prices –** A market maker quotes a bid price of $99 and an ask price of $101 for a stock.
2. **Buy Order Received –** A trader places an order to buy 100 shares at the market price.
3. **Order Execution –** The market maker sells 100 shares to the trader at the ask price of $101.
4. **Inventory Update –** The market maker's inventory decreases by 100 shares.
5. **Price Adjustment –** To manage inventory, the market maker may adjust the bid and ask prices or trade on other exchanges.
6. **Sell Order Received –** Another trader places an order to sell 50 shares at the market price.
7. **Order Execution –** The market maker buys 50 shares at the bid price of $99.
8. **Profit Realized –** The market maker earns a profit of $2 per share, totaling $200, from the spread.

This continuous process helps ensure liquidity in the market.

High-Frequency Trading (HFT)

High-frequency trading uses algorithms and high-speed data connections to execute a large number of orders in fractions of a second.

Speed and Technology

HFT firms invest heavily in technology to gain microsecond advantages over competitors.

This allows them to capitalize on minimal price discrepancies.

Market Impact

HFT can enhance liquidity and narrow spreads, but some believe it can contribute to market instability during periods of extreme volatility – or not be reliable when market is undergoing heavier volatility due to the way their algorithms widen bid and ask spreads.

Arbitrage

Arbitrage strategies exploit price differences of the same asset across different markets or instruments to make risk-free profits.

Types of Arbitrage

- **Spatial Arbitrage –** Involves buying and selling the same asset in different markets.
- **Statistical Arbitrage –** Uses statistical models to identify and exploit price inefficiencies.

Importance in Liquidity

Arbitrageurs help equalize prices across markets, contributing to overall market liquidity.

Technologically Intensive

Arbitrage these days is very technologically intensive and not easy to find manually.

Algorithmic Trading

Algorithmic trading uses computer algorithms to execute orders based on predefined criteria such as timing, price, and volume.

Execution Algorithms

- **TWAP (Time Weighted Average Price) –** Breaks large orders into smaller ones over a set time period.
- **VWAP (Volume Weighted Average Price) –** Executes orders in proportion to market volume.

Liquidity Enhancement

These algorithms reduce market impact and improve execution quality, which can contribute to smoother market functioning.

Dark Pools

Dark pools are private financial exchanges where large orders can be executed without revealing intentions to the public markets.

Advantages of Dark Pools

They offer anonymity and minimize market impact for large institutional orders.

Controversies and Challenges

Despite their benefits, dark pools can reduce overall market transparency and potentially disadvantage smaller traders who don't have access.

Liquidity Mining

Liquidity mining is a decentralized finance (DeFi) strategy where participants provide liquidity to decentralized exchanges (DEXs) in return for rewards.

Incentive Structures

Participants are rewarded with tokens or a share of transaction fees – which incentivizes the provision of liquidity.

Risks and Rewards

Liquidity mining can be profitable, but it carries risks such as impermanent loss and smart contract vulnerabilities.

Central Bank Liquidity Provision

Central banks have a part in providing liquidity to the financial system, especially during times of crisis.

Open Market Operations

Central banks conduct open market operations by buying or selling government securities to control liquidity levels.

Quantitative easing is one example.

Emergency Liquidity Assistance

In times of financial distress, central banks may offer emergency liquidity assistance to institutions facing short-term liquidity shortages.

Based in New York City, Virtu was founded by Vincent Viola, a former chairman of the New York Mercantile Exchange and current owner of the Florida Panthers.[6] Douglas Cifu, Virtu's CEO since October 2013, co-founded Virtu with Viola in 2008. Cifu is also a co-owner of the Florida Panthers with Viola and serves as the Panthers' alternate governor. Prior to co-founding Virtu, Cifu was a partner at the international law firm of Paul, Weiss, Rifkind, Wharton & Garrison LLP, where he practiced corporate law from 1990 to 2008.

The company suggested standards for electronic firms that call themselves market maker. Virtu believes market makers should be obligated to quote at or near the inside of the national best bid and offer throughout the day and quote at various price points in a number of different securities.[7][8] Virtu was ranked as one of the five largest high-frequency traders of equities in Europe in 2011.[9]

In November 2014, Reuters reported that Chris Concannon, president and chief operating officer at Virtu Financial, will succeed William O'Brien as president of BATS Global Markets, a trading venue that was founded by high-frequency traders.[10]

Virtu has offices in New York City (headquarters), Austin, Los Angeles, Boston, Chicago, London, Sydney, Dublin, Hong Kong, and Singapore.[11] It expanded its European headquarters to Dublin in September, 2013.[12] Virtu Financial Ireland Limited is regulated by the Central Bank of Ireland.

Company history: mergers and acquisitions, partnerships, and other company moves

[edit]

In May 2011, Virtu merged with proprietary trading firm Madison Tyler, based in Santa Monica, California[13][14] with the backing of Silver Lake Partners, a technology-focused private equity firm.[15] Vincent Viola co-founded Madison Tyler with David Salomon, a former arbitrage trader at Goldman Sachs.

Virtu acquired a market-making unit that handles NYSE Amex stocks from Cohen Capital Group LLC in December 2011. The purchase made Virtu the largest overseer of trading in shares listed on Amex, known as the American Stock Exchange, before NYSE Euronext bought it for $260 million in 2008. The deal gave Virtu a designated market-maker license for New York Stock Exchange companies. With the acquisition, some of the companies Virtu was able to trade and support included New Gold Inc., Northern Oil & Gas Inc., and the American depositary receipts of British American Tobacco Plc.[16]

In September 2012, Virtu acquired the exchange-traded fund (ETF) market maker assets of Nyenburgh Holding B.V., a high-frequency trader in European ETFs.[11]

In April 2017, Virtu agreed to pay US$1.4 billion in cash to purchase rival market-making firm KCG Holdings.[17] This acquisition was completed on July 20, 2017.[18]

In November 2018, Virtu announced an approximately US$1 billion deal to acquire agency brokerage and financial markets technology firm Investment Technology Group.[19] This acquisition was completed on March 1, 2019.[20]

In November 2021, Virtu launched a new electronic swaptions workflow on its RFQ hub.[6]

In May 2022, Virtu ITG Europe joined the SIX Swiss Exchange.[21]

IPO

[edit]

Virtu Financial initially planned to go public in the first week of April 2014, then postponed its initial public offering by at least a week. At the time, prospective investors advised to wait and "let the storm pass", a reference to recent scrutiny concerning HFT practices. Later in April 2014, the company decided to ultimately postpone the IPO without specifying a new date.[22] In its IPO plans, Virtu sought a valuation of about $3 billion. The IPO had been reported to make Vincent Viola the first high-frequency trading billionaire.[23] While Virtu declined to comment, Reuters reported in November 2014 that sources say Virtu Financial hopes to go public in the spring of 2015.[24] On April 15, 2015 Virtu Financial successfully priced its IPO[25] which began trading on NASDAQ on April 16, 2015.

On November 12, 2015, Virtu Financial Inc priced a secondary public offering of its Class A common stock by Virtu and certain selling stockholders affiliated with Silver Lake Partners.

Trading activity

[edit]

Virtu operates on more than 235 exchanges, markets and dark pools in 36 countries.[26] Some of these exchanges include NYSE Euronext, NASDAQ and the Chicago Mercantile Exchange. The company is a designated market maker on the NYSE and NYSE Amex. Virtu makes markets by providing passive quotations to buyers and sellers in more than 12,000 securities and other financial instruments.[26]

On August 28, 2014, Virtu Financial, along with London-based GSA Capital, executed the first trades on ParFX Prime, a foreign exchange trading platform. Unlike most exchanges and trading venues, ParFX's matching engine does not adhere to the principle of price-time

priority. Instead, ParFX subjects all orders to random pauses of about 20 to 80 milliseconds, trying to provide a more level playing field.[27]

When filing for its IPO in March 2014, it was disclosed that during five years Virtu Financial made a profit 1,277 out of 1,278 days, losing money just one day.[28]

Gregory Laughlin, astrophysicist and department chairman at the University of California, Santa Cruz, researched Virtu's trading activity.[29] In the debate about its near-perfect trading record,[28] Virtu said that it wins 51 percent or 52 percent of its trades, leading most people to figure the remainder are losses.[29] In his research, Laughlin showed that "the number of its trades that break even are about the same as its losses", indicating Virtu assumes little market risk.[29]

Investigations

[edit]

In April 2014, New York Attorney General Eric Schneiderman sent Virtu a letter seeking information on its HFT practices, asking about special arrangements with dark pools and exchanges, the company's trading strategies and whether Virtu practices latency arbitrage, a high-frequency activity.[30]

In July 2014, the Securities and Exchange Commission (SEC) sought information on ten HFT firms with broker-dealer licenses, including Virtu Financial, as part of an ongoing investigation into predatory trading strategies.[31] The SEC's probe focuses on abuse of order types and abusive trading like layering or spoofing, a tactic intended to trick investors into buying or selling a stock at unfavorable prices.[31] A settlement was announced in 2017.[32]

John McCrank of Reuters noted that scrutiny around high-frequency trading intensified after the release of Michael Lewis's best-selling book *Flash Boys: A Wall Street Revolt* in March 2014.[31]

The company was investigated by the SEC for failing to protect sensitive customer data.[

Internalization of Order Flow on the Rise

By

Editorial Staff

-

April 9, 2012

March saw a new record in U.S. equities trading executed away from registered exchanges, according to commentary released by the Tabb Group.

The new commentary, Tales from the Dark Side: Out of Sight but Very Much In Mind, was written by Tabb founder and chief executive Larry Tabb and Cheyenne Morgan, research analyst and manager of Tabb LiquidityMatrix.

The two writers comment that, although most instinctively expect non-exchange orders as flow diverted to dark pools, Tabb and Morgan estimate that dark pools themselves account for just 13% of U.S. equities trading volume. The rest, 24%, is executed via internalization.

Internalization is the practice of brokers matching orders internally on their own trading desks – before orders are either sent to dark pools or exchanges.

According to the commentary, the internalized and dark pool figures totaled only 15% in 2008.
"The million dollar question is why is such a large amount of US equity trading now making its way outside of traditional exchanges?" both Tabb and Morgan write.

From an operations standpoint, Morgan told Securities Technology Monitor, traders will need to make sure they have access to all dark venues. This would require that they are connected both on their desks and via their algorithms to all available off-exchange venues since that is where liquidity is headed.

Also, traders would need to make sure they are comfortable trading with off exchange venues.
"They'll want information how each dark pool operates. Meaning-they'll want to know the profile of the flow they could potentially be interacting with," Morgan told STM. "They'll need to know if high frequency traders are in these dark pools, whether or not they're interacting with proprietary flow, retail flow, etc. They'll be able to better direct their order flow once equipped with this information."

To-be-sure, the desire to prevent market impact is noted as a key motive, but the commentators state that there are number of factors in place here.

First, reduced volumes are pushing traders into the dark quicker. For instance, U.S. equity volume is down 14% from the same time period in 2011. Tabb Group's most recent conversations with the buy-side traders pointed out that traders were turning to

internalizers and dark pools much earlier in their trading process than in the past. As volumes fades, liquidity is simply harder to find and the search for matches often lead traders off exchange.

Second, an increasing amount of order-flow is being managed electronically. As markets increasingly fragment, humans don't have the facility to track liquidity across 50 venues operating at increasingly lower latencies. The old NYSE exchange, before the days of the Regulation National Market System promulgated by the U.S. Securities and Exchange Commission in 2005, matched orders in seconds. Today matching times are measured microseconds.

Third, managing cost has become critical as commissions, especially the fees associated with execution, are under pressure. The buy side wants to allocate more of their commission dollars to research, corporate access, and the underwriting calendar, while traders are allocating less of their commission wallets to execution. This puts pressure on trading desks to reduce internal expenses, a significant portion of which come from exchange fees. If trading desks can match orders internally, then they don't need to pay exchanges for execution.

Fourth, dark pools and internalization engines are becoming more sophisticated. Increasingly, not only are dark pools sending messages to other dark pools, but trading desks are increasingly connecting to liquidity providers and giving them notice of incoming flow.

Historically, trading desks were able to match buying and selling interest received concurrently on the desk. As technology now allows messages to be sent and responded to in microseconds, trading desks can send out messages to solicit the other side of the trade. If an order can't be found directly, it then moves into the firm's dark pool. If still unable to be matched, the dark pool sends messages to a wider array of market participants to trade. If still unexecuted, the order is sent to other dark pools that message a wider group of traders. If by the time the order went through two or three different dark pools and messaging cycles and the order remained unexecuted, it would then go to the exchanges. This all occurs in a fraction of a second, all managed by a series of electronic routing engines.

Exchanges, in this day and age, only get orders that virtually nobody wants, according to the commentary.

The Tabb paper asks this question about the trend: As nearly 40% of order-flow is being dragged away from exchanges, besides exchanges' being furious, does anyone care? Unfortunately, the writers declare, that's hard to determine.

“While some traders are upset that their orders are being surreptitiously spammed around the market and others complain about fleeting quotes and un-executable liquidity, there’s a core group of traders who view higher dark execution rates and lower commission levels as outweighing the information leakage messaging barrage,” Tabb and Morgan write in the commentary. “It’s also a fair point to say, if execution was that terrible, wouldn’t traders stop sending orders to the more egregious spammers?”

Another important detail to watch, they say: What will the SEC do as these kinds of trade reach 40% of equities activity?

Morgan told STM that it is hard to say whether this trend will accelerate this year. However, she said, “it appears to us that the exchanges have lost a significant amount of market share to the dark for good.”

“Exchanges the biggest losers if this trend continues and they’ll need to step up in order to prevent the loss of more market share,” she said.

Have you ever set a stop-loss, only for price to hit your stop and blast off in the direction you anticipated? You may have been stop-hunted.

While many traders believe it's their broker hunting their stop-loss, the actual answer is more complex. In this article, we'll explain who's really hunting your stop, show what a stop-hunt looks like on a chart, and offer some tips on reducing your chances of becoming the victim of a stop-loss hunt.

What is stop-hunting?

The Forex market is the world's largest financial market. With trillions of dollars flowing through the market every day, it's rare for a currency pair to jump more than a couple of percent in a day. As a result, leverage is almost always necessary.

Leverage in the foreign exchange market varies from country to country, but it generally ranges from 20:1 up to 500:1. This means that using a stop-loss is essential to avoid margin calls and stay in the game. After all, stop-losses are one of the best risk management tools available to a trader.

Now, imagine you were a large financial institution looking to take a $1 billion long position. Chances are, there aren't enough sell orders on the books to fill your buy order at your preferred price. If you were to press "Market Buy," the lack of liquidity would lead to slippage and put your average entry price much higher than you'd like. For our $1 billion position, this might mean losing a few million to slippage.

The problem is, where do you find the liquidity to get your order filled? Where will there be at least $1 billion in sell orders? In zones where stop-losses are placed. Retail traders and less savvy institutions often put their stops below a key support level, trendline, or round number. Who else is getting involved at these levels? Breakout traders.

As a financial institution with plenty of resources at our disposal, we can sell heavily into one of these zones, triggering long stop-losses (i.e., selling back their buy position) and encouraging short breakout traders to jump in. Meanwhile, we use this flood of sell orders to fill our $1 billion long order with minimal slippage.

As the price begins to rise, emotional traders that were stopped out and short traders now at a loss capitulate and start buying. This gives us the liquidity to exit our short position that began the stop-loss hunting in the first place. The net result is that we've entered our position with minimal loss (maybe some fees/slight slippage vs. significant slippage) and stoked the emotions of other traders that are now looking to reenter their position and push the price higher - putting us in profit.

While this may sound cruel and unnecessary, it's a fundamental characteristic of many markets. In fact, it's a practice that dates back decades. In the 1930s, Richard D. Wyckoff noticed that retail stock traders were constantly being manipulated by large institutions or the "smart money." He simplified the concept using the idea of the "Composite Man": a person who, "in theory, sits behind the scenes and manipulates the stocks to your disadvantage if you do not understand the game as he plays it; and to your great profit if you do understand it."

Stop-loss hunting occurs everywhere, from the second charts to the monthly charts. One of the tell-tale signs is a long wick that reaches into an area where stops are likely to be: above or below double tops and bottoms, in an area of support or resistance, around trendlines, etc.

Do Forex brokers hunt stops?

The common perspective of many retail traders is that Forex brokers regularly engage in stop-loss hunting. Unfortunately, this is more of an excuse for poor trading practices than anything else. True, some dodgy brokers may engage in stop-loss hunting, but if your broker is regulated, chances are, they're not performing as a broker-hunter.

There are anecdotal reports of traders seeing their stop-loss triggered despite price not actually hitting their stop, but the reality is that it's bad for business. A broker primarily makes money from spreads and commissions. It's in their interest for you to keep trading with them. If they continually hunted your stop-loss, then you'd probably go elsewhere.

Some traders will think they've been stopped out prematurely when it was actually a widening spread that got them stopped out. This is especially likely if they were stopped out around a significant news event or late in the trading day.

But what about market makers? Can market makers see stop-loss orders? The short answer is no. The long answer is maybe, but only if your broker colluded with a market maker. The issue lies in the nature of a stop order. A stop is essentially an instruction that says, "once price crosses x, do y." A stop-loss is an instruction for your broker to create a market order as soon as price reaches a certain point.

Market makers only have access to order books containing pending limit orders. A stop-limit order, for example, wouldn't be visible to a market maker; only after the stop is triggered and the limit order becomes active would the market maker see the order. So, your broker is the only party that can see your stop-loss order. A broker could provide a market maker with access to stop orders, but this would be highly unethical and likely illegal in many jurisdictions.

If you're concerned that your broker is engaging in stop-loss hunting, then trade with an ECN broker. ECN brokers connect traders directly with liquidity providers and are unable to trade against you.

The real stop-hunters

As you might have guessed by now, the players that stop-loss hunt are big banks, financial institutions, and hedge funds. These are the big guys that make serious money from trading the Forex market each year and have the resources available to manipulate such a big market.

While one might conjure up images of suit-and-tie executives sitting around a table in downtown Manhattan, plotting how they'll take out your stop-loss, it's a much more dynamic, decentralized, and complex process. On the one hand, there are algorithms and high-frequency trading desks that specialize in identifying and trading areas of liquidity across every time frame in nearly every market. On the other, there are manual prop traders that understand how stop-loss hunting works and use it to their advantage.

The culmination of these efforts is what we see on the charts: a long wick, often just beyond a key swing high or low, before blasting off in the other direction. Let's take a look at a quick example before moving on to how to avoid being a victim of a stop-loss hunt.

EUR/USD example

Here, we can see some obvious manipulation of liquidity. Multiple lows are formed before two long wicks take out the lows, leading to a move much higher.

Switching down from the 15-minute to the 2-minute timeframe, we can see how liquidity is forming. The first is with the trendline. It gets broken (1), and traders are stopped out while breakout traders enter short (especially after the retest of the trendline - a classic breakout confirmation move). Price quickly reverses before wicking above the opposing liquidity (2) and moving back down.

Price retraces (3), just taking out the liquidity above the previous swing high. It then tumbles below where many traders would consider support (4), triggering tons of stop-losses.

Looking at the stop-hunt on the 1-minute chart, we see the same thing happening. Liquidity builds up in the form of relatively equal lows before taking them and the swing low out (5). The final stop-loss hunt has occurred, the big players are in their positions, and they're ready to take price much higher.

How to avoid being stop-hunted

So, we know how stop-loss hunting works, why it occurs, and how it looks on a chart. But how do you avoid being stop-hunted yourself? Here are some crucial rules to follow.

Avoid placing stops at obvious levels

More often than not, areas prime for stop-loss hunting are visible on the chart. They're typically in one of the areas discussed: above or below key swing highs, support and resistance levels, trendlines, etc.

As a rule of thumb, the more an area seems to "hold," the more likely it is to be stop-hunted. Each time the area is tested, more traders funnel into positions and set stop-losses just above or below the area. This is precisely what smart money is looking for to fill their orders.

Instead, you could use a wider stop, avoid round numbers like 1.27 or 1.275, or place your stop in an area that clearly invalidates your idea. Alternatively, look for confirmation before entering.

Look for confirmation

One of the easiest ways to avoid being a victim of stop-loss hunting is to look for confirmation. Instead of blindly leaving a limit order and stop-loss at an area of support or resistance, you can look for price to trade into it and then show signs of reversal. This could be through reversal candlestick patterns, like tweezer tops/bottoms, hammers/shooting stars, and engulfing candles.

Like in the example above, you could also look for stop-hunts on lower time frames. For instance, if you're bullish from a 1-hour area of support, you might look for stop-hunts on a 15-minute or 5-minute chart to confirm your bias and find an entry.

Use retail trading patterns with caution

On the topic of patterns, use chart patterns with care. Triangles, wedges, double tops/bottoms, pennants, etc., are all prime candidates for smart money manipulation. This is because the big players know chart patterns are where retail traders like to get involved.

That's not to say that chart patterns don't work - they do, but their reliability is overstated. For example, you'll often see the upper trendline of a bearish wedge being breached before the move lower occurs as part of a stop-hunt. How do you get around this? Again, look for confirmation or wait for the stop-hunt to occur before entering.

Don't set stops too tight

One of the easiest ways to get stopped out prematurely is by having a tight stop-loss. Tight stop-losses work well in some strategies, but the average retail trader will likely fare much better with a wider stop. The returns from a given trade might be lower, but the goal as a trader is to consistently generate profit over securing huge wins every time. Widening your stop to a point where your idea would become invalid is a strong place to start.

Add the spread to your stop

Finally, add the spread to your stop. As mentioned earlier, many traders think their broker is stop-loss hunting when it's more likely that a wide spread got them stopped out. During periods of high volatility or low volume, note the spread and set your stop-loss as usual. Then, add (or subtract, if going long) the spread.

For example, let's say you're going long EUR/USD with an entry at 1.05850 and a stop-loss at 1.05785. If the spread is 3 pips, you'd subtract 3 pips from 1.05785 to get 1.05755. This is where you'd set your stop-loss.

Final thoughts

In summary, your broker most likely isn't hunting your stop-loss. If they're regulated and trusted by other traders, then chances are you're good. If you deal with a shady broker and you think they might be stop-loss hunting, there are plenty of better brokers out there that don't stop-loss hunt. Even better, choose an ECN broker to remove the possibility entirely.

Stop-hunting is the domain of financial institutions with lots of money at stake. It dates back long before many of us were even born and will continue to be a feature of virtually every market for decades to come.

While there are ways to counteract stop-loss hunting, it's best to trade in harmony with these big players rather than fight them. If you want to learn more about using stop-hunts to your advantage, check out the Wyckoff methodology. The whole notion of Wyckoff accumulations/distributions is based on stop-loss hunting and could be an excellent addition to your strategy. Happy trading!