Volatility, Opportunity, and Reversal Strategies
Research note

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Abstract

In this research note we investigate whether short-horizon, statistical arbitrage style alpha factors perform differently in different environments. In particular it is often said that stat arb strategies are "long vol" in the sense that they profit when market level volatility measures are higher than average. We find that reversal strategies perform best in high-volatility environments, but that both reversal and other short-horizon technical trading strategies perform best when the *opportunity set* – as measured by the cross-sectional variance of returns – is highest.

The opportunity set measure better distinguishes a priori between low- and high-performing periods for reversal, does so for the three other subcomponents of ExtractAlpha's Tactical Model (TM1), and is a more stable measure than the VIX. Current opportunity set measures favor stat arb strategies.

About ExtractAlpha

ExtractAlpha is an independent research firm dedicated to providing unique, curated, actionable data sets to institutional investors. We apply our extensive experience in quantitative analysis and the design of investment analytics products to interesting new data sets and tools. Our rigorously built quantitative models are designed for institutional investors to gain a measurable edge over their competitors. We also partner with top FinTech data firms to identify investment value in their data sets and help investors profit from these unique new sources of information.

ExtractAlpha's founding team held senior positions in the original research and development teams at StarMine and at top quantitative hedge fund groups including Morgan Stanley PDT.

Performance by volatility

We start with market neutral deciles built by going long the top 10% of stocks, and short the bottom 10% of stocks, for TM1 and each of its four subcomponents, from January 2000 through January 2016. Portfolios are rebalanced daily and returns are shown gross of transaction costs. The universe consists of stocks with market capitalizations of at least US$100mm, average daily trading volumes of US$1mm, and a $4 nominal price.

First, we notice that if we partition our universe into high-volatility and low-volatility *stocks*, each of the components performs somewhat better among high volatility stocks, but that the performance is best if we include both low- and high-volatility stocks, thereby allowing the models to take greatest advantage of disparities in technical between the two subsets over time.

|	Overall	Low Vol Stocks	High Vol Stocks	High-Low difference
TM1	**58.9%**	**13.1%**	**24.3%**	**11.2%**
Reversal Component	45.0%	10.7%	19.1%	8.4%
Factor Momentum component	49.3%	13.4%	29.9%	16.5%
Liquidity Shock Component	14.2%	4.5%	7.1%	2.6%
Seasonality component	18.9%	5.8%	9.7%	3.9%

But perhaps a more interesting partition is across *time* rather than across stocks. Here, we split the days in our sample into five groups based on the previous day's VIX values. In high-volatility regimes, the market neutral returns to TM1 are strongest, with a close to monotonic relationship, and with a performance difference between high- and low-VIX dates of 54% per annum.

Returns by VIX bin

Legend: Low, 2, 3, 4, High, 5 minus 1
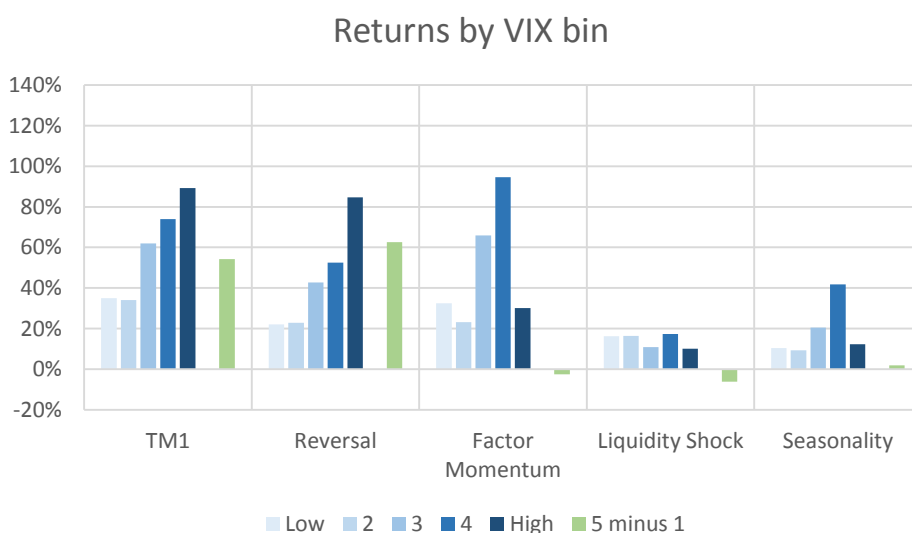
The difference in returns seems to be driven primarily by the Reversal Component of TM1, whereas the other three components perform similarly in low- and high-VIX environments.

Performance by opportunity set

Next we examine an alternative measure of volatility: the cross sectional standard deviation of returns across our universe on the previous day. We postulate that this is a better measure of the *opportunity set*, that is, the degree to which stocks are moving apart from one another and therefore the opportunity to profit when those divergences close. Taking the same approach, splitting our days into quintiles based on the cross sectional standard deviation, we see a much stronger monotonic relationship between high-opportunity and low-opportunity days. The difference in TM1 strategy performance is 99% per annum when measured by cross sectional standard deviation, nearly double the amount of differentiation versus using the VIX.

Returns by cross sectional SD bin

Legend: Low, 2, 3, 4, High, 5 minus 1
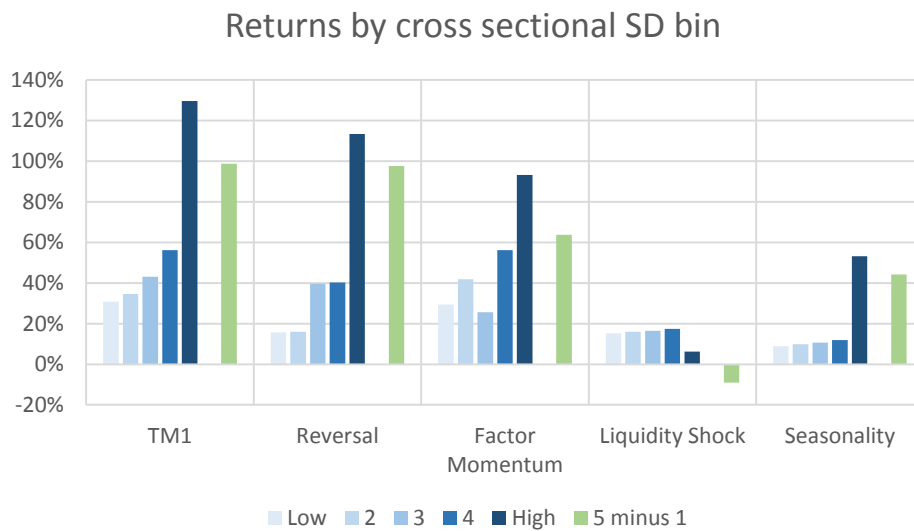
Furthermore, three out of the four subcomponents – all but Liquidity Shock (which is the only measure which does not use returns in its calculation) – demonstrate stronger differentiation in performance. Reversal and Factor Momentum, in particular, explicitly bet on stocks which have diverged – in the case of Reversal because their idiosyncratic returns have diverged, and in the case of Factor Momentum because some stocks with particular factor exposures have moved before others.

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The two measures

VIX and Cross Sectional Standard Deviation are closely related. In fact their time series are correlated at 46%:

Volatility and opportuntiy over time
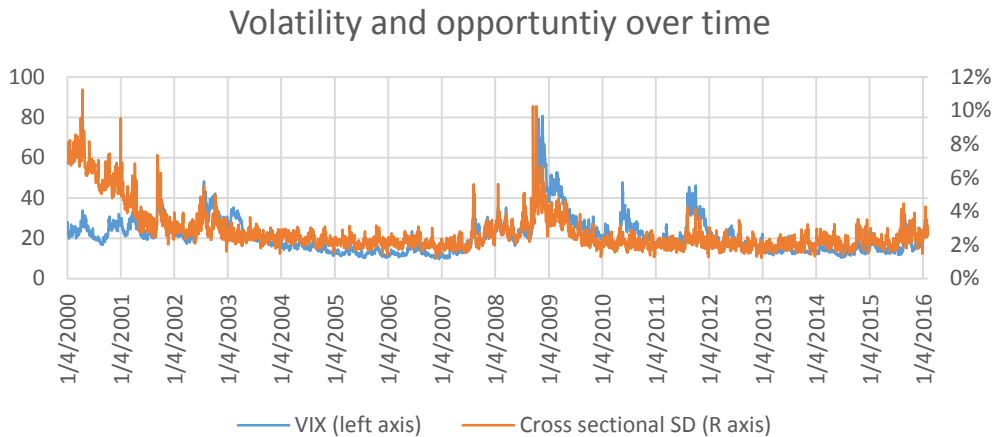
Therefore it is likely that the idea of stat arb strategies being "long volatility" is a misnomer. These strategies are long *opportunity*, and opportunity correlates to volatility. Opportunity will tend to increase alongside volatility, since to some extent both are expressions of investor uncertainty in which stocks are likely to perform well in the future.

Cross sectional standard deviation is also somewhat steadier over time; although both measures have similar time series autocorrelations out to 20 trading days, at longer horizons the opportunity measure is more stable. Therefore investors considering an allocation into or out of technical strategies can use today's value to better discern the likely longer-term performance of these strategies using the opportunity measure than using a volatility measure. Early 2016 has shown an uptick in the opportunity set measure, potentially a good sign for stat arb strategies.

Autocorrelation of opportunity measures