Everybody's Doing It: Short Volatility Strategies and Shadow Financial Insurer

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In this LongTail Research paper, Vineer Bhansali, CIO and Founder of LongTail Alpha, provides an overview of the ecosystem of volatility selling strategies. He defines the participants, highlights the connections between them and discusses features which can lead to an endogenously driven shock to markets if a sufficiently large number of investors simultaneously start believing in the same change of facts and all try to exit at the same time. Finally, he lays out potential scenarios which could cause simultaneous removal of short volatility positions and how they could reverberate through other markets.

Summary

- The financial markets are an organized system in which a group of distinct but interrelated components comprise the uniform whole. An ecosystem is an extension of the system which includes the special environment or external factors that surround the elements. To understand ecosystems, not only do we need to understand the elements, links and processes but we also need to understand the environment.
- Most ecosystems possess a "keystone species", a species on which other species in an ecosystem depend, such that if it were removed the ecosystem would change drastically
- To understand the ecosystem of market participants, it is useful to think of them lying in a hierarchical continuum, with the investment time horizon of each investor as the key scale parameter that demarcates their spot on the continuum, and the participants response to risk as the variable.
- Following are the participants in the volatility markets in order of longest time scale to shortest time scale:
  - Sovereign Wealth Funds
  - Endowments and Pension Funds
  - Large Asset Managers
  - Risk Parity Hedge Funds
  - Risk Premium Harvesters
  - Target Volatility Funds and Variable Annuities
  - Trend Followers
  - Volatility ETFs and ETNs
  - Wall Street Dealers
  - High Frequency Traders and Machine Learning Algorithms
- The longest time scale investors (SWFs, endowments and pensions) are "structural" sellers of volatility. Since they do not need to hedge their exposure, they are large suppliers of volatility in the market in exchange for which they earn a premium. Most of this volatility selling is through specific investments such as credit, asset backed securities or private equity ownership
- These longer investors do have downside optionality in their portfolio, but this has less to do with protection and more with generating liquidity in adverse market environments. These participants are the "steadiest hands" in the market and unlikely to turn into buyers of options except to cover their existing short positions under market stress, regulatory change or capital calls
- Large asset managers are defined as investors with time horizons of 3-5 years. Three to five years is the period of time most of these managers' clients assess their performance.
- Since non-linear option selling strategies are generally market neutral, in the short run such strategies look like they do not have any market beta; at least to linear risk models such as CAPM. To see this explicitly, assume that the option seller is selling both puts and calls simultaneously in a straddle, both of which has
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- essentially zero delta at inception to the underlying market and hence zero exposure to the beta of the market. The sale of options in this form does not add to the "beta" budget that many such managers work with. Unless a risk monitoring system has the metrics to measure nonlinear risks, the income they earn from selling such options can look like alpha of the manager and give them a performance advantage over their peers.
- Medium term volatility investors that follow risk parity strategies replace explicit volatility selling with "implicit" methods of selling volatility. They use volatility as an indicator for changing the portfolio composition. Since historically rising equity markets have been accompanied by falling volatility, risk parity strategies respond as if they are short volatility, i.e. they buy more equities as equity volatility falls to target their overall portfolio volatility at some predetermined level
- Risk premium harvesting funds is a catch-all for factor-based investment strategies. The idea is to harvest returns from earning risk premia. In research dating back to Stephen Ross in the 1960s, a world with risk averse investors and risk neutral investors, the risk averse investors will pay a premium for risk neutral investors to take on their risk. Implementation of this strategy, as popularized by Antii Ilmanen, takes each asset class and systematically sells options or option proxies in each asset class to earn this premium. Most of these strategies end up loading on volatility selling in one form or another as the explicit underlying variable, with Momentum and Value (or Trend and Carry) purporting to provide overall risk factor diversification
- Earning the term premium from the fixed income yield curve, or the dividend premium in equities, or the carry premium in currencies, or even the contango or backwardation premium in commodities are all strategies that originate from the transfer of risk from a hedger to a speculator
- Volatility targeters origin can be traced back to variable annuity providers and the need for regulatory relief following the financial crisis. The crisis exposed the equity market tail risk of many variable annuity providers and regulators required such providers to demonstrate that another such event would not create the same magnitude of financial distress. The providers have two choices. The first is to purchase long dated equity put options. However, this strategy is usually quickly discarded as too expensive. The other solution is to demonstrate the use of strategies that in a stochastic simulation would act like protective put options. The simplest such strategy is one that systematically sells equity index futures if volatility rises and buys the futures if volatility falls to target the overall portfolio volatility in a given range or target. Since the response function is driven by the change in volatility, this strategy is implicitly short volatility. By selling index futures for volatility targeting (if done by a large number of participants at the same time) futures will fall further which would trigger a further increase in volatility and another round of selling, etc.
- Work by Fung and Hsieh (2001) shows that trend following strategies' return distributions look like a long volatility strategy. Most trend followers target a certain level of overall portfolio volatility and are akin to volatility targeters. As the volatility of a market falls, they are able to scale up their positions since the weight of each asset class is determined by its trend and the inverse of its volatility. When volatility rises, which usually accompanies equity market selloffs, trend followers do the reverse.
- A group of shorter time horizon volatility investors have evolved with the democratization of financial research on the volatility premium and the growth of ETFs. ETF providers can now package esoteric strategies into securities that trade on stock exchanges. The shorter the horizon of an option, the more expensive the option trades relative to its actuarially fair value since there is a "lottery risk" component to short dated options and the seller of such options charges a risk premium. It's not feasible for most investors to sell large amounts of naked calls and puts to harvest this volatility or "lottery risk" premium. But the development of the VIX futures market has made it possible for such investors to obtain this exposure. The price of the VIX futures are the market's clearing price for the VIX at some future date, and the VIX itself is the price of 30 day options. So selling VIX futures is a way to sell implied S&P 500 option volatility at some future date. Under normal circumstances, the term structure of the VIX is upward sloping, thus selling VIX futures creates not only a short volatility position, but also a "roll down" as time passes. The allowance of the use of derivatives in ETFs and ETNs provides new participants to the short options market. Many view this as a source of alternative exposure even though it is not truly an alternative exposure since volatility is inversely related to the returns to the stock market. So an inverse

- volatility ETF is basically a turbocharged version of volatility selling and equivalently a turbocharged version of long equity index markets. To see this, note that as the equity markets rally, short term volatility falls while longer term volatility stays high due to purchase of insurance by risk averse investors
- An inverse volatility ETF not only sells volatility, but also rolls down the volatility curve, thus earning a triple benefit as the market is rallying: a long equity exposure, a short volatility exposure, and a roll down benefit
- Wall Street Dealers, as intermediaries, have been the temporary bid to the selling of volatility by all the other participants discussed above. Due to the substantial time decay that accompanies long volatility positions, it is safe to assume that dealers typically look to "lay off" their positions or manage their positions by other portfolio positioning. But in a secularly declining volatility market this would mean locking in losses. So it appears that the dealer hedging is being done by selling deeply out of the money options against an inventory of closer to at-the-money options.
- High frequency traders make their living by "scalping" between bids and offers. The more volatile the markets, the more benefits should accrue to these investors. As volatility rises, the need for liquidity forces liquidity seekers to execute through market orders, which results in the bid-offer spread accruing to the market makers. Thus, high frequency traders are naturally long volatility, or at least long gamma. In order to generate the same profits in markets with falling realized volatility, market makers have been forced to make larger markets on tighter bid offer spreads in order to make back their fixed costs. In other words, they are acting as if they are short volatility in order to stay in business and market conditions of low and falling realized volatility has made them work against their own long volatility posture
- The largest implicit volatility sellers in the market with a truly infinite time horizon are the central banks. In the aftermath of the financial crisis, central banks have made an implicit promise through their behavior that they will provide a perpetual "put" against a rapid selloff in the markets. Whether true or not, the belief that the market participants have in that promise is sufficient to keep a lid on volatility as long as the market believes the promise is alive, which is a good example of an endogenous structure emerging within the market ecosystem.
- Central bank suppression of volatility has suppressed the way by which markets transmit information, and when information is lacking, it is perfectly rational and optimal for agents to imitate other participants' short volatility posture, which leads to the herding behavior described above
- Some salient features of the ecosystem that are relevant for anticipating how they are likely to perform in aggregate
    - ***Mechanics of Implementation Seem Different***: Everyone knows that everyone else is selling volatility. But each participant believes that they have an edge or a specific mechanism to control downside risk
    - ***Low Yield Levels Generate Need for Income***
    - ***Academic Research Supports Risk Premium Harvesting***
    - ***Correlation Assumptions Between Asset Classes and Levels of Volatility are Assumed Stable***: An inverse correlation between market returns and volatility changes underlies most algorithms
    - ***Low Realized Volatility Provides Support for Selling Options***
    - ***Volatility Selling Meets Asset Class Diversification to Broaden the Scope of Volatility Selling***: One of the most important developments of the current era of volatility selling strategies is how wide spread they are across assets. This has resulted in a collapse of implied volatility across all assets
    - ***The Behavior Shows All the Hallmarks of Self-Similarity***: Regardless of a short volatility investor's time horizon, the main driving factor is identical. In most cases, the leading order of dynamic rebalancing mechanism is riven by the inverse of volatility. Thus, one can assume that if there is a volatility shock, each component of the ecosystem will respond coherently in the same direction, thus amplifying the behavior of the system.
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  - ***Participants Stay in the Strategy Despite Increasing Risks that are Clearly Visible***: 3 reasons: Low yields, the need for relative performance to peers, and increasing rates of return as the hazards increase
- Following are a few common hallmarks that accompany historical deep market corrections. These hallmarks are likely necessary but not sufficient conditions for "crashes"
  - ***A Very Visible Rally (or Selloff)*** in the preceding few years that defies expectations yet is extrapolated to another few years as participants become conditioned to the trend.
  - ***A Large Corrective Policy Move***, usually late, from the government, usually the central bank, in the form of sudden monetary policy or regulatory change after a long period of no change
  - ***An Unexpected Non-Market Catalyst*** that is initially surprising but then is interpreted as a major change by a large number of participants
  - ***Financial Market Innovation Driven to Excess***
  - ***A Recalibration of Correlations and Liquidity*** within and across assets.
  - ***Large and Significant Drawdowns and Draw-Ups that Usually Continue for an Extended Period of Time*** in a serially correlated fashion as risk reduction moves up the time horizon pyramid as discussed above
- These factors seem to have been repeated in each market correction in 1907, 1929, 1987, 1994, 2000, 2008 and 2010. However, simply having these conditions in place is no guarantee of a large move in the market and there are examples of many false signals as well
- If we compare current market conditions to the conditions prevalent during 2008, we find a number of parallels
  - Low levels of volatility, some such as interest rate volatility, are lower now than in 2007
  - In 2007 there was the prevalence of structured investment vehicles (SIVs) which were blamed for the unwind of credit leverage. SIVs are commonly referred to as "shadow banks" because they borrowed short and lent long. They captured both the term and credit spreads. What precipitated the SIV's unwind was the severe price decline in the collateral (the housing market).
  - "Shadow banks" have been replaced with "shadow financial insurance companies". When an investor sells an option, whether directly or through a pre-packaged product, the investor is essentially selling insurance against large market moves. In a world where one cannot see volatility rising, just as one could not see housing prices ever going down, it is perfectly rationale to operate such an insurance selling operation. In fact, it makes sense to operate as a multi-line insurer, selling insurance across all asset classes and maturities.
- What could spark a material correction
  - If something well ingrained in the risk rebalancing models changes significantly, many volatility-driven models can be put into disarray. This can happen for instance, if the relationship between returns to the market and volatility levels switches signs. Or if the correlations between equity market returns and bond market returns change
  - There are reasons to believe, like with investment trusts in the 20s, portfolio insurance in the 80s, and synthetic CDOs in 2008, that systematic selling of volatility for yield enhancement is beginning to reach extremes that might eventually be identified as a good innovation that "went bad". The spectacular performance of inverse volatility ETFs should bring back memories from the past about similar product innovations that went sour.
  - A real risk today is that for some unforecastable reason, volatility and fear rise and create a set of cascading shocks that result in ultimately the equity markets falling as the readjustment mechanism. This could play out by some event occurring that creates a large amount of uncertainty. It could be an event that is negative for the markets or positive for the markets. What is important is that it is unexpected and creates uncertainty. This could cause a large shock to the VIX or to the volatility of interest rates. This could result in systematic volatility selling strategies to back off from selling insurance or maybe even buy back their insurance contracts at a higher price for safety. The provider of the packaged insurance security (the inverse volatility ETFs and ETNs) would then buy back the VIX futures or the

short volatility derivatives. As the expectation of VIX rises, arbitrageours would bid up the prices of the options. Then, a number of mechanical strategies that use the VIX as a major input parameter such as volatility targeters, trend following investors, risk parity funds and others that are in many institutional portfolios would be triggered to reduce their exposure as per their design specifications and rules. This would put pressure on the equity index futures markets which then, by the mechanism of arbitrage, would force actual selling of index stocks. As the stocks sell off, other markets such as high yield, corporate credit, etc. would start to feel the impact forcing liquidation from holders of credit. As credit becomes less available, further liquidations happen.

IMPORTANT DISCLOSURES

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