Volatility Trading: VolContracts™ Jump into the Mix

To this day, vehicles to gain exposure to the volatility of an asset are few and both limited in nature and in some cases, imperfect in design. The advent of exchange-traded VolContracts™, to be listed on The Volatility Exchange, will offer a competitive alternative.

Overview of Existing Products

In these highly volatile times, traders, speculators, and hedgers alike might, upon occasion, wish to gain direct exposure to the volatility itself of an underlying asset. While such a desire seems straightforward, in practice, it has not always been easy to obtain such exposure. This article explores three of the most common manners by which traders currently gain exposure to the volatility of an underlying asset: Volatility and Variance Swaps, Delta-Neutral Hedging of Options Straddles, and VIX® Futures. We shall then discuss a new instrument, VolContracts™, to be traded on the soon-to-be-established Volatility Exchange.

Two Principal Kinds of Volatility

Before examining the products themselves, it behooves us to distinguish between the two main varieties of volatility that are commonly traded by the financial and investment communities: realized volatility and implied volatility.

Realized volatility is defined as the annualized standard deviation of the continuously compounded returns of an asset. In essence, it is an expression, determined by a mathematical formula, of the tendency of the underlying to display movement, regardless of direction. Traditionally, this movement is measured by using close-to-close (interday) settlement prices, although it is entirely possible to capture intraday readings, as well. Realized volatility is often referred to as historical, or asset, volatility.

By contrast, there is no straightforward formula for calculating *implied volatility*. We don't really *calculate* implied volatility as much as we *observe* option volatility, or a volatility index, such as VIX, designed to represent the implied volatility of an array of options. Since a volatility estimate is required as one of the inputs into the Black-Scholes option-pricing model (for options on stocks), the Black Model (for options on futures), or any other model, if, instead, we suppose that the observable market *price* of the option is an input, we "trick" the options model into furnishing the option volatility assumption that was used to price the option in the first place. In essence, we obtain the option's implied volatility by running the option model "backwards".

So, the best answer to the question, "What is implied volatility?" is: the volatility that one would have to input into the options pricing model in order to arrive at the current option price.

Volatility and Variance Swaps

To date, there has been only one vehicle by which an investor may gain exposure to "pure" realized volatility, and that is the volatility swap and its closely related counterpart, the variance swap. These instruments are not really swaps, as there are not two different payouts that are being exchanged, or "swapped". Rather, the investor simply receives from the provider the formula-derived volatility of a specified underlying asset, over a designated time period, and with reference to a beginning "strike price", or benchmark volatility.

Although the volatility swaps' concept is rather straightforward (see box), there are several drawbacks to using them. First, there is no access for retail traders, as, typically, swaps are traded on very large notional amounts. This restriction also becomes problematic when one contemplates using a volatility swap to trade on "all" assets. And, whereas such swaps might very well be suitable for investment banks and institutions, they are considerably less so for market-makers looking to hedge volatility exposure, as swaps may be difficult to execute quickly and at favorable prices with the sell-side counterparty.

Furthermore, there is no public quote for volatility or variance swaps, and, as such, they are subject to the credit risk of the issuing agent and have neither transparency nor a ready method for price discovery. Let us note in closing that *variance* swaps, which reckon the *square* of volatility, or the variance of the underlying asset, pose all of the same challenges as volatility swaps, with added volatility due to the exponential nature of the variance calculation itself.

> Suppose, for example, that a speculator or investor felt that the Euro, whose current three-month volatility is about 11% annualized, was going to become more volatile over the coming three months. Such an investor might purchase a three-month volatility swap, with a starting, or reference, strike of, say, 11.50 (percent). A notional value is established, such as $100,000 per volatility point, and the two counterparties to this typically over-the-counter transaction agree to settle, in three months, according to the actual volatility that the Euro goes on to display over the designated time period.
> If, for example, Euro volatility, as measured by the traditional standard-deviation formula, turns out to be 13.50, the underlying's volatility has surpassed the 11.50 strike by two points, and the holder of the swap is entitled to 2 × $100,000, or $200,000 from the issuer, upon settlement. Conversely, if the Euro exhibits less volatility over the time period than the 11.50 reference, say 9.00, the swap holder must remit (11.50–9.00) × $100,000, or $250,000, to the issuer.

Delta-Neutral Options Hedging

In the listed markets, the time-honored approach for attempting to capture the realized volatility of an asset has been to buy or sell, via the use of options, an at-the-money (ATM) straddle (one call and one put) whose expiration matches the period over which one wishes to be exposed to the underlying's volatility, and then to manage the position with "follow-ups" designed to maintain "delta-neutrality".

As the traded options are transacted at a certain implied volatility, that value serves the same function as the strike price in our swaps discussion. In theory, as the options trader adjusts his or her "deltas", or share exposure of the options, on, say, a nightly basis, those trades are designed to "capture" the actual volatility that the underlying asset is displaying. This dynamic process is repeated throughout the holding period of the straddle and is driven by the very movement of the underlying that the hedging activity is designed to capture. If that volatility turns out to be greater than the implied volatility of the original transaction, the straddle buyer will usually profit, while the seller would lose. Conversely, the straddle seller, who is looking for lower volatility than what he or she sold to establish the position, will hope that the subsequent follow-up transactions will be sufficiently limited so as to permit a profit from an asset volatility that is lower than that sold to initiate the position.

While straddle trading has several attractive features that OTC swaps do not, the former is not without considerable drawbacks of its own. Using options to capture an asset's volatility will clearly appeal to market-makers and institutional clients, who will appreciate not only the transparency that comes with an exchange-traded vehicle (no credit risk), but also the speed and relative ease with which the transaction may be effected. In addition, such volatility trading can, in theory, be achieved for any asset on which listed options are available.

But straddle trading is not without downsides. To start, the concept is complicated and requires knowledge of options sensitivities, such as delta, gamma, vega, etc. Retail traders may not feel up to the task, and portfolio managers may shun a method requiring constant monitoring and frequent trading. Those who do engage in the practice are often frustrated by the inconsistent marking policies of the options themselves, which may lead to annoyingly large swings in daily mark-to-market P&L. And, in illiquid markets with wide bid-offer options spreads, the transaction costs for follow-ups, "rolling", and overall position management can be quite high.

Finally, the use of options straddles does not always achieve what it sets out to do. There is a "path-dependency" component to the process that often prevents the trader from actually receiving the very volatility that he or she seeks. In essence, for the purpose of straddle trading, identical final volatility values for the underlying, even if determined by the same formula, are not necessarily captured in equal fashion by the delta-neutral-hedging technique, and so, the method cannot always be relied upon to provide the "pure" volatility exposure that it purports to capture.

VIX Futures

So far, our discussions of volatility trading have centered upon realized, or actual, asset volatility. The second variety of volatility, implied, is addressed by listed VIX futures and options.

The Volatility Index, or VIX, for short, was created by the Chicago Board Options Exchange (CBOE) and seeks to measure a weighted average of the implied volatilities of a wide range of options traded on the Standard & Poor's 500 Index®. This so-called "fear gauge" is often cited as a barometer for the aggregate sentiment of the investment community on future directional movement not only of the *volatility* of the broad stock market, but also of the market itself, based on the strong negative correlation between equity volatility and price movement.

Futures contracts on the VIX trade on the Chicago Futures Exchange (CFE) and, therefore, enjoy some of the benefits of transparency, exchange-trading, and price discovery that have been mentioned above. Still there are some key problems with VIX. As VIX futures expire not to a calculated, or real, volatility, but rather to yet another forecast, or implied volatility, traders can never be sure of capturing, via their VIX investment, the actual volatility that the underlying displays. Instead, the trader is obliged to speculate on what the sentiment of others will be, at the time of expiration, as to the *future* volatility of the underlying – a very tenuous exercise, at best. What's more, due to several complex pricing mechanisms, VIX futures themselves do not track well the underlying VIX Index, and several scholarly articles have documented these mistrackings of futures compared to the cash index.

Retail traders are often disappointed by the above phenomenon, as they do not always receive from the futures the same change in volatility that the Index itself displays, while market-makers and institutions are hesitant to risk large amounts of capital on what amounts to no more than a future forecast of *implied* volatility. The arcane formula by which the actual VIX determination is achieved is off-putting to many, and critics have cautioned against the possibility of market manipulation, as the final settlement price of the futures is subject to a special opening quote that depends, to a certain extent, on the liquidity of the S&P 500 options. Yet, VIX futures provide the only current instrument for trading implied volatility.

VolContracts™

In this environment, a new financial exchange is being launched comprising a futures and a securities component. The Volatility Exchange will offer VolContracts™, futures-like instruments whose settlement will be based on the realized volatility of an underlying asset, instrument, or index.

Available in various durations, they will expire to the actual close-to-close volatility displayed by the asset, as calculated by the Vol Formula, a traditional standard-deviation formula.

Calculating Realized Volatility

The formula to settle any VolContract™ on its expiration day is the following:

$$\text{Vol} = 100 \bullet \sqrt{\frac{252}{n} \sum_{t=1}^{n} R_t^2}$$

For the first time, market participants will have access to a *listed* realized-volatility product that can be traded on all assets, with the added benefits of low execution costs and ease of calculation. Such an instrument is aimed at a broad range of investors, spanning from retail traders to investment banks and institutions, and, especially, portfolio managers, as a powerful, new risk-management tool.

Indeed, it has been demonstrated that an overlay of a volatility product, such as VolContracts™[1], to a traditional equity portfolio may substantially reduce the overall volatility of the holdings while having only a very slight negative impact on actual returns. The result often can be an increased Sharpe ratio, a vital measure of the risk-adjusted returns of a portfolio.

VolContracts™ should be available on selected assets during the first half of 2011. The Volatility Exchange intends to outsource its around-the-clock trading execution, clearing, compliance, and surveillance functions and to partner with established marketplaces globally.

Features	VolContracts™ (realized volatility)	VIX® Futures (implied volatility)	Volatility & Variance Swaps (realized volatility)	Delta-Neutral Hedging (realized volatility)
Expires to actual, or realized, volatility or variance	✓	X Expires to a forecast	✓	X Path dependency does not provide "pure" volatility exposure
Appeals to retail traders	✓	X Does not necessarily react to changes in realized volatility	X No access	X Too complicated
Appeals to option market-makers	✓	? Available on only a few equity indices, and not an effective hedge	? May be difficult to execute quickly and at favorable prices	✓
Appeals to investment banks and institutions	✓	X Not willing to risk capital on forecasting a future forecast of volatility	✓	✓
Appeals to portfolio managers	✓	X Not liquid enough	? Losses can be extreme for variance swaps	X Requires constant monitoring
Exchange-traded (regulated with no credit risk)	✓	✓	X Subject to credit risk	✓
Not subject to market manipulation	✓	X Special opening quote that depends on liquidity	✓	? Large swings in P&L possible due to inconsistent marking policies
Transparency and price discovery	✓	✓	X No public quote	✓
Could be traded on all assets	✓	X Only on very liquid option markets	? Must be traded in large size	✓
Easy to calculate	✓	X Formula is complex and cannot be verified without fee paid for data feed	✓	X Calculation requires execution prices and commissions for each transaction
Execution costs low	✓	✓	? No direct expense, but execution price may not be favorable	X Market spreads and commissions on all legs and follow-up trades

Conclusion

Several instruments exist that allow investors to gain exposure to, or to hedge, volatility. While swaps and options straddles capture realized volatility, the former are OTC instruments not readily available to the general public, while the latter do not always reflect the actual volatility of the underlying. VIX futures reflect a sentiment and are intended to represent the aggregate implied volatility of S&P 500 options, but the futures often mistrack the underlying cash, and some investors are left wanting when the futures expire to yet another forecast, as opposed to a concrete calculation.

VolContracts™ seem to respond well to all of the shortcomings of the above products and should offer an easily traded, exchange-listed instrument that settles to realized volatility, while appealing to a wide array of market participants.

Donald Schlesinger is currently the Vice Chairman and Chief Strategy Officer of The Volatility Exchange Group. Before this he was an Executive Director in Morgan Stanley Dean Witter's Worldwide Equity Derivatives department. Some of his responsibilities at the firm included: Derivatives education and training, establishing and perfecting risk-management techniques and systems for global equity derivatives, and managing the proprietary options book.

Robert P. Krause is currently Chairman and Chief Executive Officer of The Volatility Exchange Group. He was also a senior member of staff at Event Capital Markets, Zurich Capital Markets, Mitsui Commodities, Morgan Stanley, and the Chicago Mercantile Exchange.

1 (http://econ.duke.edu/uploads/assets/dje/2008_Symp/Sloyer%20Tolkin.pdf)