VolS

Volatility Strategies

VolX®

The Volatility Exchange

Volatility Hedging — Turn Up the Static!

Until the advent of VolContract® brand of futures-like instruments on realized volatility, the only way to offset some of the gamma and vega (also known as kappa) risk of an options book in a listed instrument was to trade more options. For a market-maker, crossing the spread to execute feels like "throwing money away." This is because the essence of market-making is to buy as close to the bid as possible, sell near the offer, and then manage the risk of the book, via hedging, to capture the small advantage.

VolContract futures, as we shall see, can play a major role in this hedging activity. However, even if it provided the best hedge possible, at present the VolContract futures market is in its infancy and not very liquid, which makes it difficult to use the product in a cost-effective manner for dynamic hedging.

"Static hedging may be the answer."

Static hedging may be answer. For all the below reasons, a static hedge may be preferable to a dynamic one:

- Easier to manage (put on the position, then hold until expiration)
- Considerably less costly (no additional transaction fees)
- Guaranteed exit (expiration)
- Placing a simple limit order into the market often stimulates other market participants interested in taking the other side
- Block orders available (often large order size can get executed efficiently and effectively)

Obviously, there is a trade-off. If one is unable or unwilling to adjust the hedge as needed, the result is a hedge that is less than optimal. The question becomes: how much less optimal than a dynamic one would a static VolContract futures hedge be?

Issue # 2

$$\sqrt{\frac{252}{n}\sum_{t=1}^{n} R_t^2}$$

The Volatility Exchange Corporation, a Delaware Corporation, plans to apply for contract market designation to the CFTC and for approval of its financial instruments. VolContract® is a registered trademark and The Volatility Exchange™ is a trademark of The Volatility Exchange Corporation in the U.S. and other countries. VolX® is a registered trademark of The VolX Group Corporation in the U.S. and other countries.

“VolContracts futures ... are designed to hedge both the vega and gamma risk of an options book.”

Delta-Hedging
It is a well-known and practiced technique to hedge the directional exposure of an options book with the underlying. Known as delta-neutral hedging, the strategy involves calculating the net delta of all positions in the book and then offsetting that value with an equivalent and opposite delta position in futures.

Options prices, with respect to the underlying market value, are represented by a curved function, while futures prices vary linearly. Calculating the delta is, therefore, equivalent to establishing the tangent to the curve. But, that “perfect” hedge is available only at one point on the curve. As soon as the market moves, there is a new tangent line that no longer matches the perfect hedge that was established earlier.

Gamma
Obviously, if the options curve is nearly flat, or linear, then the hedge can remain over a wide range of underlying prices, without adjustments. However, if the curve is more pronounced, frequent adjustments to the hedge may be required. The measurement of the amount of potential adjustments needed is the gamma. Gamma cannot be hedged with the underlying.

Vega
Another risk factor is the tendency of the entire curve itself, or specific portions of the curve, to rise or fall with a change in the estimate of future volatility. This exposure is known as the vega — the change in the price of options due to a change in implied volatility. Thus, gamma is the rate of change of the tangent to the curve (the delta), while vega is the shifting of the curve up or down, as options prices vary with implied volatility. Vega cannot be hedged with the underlying either.

VolContract Futures
VolContract futures come to the rescue! These instruments, recently listed on the CME, are designed to hedge both the vega and gamma risk of an options book.

Simulation
With the above terms defined, let us now consider the results of a simulation to determine how well VolContract futures can hedge the risk of an options book. We first examine the basic parameters and various scenarios of the study, and then consider some further assumptions.

Basic Parameters
In this simulation, we assume that a market-maker gets hit on 800 offers to sell options in Euro FX options with approximately three months remaining until expiration. The 800 options come from selling 100 each of four different strikes in both calls and puts. The strikes are approximately 2 cents and 6 cents above and below the current market. Those strikes were sometimes adjusted if there were no data or trading in a particular strike. Three scenarios are run for each quarterly simulation.

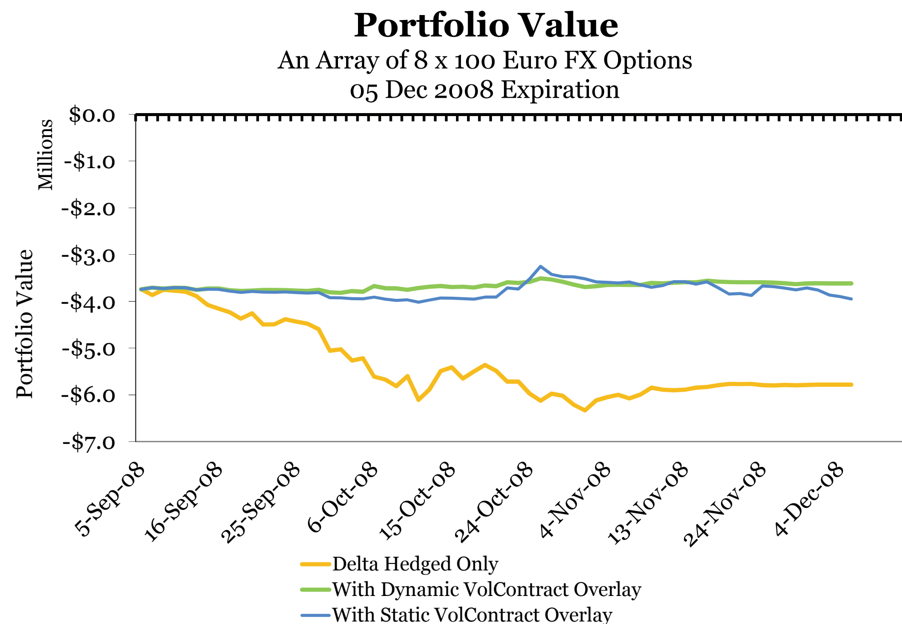
Three Scenarios
The first scenario is to delta hedge the options book. Nearly every options market-maker delta hedges in order to reduce the directional-risk component of outright options positions. This will serve as our baseline portfolio (yellow plots).

Scenario number two is to hedge both the vega and gamma risk of that book with VolContract futures in a dynamic process that adjusts the number of contracts each day for the changing market conditions. In theory, this should be the optimal hedging scenario (green plots).

The third scenario is to enter into a volatility hedge using a static number of VolContract futures. Obviously, the vega and gamma hedges will no longer be as effective as they would be if the "perfect" hedge were recalculated on a daily basis. Thus, it is clear that, if we are not implementing an optimal hedge each day, the overall hedge to the options books is diminished. The question is, by how much? And the answer, of course, is "it depends," as each unique market scenario leads to its own unique set of results. However, running the simulation over a number of years provides representative data that should give us insight into the effectiveness of the static hedge (blue plots).

Further Assumptions

Theoretical value of the VolContract futures is defined as the root-mean-square of the to-date realized volatility (the Partial Realized Volatility, or PVOL™) and the implied volatility of the at-the-money (ATM) options. We also assume that all positions are held to expiration; that is, the market-maker cannot trade in or out of the options positions, but must manage the exposure with only the underlying futures and the new VolContract futures.

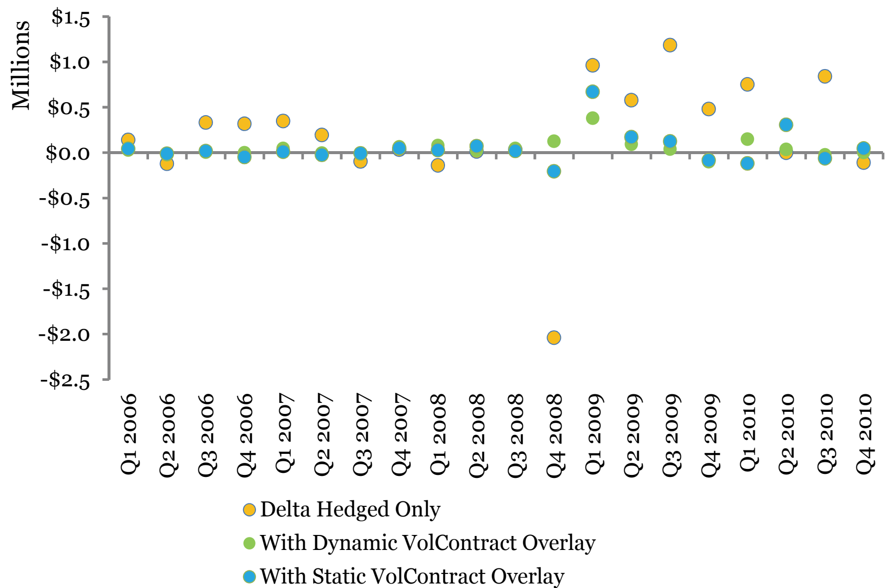


The first chart, above, shows the changing portfolio value for the three scenarios using the market break of Q4 2008 as an example of a market under stress. Notice how a delta-hedged portfolio incurred significant losses, in this example, over $2 million, while the dynamic VolContract futures overlay gained $125k, and the static VolContract futures overlay lost $208k. The daily standard deviation (s.d.) for the delta-hedged-only portfolio was $157.7k, while the dynamic and static VolContract futures hedge overlays had a s.d. of $31.6k (79.9% further reduction in risk) and $73.4k (53.4% reduction), respectively.

"The third scenario is to enter into a volatility hedge using a static number of VolContract futures."

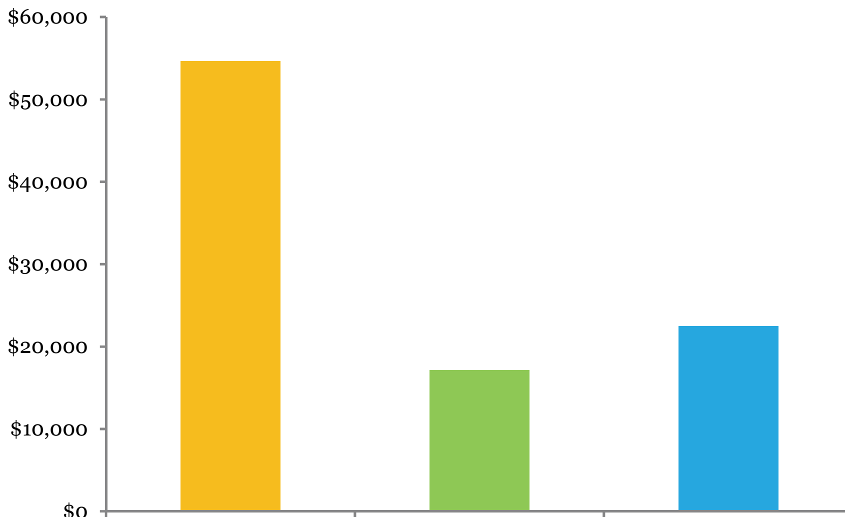
During the market break of 2008, significant losses occurred to those delta hedging a short options portfolio.

Of course, the value of a VolContract futures overlay during an extremely volatile market period, such as the one just studied, should be expected. But how will the strategy fare during other, less chaotic, periods? The two charts displayed here consider a full five years of data, broken down into 20 consecutive quarters, during which a three-month VolContract futures (3Vol™) overlay was employed, again, both dynamically and statically. The results are impressive.



To the right, and above, the net quarterly profits of the total portfolios are displayed. Note the considerable dispersion of results around zero for the delta-hedged-only options book, compared to the extremely stable results obtained via the VolContract futures overlays. Options market-makers should take great solace in a methodology that could so effectively smooth out the P&L swings of their books.

Finally, we consider, in bar-graph form, the summary statistics of the three approaches to hedging ("Daily Risk").



An original portfolio of 800 options, representing on average $3.4 million of sold time premium, was established in each of the 20 quarters. The average daily s.d., without a VolContract futures overlay, turned out to be $54.6k. The addition of a dynamic VolContract futures hedge decreased that s.d. to $17.2k, a 68.6% further reduction. Finally, a static VolContract futures overlay brought the average s.d. for the five-year study to $22.5k, or a 58.9% further reduction.

It is interesting to note how effective the static hedge is in reducing risk in the past five years, providing almost 86% of the efficiency of the dynamic process, with, of course, lower transaction costs and effort.

For more information
www.VolX.us
Info@VolX.us
1-888-VolX-Corp (865-9267)

Subject to change. Details vary according to the underlying asset. The rules of The Volatility Exchange Corporation, when adopted, may not be consistent with the above strategies. The information provided herein must not be relied upon and The Volatility Exchange Corporation and The VolX Group Corporation will not be liable for actions taken or not taken in reliance thereon. The strategies are for informational purposes only and are purely hypothetical. Interested parties should independently verify the data, seek professional advice, and draw their own conclusions regarding the benefits and risks of any strategy and the legal, regulatory, credit, tax, and accounting implications with respect thereto. Statistical results have certain inherent limitations. Such analyses are based on subjective assessments and assumptions and may use one among several alternative methodologies. Other methodologies may produce different results. Accordingly, such statistical analyses should not be viewed as facts and should not be relied upon as predictions of future events or results.