RealVol®

Strategies

Issue #

1

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Demand Derivatives Corp.

Four-Wheel Drivers of Volatility

There are four primary drivers of volatility (both implied and realized). Two are generally longer-term effects (mean reversion and autocorrelation), while two are often short-term in nature (shocks and relief).

1. Mean Reversion — The tendency for volatility values to move toward their long-term average, or mean.
2. Autocorrelation — The observed propensity for volatility values to remain near where they have been in the recent past.
3. Shock — The change from a lower-volatility environment to a higher one, typically because of the occurrence of a significant, unforeseeable event.
4. Relief — The shift from the regime of a significant anticipated event, and the immediate aftermath, back to "normal."

Mean Reversion

Mean reversion is the term used to describe any dynamic process that tends to revert to its long-term mean, or average. Volatility has historically shown this tendency. Some would describe the mean-reversion process as similar to a rubber band being stretched. When it gets far away from its resting state, the band "snaps back."

One way to measure how far volatility is straying from its mean is to construct a "volatility cone." The RealVol version of a volatility cone (RealVol Cone) shows the extreme values, along with the percentile rankings at various points, which are then plotted on a monthly basis going back over several time periods (we display one year in this article). The typical shape of this plot is a cone — essentially with the widest range of volatility values at the 1-month calculation period, and a progressively smaller range out to 12 months (the RealVol Cone on the following page is based on the SPDR® S&P 500® ETF, symbol SPY).

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

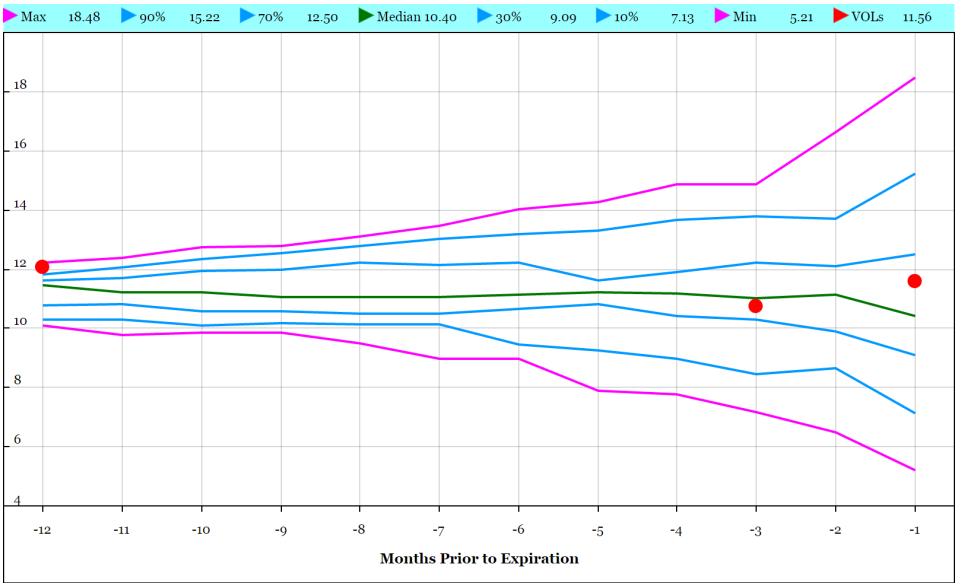
"Some traders find it much easier to predict future volatility levels than to forecast directional moves, making volatility trading a potentially strong candidate for inclusion in an investor's portfolio."

RealVol Cone

To create a RealVol Cone, as a first pass, take 21 trading days of historical data (approximately one month) and calculate the realized volatility over that period. (At RealVol LLC, the RealVol Daily Formula is used for all daily realized-volatility calculations.) Repeat the same process for each day in the sample period. After collecting all of these 21-day volatilities, sort from lowest to highest. Upon sorting, the proper volatility reference values can be found by taking the readings found at the various percentile cut-off points.

For example, if there were 10,001 sorted volatility values from lowest to highest (each one using 21 days of historical return data), take the first one as the lowest extreme, take the 1,001st value as the 10th percentile, the 3,001st value as the 30th percentile, the 5001st as the median, etc. The next pass includes going back through the same returns data, but this time increasing the measurement period from 21 trading days of rolling data to 42 days (2 months). Sort, then recalculate the percentiles as above. Subsequent passes are made for progressively longer periods of 63 trading days (3 months), 84 trading days (4 months), …, and 252 trading days (1 year).

RealVol Cone on SPY — 1-Year Lookback



Warning

This is just a sample. Of course, the current volatility cone may be different. Please visit realvol.com for an updated RealVol Cone chart. There is nothing to suggest that the highest or lowest extremes are *the* "maximum" or "minimum" that could ever be experienced going forward. Remember that RealVol Cones are created from historical data. The future has not yet been written and has a way of offering up the unexpected at times. However, it is also interesting to note how stable the RealVol Cones have been over the years.

Autocorrelation

Autocorrelation is the tendency for recent past prices to influence future prices. In other words, high volatility often begets further high volatility, and low volatility begets low volatility. On the surface, this phenomenon would appear to be contradictory to the notion of mean reversion (high volatility has a tendency to fall, while low volatility has a tendency to rise). How can these two apparently opposite concepts coexist?

A real-life example is in order: The temperature in the summer is high; the temperature in winter is low. Even though there is a recurring pattern, we still check the weather report each day before venturing outside because any particular day's temperature may stray from what is expected. However, while the current temperature can change, it won't change "dramatically." This means that in the middle of summer, we won't see temperatures below freezing. High temperatures in summer beget more high temperatures (autocorrelation), while there is a long-term tendency for those same high temperatures to fall toward the mean through the late summer and autumn (mean reversion). In essence, autocorrelation and mean reversion *can* coexist peacefully!

Shocks

Having shown how two seemingly opposite concepts can work together, there is yet another idea that may appear contradictory to both — shocks. Shocks can occur anytime. Essentially, a shock is an unknown event that surprises a market — prices jump, options premiums soar, and if there were a RealVol futures contract available on that asset, its price would probably spike higher as well. Depending on the severity of the shock, an event could have the power to move volatility from a lower regime to a higher one literally overnight.

"...a shock is an unknown event that surprises a market ."

Relief

We call the opposite of a shock "relief." In this case, there is a known event on the horizon, but with an unknown outcome. In such a case, implied volatility often rises into the event while realized volatility typically falls. After the event, implied volatility often collapses while realized volatility can at times jump. (As soon as it is perceived that the underlying has made its move, everything returns to "normal," thus providing the expected "relief.")

Strategy

Even the best money managers have losing trades. The trick is, generally, to have more winning trades than losing ones. We say "generally" because the proportion of winners to losers is only half of the equation. One must also take into consideration the amount won on winning trades versus the amount lost on losing trades. For the moment, let's assume that a trader wins roughly the same amount on winning trades as that lost on losing trades. In this case, the trader needs only a greater percentage of winners to losers to be profitable. Many would agree that a "good" trader is one who manages 55% winners. A "great" trader may approach a 60% success rate. Yet, it may be possible to get a higher success rate trading volatility rather than direction.

Using the Volatility Cone

Can the RealVol Cone be used to increase the odds of a winning trade? If the trader wanted to enhance his winning percentage to, say, 70%, he would simply consult the RealVol Cone at the 70th percentile for the corresponding value. If history is a guide, then there is a 70% chance that the coming one-month realized volatility will be lower than this indicated value, and a 30% chance that the volatility will be higher.

In this particular case of the SPY RealVol Cone one-year look-back period shows that selling RealVol Futures at a value of approximately 12.50 should yield the approximate 70/30 win-loss ratio for the seller. If all data is used (since SPY has been in existence, which began in 1993), the 70% level would be at 19.15% (not shown, but available on the web site).

However, this is not the entire story. As mentioned earlier, one needs to look at the magnitude of profit on winners and the amount lost on losers. The extreme values (pink lines) help in this regard. If the extreme (top pink line) is much higher than the 70th percentile (second blue line from the top), then there could be a large loss possibility even though the actual number of losing trades is small (again if history is a guide). One way to increase the odds in the investor's favor is to sell at a level above the 70th percentile, perhaps even closer to the 80th or 90th percentiles. Of course, there will be fewer traders willing to take the other side of that trade, and the opportunities will be less frequent, but if successfully executed, this should increase the odds in the investor's favor while simultaneously reducing the magnitude of loss on losing trades.

The final piece of the puzzle is to use Shock and Relief to the trader's advantage. These two pressures on volatility can come from either known or unknown events. Often, these events are the catalysts needed to push volatility to levels that afford the potentially high-winning-probability trading opportunity.

Summary

Predicting volatility changes is a very different exercise than trying to predict directional movement. This article outlines four material effects, or drivers, of volatility: mean reversion, autocorrelation, shocks, and relief. Volatility is a fascinating concept to study. Some traders find it much easier to predict future volatility levels than to forecast directional moves, making volatility trading a potentially strong candidate for inclusion in an investor's portfolio.

Finally, with RealVol futures expecting to come on the scene, traders will be able to convert these volatility forecasts into a simple buy-or-sell decision.

"Predicting volatility changes is a very different exercise than trying to predict directional movement."

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