

Issue #

3

Updated: 1 October 2017



Demand Derivatives Corp.

## Day-Trading Convexity

There is a very interesting and potentially lucrative spread trade available exclusively to the day-trader in RealVol™ instruments (VOL). This strategy has never been feasible prior to the advent of instruments on realized volatility; however, be aware that the trade works only in certain market environments.

### Measuring Volatility

The RealVol formula uses *daily* returns, which means that intraday trades are not considered in the calculation, and only the closing, or settlement, price matters.

Obviously, a large close-to-close move will yield a higher volatility value. However, it is also easy to envision how a big move within the day that retraces before the close to end unchanged means a close-to-close volatility of zero. In other words, offsetting large *intraday* moves may not translate into a large *interday* contribution to volatility. This phenomenon of how to potentially capture intraday volatility is the subject of this “RealVol Strategies” issue.

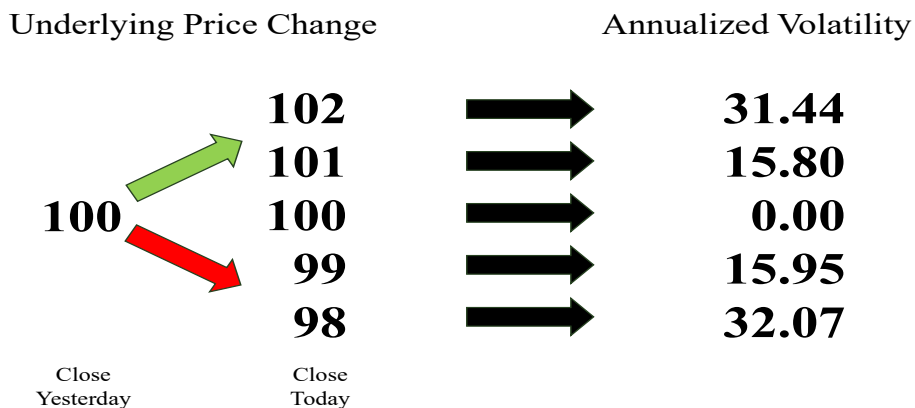
### Hypothetical Example

Start with a simple example: Suppose that somehow it is known that there can be only two outcomes for the price change of some underlying futures contract (“FUT”) for the entire day of tomorrow’s trading (i.e., close-to-close): either the contract will rise 2% or fall 2%. Of course, if we bought FUT and the underlying gained 2%, the account would show a profit. Conversely, if the market dropped 2%, there would be a loss.

Instead, suppose that the trader buys a VOL. If participants were expecting a 1% daily move and the actual move were 2%, VOL would most likely show a nice gain.

In the pictograph on the following page is a plot of the aforementioned 2% moves but also 1% moves up and down, and no move at all (unchanged) in order to give a broader perspective of the extrapolated yearly volatility value based on only one day of data.

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

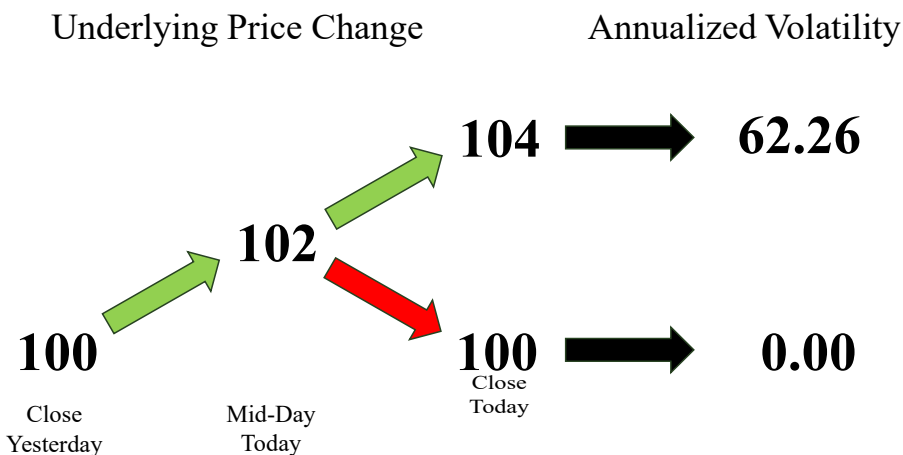


### Intraday Trade

This time, consider a slightly different scenario: Suppose that the market is up 2% *within* the day and there is still half of the trading day remaining. At this point, it is still assumed that the market can make only a further 2% move *from that point*, either up or down.

In such a case, if the market moved back down about 2%, then the day-to-day price action of the underlying would be unchanged. The one-day contribution to the 21-day Calculation Period (CP) is zero volatility. What if, instead, the price moved up another 2% for remainder of the day? The total move would be about 4% for the entire day, which likely would be a significant contributor to the ultimate expiration, or final settlement, value. The below pictograph graphically shows this effect.

“The point is that there is a strong directional component intraday that is not available interday.”

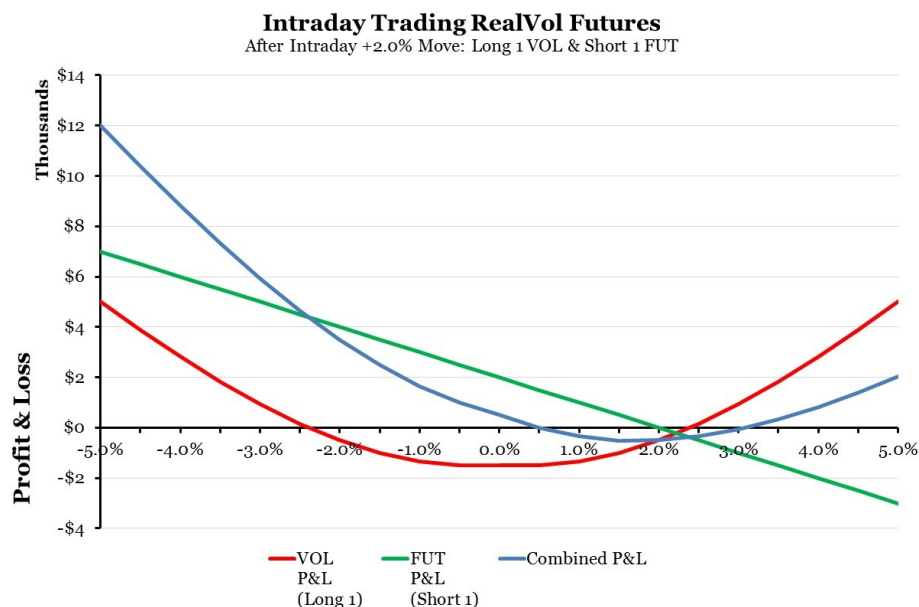


The point is that there is a strong directional component intraday that is not available interday. Such a potential trade may not be available to longer-term investors, such as many hedge funds, investment banks, and corporate users, but could be used by day-traders, futures market-makers, options market-makers, and algorithmic traders.

So, how could someone capitalize on such a scenario?

## Day-Trading Strategy

One potential spread trade is to buy a VOL after it makes a significant intraday move, and trade FUT in the opposite direction of that move. Therefore, in our up-2%-within-the-day example, after the market moved up 2%, one would buy VOL and sell FUT. The following chart shows one possible profit and loss scenario of long VOL (red line), short FUT (green line), and the combination of the two positions (blue line).



## Convexity

As one can see, if FUT keep rising, VOL should gain at an exponential rate, while FUT would lose at a linear rate. Conversely, if FUT reversed course and headed back down, VOL would lose at a decreasing rate (until the line actually turns up again, below a 0% change in the underlying, and starts gaining once more), while the short FUT would continue to gain at a linear rate.

## Considerations

As mentioned at the start, the trade described herein works only under certain circumstances.

- To begin, the underlying must make a large move within the day.
- On the day of contract expiration, the profit and loss lines will be known with certainty after the close of the underlying. This is the best day to trade convexity as settlement will be to an exact value of interday movement with no implied volatility component at expiration.
- On days prior to expiration, but still within the CP, one must take into account the implied volatility component of VOL pricing, which will play a larger role if expiration is farther away.
- On days in the Anticipatory Period (AP), which consist of the period from listing until the first day of the CP, the pricing of VOL has no dependence on realized volatility or the actual move experienced; rather the primary consideration to pricing is to implied volatility changes, which would not react the same as realized volatility and is beyond the scope of this paper.

## Warning

As of this writing, RealVol futures on equity indices have not yet begun trading. All results are hypothetical. There is no guarantee that the prices received in the market will mimic the prices in the chart. Pricing is hypothetical.

This article discusses trading VOL only within the Calculation Period (CP). If one trades VOL outside of its CP, different factors come into play and are beyond the scope of this article.

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### Another Way to Look at It

Think of a VOL as a pure form of an at-the-money (ATM) delta hedged options straddle. In other words, one can create a realized volatility result by trading a VOL or an options straddle that is followed up at the close in a delta neutral manner using the underlying futures. Both are nearly equivalent positions. If one instead adjusts either position intraday (the main thrust of this paper), then an intraday VOL hedge or an intraday delta-neutral straddle hedge are almost identical in nature.

### Market-Maker Corner

Suppose that a large insurance company wants to trade 10,000 RealVol futures. Also suppose that the market is just starting and liquidity is not sufficient to accept such a large order. What could market-makers (MMs) do? Not take the business? Or, execute the order and hedge it? If so, then hedge it with what?

If the VOL is currently in the AP, the prior month's VIX futures would probably be the closest hedge. If VOL is currently in the CP, what could the market-maker do? The appropriate VIX contract expired already (before the CP started), so VIX isn't available. Obviously, the best long-term hedge is a vol swap or a delta-hedged straddle using standard options. However, to execute either of those two without significant transaction costs would take time. Market-makers do not have time; they need a hedge *immediately*. The best hedge in the CP, after a large move, and for the remainder of the day, is the underlying futures contract. This will hedge the MMs' exposure for the time being, providing precious time to establish the swap hedge or to try to execute the thousands of straddles needed. Typically, the underlying futures contract is quite liquid and would allow the MMs to establish an interday hedge at minimal cost. Subsequently, as other orders arrive, the hedge could be adjusted economically.

### Intraday Trader Corner

Depending on the prices received for the VOL/FUT intraday spread trades, the potential profits may look attractive for a day-trade spread. In addition, such a spread forces the trader to be disciplined in his or her approach because the spread must be liquidated at the close. If held beyond the day's settlement, the VOL/FUT spread loses its reason for existence as well as its potential edge.

### Conclusion

Spreading RealVol instruments with the underlying futures opens up a large pool of liquidity right when it is needed most — when demand is highest, and VIX is no longer there to help. As long as one understands the limitations and risks, there could be opportunities for the savvy day-trader or market-makers to capitalize on the embedded directional component, or intraday convexity, in RealVol instruments.

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