Buying and Selling Volatility

Len Yates

Options are like a 3D chess game. The three dimensions are price (of the underlying), time, and volatility. The most misunderstood and neglected dimension, and often the last thing a novice trader learns about, is volatility.

However, an options trader needs to understand volatility and appreciate its effects. No savvy trader ever buys or sells an option without awareness of the current volatility scenario. Many sophisticated options traders go beyond that, choosing to focus on volatility as the main aspect of their trading (while neutralizing the other factors). How do they do this, and why?

The essence of volatility based trading, or V-trading for short, is buying options when they are cheap and selling options when they are dear. The reason it's called volatility based trading comes from the way we measure cheapness or dearness – using a parameter called implied volatility (or IV for short). We'll discuss IV in more detail below, but for now, it will suffice to say that high IV is synonymous with expensive options; low IV is synonymous with cheap options.

Measuring premium levels is one thing; judging good trading opportunities is another. There are two ways of judging the cheapness or dearness of options. The first is simply by comparing current IV with past levels of IV on the same underlying asset. The second is by comparing current implied volatility with the volatility of the underlying itself. Both approaches are important and come into play in all V-trading decisions. The most attractive opportunities are when options are cheap or dear by both measures.

The volatility trader typically uses puts and calls in combination, selecting the most appropriate strikes, durations, and quantities, to construct a position that is said to be "delta neutral". A delta neutral position has nearly zero exposure to small price changes in the underlying. Sometimes the trader has a directional opinion and deliberately biases his position in favor of the expected underlying trend. However, more often the V-trader is focused on making money just from volatility, and is not interested in trying to make money from underlying price changes.

Once a position is set up, it is simply held and then adjusted when necessary to re-establish the appropriate delta. These adjustments can be costly, in terms of transaction costs, and should be minimized, but not to the point where you expose yourself to too much delta risk. My rule is: "If you give the market a chance to take money away from you (through delta), it will."

Once option prices return to a more normal, average level (as measured by IV), then the position can be closed. If not too many adjustments were required in the meantime, the trader should see a profit.

Since options are extremely sensitive to changes in implied volatility, trading options on the basis of volatility can be lucrative. Occasionally, options become way too expensive or way too cheap. In these situations the V-trader has a considerable edge.

The investor can always count on volatility returning to normal levels after going to an extreme. This principle is called "the mean reversion tendency of volatility", and it is the foundation of volatility based trading. That volatilities "mean revert" is well established in many academic publications [1]. You can also see it for yourself just by looking at a few historical volatility charts. You will notice that when volatility goes to an extreme level, it always comes back to "normal". It may not happen right away. It may take anywhere from days to months, but sooner or later it always comes back.

Implied volatilities seem to change from week to week, if not day to day. V-Traders find profit opportunities in this. Others find these volatility changes a nuisance and a hazard. V-Trader or not, you need to pay attention to volatility.

Tools of the V-Trade

Since we measure how expensive or cheap options are using a parameter called implied volatility, or IV for short, it is important to understand IV. The term implied volatility comes from the fact that options imply the volatility of their underlying, just by their price. A computer model starts with the actual market price of an option, and measures IV by working the option fair value model backward, solving for volatility (normally an input) as if it were the unknown. (Actually, the fair value model cannot be worked backward, and has to be worked forward repeatedly through a series of intelligent guesses until the volatility is found that makes fair value equal to the market price of the option.)

Again, high IV is synonymous with expensive options; low IV is synonymous with cheap options. It is useful to plot an asset's IV over a period of years, to see the extent of its highs and lows, and to know what constitutes a normal, or average level.

We measure how much the price of an asset bounces around using a parameter called statistical volatility, or SV for short. There are several different computer models for measuring SV. All of them seek to quantify the extent, or magnitude, of the asset's price swings on a percentage basis, and use varying periods of the asset's recent price history (for example, 10, 20 or 30 days). SV can also be plotted, so that the investor can see the periods of relative price activity and inactivity over time.

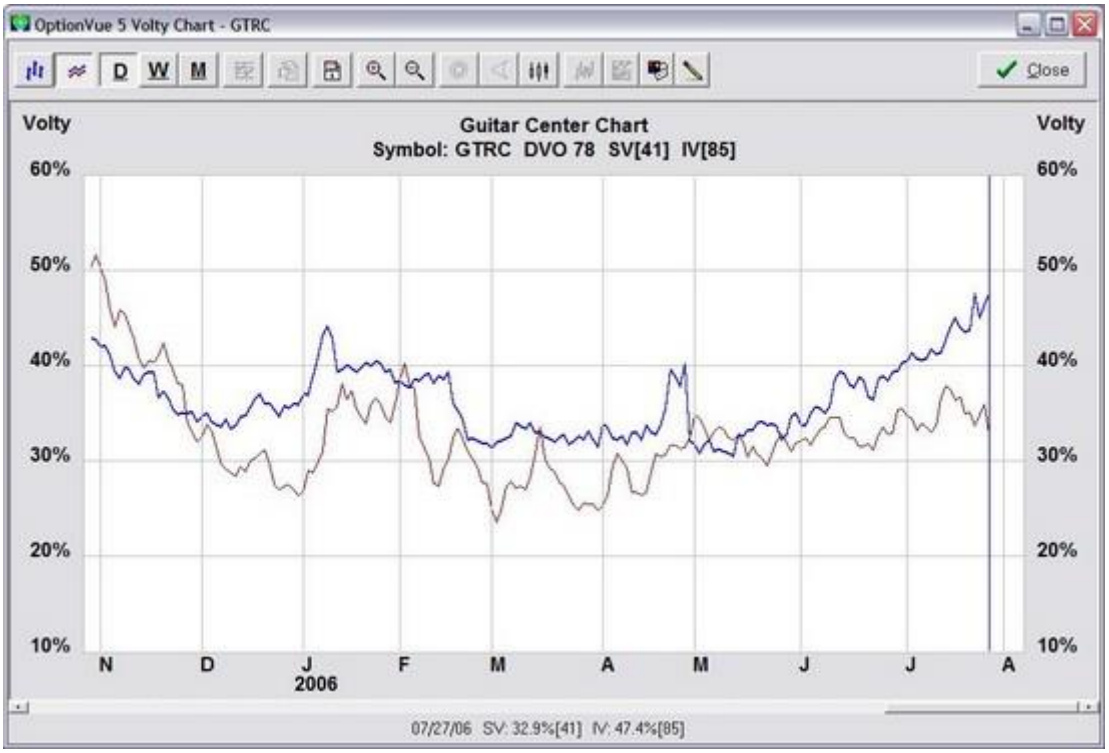
Note: Much of the industry calls this historical volatility, but we prefer to call it statistical volatility, reserving the word historical for its true meaning – that of referring to the history of IV and SV.

Regardless of the length of the sample period, SV is always normalized to represent a one-year, single standard deviation price move of the underlying asset. IV is also normalized to the same standard. Thus IV and SV are directly comparable, and it is very useful to see them plotted together.

The High Road

When the options of a particular asset are more expensive than usual, sometimes that additional expense is justified by unusually high volatility in the underlying. While this may be a decent opportunity to sell options, it is even more advantageous to sell options when the extra IV is not accompanied by extra SV. One example of this, at

the time of this writing, was the stock for Guitar Center (Symbol: GTRC). In this example, IV (represented by the blue line) is at a relatively high level. At the same time, these high IV levels would not seem to be supported by a correspondingly high SV (the red line).



Clearly, the advantage is with the trader who sells this high volatility, and that means selling options. Generally, any position in which you are short more options than you are long will also be short volatility. The purest selling strategy is a naked strangle, which involves simultaneously selling out-of-the-money calls and out-of-the-money puts. Some like to buy farther out-of-the-money calls and puts at the same time for protection (thus creating credit spreads), but this will weakens the position's vega, or volatility sensitivity, substantially. We want a substantial vega so that when IV eventually comes down, our position makes money.

Out-of-the-money options are preferable because it gives the underlying some room to wander, and increases the likelihood of realizing a profit. Generally, the farther out-of-the-money you go, the lower your returns, but the greater the probability of achieving those returns. By giving the underlying room to move, the trader minimizes his chances of having to make costly adjustments.

I use the longest term options I can get, provided they have decent liquidity. Longer term options have higher vega, and will therefore respond best when IV comes down. Longer term options have the additional advantage of having lower "gamma". Gamma measures how fast delta changes with price changes in the underlying. By using lower gamma options, it takes a bigger price change in the underlying to imbalance your position.

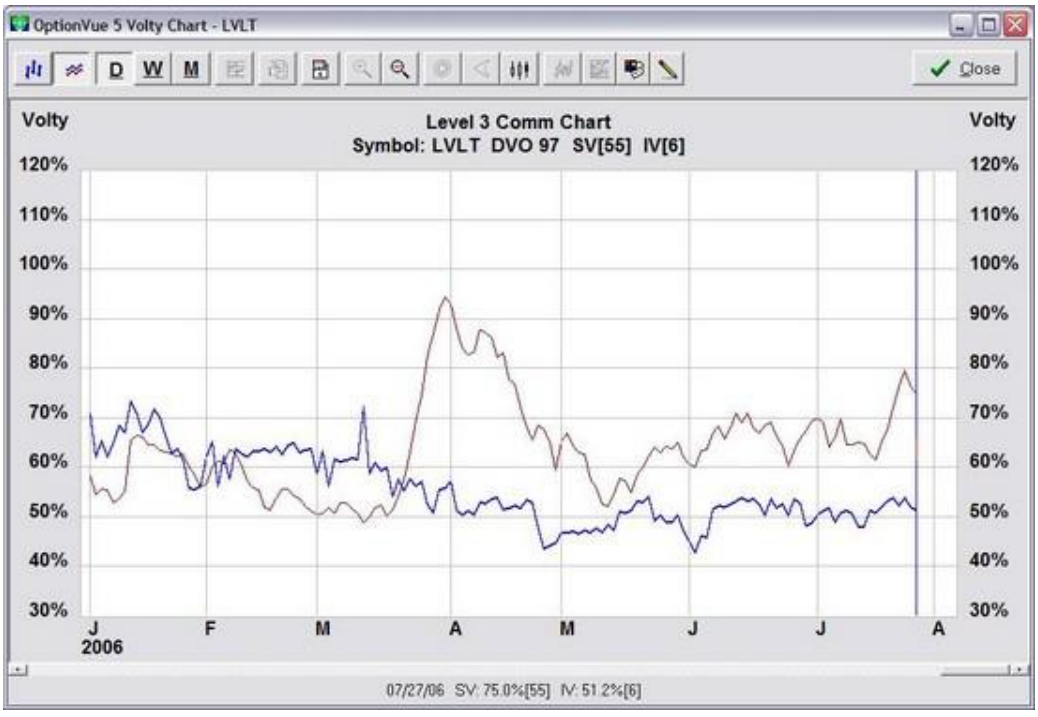
One other strategy for selling options (but which cannot be used with index options) is covered writing, which involves buying the underlying stock or futures contracts and selling call options. However, covered writing is not delta neutral and since it involves the ownership of a portfolio of stocks, is in a camp by itself. There are many mutual funds and individually managed covered writing programs. Managers of these funds would do well to pay attention to IV levels in timing the sale of their calls.
The Low Road

Low volatility situations can be just as lucrative. I have heard arguments against buying options, based on the idea that time decay is against you. Time decay is a funny concept. Do you remember using "imaginary numbers" in math class to deal with the square roots of negative numbers? Time decay (or theta) is kind of like that. It's an imaginary number. It says that if the underlying asset's price holds perfectly still, the option will decay at a certain rate. But what underlying asset price holds still? None, obviously. In fact, time is what gives the asset its freedom to move!

Let's say I have a short volatility position with a theta of 100. This means I'm making $100 dollars per day from time decay. Should I feel gratified to see this? Not really. It's a false gratification because today's movement in the underlying could take away that $100, or perhaps many times more than that.

There is nothing wrong with buying options. When an option is fairly valued, by definition there is no advantage to the buyer or the seller. If you buy a fairly valued option, you have not taken on a latent disadvantage in the guise of "time decay". Why? Because the underlying is in constant motion.

An example of extremely low volatility right now is Level 3 Communications (Symbol: LVLT). Current IV is 51.2%, which much lower than it has been during the past six years. Yet the actual volatility of the stock is at 75%, and SV has been considerably higher than IV for several months.



When buying options, it makes more sense to buy near-the-money. For volatility trading, the straddle position is recommended, although it doesn't have to be a pure straddle (with both the call and put options at the same strike price). That way a sharp move in the underlying has a better chance of helping the position. When that happens, not only does IV normally get a boost, but the move may drive one of the legs deep in-the-money and give you a gain just from price movement.

Of course, this awaited price activity might not happen right away, but since the options in question have more than 300 days to go, you'll have plenty of time. You might even say that time is on your side! (Surely it won't take that long before we see higher levels.)

It is interesting that long volatility positions have a completely different "feel" than short volatility positions. Short volatility positions often gratify the holder with steady, almost daily, gains, but can suddenly lose money if the underlying makes a sharp move. Long volatility positions often seem to dribble away value day by day for many weeks, and suddenly gain very quickly. Despite their opposite psychological effects a mix of both types of positions belong in the V-trader's portfolio.

Deciding when to close a long volatility position is usually more difficult, since the position has blossomed into a larger position with a sharp move in the underlying, and has probably become imbalanced. Often there is the potential to make (or lose) more money with each additional day that you hold the position. What can help you make a decision is to identify whether volatility has returned to normal levels. If it has, you should consider closing the position. If it has not, you might consider continuing with an adjusted (re-balanced) position.

When buying volatility, just as when selling volatility, use the longest dated options you can find that give you decent liquidity. The reason is the same as when selling: high vega. The long dated options, with their higher vega, respond best when IV increases.

There are other variations on the volatility game. For example, some traders like to watch individual stocks relative to their industry group and play high and low ones against each other.

1 "Mean reversion in stock market volatility", Michael Dueker, 1994
"A panel data test for mean reversion using randomization", H. Schaller, 1993
"Long-term equity anticipation securities and stock market volatility dynamics", T. Bollerslev, 1996
"How to tell if options are cheap", Galen Burghardt and Morton Lane, 1990

Option Volatility: Strategies and Volatility

By John Summa, CTA, PhD, Founder of OptionsNerd.com

When an option position is established, either net buying or selling, the volatility dimension often gets overlooked by inexperienced traders, largely due to lack of understanding. For traders to get a handle on the relationship of volatility to most options strategies, first it is necessary to explain the concept known as Vega.

Like Delta, which measures the sensitivity of an option to changes in the underlying price,*Vega* is a risk measure of the sensitivity of an option price to changes in volatility. Since both can be working at the same time, the two can have a combined impact that works counter to each or in concert. Therefore, to fully understand what you might be getting into when establishing an option position, both a Delta and Vega assessment are required. Here Vega is explored, with the important ceteris paribus assumption (other things remaining the same) throughout for simplification.

Vega and the Greeks

Vega, just like the other "Greeks" (*Delta, Theta*,*Rho*, *Gamma*) tells us about the risk from the perspective of volatility. Traders refer to options positions as either "long" volatility or "short" volatility (of course it is possible to be "flat" volatility as well). The terms long and short here refer to the same relationship pattern when speaking of being long or short a stock or an option. That is, if volatility rises and you are short volatility, you will experience losses, *ceteris paribus*, and if volatility falls, you will have immediate unrealized gains. Likewise, if you are long volatility when implied volatility rises, you will experience unrealized gains, while if it falls, losses will be the result (again, ceteris paribus).(For more on these factors see, *Getting to Know The "Greeks"*.)

Volatility works its way through every strategy. Implied volatility and historical volatility can gyrate significantly and quickly, and can move above or below an average or "normal" level, and then eventually revert to the mean.

Let's take some examples to make this more concrete. Beginning with simply buying callsand puts, the Vega dimension can be illuminated. Figures 9 and 10 provide a summary of the Vega sign (negative for short volatility and positive for long volatility) for all outright options positions and many complex strategies.

-	Vega Sign	Rise in IV	Fall in IV
Long call	Positive	Gain	Lose
Short call	Negative	Lose	Gain
Long put	Positive	Gain	Lose
Short put	Negative	Lose	Gain

Figure 9: Outright options positions, Vega signs and profit and loss (ceteris paribus).

The long call and the long put have positive Vega (are long volatility) and the short call and short put positions have a negative Vega (are short volatility). To understand why this is, recall that volatility is an input into the pricing model - the higher the volatility, the greater the price because the probability of the stock moving greater distances in the life of the option increases and with it the probability of success for the buyer. This results in option prices gaining in value to incorporate the new risk-reward. Think of the seller of the option - he or she would want to charge more if the seller's risk increased with the rise in volatility (likelihood of larger price moves in the future).

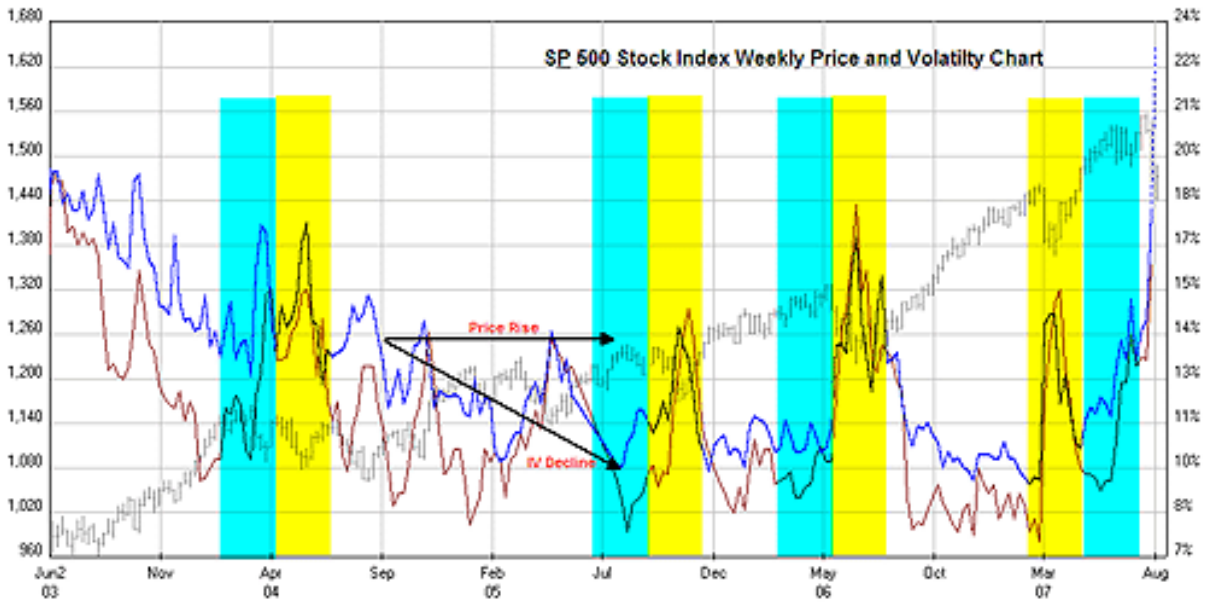
Therefore, if volatility declines, prices should be lower. When you own a call or a put (meaning you bought the option) and volatility declines, the price of the option will decline. This is clearly not beneficial and, as seen in Figure 9, results in a loss for long calls and puts. On the other hand, short call and short put traders would experience a gain from the decline in volatility. Volatility will have an immediate impact, and the size of the price decline or gains will depend on the size of Vega. So far we have only spoken of the sign (negative or positive), but the magnitude of Vega will determine the amount of gain and loss. What determines the size of *Vega* on a short and long call or put?

The easy answer is the size of the premium on the option: The higher the price, the larger the Vega. This means that as you go farther out in time (imagine LEAPS options), the Vega values can get very large and pose significant risk or reward should volatility make a change. For example, if you buy a LEAPS call option on a stock that was making a market bottom and the desired price rebound takes place, the volatility levels will typically decline sharply (see Figure 11 for this relationship on S&P 500 stock index, which reflects the same for many big cap stocks), and with it the option premium.

-	Vega Sign	Rise in IV	Fall in IV
Short Strangle	Negative	Lose	Gain
Short Strangle	Negative	Lose	Gain
Long Strangle	Positive	Gain	Lose
Long Straddle	Positive	Gain	Lose
Backspread	Positive	Gain	Lose
Ratio Spread	Negative	Lose	Gain
Credit Spread	Negative	Lose	Gain
Debit Spread	Positive	Gain	Lose
Butterfly Spread	Negative	Lose	Gain
Calendar Spread	Positive	Lose	Gain

Figure 10: Complex options positions, Vega signs and profit and loss (ceteris paribus).

Figure 11 presents weekly price bars for the S&P 500 alongside levels of implied and historical volatility. Here it is possible to see how price and volatility relate to each other. Typical of most big cap stocks that mimic the market, when price declines, volatility rises and vice versa. This relationship is important to incorporate into strategy analysis given the relationships pointed out in Figure 9 and Figure 10. For example, at the bottom of a selloff, you would not want to be establishing a long strangle, backspread or other positive Vega trade, because a market rebound will pose a problem resulting from collapsing volatility.



Generated by OptionsVue 5 Options Analysis Software.
Figure 11: S&P 500 weekly price and volatility charts. Yellow bars highlight areas of falling prices and rising implied and historical. Blue colored bars highlight areas of rising prices and falling implied volatility.