THE VALUE LINE

Daily Options Survey

The Weekly Option Strategist, **June 10, 2021**

Understanding Our Volatility Forecasts

We are proud to say that we are the only options service available to retail investors that provides state-of-the-art volatility forecasts on much of the equity options market. These volatility forecasts are important, because they tell you whether an option is favorably priced for a particular strategy. This week, we describe what goes into these volatility forecasts.

Quick Review: What is Volatility?

In standard option valuation models, such as Black-Scholes, you calculate the price of an option with five known inputs and one input that is an estimate. The five known inputs are: (1) stock price, (2) strike price, (3) time to expiration, (4) interest rate, and (5) the dividend (if there is one). The estimated input is volatility. Without volatility, an option would only be worth its tangible value (plus whatever time value that results from interest and dividends). The more a stock has jumped around in the past, and the more unsure investors are about its future trends, the greater this volatility input will be, resulting in a higher option time premium. In the Black-Scholes model, volatility is the expected standard deviation of price changes. It is usually expressed (and entered) as an annualized number.

How do you arrive at this volatility input? One way is to observe what volatility the market is currently using to price options. This is known as Implied Volatility. One can also use past volatility, which is known as Historical Volatility. At Value Line, we use a more forward-looking technique than simple historical volatility to come up with our Forecast Volatility. Finally, we adjust this Forecast Volatility so that it fully reflects the risk of a particular strike price at a particular point in time. This becomes our Adjusted Forecast Volatility.

Implied Volatility

It is easy to calculate what the market thinks volatility should be at any point in time. You simply take the current option premium (as quoted) and use the five known variables and the Black-Scholes model to find the volatility number that would give you that particular premium. We call this metric implied volatility (i.e. the volatility "implied" by the current premium). Implied volatility is, in effect, the market's forecast of future volatility. In The Value Line Daily Options Survey, we show the implied volatility for each option's bid and ask prices in our regular options display and in our detailed Options Profile.

Historical Volatility

Historical volatility is the historical annualized standard deviation of price changes in the stock over a specified period of time. Historical volatility is often used as a forecaster of future volatility. Typically, when evaluating an option that will expire a certain number of days forward (say 45 days) an option trader will calculate the historical volatility of the stock over the same number of days in the past. However, this historical number is often not a good forecast of future volatility because volatility tends to be moving in one direction or another.

Our (Raw) Volatility Forecasts

In 1982, Robert Engle, then a Professor at the University of California (San Diego), formulated a model that generates a more dynamic and forward-looking forecast of future volatility. What Professor Engle did was change the way economists think about volatility. Rather than treating daily volatility as a random error around a trend, Engle assumed that daily volatility systematically depends on both the long term and the short term.

In subsequent work, Engle (and other academics) developed a more generalized and practical model for predicting future volatility. This model is known as GARCH (stands for Generalized Autoregressive Conditional Heteroskedasticity). The importance of GARCH in volatility forecasting – and in finance in general – was recognized when Engle was awarded the Nobel Prize in Economics in 2003.

At Value Line, we use GARCH to formulate our unadjusted (raw) volatility forecasts on each of the 2,500+ underlying common stocks that we follow. One attractive feature of GARCH is that it gives us a set of coefficients for each stock that tells us for how long high- or low-volatility is likely to persist in a stock, and how long it might take for volatility to revert to its longer-term average. In our service, we show each option's raw or unadjusted volatility forecasts in our Options Profiles.

One More Step - Our Adjusted Volatility Forecast

These GARCH-based volatility forecasts tell us how volatile our model expects a stock to be out to the expiration date of the option. However, we need to make a further adjustment to these forecasts. Empirical studies show that stocks can exhibit price movements that are well beyond the bounds of a normal distribution. Thus, we adjust our volatility forecasts for the likelihood that the stock can reach the strike price. We do this by calculating to what degree a stock's actual outcome differs from the probabilities assumed under a normal distribution. This becomes our Adjusted Volatility Forecast, which we use in calculating whether an option is undervalued or overvalued.

At Value Line Options, we determine whether an option is undervalued or overvalued by comparing its implied volatility with our model's adjusted volatility forecast for that option. Thus, the calculation formula for under/over valuation is: (implied volatility-adjusted volatility forecast)/adjusted volatility forecast. We show each option's adjusted volatility forecast in our detailed Options Profile and in column AM of our spreadsheet files. We also show the degree to which the implied volatility is less than (undervalued) or greater than (overvalued) our adjusted volatility forecast. If the option's implied volatility is significantly above the option's adjusted

volatility forecast, then the option is overpriced according to our model and likely to be attractive for premium selling strategies.

Volatility and Our Ranks

Our adjusted volatility forecasts are important because they are a major factor in the formulation of our option ranks. Here is an example. If an underlying stock is ranked 1, then it is likely that calls on the stock will be highly ranked for some bullish strategy. But which strategy will our model recommend? If a call on this rank 1 stock is underpriced, then our model is likely to recommend it for Call Buying, since you are paying a cheap premium for the chance to make a large profit. Alternatively, if the call on the same rank 1 stock is overpriced, then our model is likely to give that call a rank of 1 for Covered Call Writing. Here, we are recommending the option for a bullish strategy in which the premium more than compensates you for giving up some upside potential.

Prepared by The Option Strategist Team
vloptions@valueline.com