GLOBAL VOLATILITY SUMMIT 2014

March 2014 Newsletter

2014 Event Details

Date. April 3rd, 2014

Location. 82 Mercer, SoHo, New York City

Managers. The following managers will be participating in 2014:

BlueMountain Capital
Capstone Investment Advisors
Capula Investment Management
Fortress Investment Group
Forty4 Asset Management
Ionic Capital Management
JD Capital Management
Parallax Volatility Advisors
Pine River Capital Management
Saiers Capital

Registration for institutional investors can be found on our website: www.globalvolatilitysummit.com

2013 Event Recap

The fourth annual Global Volatility Summit ("GVS") took place on February 25th in New York City. Ten volatility and tail hedge managers hosted an audience of over 350 people.

Keynote speaker. Sal Khan, founder of The Khan Academy and author of *The One World Schoolhouse* gave an insightful presentation on using technology to innovate the way education is provided across the globe.

Questions?
Please contact info@globalvolatilitysummit.com

2014 March research piece

The Global Volatility Summit is a dynamic community of managers, investors, and industry experts, with the focused goal of educating the investment community about volatility strategies and the roles they can play in institutional investment portfolios.

The 5th Annual Global Volatility Summit is less than two weeks away! We have an exciting line up of speakers, managers, and investor panelists. A comprehensive agenda is available on the website. Currently, limited registration for institutional investors is also available on the website (www.globalvolatilitysummit.com). Please register soon as space is limited.

Scott Nations, President & CEO of NationsShares, has shared a piece in which he explores options skew and the broader implications of skew in the domestic equity markets.

Cheers,

Global Volatility Summit

Option Skew: The Many Measures And What They Tell Us

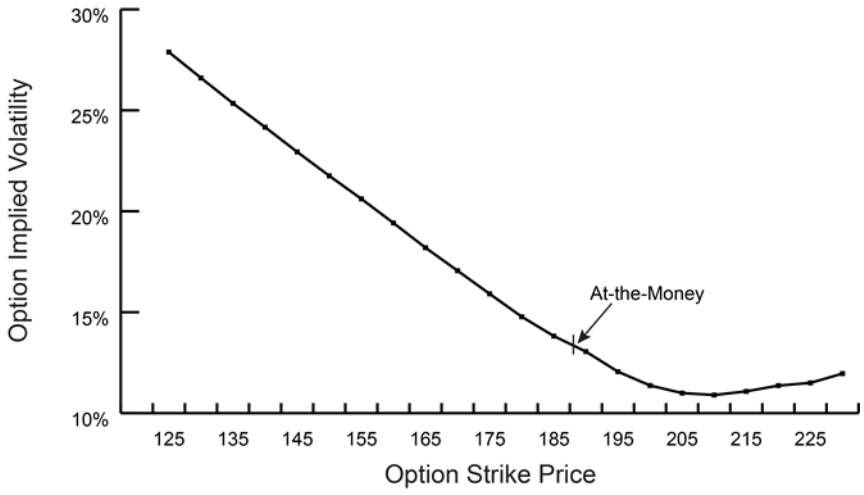
NαTIONS®

We like to watch, and often comment on, the amount of put skew in the S&P option market. It can serve as a wonderful gauge of the market's concerns about an extreme event; extreme events are inherently rare so it can be telling when market participants at-large are concerned about tail-risk. While there is anecdotal evidence that option skew levels can predict inflection points for the broad domestic equity markets, the world of finance doesn't agree on the best way to measure skew. We examine the phenomenon of skew, several of the suggested methods of calculating or measuring skew, and the emerging consensus regarding the measure that will ultimately become the standard.

What is Option Skew?

The volatility input to every option pricing model is the volatility for the underlying security for the term of the option. If we could peer into the future and we knew precisely what this realized volatility would be for the term of an option we could know the value, not just the current price but the ultimate value, of the option.

This future realized volatility obviously isn't knowable but options trade nonetheless. Since the other inputs to an option pricing model are knowable or observable and since the prices at which an option is actually trading is observable, it's possible to "reverse engineer" the volatility input implied by the observed option price. Since the volatility input applies to the underlying security, all options on a single underlying that share an expiration date should theoretically return a single implied volatility. But we know that's not the case as you can see from the implied volatility graph for options on SPY.



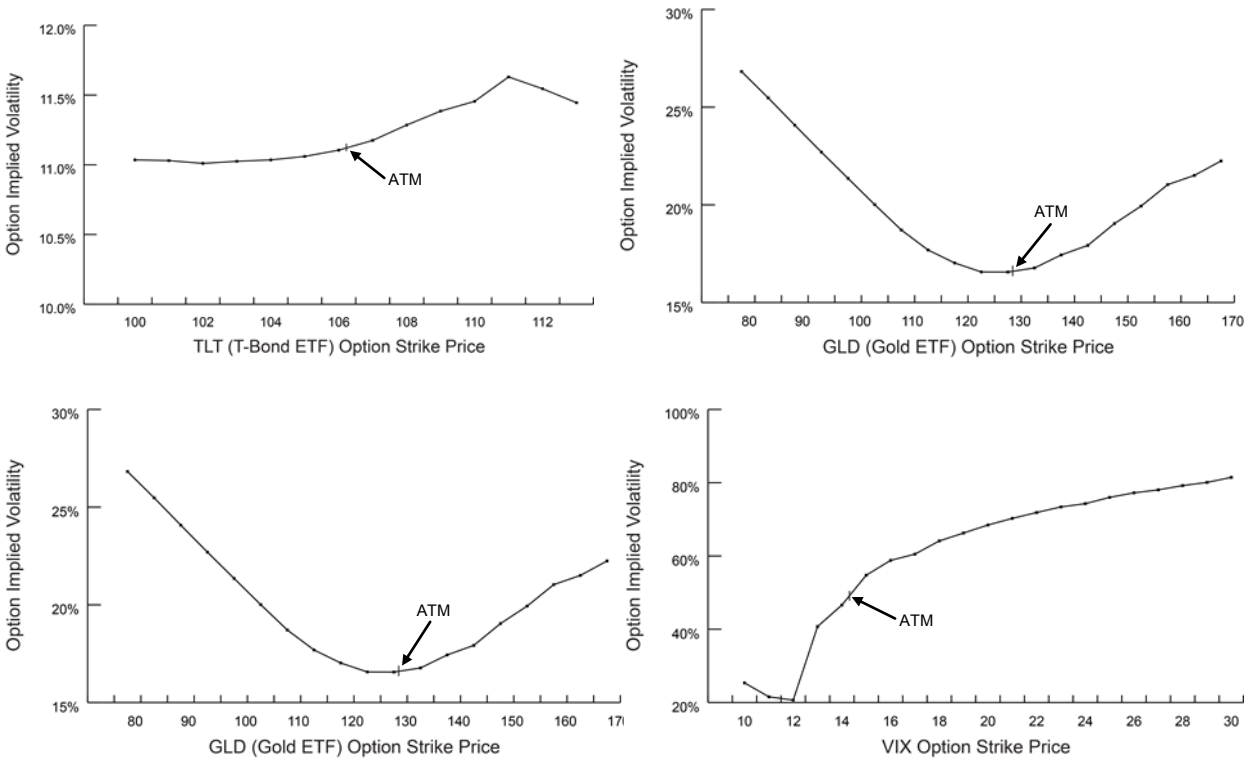
These SPY puts show higher implied volatilities than the calls. In other words, these puts are saying that the S&P will experience more volatility than the calls say—the curve is skewed. How can the market believe they're both correct? That's a little like asking a room full of people what the odds are that

the Chicago Cubs will win this year's World Series, getting 30 different answers and having the market say they are all correct simultaneously.

Volatility skew in the equity world is generally caused by hedging demand from put buyers and supply from covered call sellers and it has been a constant in equity index markets since October 1987 when investors and option users learned that many of the assumptions inherent in their previous understanding of markets and in option pricing models aren't valid in the real world, particularly the assumption that trading is continuous.

Notice that this put skew in the S&P universe exists in the direction that tends to see the most dramatic jumps. Since other asset classes, notably Treasury Bonds, gold, crude oil, and implied volatility tend to jump in the other direction, upward, what does skew look like in those markets?

Volatility Skew In Other Asset Classes



Measuring Volatility Skew

But what does this S&P option skew tell us, other than that the equity markets work in ways that are messy and that don't adhere to the assumptions that are necessary to make option pricing models useable? And while the presence of volatility skew is obvious to anyone looking at a plot of implied volatilities, that doesn't help if we're trying to measure or quantify volatility skew.

Quantifying normalized volatility skew isn't simply an academic exercise, it's necessary in order to determine whether skew is historically rich or cheap, to compare skew across asset classes, and to determine if it offers any insight into future asset returns or changes in the general level of implied volatility for that asset.

Another meaningful use of a robust skew measure arises when initiating portfolio hedges, either buying puts or establishing collars, since a robust skew measure would make it possible to establish equity hedges when skew was cheap and then scale or lift those hedges when skew was rich. Another use might come from speculators using a robust measure to determine when skew is rich and in that situation choosing to generate equity exposure through option risk reversals.

How To Measure Option Skew

Just as opinion differs on how an equity index should be constructed, opinion differs on how a skew measure or index should be constructed. There are a number of measures of volatility skew, including the dozen suggested by the academic literature, and they generally differ in how the strike prices of the constituent options are determined. Some of the measures are very similar to each other but differ only in the way the out-of-the-money strike is determined. A sampling of the current heuristic measures of volatility skew:

$$Skew = \frac{25\Delta\ Put\ Implied\ Volatility - 25\Delta\ Call\ Implied\ Volatility}{50\Delta\ Put\ Implied\ Volatility}$$

$$Skew = Moneyness\ Of\ Put\ That\ Completes\ Zero\ Cost\ Collar\ With\ 10\%\ OTM\ Call$$

$$Skew = \frac{OTM\ Call\ Option\ Price}{OTM\ Put\ Option\ Price} - 1$$

$$Skew = 10\%\ OTM\ Put\ Implied\ Volatility - ATM\ Implied\ Volatility$$

$$Skew = 25\Delta\ Call\ Option\ Implied\ Volatility - ATM\ Implied\ Volatility$$

$$Skew = \frac{OTM\ Put\ Option\ Implied\ Volatility}{ATM\ Implied\ Volatility}$$

$$Skew = \frac{Strike\ Price\ Weighted\ Volatility\ of\ Puts}{Strike\ Price\ Weighted\ Volatility\ of\ Calls}$$

$$Skew = \frac{Implied\ Volatility\ Of\ 1\ STD\ OTM\ Put - Implied\ Volatility\ of\ ATM\ Put}{Implied\ Volatility\ of\ ATM\ Put}$$

These measures all lead to the question, what is the best way to measure skew? A robust measure of skew would generate useful information if the underlying asset was a 7% implied volatility bond, the 12% implied volatility S&P, the 25% implied volatility S&P, 75% implied volatility Tesla (TSLA), and the 150% implied volatility biotechnology company awaiting clinical test results.

Should any skew measure be normalized by the at-the-money implied volatility? Should any skew measure be model free? Is any skew measure predictive for future returns of the underlying asset? What is the best measure of skew?

These questions, particularly the final one, are generally unanswered but there does seem to be consensus emerging:

- No single measure of skew is optimal for all assets, timeframes and volatility regimes;
- Moment-based measures can be difficult to comprehend and are vulnerable to changes in prices of very small delta options that might rarely trade and that have bid/ask spreads that are very wide in relation to the absolute price of the option;
- Most skew measures are not comparable over different implied volatility regimes;
- The "best" measure of skew will almost certainly be normalized.

Skew is a fascinating and infuriating phenomenon for practitioners. It shouldn't exist but it is a major consideration for every option trader. It's a messy "work around" for the otherwise elegant pricing models that have allowed options to grow from an afterthought that got its toehold in the unused former smoker's lounge at the Chicago Board of Trade to one of the fastest growing vehicles in the history of finance; a vehicle that supports a dozen U.S.-based exchanges and many others around the world. And the person who creates the best skew index will be the one that understands what skew is trying to tell us.

Important Disclosures

Data sources: Bloomberg, CBOE.com, LiveVol, and NationsShares

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