



# Volatility in the Crosshairs: Aligning Volatility and Strategies

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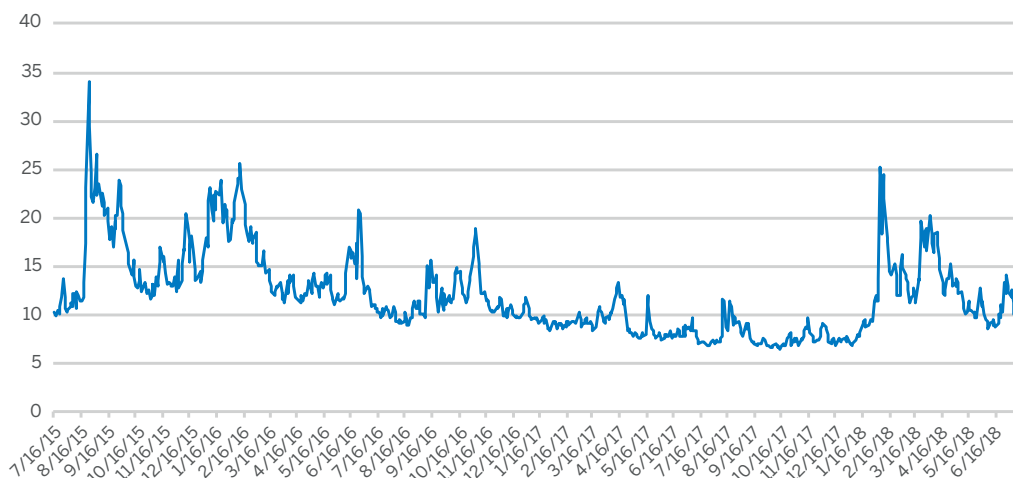
It's often been said that while futures are "two-dimensional" instruments, options tend to be four-dimensional instruments. With futures, you are generally concerned only with up and down direction, while with options however, you must deal with the ups and downs of the underlying as well as time decay and changes in implied volatility. Too often, beginners, and even more experienced traders ignore where we are on the volatility continuum and it can lead to sub optimal trading results.

In this paper we will discuss volatility from a slightly different perspective. We will attempt to distinguish average levels of volatility from above average volatility and also measure the extremes of volatility on both the high side and low side. The goal: To formulate more proactive strategies by taking into account the current volatility environment. What do we mean by that? Many options traders are familiar with a straddle where you buy a call and a put with the same expiry and same strike price. Ideally, you want to execute long straddle positions in low volatility environments with the expectation that vol (vol = volatility) will rise significantly in the near future. The problem is many traders make the mistake of doing such a strategy in higher volatility environments. Doing so carries more risk and also a reduced chance of profiting from the trade.

Hence, for some time now, we at CME Group have been going beyond looking at a volatility chart to determine the state of volatility and producing implied volatility percentile rankings. Volatility percentile rankings allow the trader to "grade" current volatilities in terms of what is high, what is exceedingly high vs. what is low vs. what is historically low as well as average levels of volatility.

Looking at Figure 1 below; illustrates a typical chart that looks at implied volatility over some period of time. You get some sense of highs and lows, observing that volatility rarely gets above 20-25 percent and rarely goes below 7-8 percent. Ideally, A trader may want to buy low and sell high with volatility as well. Higher vol helps a long options position and lower vol hurts a long options position (all other things being equal). This is because at higher volatility, there is a greater chance of going through strike prices. Hence, traders are willing to pay higher prices and sellers of options demand more premium in return for the added risk.

**Figure 1: The Traditional Way of Looking at Volatility Over Time: S&P 500 Implied Volatility 3 Years Ending July 16, 2018**



Source: CME Group

On the other hand, figure two shows a table with implied volatility percentile rankings. The data used to create the chart in figure 1 was the same data, just reformulated to allow a deeper dive into a "volatility gradient". As we draw an analogy. Implied volatility percentile rankings work much like college entrance exams that many of us are familiar with. If you took, for example, the SAT test, you received two scores: a raw score and a percentile ranking. If you scored a 790 on the math section, you were in the 99th percentile. That is, you beat 99 percent of those that took the test and likely went on to a prestigious university. If you scored a 300, you were in the 10th percentile and would probably want to retake the exam as 90% of those taking the exam scored higher.

Volatility percentile rankings work the same way. We took the implied volatility numbers each day and ranked them using a percentile generator in excel. Figure 2 shows the implied volatility percentile rankings for the E-mini S&P 500 options on futures. The data was taken each day and we used three years of data (ending July 16, 2018 in this case). The implied vol is the ATM straddle using a 30-day expiry (constant maturity).

**Figure 2: Cheap vs. Expensive Premium  
Volatility Percentile Rankings: Various CME Group Products: 3 Years Ending July 16, 2018**

Percentile ranking	E-mini S&P 500	Est. ATM Straddle* in premium terms
High	34.03	218.12 (\$10,906)
90th percentile	18.34	117.32 (\$5,866)
75th percentile	13.80	88.13 (\$4,407)
50th percentile	11.30	72.06 (\$3,603)
25th percentile	9.03	57.47 (\$2,873)
10th percentile	7.59	48.21 (\$2,411)
Low	6.50	41.20 (\$2,060)

\*2815 straddle (ATM), 30 days to expiry

The highest implied volatility during this 3-year window was 34.03.

The 90th percentile level was an implied vol of 18.34%

The 75th percentile level was an implied vol of 13.8%

The 50th percentile level was an implied vol of 11.3%

The 25th percentile level was an implied vol of 9.03%

The 10th percentile level was an implied vol of 7.59%

The lowest implied vol during that three-year window was 6.5.

So, say today's implied volatility was calculated to be 7.59%. This would put it at the 10th percentile—i.e. 92 percent of the time implied volatility was higher. Higher volatility helps long options positions. Traders get long premium (straddles, strangles, etc...) in anticipation of higher vol in the near future (the last column of figure two shows the ATM straddle in premium terms).

At the 10th percentile the ATM straddle would cost the buyer 48.21. But the price of the same straddle at the 50th percentile is a much higher 72.06—a substantial difference.

For those inclined to sell options premium, the goal would be to do so in higher vol environments such as the 75-90th percentile. But remember, selling options carries unlimited risk. Hence, risk management capabilities must be spot on and the account large enough to withstand the added risk. Most importantly, percentile rankings can help manage risk. If a mistake is to be made with an options purchase, better to be wrong buying premium in the 10th percentile than in the 90th percentile. Just notice the difference in the premiums of the ATM straddle in figure two at the 10th percentile and the 90th percentile. The straddle at the 90th percentile is more than twice as expensive. Being wrong in the 10th percentile would cost significantly less in the case of maximum loss.

Repeating what we said earlier, “buy low/ sell high” pertains to an option’s implied volatility too. The crux of these tables is to buy in the lower percentile rankings and sell options premium in higher percentile environments. Volatility percentile rankings can help the trader align the correct strategy for the correct volatility environment.

In the pages that follow, we have provided the volatility percentile rankings for many of the CME Group core products. The data is recent and ends with the three-year period ending July 16, 2018.

**Figure 3: Cheap vs. Expensive Premium  
Volatility Percentile Rankings: Various CME Group Products, 3-years ending 7/16/2018**

Percentile ranking	E-mini S&P 500	E-mini NASDAQ 100	E-Mini Russell 2000	10 Year Note	30 Year Treasury Bond	Eurodollar
High	34.03	39.27	27.91	7.43	14.93	50.36
90th percentile	18.34	22.13	17.15	5.54	11.73	36.07
75th percentile	13.80	16.94	14.78	5.10	10.76	32.20
50th percentile	11.30	14.33	13.21	4.65	9.62	27.79
25th percentile	9.03	12.49	12.19	3.92	7.58	23.19
10th percentile	7.59	11.09	11.37	3.58	7.14	19.88
Low	6.50	8.73	7.62	3.12	6.21	9.14

**Figure 4: Cheap vs. Expensive Premium  
Volatility Percentile Rankings: Various CME Group Products, 3-years ending 7/16/2018**

Percentile ranking	Crude Oil	Natural Gas	Gold	Soybeans	Corn
High	79.79	62.20	26.39	36.11	42.29
90th percentile	46.97	51.84	16.80	24.84	29.27
75th percentile	40.56	45.55	15.12	20.23	24.57
50th percentile	30.74	38.74	12.94	17.07	19.66
25th percentile	25.24	33.76	10.09	14.71	15.99
10th percentile	23.12	23.62	9.24	12.24	13.10
Low	15.74	20.89	7.80	9.77	9.82

**Figure 5: Cheap vs. Expensive Premium Volatility Percentile Rankings: Various CME Group Products, 3-years ending July 16, 2018**

Percentile ranking	JPY/USD	EUR/USD	GBP/USD
High	14.57	14.43	13.15
90th percentile	12.47	9.76	10.52
75th percentile	10.61	8.54	9.52
50th percentile	8.78	7.77	8.19
25th percentile	7.86	6.96	7.55
10th percentile	6.92	6.24	7.03
Low	5.93	5.16	5.76

## Using Volatility Percentile Rankings – A Case Study

Several years ago a broker and one of his larger clients witnessed the market trading water for months and volatility creeping lower and lower with each passing week. The client and broker decided to sell a large number of straddles in the SP 500 futures to take advantage of the time decay inherent in straddle selling.

At that particular time, volatility was running at 7.1 percent. The lowest it had been in the last decade was 6.9 percent. In fact, at 7.1 percent, it was in the 2nd percentile. 98 percent of the time volatility is higher than 7.1 percent and when volatility heads higher, it has a negative impact on short straddles. Statistically speaking, the probability favored higher vol. But vol could remain low and the strategy would be profitable in that case. But probability is not working in your favor.

*A week later the market plunged and volatility went from the 2nd percentile to the 90th in 5 trading days. Needless to say, the straddle would have lost substantial sums of money in a short period of time. The puts and calls exploded in premium terms. Volatility percentile rankings would have helped determine if this strategy had acceptable odds for success.*

## Summary

- Anyone can trade a straddle or strangle or any other options strategy from the long or short side. But doing the trade in the correct volatility environment will be a key determinant in success rates. A trader wants probability working for them, not against them.
- Buy low, sell high pertains to volatility levels too.
- Use Volatility Percentile Rankings as a tool or gauge to screen for certain trade strategies. They can be used as a risk management tool as well.
- To “short” premium, consider doing so when volatility is high...above the 75th percentile. Remember, percentile rankings are only one tool. Just because volatility carries a low percentile rank, doesn't mean that it can't go lower. High volatility can sometimes go higher as well !
- Moreover, even if you are fortunate enough to buy volatility in the lower percentile rankings, you still must deal with time decay issues and choosing appropriate strikes & strategy. Keep in mind that options are four dimensional instruments—it's not only the up and down movement in the underlying that matters, but time to expiration as well as volatility. It's more work—more plates to keep spinning, but the additional strategies available to options traders are worth the effort.

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