

October 2018 Newsletter

Dear Investor,

The Global Volatility Summit (“GVS”) brings together volatility and tail hedge managers, institutional investors, thought-provoking speakers, and other industry experts to discuss the volatility markets and the roles volatility strategies can play in institutional investment portfolios. The GVS aims to keep investors updated on the volatility markets throughout the year, and educated on innovations within the space.

Capstone Investment Advisors has provided the latest piece in the GVS newsletter series.

Cheers,
Global Volatility Summit

Event

The tenth annual Global Volatility Summit (“GVS”) is scheduled for Wednesday, March 13th, 2019 at Chelsea Piers in New York City. Alongside our featured volatility managers, we are excited to announce the addition of a Risk Premia manager panel, featuring prominent portfolio managers in the space to share their views on the volatility markets and resulting impact on these strategies.

2018 Event Recap

The 9th Annual Global Volatility Summit was held on March 14, 2018 at Chelsea Piers in New York City. 14 hedge fund managers were joined by senior professionals from hedge fund consultants, the institutional investor community, and leaders in the industry to discuss volatility, tail hedging, macro and quant strategies within the investment context. Three keynote speakers, Lance Armstrong, David Gallo, and Ryan Holiday temporarily drove the conversation away from the central content to speak to volatility across other contexts including athletic competition and underwater astonishments. The event hosted the first-ever GVS Think Tank Panel, which featured three industry experts across East Asia policy studies, macro quantitative and derivatives strategies, and US politics. Among these panelists included Ryan Hass, Marko Kolanovic, and Demetri Sevastopulo.

2018 MANAGER PARTICIPANTS

36 South Capital Advisors
Argentièrre Capital
Artemis Capital Management
BlueMountain Capital
Capstone Investment Advisors
Capula Investment Management
Dominicé & Co

III Capital Management
Ionic Capital Management
JD Capital
Man AHL
Parallax Investment Advisors
Pine River Capital Management
True Partner

Conventional wisdom suggests the more investors pay for a security, the less they should expect to earn. Though trend followers will generally disagree, as they typically buy high and expect to profit from selling even higher, this notion seems obvious enough not to merit a discussion. However, Capstone has often wondered about the real-world applications of such a truism to the options market.

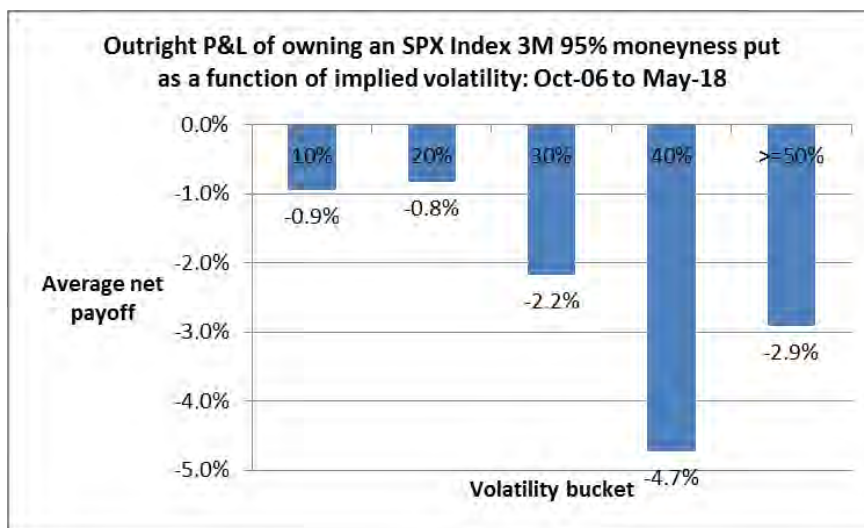
For a hypothetical example, implied volatility in equity index options is low. Therefore, one would expect it is a good time to hedge equity risk by buying puts. This suggestion seems quite reasonable. Insurance is cheap, buy it.

To test this claim, Capstone compared the actual performance of owning puts with the put's initial implied volatility. To generate the data used in Figure 1, Capstone analyzed historical implied volatility, interest rates and dividend yields from Bloomberg and used them to price 3-month 95% moneyness puts every day from October 2006 to May 2018. The team then compared the implied volatility of each put to the put's net payoff and grouped the results into volatility buckets, calculated by rounding the put's initial implied volatility to the nearest 10%.

ABOUT CAPSTONE

Capstone Investment Advisors, LLC is a global hedge fund manager who has specialized in trading volatility as an asset class since the firm's inception in 2007. With 54 investors, Capstone currently manages approximately \$5.8 billion across three platforms: multi-strategy volatility arbitrage, customized and volatility-based solutions, and global macro. Through offices in New York, London, Amsterdam and Los Angeles, Capstone trades globally across equities, fixed income, foreign exchange, and commodities.

Figure 1: SPX Index 1M 95% Put Outright Performance from October 2006-May 2018



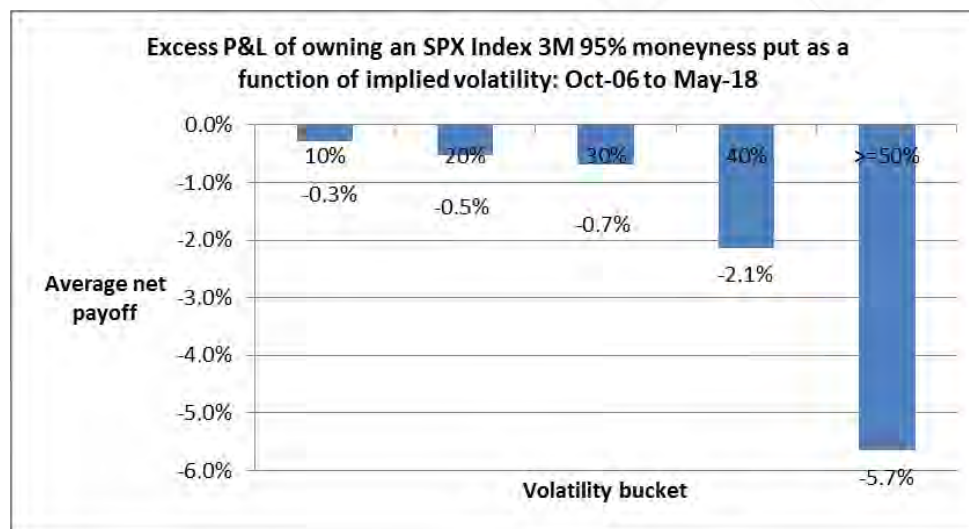
Source: Bloomberg, Capstone

At first glance, there seems to be a relationship between the put's initial volatility and its average net payoff. For example, when initial volatility was relatively low, around 10%, the put lost 0.9%, on average. When volatility was relatively high, losses were higher, closer to 4.7% when volatility was around 40% and 2.9% when volatility was 50%.

It may be more reasonable to look at the delta-adjusted payoff of the put, as many investors rightfully think in terms of relative performance. In this case, had one shorted the market instead of buying the put, one would have established a

directional position that was initially similar to the put. And if, for example, the market had rallied significantly, i.e. rallied 10%, then, though the put would have lost money, it would have lost less money than simply being short the market. Figure 2 represents the data including the adjustment of the payoff by the put's initial delta.

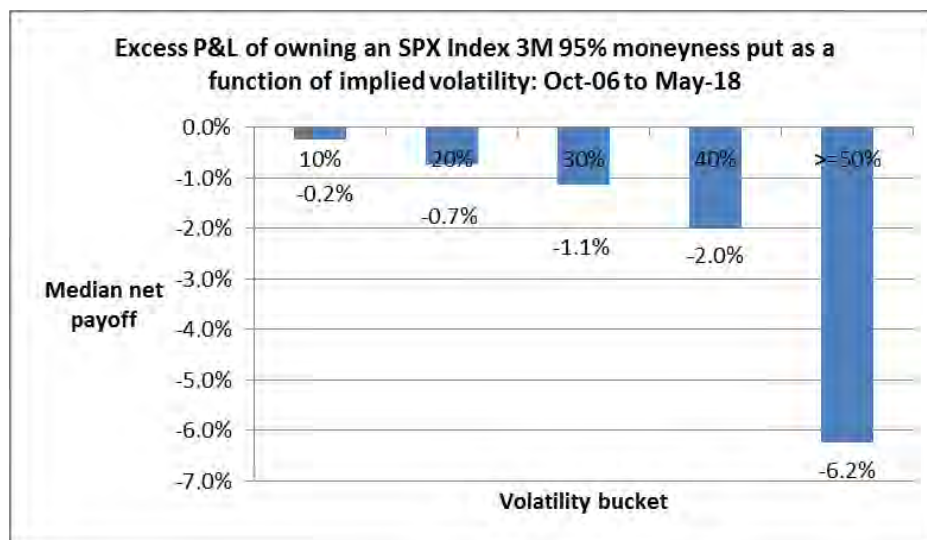
Figure 2: Owning an SPX Index 3M 95% Moneyness Put Excess Performance from October 2006-May 2018



Source: Bloomberg, Capstone

While Capstone believes there exists a clear relationship between implied volatility and subsequent performance, where the more expensive the put, the greater the loss on average, the analysis is possibly incomplete. So far, performance has been measured by looking only at the *average* of the net profit in each volatility bucket. However, maybe there is information hidden when only looking at the average. Figure 3 shows the performance calculated using the *median* of the net payoff per bucket.

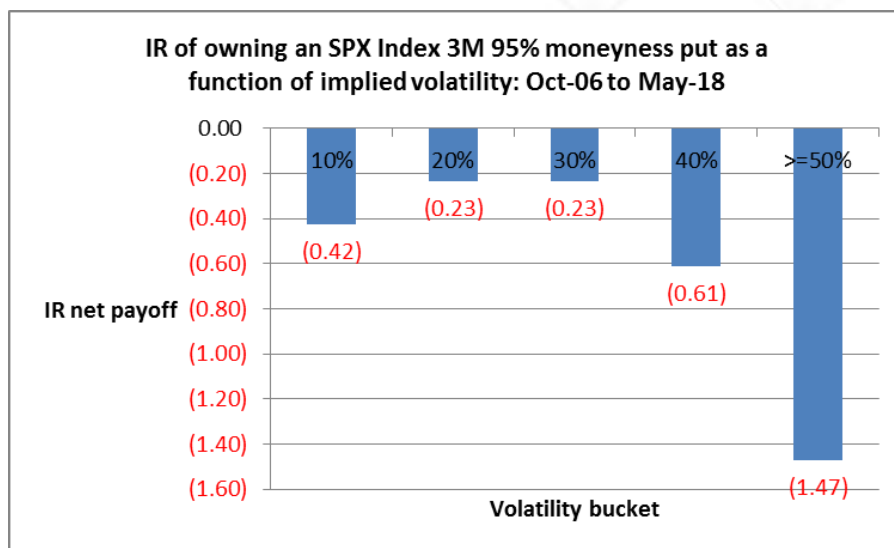
Figure 3: Performance of Owning an SPX Index 3M from October 2006-May 2018



Source: Bloomberg, Capstone

The result is very similar to the average, suggesting it's not just a few outliers that explain the data. As a final test, the Capstone team incorporated the standard deviation of results to calculate an information ratio ("IR"), as calculated by the average divided by standard deviation per volatility bucket.

Figure 4: IR of Owning an SPX Index 3M 95% Moneyness Put from October 2006-May 2018



Source: Bloomberg, Capstone

The information that Figure 4 conveys is a little less clear. To be certain, owning volatility when it was greater than 50% yielded a negative information ratio. Capstone believes this is not surprising given the data shown in the previous figures. When looking at the IR of all the volatility buckets, the 20% and 30% buckets, in fact, "outperform" the 10% volatility bucket. How can this be when the average performance was worse? It's because the standard deviation of the results in the 20% and 30% volatility buckets was relatively high as well, thus, "improving" the IR calculation by making it less negative. Typically, one thinks of a high standard deviation of outcomes for an investment as "bad" as it means less predictability in the result. In the case of buying insurance, where, frequently one is dealing with negative expected values, it's less clear what a high standard deviation means.

One interpretation of the IRs produced is that owning financial insurance when the price has been historically low has not cost the buyer much, approximately 20 bps, on average. That is worth noting, especially for investors who are most concerned with the amount of premium they spend on protection.

However, at a minimum, historically owning low premium options has also been a likely loser, because the standard deviation has been relatively low. As volatility rose, the expected value of owning options worsened, but as the standard deviation also increased, options owners had a fighting chance of their hedges paying off.

Another way of seeing this is to look at the percent of the time that owning puts paid off and the value of the payoff, shown in Table 1.

Table 1: Average Put Outperformance per Volatility Bucket

Bucket	Count	% wins	Avg Win Adj_PL	Avg Loss Adj_PL
10%	483	35%	0.4%	-0.6%
20%	1,926	28%	1.6%	-1.3%
30%	455	29%	2.5%	-2.0%
40%	107	20%	2.8%	-3.3%
>=50%	55	9%	2.8%	-6.5%

Source: Bloomberg, Capstone

Note that the win percent of the put outperforming a similar market exposure is similar for the 10%, 20% and 30% volatility buckets (~30%). Further, the amount of contingent outperformance increases as the volatility buckets increase: from 0.4% to 1.6% to 2.5%. Of course, so does the amount of loss: from -0.6% to -1.3% to -2.0%.

Capstone believes the investment implication is that hedgers who are most concerned with exogenous shocks should focus on hedging more when premiums are low. These types of events tend to be difficult, if not impossible, to predict and, as a result, are no more likely to occur when implied volatility is high.

But investors who are more focused on endogenous shocks, so-called “known unknowns” like elections, earnings and monetary policy, should not necessarily shy away from owning insurance even when premiums rise.

DISCLAIMER

Results include hypothetical backtested results. Backtest performance shown does not represent the results of actual trading using client assets but were achieved by means of the retroactive application of the model. The hypothetical performance presented was compiled after the end of the period depicted and does not represent the actual investment decisions of Capstone Investment Advisors, LLC. Hypothetical performance results have many inherent limitations, some of which are described below. No representation is being made that any account will or is likely to achieve profits or losses similar to those shown. The hypothetical backtest results have been provided to you on the understanding that, as a sophisticated investor, you understand and accept the inherent limitations of such illustrations, and you will not rely on them in making any investment decision.

Backtest Construction Details

- Backtest was constructed as a result of buying each put at premium and calculated using volatilities, rates, dividend yields and spot prices from Bloomberg on the close of each business day.
- Backtest results were calculated using mid prices. Puts were not rolled and every put was held to maturity.
- Backtest results do not account for transaction costs ("t-costs"), nor do the backtest results specify size.

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