Capturing the volatility premium through call overwriting

Systematic call overwriting strategies are valuable tools in the investment toolbox. They can provide income, attractive risk adjusted returns and the potential for a cushion during market downturns. In this paper, we explore call overwriting, the impact of strategy construction and performance across various market environments.

From Russell’s vantage point we see growing conviction in the marketplace for moderating long term return expectations. Combine this view with a low interest rate environment and the result is an increasing number of investors searching for higher levels of portfolio income and protection against short term volatility. One way investors are achieving these goals is by implementing indexed or active call overwriting programs against long portfolios. In this paper, our objective is to review basic strategy characteristics, risk/reward profiles and key overwriting strategy design factors. Naturally these elements should be viewed against the backdrop of overall portfolio objectives, current volatility regime and expectations for future volatility in order to optimize the strategy.

Exhibit 1: Call overwriting has historically benefited long term wealth creation and lowered overall portfolio volatility for attractive risk adjusted returns

Source: CBOE, Bloomberg, Russell Investments July 29, 1988 to June 29, 2012. All indices referenced are total return indices. Indexes are unmanaged and cannot be invested directly.
Basics: call overwriting strategies aim to capture the volatility risk premium

Call overwriting strategies can be viewed as selling a form of insurance whereby the option seller receives an upfront call premium for writing insurance to a buyer who wishes to gain long exposure with limited downside risk. The main risk and potential cost at expiration to the call option seller is the liability born if the security/index moves above the strike price plus premium points received.

All forms of insurance come at a cost and in the world of options a key element of the cost is the “volatility risk premium.” The volatility premium is a well understood and documented investment concept. Simply, the volatility implied by option prices over time has consistently been greater than subsequent realized volatility of the underlying securities. This phenomenon creates an implied-to-realized volatility spread. Exhibit 2 shows the volatility spread for the S&P 500. When an option is sold it is priced based on implied volatility. The ultimate value of the option is partially dictated by the realized volatility. This is the mechanism the option seller uses to capture the premium.

The volatility premium will generally increase as volatility rises and decrease as volatility falls. In other words, higher levels of premium can often be realized during high volatility regimes. Post credit crisis, the S&P 500 implied-to-realized spread is higher than long term norms. Insurance providers over recent history have been “paid” by insurance seekers on average at historically attractive levels.

Exhibit 2: S&P 500 volatility premium spread

![Exhibit 2: S&P 500 volatility premium spread](image)

Source: B of A Merrill Lynch Global Research, Jan 2, 1990 to May 31, 2012. Standard & Poor’s Corporation is the owner of the trademarks, service marks, and copyrights related to its indexes. Indexes are unmanaged and cannot be invested directly.

A visual look at call overwriting

An illustration of the payoff profile for a “covered” portfolio is helpful. Not only does Exhibit 3 demonstrate the profile at option expiration, it also shows the payoff at various times between initiation and expiration. What is important to see in the graph is the inherent tradeoff that is made with overwriting. In return for an upfront payment the upside potential for the underlying portfolio is truncated. So for large upside moves the overwritten portfolio will underperform (denoted by colored lines below delta-1 index benchmark). For large downside moves, the
overwritten portfolio will outperform (denoted by colored lines above delta-1 index benchmark). The net effect of this structure is an overall reduction in portfolio volatility. With this core concept in mind, the process of strategy optimization then becomes an exercise in maximizing the premium received while minimizing the upside truncation.

Another important consideration is the risk management of managing option positions. Time decay (theta) works in favor of the call seller. Gamma is the rate of change of the underlying delta with respect to market movement. As the time to expiration shrinks both theta and gamma become increasingly large for short at-the-money options. What is important to understand and evaluate is the impact a strategy’s design elements will have on gamma and theta. Without this insight, management of an options portfolio can be extremely challenging. For further background material, please reference the Appendix.

**Exhibit 3: Payoff profile of one-month call overwriting vs. long equity exposure**

![Payoff Profile Chart](chart)

Source: Russell Investments. For illustrative purposes only. Standard & Poor’s Corporation is the owner of the trademarks, service marks, and copyrights related to its indexes. Indexes are unmanaged and cannot be invested directly.

**A starting point – CBOE BXM index**

As a baseline, we consider the BXM index which is a widely known buy write index. Marketed by the CBOE as a passive total return index, the strategy buys an S&P 500 index portfolio and sells 1-month index call options nearest to the money rounding up. The options are held to expiration and settled against the Special Opening Quotation at expiration. The options are then written again on expiration day using a VWAP strategy over a specified time period.

Option participants commonly use the 1987 market crash as a marker to differentiate volatility environments. In the post-1987 volatility regime the BXM index has, on average, outperformed the S&P 500 Total Return Index (SPTR). A notable exception was the period from the mid 1990’s to the end of the Tech Bubble in 2000. Over the time period shown in Exhibit 4, the SPTR returned 9.19% annualized while the BXM returned 9.53%. More importantly, the BXM posted these returns with only two-thirds of the portfolio volatility.
Exhibit 4: Call overwriting index data June 1, 1988 to Dec 30, 2011

An important consideration when implementing a call overwriting strategy is the investor’s ability to withstand the performance deviation during periods when the strategy significantly underperforms a long only broad market index. This point becomes clear in Exhibit 4. From 1995-1998 and again 2003-2005 the BXM and BXY strategies trailed the S&P 500 total return. Overall, it is important to see how the benefits of improved risk adjusted returns over longer periods of time can come at the cost of significant negative tracking error during many shorter time periods.

While simple to understand and replicate, we believe that the BXM strategy has room for improvement in terms of both risk adjusted return and flexibility to adjust in changing market conditions. In relation to the baseline BXM case, our view is that all strategies are not created equal. We believe that with an understanding of historical implied and realized volatility an investor can make a more informed decision as to when and how to participate in overwriting. By also looking at technical indicators, the investor can better quantify market expectations and make a more thoughtful decision on how aggressively to overwrite. These concepts coupled with an understanding of the relevant risk metrics are the building blocks for developing a successful strategy.

GUIDELINES FOR DETERMINING THE OPTIMAL STRATEGY RANGE

Strike considerations

One of the reasons that option strike matters when designing a strategy is that closer to the money options tend to generate higher risk adjusted returns. Close to the money options maximize the amount of time premium taken in, thereby increasing the ability to earn positive theta or time decay. This is evidenced in Exhibits 6 and 7 which show the 100% at-the-money
(ATM) and 102% slightly out-of-the-money strike outperforming deep in-the-money or deep out-of-the-money strikes over a long time period.

We see that writing in-the-money (ITM) options tends to lower volatility and provides more “cushion” on the downside. The trade-off for this benefit is greater truncation of upside potential because less time value and more intrinsic value is captured. ATM options provide the highest amount of time value and no intrinsic value capture. The trade-off here is a smaller downside buffer. Lastly, out-of-the-money (OTM) options provide more upside potential for the underlying portfolio, but take in less premium and therefore contain less time value and downside buffer.

Exhibit 6: Daily rolls of one week options – strikes: 95%, 98%, 100%, 102 & 105%

Source: Goldman Sachs July 2002 to July 13, 2012. SPTR is the S&P 500 total return index as calculated by S&P. For illustrative purposes only. Standard & Poor’s Corporation is the owner of the trademarks, service marks, and copyrights related to its indexes. Indexes are unmanaged and cannot be invested directly.

Exhibit 7: Daily rolls of one month options – strikes: 95%, 98%, 100%, 102 & 105%

Source: Goldman Sachs April 2002 to July 16, 2012. SPTR is the S&P 500 total return index as calculated by S&P. For illustrative purposes only. Standard & Poor’s Corporation is the owner of the trademarks, service marks, and copyrights related to its indexes. Indexes are unmanaged and cannot be invested directly.
Tenor considerations

As a starting point for a discussion on tenor, keep in mind that in the world of listed equity index options there are three common tenors: weekly, monthly, and quarterly options. Over-the-counter options can be utilized for strategies requiring customized expiries and longer dated tenors.

Exhibit 8 compares 16 years of historical annual premiums received by rolling weekly, monthly, quarterly, and annual ATM options. This historical data shows that shorter term options maximize the total amount of premium received on an annual basis. A one week tenor option rolled four times per month has generated more than 2.0x the premium of a one month tenor option rolled once per month. Likewise, a one month option rolled three times per quarter on average generates 1.6x the premium of a three month option. This helps make clear that close to the money strategies with short tenors have consistently generated a higher level of gross income. This is a direct result of the higher theta capture versus longer dated strategies.

It also results in a higher reset frequency of the option strike. One of the reasons strategies using shorter maturity options tend to outperform over longer time periods is that more frequent resets help keep up with market price and volatility movements, better positioning the portfolio to capture the time decay.

Exhibit 8: Comparison of weekly, monthly, quarterly, and yearly tenor ATM option premiums received on an annual basis

Source: Russell Investments. Historical data provided by JP Morgan Research, daily data Jan 1996 to Dec 31, 2011 data annualized. For illustrative purposes only.

1 Transaction costs include round trip commission costs for each time options are rolled which varies by tenor as well as ½ bid-ask spreads which are derived from historical option data.
Optimal combinations of tenor and strike

Exhibit 9 shows the optimal strategy range for both tenor and strike based on Sharpe Ratios. The heat map emphasizes how shorter term options that are at or near-the-money, tend to provide an optimal framework for a call overwriting program. We view the optimal strategy range as 98% to 105% with a Sharpe Ratio range of .21 to .29 versus .13 for the plain vanilla S&P 500.


Source: BofA Merrill Lynch Global Research. Long term history not available for weekly options. (Weekly options began trading in October 2005). For illustrative purposes only. Standard & Poor’s Corporation is the owner of the trademarks, service marks, and copyrights related to its indexes. Indexes are unmanaged and cannot be invested directly.

Despite the historical evidence and empirical support for short tenors near 100% strikes, overwriters should consider that the optimal strategy range can be flexible to meet specific objectives. In fact, we believe tactical adjustments can be made without losing the benefits of being in the optimal range or violating any predefined portfolio risk objectives. For example if an investor is targeting a lower portfolio weight for equities, a shift of the strike to the 97-98% range with no periodic rebalancing will increase the likelihood of a gradual reduction in equity exposure over time.

Roll considerations

The last important design factor to consider is roll strategy. Exhibit 10 shows clearly that there is a strong “day of the week” effect for a weekly options strategy. Historically for example, Monday rolls have underperformed the other days of the week.
Exhibit 10: Daily rolls of one week ATM options

Source: Goldman Sachs July 2002 to July 13, 2012. SPTR is the S&P 500 total return index as calculated by S&P. For illustrative purposes only. Standard & Poor’s Corporation is the owner of the trademarks, service marks, and copyrights related to its indexes. Indexes are unmanaged and cannot be invested directly.

Exhibit 11 shows clearly that there is a strong effect for a monthly options strategy also. Simply, what we want to portray is the diversification and potential value added that end of month expiries may add. This can be attributed to volatility depression due to mid month listed expirations and a wider implied to realized volatility spread exhibited during month end periods when typical rebalancing flow is taking place. If not available in listed expiries, month end options may be traded OTC.

Exhibit 11: Daily rolls of one month ATM options

Source: Goldman Sachs April 2002 to July 16, 2012. SPTR is the S&P 500 total return index as calculated by S&P. For illustrative purposes only.
CALL OVERWRITING WITH DYNAMIC IMPLEMENTATION

We believe that traditional call overwriting can be enhanced within a dynamic implementation framework to add value across varied market environments. Path dependence can be significant over short term periods, but our work suggests that there are more efficient ways to determine where to strike the options that can, for example, allow for more upside potential during rising markets.

Trade signal based implementation can improve upon static overwrite strategies. Quantifying market movement and volatility metrics can create implementation signals across various tenors and strikes. For example, a volatility signal can incorporate long term and short term triggers to monetize higher levels of premium in high volatility regimes and capture mean reversion in short term volatility and price. Volatility in general can guide a dynamic strategy as to when and where to overwrite.

Final considerations

In summary, we believe that call overwriting can provide income generation and a cushioning effect on the downside. Over longer periods, overwriting strategies can significantly reduce portfolio volatility without necessarily sacrificing performance potential in relation to a long only equity program. This outcome is achieved by (1) selling insurance to the marketplace in the form of a call option and (2) capturing the volatility risk premium embedded in these options. It is important to remember that over shorter periods an investor can experience significant underperformance relative to a benchmarked long equity position. We highlight that overwriting strategies can be implemented as a customized solution for an investor's unique objectives or with systematic rules-based trading strategies. Furthermore, our research suggests that dynamic implementation can significantly improve upon static strategies, providing additional value over time.
APPENDIX

Some specifics about options Greeks and option terminology

The most common of the Greeks are the first order derivatives: Delta, Vega, Theta and Rho. Gamma is also a critical risk metric, a second order derivative of the value greek, delta.

**Delta:** The rate of change of the price of a derivative with the underlying asset.

**Vega:** Measures the sensitivity of an option’s price to volatility.

**Theta:** The rate of change of price of an option with the passage of time.

**Rho:** Measures sensitivity to the applicable interest rate.

**Gamma:** The rate of change of delta with respect to the asset price.

**Intrinsic value:** For call options, this is the difference between the underlying stock’s price and strike price of the option.

**Time value:** For call options, this is the excess value above the amount of intrinsic value.

**Tenor:** The expiration date or life of the option is called the tenor. An option is usually referred to by the month that the expiration date occurs.

**Moneyness:** The percent moneyness determines the strike versus the underlying market. A strike trading around the underlying is considered at-the-money (ATM), away from is considered out-of-the-money (OTM) and below from, in-the-money (ITM).

**Path dependence:** Explains how the set of decisions one faces for any given circumstances is limited by the decisions one has made in the past, even though past circumstances may no longer be relevant. In economics and investment theory, this can refer either to outcomes at a single moment in time or to long run equilibrium of a process.

**Special opening quotation (SOQ):** The SOQ of an index is generally based on the opening values of the component stocks, regardless of when those stocks open on expiration day.

**Delta-1:** Generally, financial derivatives or beta exposure that has no optionality and as such have a delta of one (or very close to one). They often incorporate a number of underlying securities, such as in an index and give the holder an easy way to gain exposure to a basket of securities in a single product.