

# Russell Research

By: Scott Maidel, CFA, CAIA, FRM, Senior Portfolio Manager  
Karl Sahlin, CPA, Portfolio Manager

DECEMBER 2010

## Capturing the volatility premium through call overwriting

Systematic call overwriting strategies are valuable tools in the investment toolbox. They can provide income, attractive risk<sup>1</sup> 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 call overwriting programs against long portfolios. 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 the overall portfolio objectives, the current volatility regime and expectations for future volatility in order to optimize the strategy.

It should be noted up front that call option overwriting is most commonly implemented in equity markets. Primary reasons for this include the high degree of relative volatility, liquidity, and market participant familiarity. Though this paper focuses on equity markets, many of the strategies can also be successfully applied to other asset classes.

### **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.

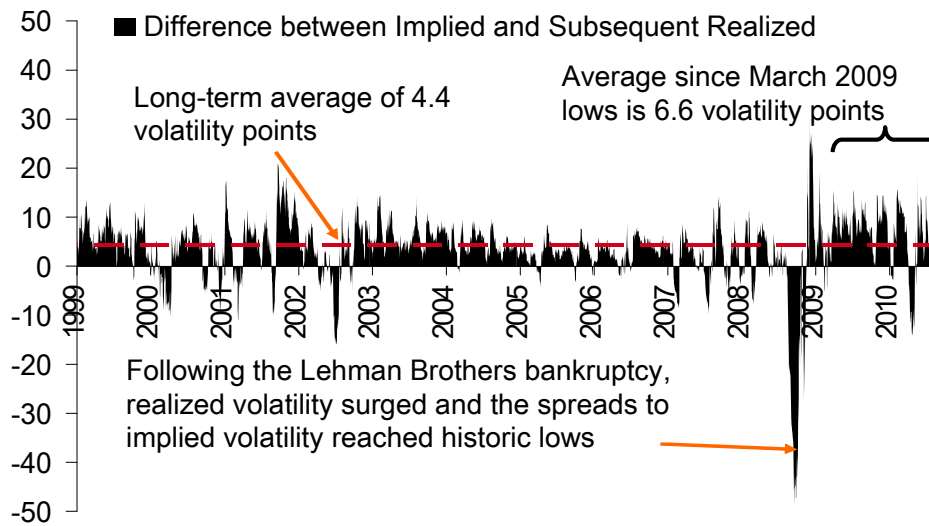
---

<sup>1</sup> Many measures of portfolio risk do not control for non-normal return patterns. In this paper we attempt to portray portfolio risk via measures that are widely understood and accepted, acknowledging that skew, kurtosis and other statistical measures are not universally accounted for in some of these measures.

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 1 shows the volatility spread for the S&P 500 Index. 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 1: S&P 500 Volatility Premium Spread



Source: B of A Merrill Lynch Global Research, Jan 2, 1999 to Sept 30, 2010. 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. Data is historical and is not a guarantee of future results.

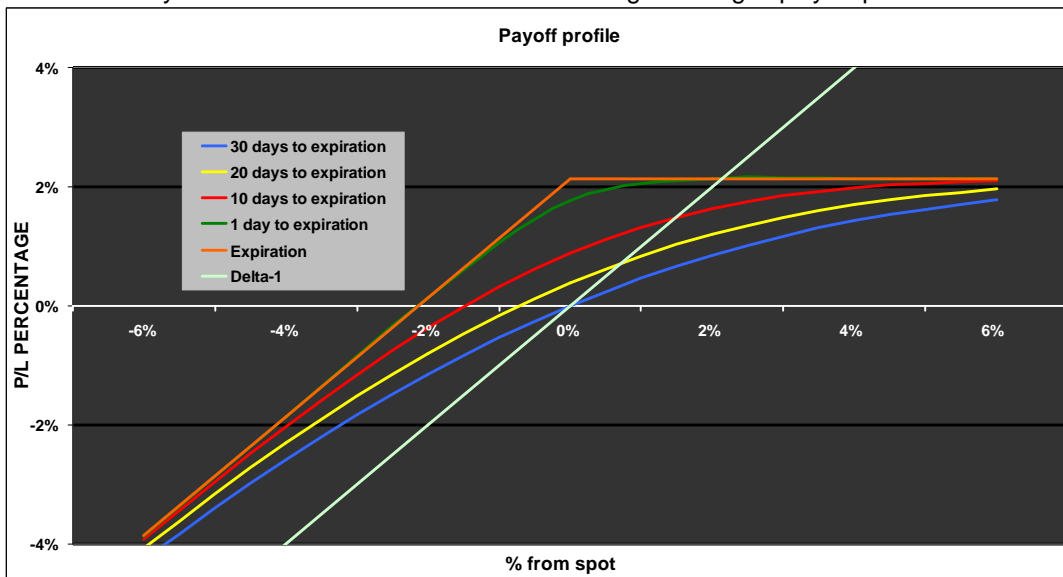
### A visual look at call overwriting

An illustration of the payoff profile for a “covered” portfolio is helpful. Not only does Exhibit 2 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 benchmark line). For large downside moves, the overwritten portfolio will outperform (denoted by colored lines above delta-1 benchmark line). 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 generic risk of managing short option positions. Without diving too deeply into a discussion of the “greeks” it is worth commenting on theta

and gamma. Simply put, they are risk metrics that require monitoring. Theta is the rate of change of option price with the passage of time. This time decay 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 2: Payoff Profile of One-Month Call Overwriting vs. Long Equity Exposure



Source: Russell Investments. The above is shown for illustrative purposes only and is not meant to represent any actual profile.

### A starting point – CBOE BXM Index

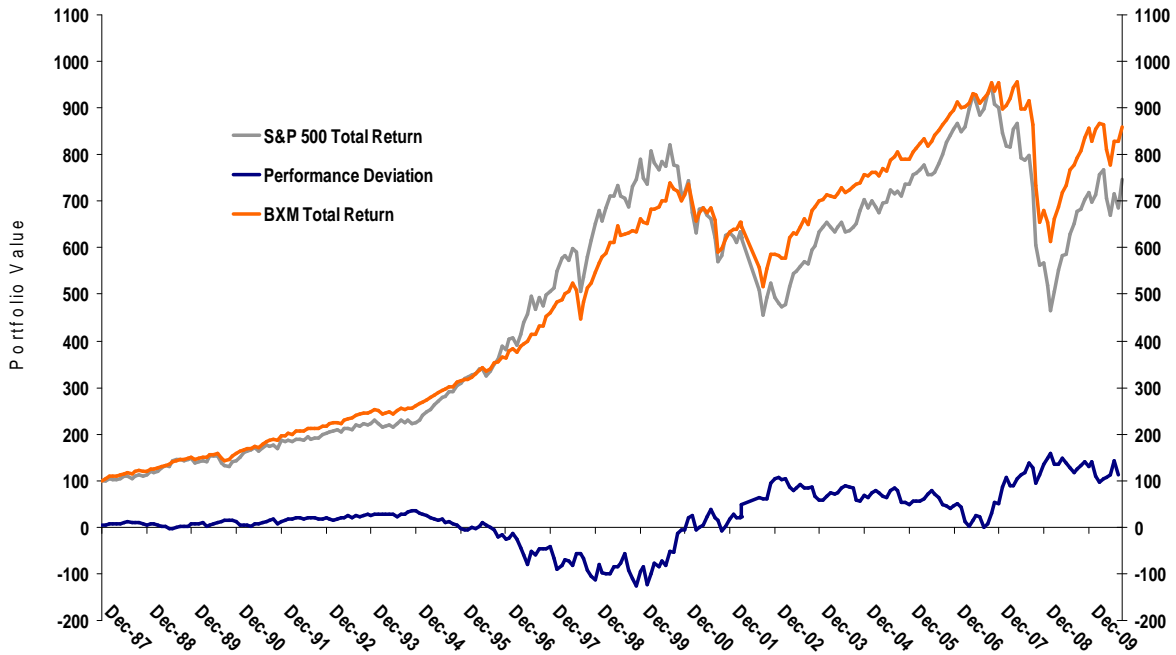
As a baseline, we consider the BXM index which is a widely known buy write index. Marketed by the CBOE as a passive total return index, the strategy buys an S&P 500 index portfolio and sells 1-month index call options nearest to the money. The options are held to expiration and settled against the Special Opening Quotation at expiration. The options are then written again on expiration day using a VWAP<sup>2</sup> 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 3, the SPTR returned 9.4% annualized while the BXM returned 9.9%. More importantly, the BXM posted these returns with only two-thirds of the portfolio volatility.

<sup>2</sup> Volume Weighted Average Price

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 to changing market conditions.

Exhibit 3: S&P 500 TR Index versus BXM from January 1988 to September 2010

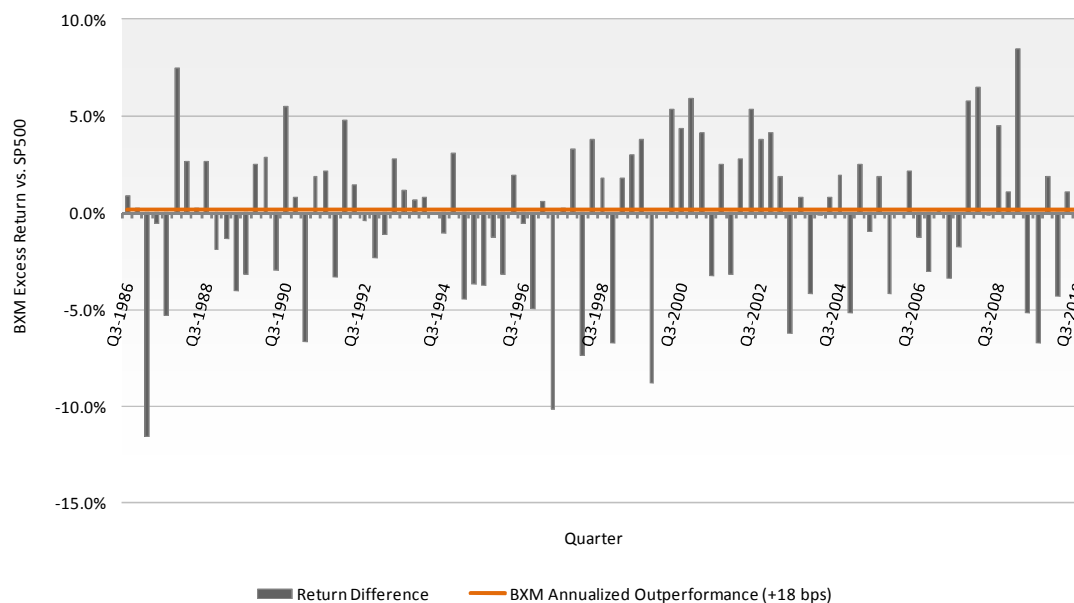


	S&P 500 TR	BXM TR
Return (Annualized)	9.4%	9.9%
Risk (Annualized)	15.1%	10.6%

Source: Russell Investments, CBOE, Bloomberg. For illustrative purposes only. Indexes are unmanaged and cannot be invested in directly. Example is based on historical data and it is not a guarantee of future results.

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. This point becomes clear in Exhibit 4. From January 1987 to September 1987 the BXM strategy trailed the S&P 500 total return significantly. On the other hand, the downside "cushion" provided during the 4<sup>th</sup> quarter of 1987 is an example of positive performance deviation and illustrates the moderating effect overwriting can have on portfolio standard deviation. 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. This is evident in the number of quarters in which the BXM strategy underperforms by 500 to 1000 bps.

Exhibit 4: BXM Excess Return versus S&P 500 TR from July 1986 to September 2010



Source: Russell Investments, CBOE, Bloomberg. For illustrative purposes only. Indexes are unmanaged and cannot be invested in directly. Example is based on historical data and it is not a guarantee of future results.

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

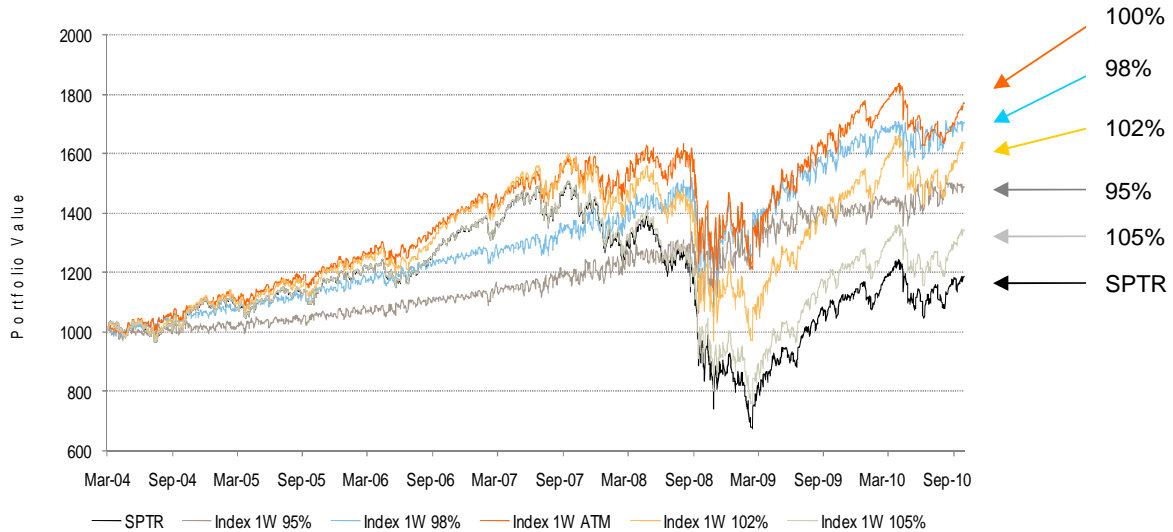
### Strike Considerations

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 Exhibit 5 which shows the 100% at-the-money (ATM) strike outperforming other strikes on a fairly consistent basis.

More specifically, Exhibit 5 displays the historical outperformance of equal weighted, daily rolled, weekly option strikes. 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. OTM options offer even less downside buffer to the investor.

A related pricing nuance associated with OTM call options is that they often trade at lower volatilities than ITM and ATM call options because of volatility skew (See Collie and Thomas, Q4 2010).

Exhibit 5: Daily Rolls of One Week Options – Strikes: 95%, 98%, 100%, 102 & 105%



Source: Societe Generale Financial Engineering March 26, 2004 to Oct 25, 2010.

For illustrative purposes only. Indexes are unmanaged and cannot be invested in directly. Example is based on historical data and it is not a guarantee of future results.

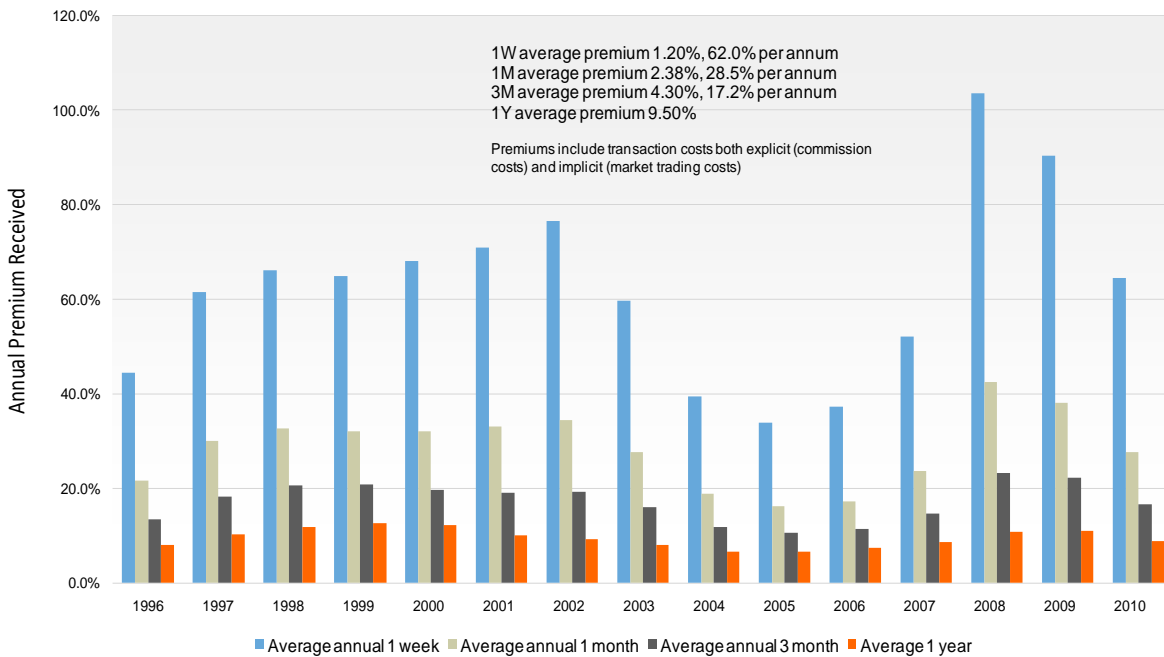
### Tenor Considerations

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. Quarterly options are listed out to one year, while weeklies are listed on Thursdays for the proceeding week. Over-the-counter options can be utilized for strategies requiring longer dated tenors.

Exhibit 6 compares the 15-year 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. That said, it is important to note that short tenor strategies increase the probability of capping the upside in any given period. This is the result of the increased probability of paying an exercise cost when these shorter dated ATM options expire in-the-money.

Exhibit 6: Comparison of Weekly, Monthly, Quarterly, and Yearly Tenor ATM Option Premiums Received on an Annual Basis<sup>3</sup>

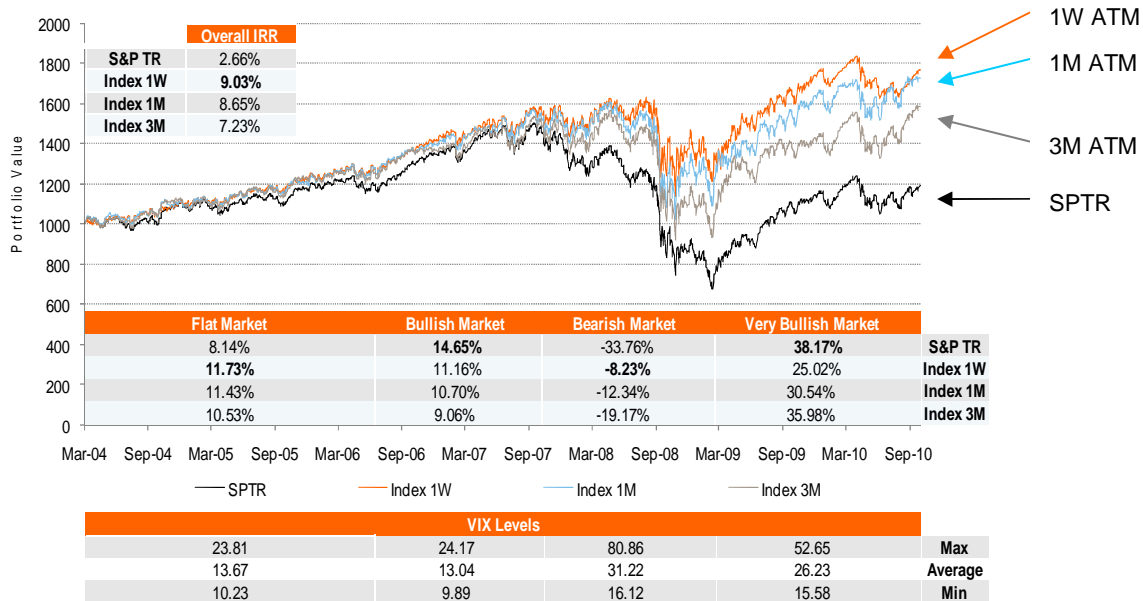


Source: Russell Investments. Historical data provided by JP Morgan Research, daily data Jan 1996 to Sept 30, 2010 data annualized. For illustrative purposes only. Data is historical and is not a guarantee of future results.

Taking the results of the average premium conclusion a step further, Exhibit 7 compares the various tenor strategies against a plain vanilla SPTR portfolio across a number of volatility regimes. Not surprisingly, we see that a covered call strategy tends to outperform in bearish and flat markets and underperform in bullish and very bullish markets. Additionally we see that during this time frame shorter tenors consistently outperformed longer tenor strategies in all but very bullish market environments.

<sup>3</sup> 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.

Exhibit 7: Daily Rolls of ATM Options - 1W, 1M, 3M Maturities

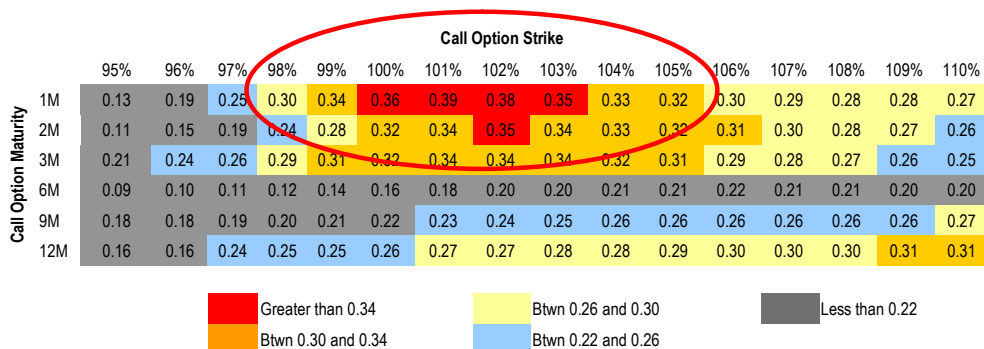


Source: Societe Generale Financial Engineering Mar 26, '04 to Oct 25, '10. Flat: 3/26/04 - 6/30/06 Bullish: 7/3/06 - 7/30/07 Bearish: 8/1/07 - 2/28/09 Very Bullish: 3/2/09 - 6/30/10. For illustrative purposes only. Indexes are unmanaged and cannot be invested in directly. Example is based on historical data and it is not a guarantee of future results. VIX: CBOE Volatility Index.

Optimal Combinations of Tenor and Strike

Exhibit 8 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 one month Sharpe Ratio range of .30 to .39 versus .22 for the plain vanilla S&P 500.

Exhibit 8: Sharpe Ratios of Systematic S&P 500 Covered Call Strategies, March 1990 to September 2010.



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. Data is historical and is not indicative of future results.

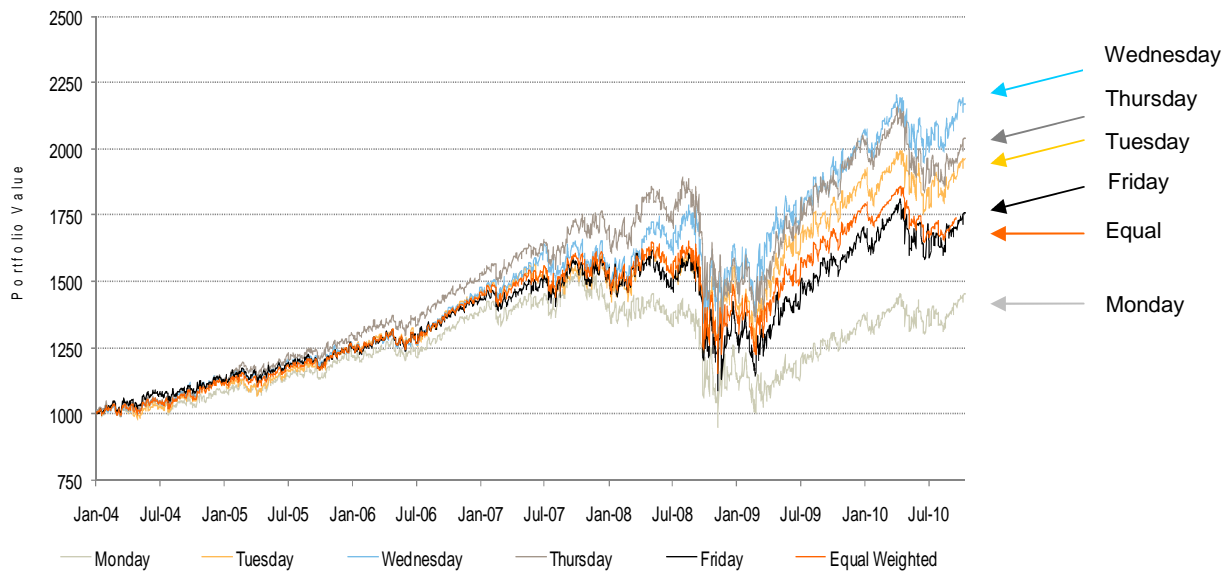


Despite the historical evidence and empirical support for short tenors near 100% strikes, overwriters should consider that the optimal strategy range can be flexible to meet specific objectives. In fact, we believe tactical adjustments can be made without losing the benefits of being in the optimal range 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 9 shows clearly that there is a strong “day of the week” effect for a weekly options strategy. Historically, Monday and Friday rolls have underperformed the other days of the week.

Exhibit 9: Daily Rolls of 1 Week ATM Options



Source: Societe Generale Financial Engineering January 14, 2004 to Oct 25, 2010. For illustrative purposes only. Data is historical and is not a guarantee of future results.

### 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.

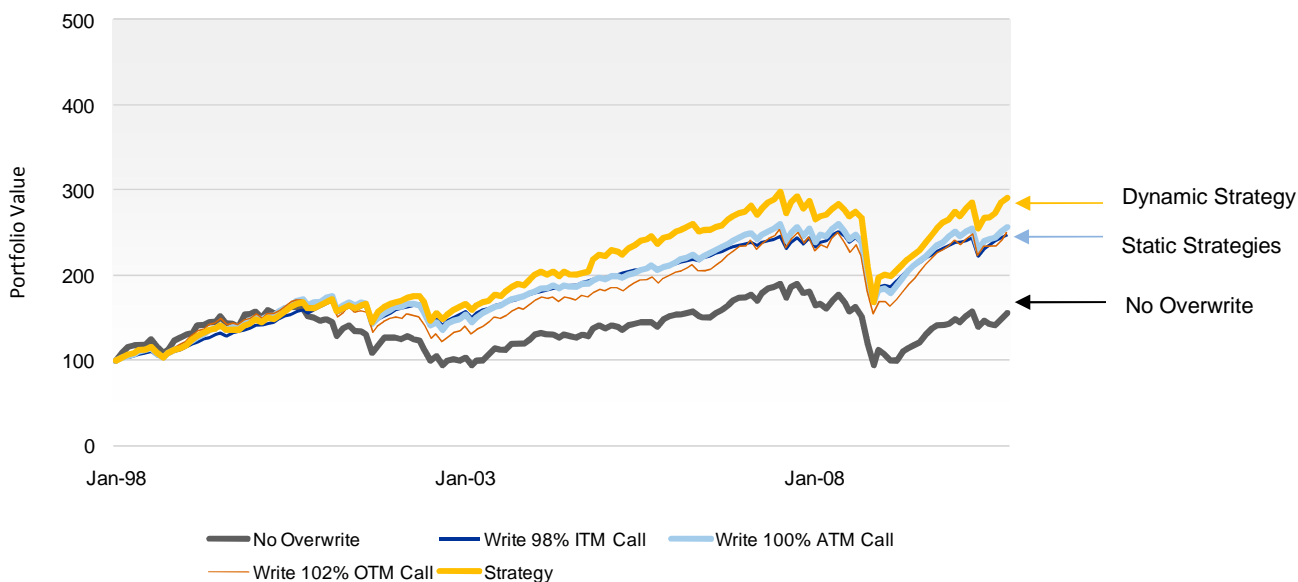
Exhibit 10 shows the historical performance results for a dynamic, rules-based trading strategy using monthly options. The purpose of this basic example is to show how dynamic, signals based implementation can improve upon static overwrite strategies such as the BXM. In our example we have analyzed market momentum and volatility metrics to create implementation signals. The momentum signal uses moving averages as a guide to strike either 98% ITM, 100% ATM or 102% OTM options within the monthly rolling cycle. The volatility signal incorporates triggers to monetize higher levels of premium in certain high volatility regimes and capture mean reversion in short term volatility. The volatility signal

also guides the dynamic strategy to not overwrite in a very small percentage of extreme market conditions.

In Exhibit 10 we compare the dynamic strategy results to the static strategies which sell a predetermined option strike systematically over time. We also show the results of a no overwrite program. A static 100% ATM strategy is similar to the approach used with the BXM, which will always trade ATM options regardless of market environment. The results indicate value can be added over time with a dynamic strategy.

Exhibit 10: Monthly Overwriting Strategy Examples Jan 1998 to Oct 2010

	Write 98% ITM Call	Write 100% ATM Call	Write 102% OTM Call	No Overwrite	Dynamic Strategy
Annualized Return	7.4%	7.6%	7.4%	<b>3.5%</b>	<b>8.7%</b>
Volatility	10.6%	12.7%	14.7%	<b>18.9%</b>	<b>15.1%</b>
Sharpe Ratio	0.41	0.39	0.34	<b>0.10</b>	<b>0.41</b>
% of time past strike at expiration	73.9%	60.1%	38.6%	-	45.8%
% of past strike & premium at expiration	44.4%	37.3%	26.1%	-	30.1%
Monthly Return 5 <sup>th</sup> Percentile	-4.8%	-6.1%	-7.1%	-8.7%	-6.9%
Monthly Return 95 <sup>th</sup> Percentile	3.3%	4.1%	4.9%	7.6%	4.8%
Skew	-2.9	-2.3	-1.8	-0.9	-1.9
Excess Kurtosis	11.5	7.3	4.5	3.0	9.1
Correlation	85.5%	90.5%	94.6%	100.0%	90.9%
Tracking Error	11.3%	9.2%	6.9%	0.0%	8.1%



Source: Russell Investments. Historical data and indicative options pricing provided by UBS Research. Month over month performance figures calculated from option expiration date. For illustrative purposes only.

---

## 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, in-the-money (ITM).

**Path Dependence:** Explains how the set of decisions one faces for any given circumstance 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.

---

## RELATED READING

Collie, Bob (April 2009), "Basic Greeks: Essential knowledge for investors considering options", *Russell Research*.

Thomas, Michael and Collie, Bob (Fourth Quarter 2010), "The volatility smile and the cost of tail risk protection", *Russell Communiqué*.

### For more information:

Call Russell at **800-426-8506** or  
visit [www.russell.com/institutional](http://www.russell.com/institutional)

### Important information

---

Nothing contained in this material is intended to constitute legal, tax, securities, or investment advice, nor an opinion regarding the appropriateness of any investment, nor a solicitation of any type. The general information contained in this publication should not be acted upon without obtaining specific legal, tax, and investment advice from a licensed professional.

Russell Investments is the owner of the trademarks, service marks, and copyrights related to its respective indexes.

Indexes and/or benchmarks are unmanaged and cannot be invested in directly. Returns represent past performance, are not a guarantee of future performance, and are not indicative of any specific investment.

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 in directly.

Unless otherwise noted, source for the data in this presentation is Russell Implementation Services Inc.

This material is a product of Russell Implementation Services Inc., a registered investment advisor and broker-dealer, member FINRA, SIPC

Copyright © 2010 Russell Investments. All rights reserved. This material is proprietary and may not be reproduced, transferred, or distributed in any form without prior written permission from Russell Investments. It is delivered on an "as is" basis without warranty.

Russell Investment Group is a Washington, USA corporation, which operates through subsidiaries worldwide, including Russell Investments and is a subsidiary of The Northwestern Mutual Life Insurance Company.

The Russell logo is a trademark and service mark of Russell Investment Group.

First used: December 2010 USI RC-8473

: