



RESEARCH NOTE

Covered Call Strategies

August 2006

Executive Summary

- A covered call strategy involves writing (or selling) covered call options on equity or equity index positions. The writer of a call option is “covered” when he holds the underlying security. A writer of a covered call option is foregoing the upside of the security or index in return for a cash payment. The downside of the return distribution remains present, less the income payments.
- Covered call strategies on the S&P 500 have materially outperformed the index on a risk-adjusted basis since the late 1980s. Call options have been priced too high given realized volatility. This may be because of an imbalance between those who desire portfolio protection (buyers of options) and those willing to provide protection (sellers of options).
- Our hunch is that covered call strategies will not be as attractive in the future as in the past. With recent increased attention for the strategy, we speculate that the risk-adjusted performance advantage will be much narrower. If too many investors implement these strategies, it could eliminate the imbalance between buyers and sellers of portfolio protection. The recent fall in implied volatility hints that this may be happening. Realized volatility has not fallen as much as implied volatility.
- **Covered call strategies are worth considering as a way to lower the beta exposure of an equity allocation. Nevertheless, in most cases, we would not recommend the strategy. We would generally prefer to reduce beta through an explicit reduction in the equity allocation, especially since covered call writing does not currently pay very well.**

Covered call strategies offer a way to reduce the risk of an equity or equity index position and to generate income through the selling of call options. The income received from this approach reduces the beta exposure to the market by altering the return distribution. It trades the upside beyond a pre-defined price for income. The downside remains, less the income payments.

Covered call strategies were popular in the early- to mid-1990s. However, they fell out of favor in the late 1990s when they could not keep pace with the booming equity market because of the truncated upside. Covered call strategies are again gaining interest, due to their relative outperformance during the bear market. Overall, since 1988, covered call strategies on the S&P 500 have yielded impressive risk-adjusted returns relative to a straight S&P 500 position. In this Research Note, we examine the historical performance of covered call strategies on the S&P 500 and comment on the future prospects.

Covered Call Strategies

A covered call strategy involves writing (or selling) covered call options on equity or equity index positions. A call option gives the purchaser the right to buy a security from the writer at a pre-defined price for a limited time horizon. The purchaser of the call option must pay an up-front premium to the writer of the call

option for this privilege. The writer of a call option is “covered” when he holds the underlying security. Therefore, if the price of the security rises beyond the strike price, the writer of the option can deliver the underlying security for the strike price. A writer of a covered call option is foregoing the upside of the security beyond the strike price in return for a cash payment. A covered call strategy, therefore, truncates the right side of a return distribution.

One key decision in implementing a covered call strategy is the strike price relative to the current price. Covered call strategies are usually implemented with strike prices either “at-the-money” or “out-of-the-money.” An at-the-money option has a strike price very close to the current market price. Therefore, almost any increase in the price of the underlying security will result in the purchaser of the call option exercising the option. In this case, the writer of the option is giving up all the potential upside. An out-of-the-money option’s strike price is above the current market price. This means that the option premium is smaller, but the writer retains more upside. The further out-of-the-money a covered call strategy, the more it will behave like the underlying asset.

As an example, assume an investor in an S&P 500 index fund decides to write covered calls using options with a one month maturity. Writing an at the money call option

on a \$1 million index position currently yields roughly \$15 thousand per month, or 1.5%. If over the next month, the S&P 500 is flat or declines in value. The option expires worthless, meaning the covered call strategy outperforms the S&P 500 by the 1.5% option premium. If the S&P 500 instead rises by 1%, the option expires in-the-money, so the writer of option owes 1% at maturity. Net of the option premium, the writer of the option is still better off by 0.5% (1.5% premium less 1% exercise cost). However, if the S&P 500 rises by 5%, the covered call strategy underperforms the index. The cost of closing the option position would be 5%, and it is only offset by 1.5% of income, meaning that writer is 3.5% in the hole (1.5% option premium - 5% exercise cost). Exhibit 1 shows an example of an at-the-money strategy and a 2% out-of-the money strategy under different return scenarios for the S&P 500.

Exhibit 1: Hypothetical Covered Call Strategy Payoff

| S&P 500 Return for Month | -5% | 0% | 2% | 5% |
|--|-------------|-------------|--------------|--------------|
| At-the-Money Covered Call Strategy | | | | |
| Premium for Writing Call Option | 1.5% | | | |
| Less: Exercise Cost | | | | |
| [MAX (0% , S&P 500 return)] | 0.0% | 0.0% | 2.0% | 5.0% |
| Return on Call Position | 1.5% | 1.5% | -0.5% | -3.5% |
| Plus: S&P 500 Return | -5.0% | 0.0% | 2.0% | 5.0% |
| Return on Covered Call Strategy | -3.5% | 1.5% | 1.5% | 1.5% |
| Excess Return to the S&P 500 | 1.5% | 1.5% | -0.5% | -3.5% |
| 2% Out-of-the-Money Covered Call Strategy | | | | |
| Premium for Writing Call Option | 0.5% | | | |
| Less: Exercise Cost | | | | |
| [MAX (0% , S&P 500 return - 2%)] | 0.0% | 0.0% | 0.0% | 3.0% |
| Return on Call Position | 0.5% | 0.5% | 0.5% | -2.5% |
| Plus: S&P 500 Return | -5.0% | 0.0% | 2.0% | 5.0% |
| Return on Covered Call Strategy | -4.5% | 0.5% | 2.5% | 2.5% |
| Excess Return to the S&P 500 | 0.5% | 0.5% | 0.5% | -2.5% |

Historical Performance

The Chicago Board of Options Exchange publishes two indexes that simulate covered call strategies—S&P 500 BuyWrite (BXM) and S&P 500 BuyWrite 2% OTM (BXY). Both simulate writing covered call options on an S&P 500 index position. The BXM index assumes an investor writes at-the-money calls with a one-month maturity. The BXY assumes an investor writes 2% out-of-the-money calls, again with a one-month maturity. The results *do not* include transaction costs. Exhibit 2 summarizes the return and risk of these indexes versus the S&P 500.

Since the inception of the two BuyWrite indexes, they have outperformed the S&P 500 on a risk-adjusted basis.¹ Since June 1988, the BXM (at-the-money) has

¹ Goldman Sachs simulated a covered call strategy writing one-month options on the S&P 500 from 1990 to 2004, using slightly different

earned 11.9%, which matched the S&P 500 index, and the BXY (2% out-of-the-money) earned 12.7%, which bettered the S&P 500. Going back seven years to include the bear market, both covered call indexes have beaten the S&P 500. However, the S&P 500 has outperformed over the last three years.

Exhibit 2: Return and Risk Statistics

| Through April 2006 | CBOE BuyWrite (BXM) | CBOE BuyWrite 2% OTM (BXY) | S&P 500 |
|-----------------------------------|---------------------|----------------------------|---------|
| Since 6/88 | 11.9 | 12.7 | 11.9 |
| Last 10 Years | 9.7 | 10.2 | 8.9 |
| Last 7 Years | 4.5 | 3.6 | 1.3 |
| Last 5 Years | 4.3 | 5.1 | 2.7 |
| Last 3 Years | 10.4 | 12.3 | 14.7 |
| Standard Deviation (%) | 9.3 | 11.7 | 14.0 |
| Relative to S&P 500 (%) | -33.0 | -16.4 | — |
| Semideviation (%) | 6.1 | 7.0 | 8.1 |
| Relative to S&P 500 (%) | -25.1 | -13.8 | — |
| Sharpe Ratio – Standard Deviation | 0.78 | 0.70 | 0.53 |
| Relative to S&P 500 (%) | 49 | 33 | — |
| Sharpe Ratio – Semideviation | 1.20 | 1.16 | 0.90 |
| Relative to S&P 500 (%) | 33 | 29 | — |
| Beta to S&P 500 | 0.58 | 0.77 | — |
| Beta – Up Markets | 0.44 | 0.58 | — |
| Beta – Down Markets | 0.79 | 0.84 | — |
| R ² to S&P 500 | 76 | 85 | — |
| Tracking Error to S&P 500 | 7.4 | 5.6 | — |

Both covered call indexes have realized lower standard deviation than the S&P 500. The standard deviation is somewhat misleading because of the shape of the return distribution. A flaw with the standard deviation statistic is that it does not distinguish between volatility on the upside and the downside. Of course, downside volatility is unwelcome, while upside volatility is desirable. With a normal return distribution, upside volatility and downside volatility is virtually identical, so the standard deviation is an appropriate risk comparison measure. Negatively skewed return distributions, however, have more downside volatility than upside volatility.² Covered call strategies engineer a negatively skewed distribution curve. The more negatively skewed a return distribution, the less meaningful the standard deviation statistic because the volatility becomes increasingly weighted to the downside.

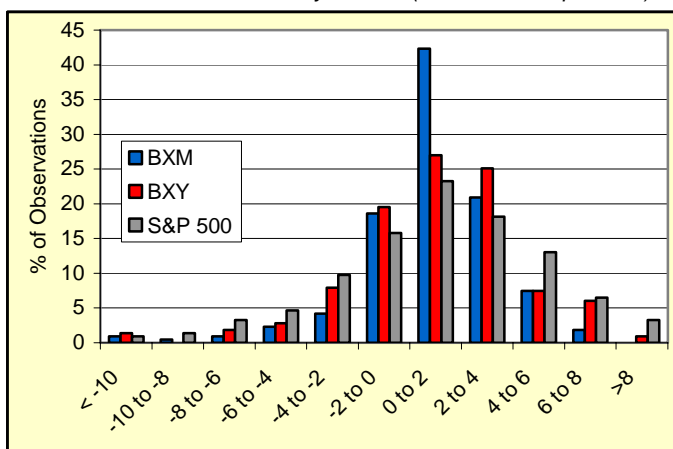
assumptions than CBOE. They reported the average monthly premium was 2.1% and 1.2% for at-the-money and 2% out-of-the-money calls, respectively. The at-the-money calls were exercised 63% of the time and the out-of-the money calls were exercised 38% of the time. The exercise cost (the opportunity cost of positions called away), averaged 2.1% per month for at-the-money calls and 1.1% for out-of-the-money calls.

² A negatively skewed return distribution has a fatter left tail than right tail. Large returns are more likely to be experienced on the downside than upside.

To better evaluate the risk of covered call strategy, we examine a different risk measure called semideviation. The semideviation only weights volatility *below* a target return. The volatility above the target return is ignored. In this case, we used the risk-free rate as the target return. Exhibit 2 shows the standard deviation and the semideviation for the covered call strategies and the S&P 500.

The BXM index has a 33% lower standard deviation than the S&P 500. The BXM still exhibits meaningfully less risk using semideviation, but the margin is modestly lower than with the standard deviation. The BXM reduces the semideviation by 25%. The BXY index has a 16% lower standard deviation than the S&P 500 and a 14% lower semideviation. There is a smaller difference between the standard deviation and semideviation for BXY because its distribution is less negatively skewed. In terms of beta, the covered call indexes have a lower beta to upside moves in the S&P 500 than to downside moves. All else equal, the larger the loss for the S&P 500, the higher the beta of the covered call strategies.

Exhibit 3: Distribution of Monthly Returns (June 1988 to April 2006)



Since BXM has matched the return of the S&P 500 since 6/88 and the BXY has outperformed the S&P 500, they both have materially better risk-adjusted returns than the S&P 500. The BXM has a 33% higher Sharpe Ratio (using semideviation) than the S&P 500, and the BXY has a 29% higher Sharpe Ratio.

While both BuyWrite indexes have performed well versus the S&P 500 over the last 18 years, they have experienced periods of substantial underperformance. As Exhibit 2 shows, the R² of the BXM and BXY to the S&P 500 is only 76% and 85%, respectively. The tracking error of BXM and BXY is 7.4% and 5.4%, respectively. This indicates wide S&P 500-relative return dispersion. Exhibit 4 shows rolling 3-year absolute returns for BXM, BXY, and the S&P 500. Exhibit 5 shows rolling 3-year excess returns for BXM and BXY versus the S&P 500.

Exhibit 4: Rolling 3-Year Returns (Annualized)

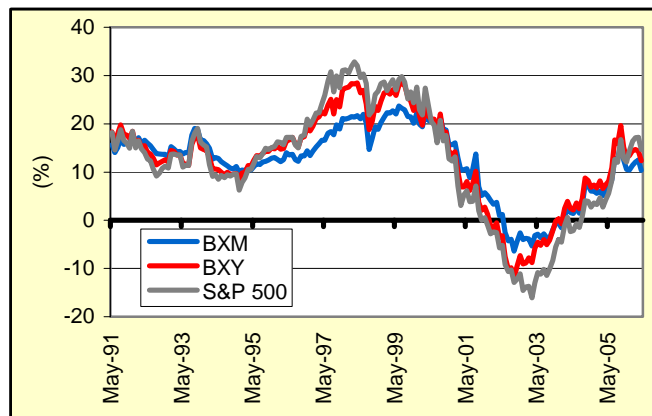
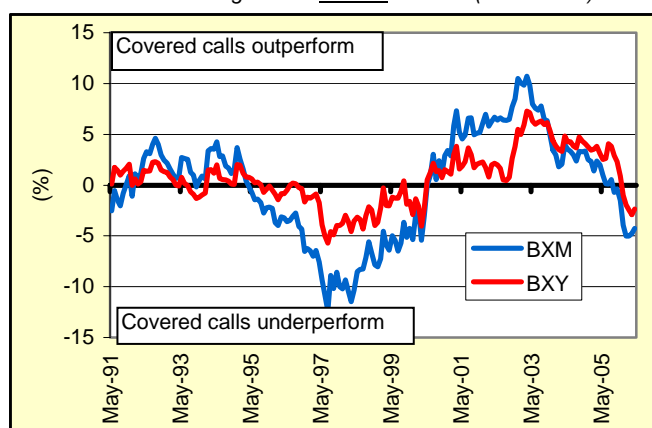


Exhibit 5: Rolling 3-Year Excess Returns (Annualized)



Since the idea behind covered call strategies is to sacrifice upside in return for an income payment, they tend to underperform during strong equity markets and outperform during poor markets. Covered call strategies severely lagged the S&P 500 in the mid- to late-1990s when the index was posting 20%-plus returns. For the period of 1995 through 1999, BXM and BXY trailed the S&P 500 by an annualized 8.0 and 3.1 percentage points, respectively. BXM and BXY thrived during the bear market of 2000 to 2002, outperforming by 10.1 and 5.5 percentage points, respectively. During the recovery, BXM has trailed the S&P 500 by 3.5 percentage points, while BXY has virtually matched it.

Exhibit 6: Intra-period Returns (Annualized, 2006 through April)

| | CBOE BuyWrite (BXM) | CBOE BuyWrite 2% OTM (BXY) | S&P 500 |
|-------------|---------------------|----------------------------|---------|
| 1989 – 1994 | 13.6 | 13.3 | 12.2 |
| 1995 – 1999 | 20.6 | 25.5 | 28.6 |
| 2000 – 2002 | -4.0 | -9.1 | -14.6 |
| 2003 – 2006 | 11.2 | 14.6 | 14.7 |

One who invested in either the BXM or BXY in June 1988 (and had the intestinal fortitude to stick with it through the last half of the 1990s) would have

outperformed the S&P 500 on a risk-adjusted basis. Why has this happened and should we expect it to continue?

Why Have Covered Call Strategies Outperformed?

Theoretically, a covered call strategy on the S&P 500 should reduce BOTH the return and the risk relative to the S&P 500. This is because writing covered calls lowers the beta exposure to the index. On a risk-adjusted basis, covered call strategies should result in similar performance as the underlying asset over the long-term. However, as shown in the last section, covered call strategies have actually significantly outperformed on a risk-adjusted basis. The reason for this comes down to implied volatility versus realized volatility.

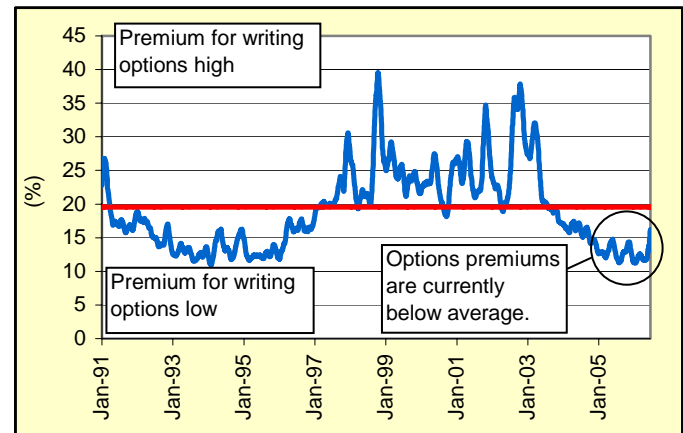
Expected volatility is a key factor in determining the price of an option. The higher the expected volatility, the higher the income received by writing covered calls. A security with high volatility is more likely to finish in-the-money than one with low volatility, so a buyer is willing to pay a higher price. Given the price of a call option, one can calculate the implied volatility. Historically, volatilities implied by option prices have been higher than realized volatility. Studies have shown that implied volatility has exceeded realized volatility by between 1.5 and 2.5 percentage points on average. This explains the risk-adjusted outperformance of covered call strategies. Call options have been priced too high given realized volatility.

The most likely explanation for this is that investors have been willing to pay-up for portfolio protection. Investors who desire protection will favor long positions in options. Call options provide upside participation with limited downside risk and put options provide downside protection to an existing position. Writers of covered calls are essentially providing portfolio protection because they are foregoing potential upside on an investment, but fully retaining the downside (less the premium). If more investors desire to buy than sell portfolio protection, options could be priced above theoretical value to entice sufficient sellers.³

Looking forward, one concern is the growing popularity of covered call strategies. Covered call writing has received significant attention over the last few years due to the launch of the CBOE indexes, other research espousing the strategy, and the performance during the

bear market. If the excess returns from the strategy have come from an imbalance of buyers and sellers of protection, increasing popularity may begin to correct the imbalance, meaning that option prices could fall to their theoretical value.⁴ If this happens, there is no reason to expect the strategies to outperform on a risk-adjusted basis.

Exhibit 6: S&P 500 Implied Volatility (VIX, Rolling 30-Day Average)



In the current environment, a reason for caution is the trend downward in implied volatility, which is shown in Exhibit 6. Implied volatility itself is very volatile. In the mid-1990s, volatility was very low, so option writers received below average income. This, coupled with high returns for the S&P 500, made the mid-1990s a tough environment for the strategy. Implied volatility was very high during the bear market, so option writers received high income in a falling market leading to significant outperformance. Implied volatility began falling in 2003 and reached near record low levels in the first quarter of 2006, which meant that covered call strategies again were not paying much (although volatility has spiked since May).⁵ This could mean lower future returns from covered call strategies if realized volatility does not fall as much as implied volatility. The spread between implied volatility and realized volatility has, in fact, been trending downward.

Covered Call Strategies on Individual Stocks

We have focused on writing covered call options on the S&P 500 in this paper because of data availability. Of course, an investor could implement covered call strategies on individual positions, as well. We would expect the overall return/risk profile to be similar as on the S&P 500, but there would also be the potential for

³ A second related explanation is that there may be a negative volatility premium. Writers of options are short volatility. As sellers of protection, volatility spikes hurt option writers. Buyers of options are long volatility, so volatility spikes are beneficial. Volatility is negatively correlated to equity returns (rising volatility is associated with falling markets and vice versa). For that reason, investors may prefer to be long volatility than short volatility. If that's the case, there is a market preference towards long option positions, leading to higher prices.

⁴ The growth of hedge fund assets is also a concern. Many hedge funds are sellers of protection.

⁵ According to a study by Goldman Sachs, at-the-money options provided a monthly premium of 1.29% in 2005, which was 40% less than the average of 2.06% since 1990. The premium for 2% out-of-the-money options averaged only 0.44% in 2005, which was 60% less than the average of 1.12%.

alpha. A manager may be able to add value by selectively writing options on positions where the price of call options is too high given the risk of the position expiring in the money.

Conclusion

Covered call strategies are worth considering as a way to lower the beta exposure of an equity allocation. We prefer out-of-the-money strategies because their distributions curves are less negatively skewed than at-the-money options. Historically, a covered call strategy on the S&P 500 has outperformed the index on a risk-adjusted basis. This outperformance may have come from an imbalance between those who desire portfolio protection (buyers of options) and those willing to provide protection (sellers of options). However, covered call strategies are not a free lunch. They engineer a negatively skewed distribution curve, meaning there is more downside risk than upside risk. In other words, the beta exposure of a covered call strategy increases as the market falls (although it never reaches 1).

Our hunch is that covered call strategies won't be as attractive in the future as in the past. With the recent increased attention for the strategy, we speculate that the risk-adjusted performance advantage will be much narrower. If too many investors implement these strategies, it could eliminate the imbalance between buyers and sellers of portfolio protection. The recent fall in implied volatility hints that this may be happening. (Realized volatility has fallen less than implied volatility.) Our best guess is that covered call strategies will result in underperformance versus a straight S&P index investment in the future, but with lower risk.

In most cases, we would not recommend the strategy at an index level. We would generally prefer to reduce beta through an explicit reduction in the equity allocation, especially since covered call writing does not currently pay very well. Furthermore, many of our clients have sizeable allocations to hedge funds. Hedge funds also exhibit characteristics of covered call strategies. Hedge funds tend to be providers of portfolio protection and are short volatility.

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