A Leveraged Portfolio Management Approach Applying The CBOE S&P 500 2% OTM BuyWrite Index

Updated as of March 2017

The CBOE S&P 500 2% OTM BuyWrite Index (BXY[SM] Index) is an index that depicts a consistent covered call strategy. The index demonstrates the performance that would be expected from owning a portfolio mirroring the S&P 500® Index along with selling out-of-the-money S&P 500 Index (SPX) call options against that portfolio on a consistent basis. The strike price of the call options is based on a level that is 2% higher than the S&P 500 on the dates that the strategy is rebalanced. Over most time periods analyzed, BXY has tended to outperform the total return of the S&P 500 on both an absolute and risk-adjusted basis. After analyzing historical returns the authors took a look at applying the BXY strategy in a leveraged portfolio.

BXY Construction

The strategy that is depicted by the performance of BXY is rolled on the standard third Friday option expiration date each month. SPX call options that expire on the following standard expiration date are sold against a hypothetical S&P 500 portfolio. The strike price of the call options is based on the level of the S&P 500 at 10:00 am central time with the S&P 500 quote multiplied by 1.02. This determines a price level that is 2% higher than the S&P 500 at that time. The SPX strike price that is closest to, but greater than, this 2% out-of-the-money level is then chosen to be the call option sold as part of the strategy.

For example –

May 16, 2014 – the last S&P 500 quote before 10:00 am central time = 1869.58

1869.58 x 1.02 = 1906.97 – the strike price closest to 1906.97 to the upside is 1910

The volume-weighted average price (VWAP) for the SPX Jun 1910 Call from 10:30 am to 11:00 am central time is then determined (in this case the VWAP is 7.21).

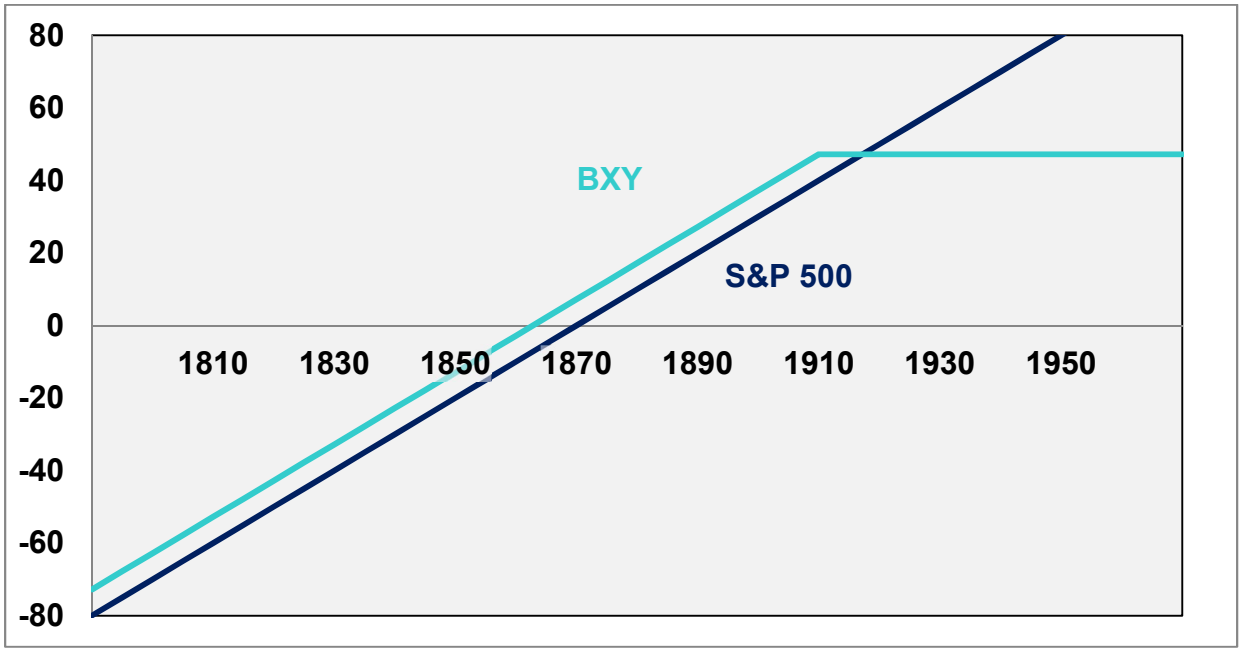
On Friday, June 20, 2014, this option will expire based on the S&P 500 special opening quotation price with cash settlement resulting if the option is in-the-money.

This process is then repeated starting at 10:00 am central time on June 20 when a July call option is sold against the S&P 500 portfolio.

BXY Payoff Diagram

The payoff diagram in Figure 1 compares the profit and loss of BXY and the S&P 500 at different price levels at June 2014 expiration. At any price level below 1917.21, BXY appeared to outperform the S&P 500. This 1917.21 level is determined by adding the option strike price (1910) plus the option premium (7.21). The ability to profit from price appreciation in the S&P 500 is hampered through the short SPX Jun 1910 Call option.

Figure 1 – Payoff Diagram Comparing BXY and S&P 500



Data Adjustment

Since BXY is rebalanced on the standard option expiration date of each month, the month-to-month performance comparisons occur on those dates as well. For example, the performance for April would in reality incorporate the respective index's performance from the standard third Friday expiration date in March to the standard third Friday expiration date in April. Obviously, this is not the typical method of calculating monthly performance, but the authors believe this is a more accurate depiction of performance if these strategies are being replicated in a portfolio.

The data used in this paper for the performance of BXY was obtained from the Chicago Board Options Exchange® (CBOE®) and the total return data for the S&P 500 was found at Bloomberg. Based on data availability, all calculations in this paper begin with December 1988 option expiration, which was December 16, 1988, and run through March 17, 2017, which was also a standard option expiration date. The result is over twenty-eight years of performance data which represents all types of market scenarios.

Performance Comparison

The average annual return for BXY from expiration in December 1988 through March 2017 was 8.51% with an annualized standard deviation of 13.02%. Over the same time period, the average annualized total return for the S&P 500 was 7.58% with an annualized standard deviation of 16.01%. Therefore, on a risk-adjusted and an absolute basis, the BXY strategy tended to outperform the total return for the S&P 500.

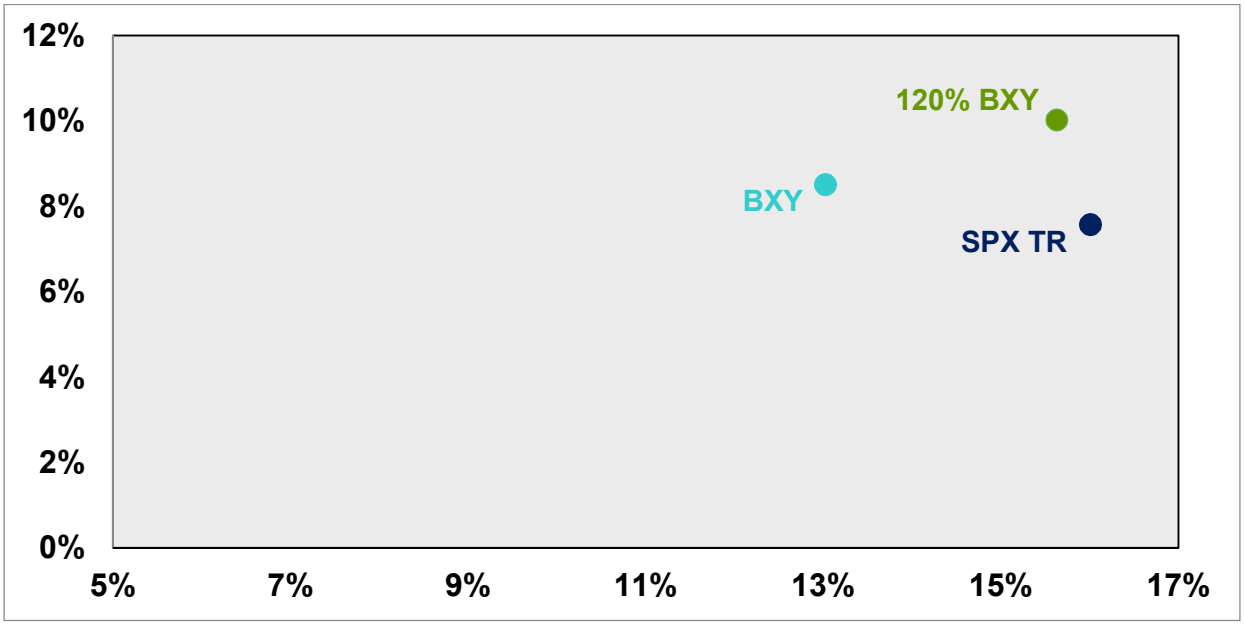
After taking a look at the annualized standard deviation of BXY relative to that of the S&P 500, we explored implementing a leveraged BXY strategy and compared it to the S&P 500. This was done in increments of 10% leverage from 110% to 150%. The average annualized returns along with the annualized volatility of those returns appear in Table 1.

Table 1 – Leveraged BXY Performance versus S&P 500 Total Return – December 1988 – March 2017

	S&P 500	BXY	110% BXY	120% BXY	130% BYX	140% BXY	150% BXY
Avg. Annual Return	7.58%	8.51%	9.28%	10.02%	10.75%	11.45%	12.13%
Annualized Volatility	16.01%	13.02%	14.33%	15.63%	16.93%	18.23%	19.54%

We discovered that implementing a strategy that returns 120% of the historical BXY performance has a slightly lower annualized standard deviation than a portfolio holding the S&P 500. Despite having slightly less volatility than unleveraged direct exposure to the S&P 500, returns for the 120% portfolio appeared to beat the S&P 500 by over 240 basis points. A risk-return profile showing the 120% leveraged BXY portfolio, unleveraged BXY, and S&P 500 performance appears in Figure 2.

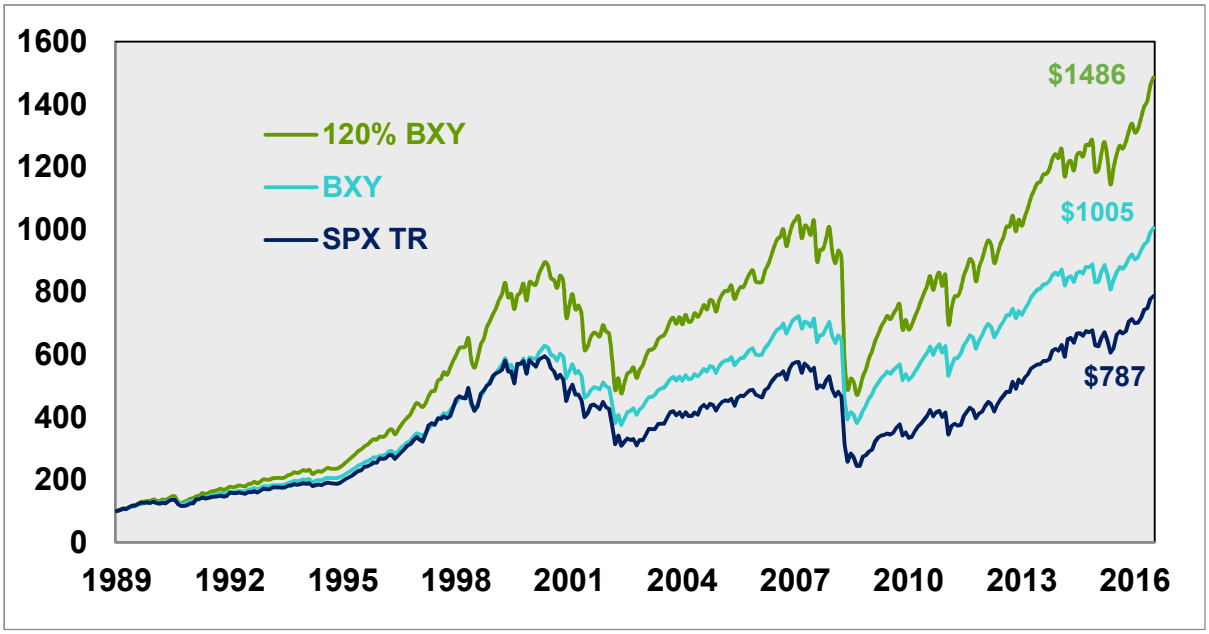
Figure 2 – Annualized Returns versus Risk for S&P 500, BXY, and 120% BXY



Over the twenty-eight plus years of data analyzed, a 120% leveraged portfolio constructed using the BXY methodology would appear to outperform buy and hold for the S&P 500. This strong relative and absolute performance would appear to have been achieved without taking on excess risk relative to buy and hold in the stock market.

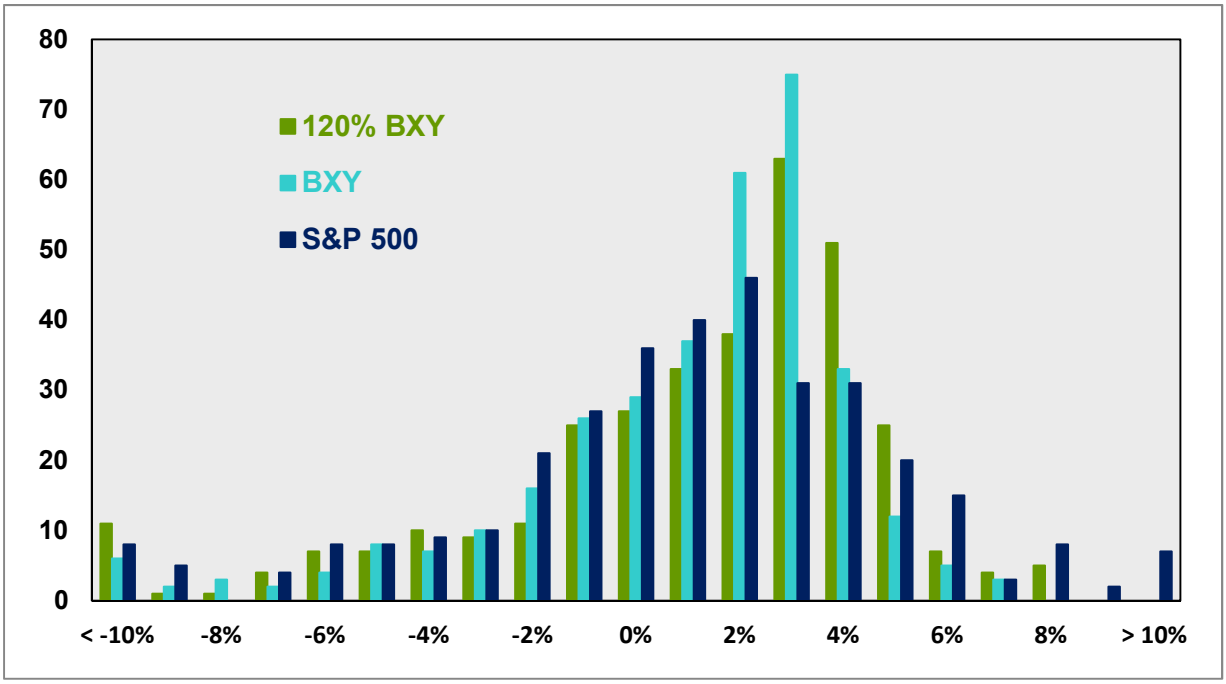
On the following page Figure 3 shows the growth of $100 from late December 1988 through March 2017. $100 invested in a portfolio that matches the total return of the S&P 500 would be worth $787. A portfolio that matched the unleveraged performance of BXY would have a value of $1,005, while a portfolio that matched a 120% leveraged return of BXY would be worth $1,486.

Figure 3 – Growth of $100 Invested in S&P 500, BXY, and 120% BXY Portfolios



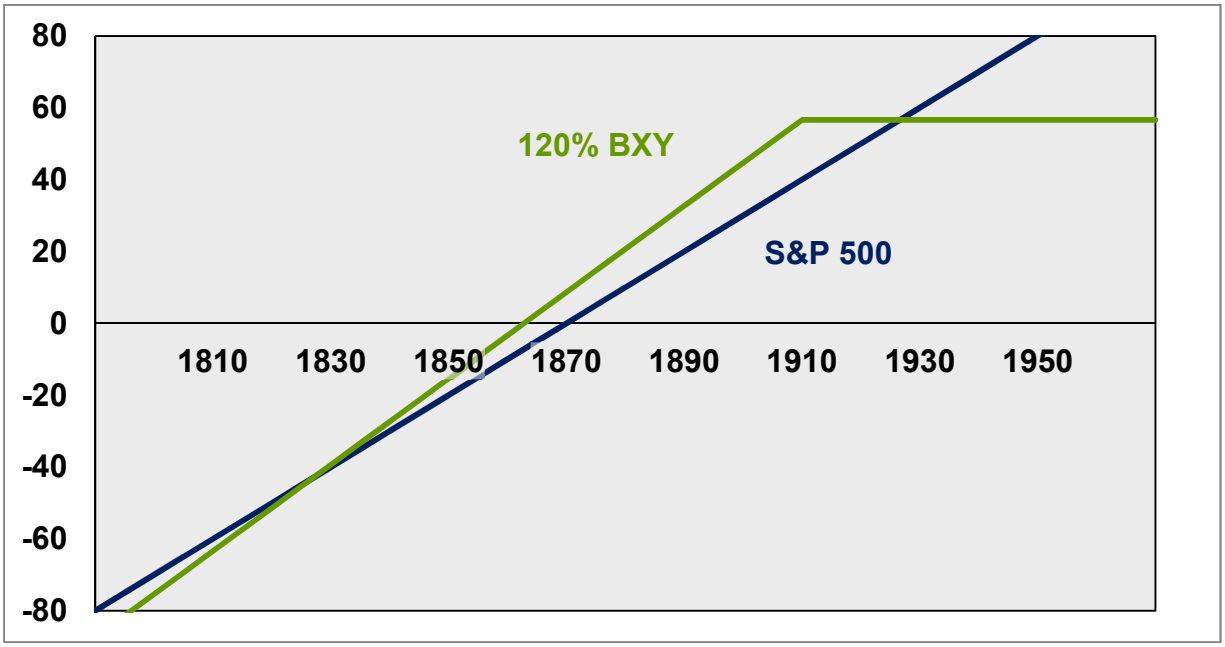
It is worth noting that the leveraged performance of BXY appeared to result in pretty substantial losses during bear market periods. This would be expected from any leveraged, long-oriented strategy. The histogram in Figure 4 shows the frequency of returns from roll date to roll date for the S&P 500, BXY, and 120% leveraged BXY.

Figure 4 – Distribution of Expiration to Expiration Returns for S&P 500, BXY, and 120% BXY



Buy write strategies are expected to underperform their underlying market during bullish periods. However, the leveraged BXY strategy may also underperform during bearish market periods. The payoff diagram in Figure 5 illustrates why the leveraged strategy performed poorly on a relative and absolute basis during bear market periods. Note that this payoff diagram differs slightly than the one in Figure 1 that mirrors the unleveraged payoff for BXY. The difference is that the leveraged BXY strategy appears to underperform when the S&P 500 moves significantly higher in a month and when the S&P 500 moves significantly lower.

Figure 5 – Payoff Diagram Comparing 120% Leveraged BXY and S&P 500



Replicating a Leveraged BXY Performance

The CBOE S&P 500 2% OTM BuyWrite Index measures a strategy that owns an S&P 500 portfolio and sells out-of-the-money SPX call options against the portfolio. There are multiple methods of replicating this performance in practice. Additionally, there are many methods that portfolio managers may undertake to replicate a 120% leveraged version of this strategy. The following example combines a leveraged long position in an exchange traded fund that mirrors the performance of the S&P 500 along with a short position in out-of-the-money SPX call options. This example does not include any transaction costs.

SPDR S&P 500 ETF and Short Out-of-The-Money (OTM) SPX Calls

The SPDR® S&P 500 ETF (SPY) is one of the most liquid financial instruments available for gaining exposure to the US stock market. Investors who have been approved for portfolio margin may be permitted to sell S&P 500 Index options versus a long holding in the SPY ETF. Combining these two instruments can be an efficient method of replicating either an unleveraged BXY portfolio or even a leveraged position.

April 17, 2014 was the expiration date for standard April SPX option contracts and also the roll date for BXY. On this date, an out-of-the-money SPX call option is chosen based on the level of the S&P 500 at 10:00 am central time. The volume-weighted average price from 10:30 am to 11:30 am central time of this SPX call, 5.04, is used as the reference price for selling this call option. At 10:00 am central time, the S&P 500 was quoted at 1863.96 and the SPY was trading at 186.32. The S&P 500 reference price of 1863.96 is multiplied by 1.02 with the result coming to 1901.24. The next higher strike price above 1901.24 was 1905, so the SPX May 1905 Calls are sold as part of the BXY strategy. Based on the SPY price at 10:00 am, an investor would allocate $1,863,200 to the strategy which, in an unleveraged portfolio, would be 10,000 shares of SPY.

The following three trades would have occurred –

1. 12,000 shares of SPY purchased on margin which would give the investor 120% exposure to the S&P 500.
2. 12 SPX May 1905 Calls sold at the reference price of 5.04. The net proceeds of this option sale, excluding commissions, are $6,048.
3. According to the BXY strategy, the premium received from selling SPX options is expected to be invested in the stock market, therefore 120% of $6,048 or $7,258 should be invested in SPY, which would involve buying 39 more shares of SPY.

The portfolio value is $1,869,248, which is the combination of the original deposit of $1,863,200 and $6,048 received for selling the SPX call options.

The portfolio also has the following two positions –

Long 12,039 SPY at 186.32
Short 12 SPX May 1905 Calls at 5.04

The next roll date for BXY was on May 16, 2014. May SPX settlement was 1870.76 which means that the short position in SPX May 1905 Calls expired with no value. At 10:00 am central time, SPY was trading at 187.22 and the S&P 500 reference price for determining which June SPX options to sell is 1896.58, which translates into the SPX Jun 1910 Call being sold to replicate the BXY strategy. The relevant SPX Jun 1910 Call VWAP price is 7.21. On this date, the following trades would have been executed –

1. Sell 12 SPX Jun 1910 Calls at 7.21. The net proceeds from this trade, excluding commissions, are $8,652.
2. The proceeds from selling the calls would be invested in the stock market through purchasing $10,382 worth of SPY shares. Based on the price of 187.22, 58 shares of SPY would be added to the portfolio.

The portfolio value is now approximately $1,888,735, or up just over 1%. The new portfolio value is determined through adding up the original deposit ($1,863,200), premiums received from both short SPX call transactions ($6,048 + $8,652), and the appreciation in the value of SPY ($10,835). The portfolio's positions are now –

Long 12,097 SPY at 187.22
Short 12 SPX Jun 1910 Calls at 7.21

On each roll date an appropriate number of the relevant SPX options would be sold based on the anticipated SPY position after the proceeds from the option sale are reinvested. In cases where the expiring short call options are in-the-money, shares of SPY may need to be sold to cover the losses on the short call position. Finally, the SPY ETF pays dividends on the last day of January, April, July, and October. These proceeds would be reinvested into the stock market through purchases of SPY shares.

Conclusion

Historically, the CBOE S&P 500 2% OTM BuyWrite Index has tended to outperform the total return that would be expected from passively holding a market portfolio. This outperformance appears to have occurred on both an absolute and risk-adjusted basis. Additionally, a leveraged strategy that matches 120% of the expected performance of BXY may enhance this performance, but not exceed the risk profile taken on when holding a market portfolio.

About the Authors –

Russell Rhoads, CFA is Director of the CBOE Options Institute. He is the author of multiple trading and financial market-oriented books. Russell is currently pursuing a PhD from Oklahoma State University.

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