

A Study of the Effect of a Rising Interest Rate Environment on a Covered Call Strategy

by

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Introduction

The purpose of this paper is to analyze two major indices provided by the Chicago Board Options Exchange (henceforth referred to as CBOE), as well as use historic information gathered to provide a prediction for market performance given the coming macroeconomic environment. The two indices being analyzed are the CBOE Volatility Index (VIX) and the CBOE S&P 500 BuyWrite Index (BXM).

The coming interest rate regime is one that has been long awaited. The risk-free investment vehicles that are normally used do not provide adequate returns, especially in the face of rising inflation. This has forced investors to pursue riskier investments to get satisfactory returns. This has caused the multiples on many stocks in the S&P 500 to rise very quickly, especially high growth technology companies that may not have turned the corner on profitability. Now that interest rates are rising again, safer investment vehicles are more attractive, and the riskier investments that have seen run-ups recently will begin to see more normalized multiples. If that is the case, then the short-term outlook for the index points towards negative returns, and the longer-term outlook points towards normalized returns. If that is the case, then there may be opportunity in collecting premium to reduce the downside risk as well as increase normalized gains, which the BXM accomplishes.

Short Background on the Indices

VIX is, as the CBOE explains it, “a calculation designed to produce a measure of constant, 30-day expected volatility of the U.S. stock market, derived from real-time, mid-quote prices of S&P 500 Index (SPX) call and put options.” Simply put, it is a forward-looking measure of the market’s fear, and tends to have an inverse relationship with the S&P 500: that is, higher volatility tends to correlate with lower returns in the S&P 500.

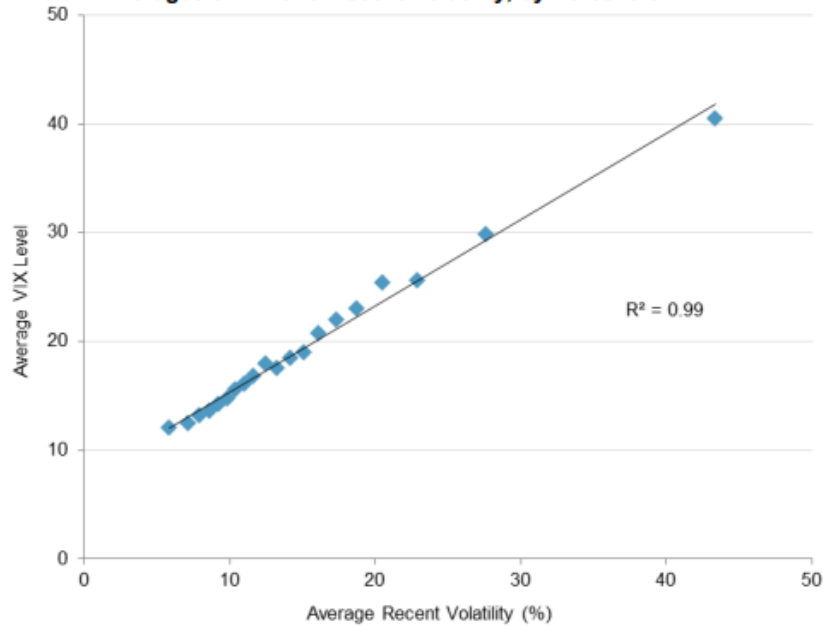
BXM “is a benchmark index designed to track the performance of a hypothetical buy-write strategy on the S&P 500 Index (CBOE, 2021).” It attempts to replicate a hypothetical just-out-of-the-money covered call strategy against the S&P 500, which generates income. The portfolio is rebalanced every month, and dividends generated from underlying stocks are reinvested back into the portfolio (CBOE, 2021).

Analysis of VIX and its Performance

When we look at the VIX, it is important to remember that it is a forward-looking, expected volatility index that is calculated via option premiums for one month in the future. It should be acknowledged that VIX is not absolute or entirely dependable in its measurements for volatility. In a paper by Edwards and Preston (2017), it was observed that realized volatility of the same magnitude, which was measured as a 30-day trailing average, was preceded by VIX levels of 34, 12, and many points in between. With variance like this, one may be able to say that the VIX is not a good predictor of volatility, but if you break down all the data points, the VIX, on average, has a strong linear relationship with realized volatility. For example, actual volatility of 7% would be expected to have a preceding VIX level of around 12, and a realized volatility of around 20% would have a preceding VIX level of around 23 (Edwards and Preston, 2017). This does, however, show that VIX tends to overestimate volatility, except during periods of extreme market volatility, in which case it either is a highly accurate predictor or even underestimates volatility.

Another major finding in this paper is that realized volatility in the S&P 500 shows signs of mean reversion. Using the same method of averaging out data points, Edwards and Preston were able to chart out recent (realized) volatility against the volatility measured 30 days following, calling it “next realized volatility.” From this data, it becomes apparent that volatility in the S&P 500 tends to revert to a mean somewhere in the mid-teens, and there is a certain rate at which this happens. Upon further analysis, it was found that the mean volatility of the S&P 500 is around 15%, and that month-to-month, it can be expected to move towards this mean by 27% (Edwards and Preston, 2017).

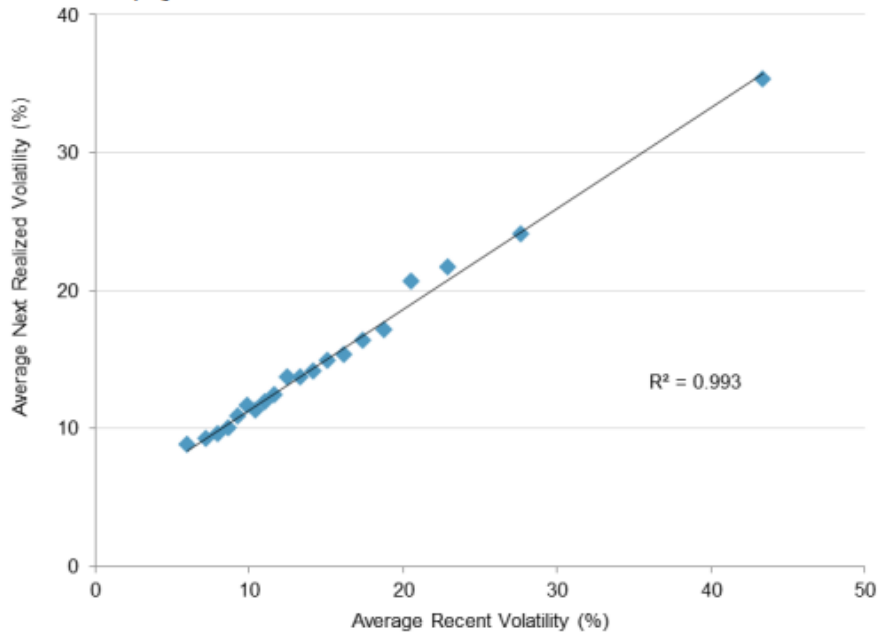
Exhibit 4: Averages of VIX and Recent Volatility, by Percentile



Source: S&P Dow Jones Indices LLC and CBOE. Data from Jan. 1, 1990, to Oct. 31, 2017. Chart is based on VIX levels and their corresponding S&P 500 recent volatility levels on each trading day. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

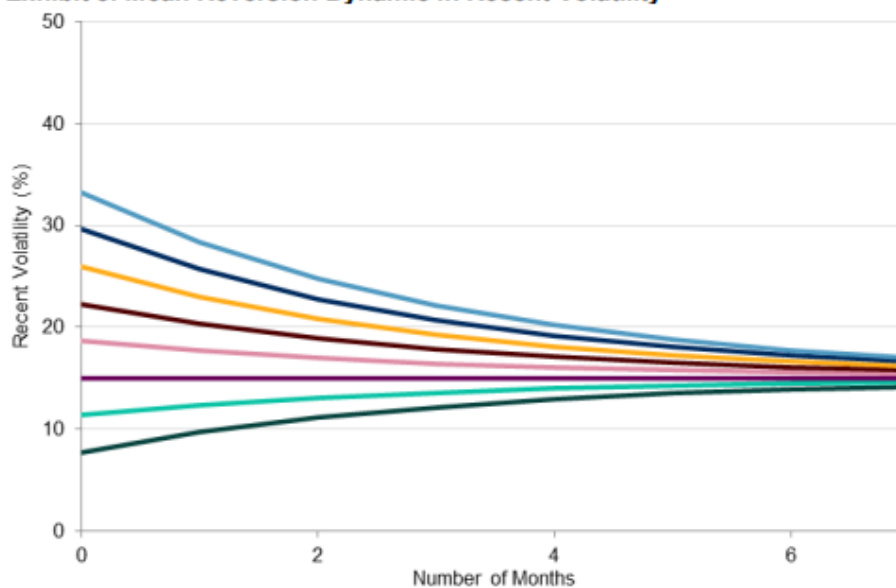
Source: Reading VIX®: Does VIX Predict Future Volatility?

Exhibit 7: Average Recent Volatility and Average Next Realized Volatility in the S&P 500, by Percentile



Source: S&P Dow Jones Indices LLC. Data from Jan. 1, 1990 to Oct. 29, 2017. Chart is based on VIX levels and their corresponding S&P 500 recent volatility levels on each trading day. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

Source: Reading VIX®: Does VIX Predict Future Volatility?

Exhibit 8: Mean Reversion Dynamic in Recent Volatility

Source: S&P Dow Jones Indices LLC. Chart is provided for illustrative purposes. Chart assumes a constant $M = 15\%$ and $S = 27\%$ over the eight-month period.

Source: Reading VIX®: Does VIX Predict Future Volatility?

Analysis of BXM and its Traits

With the VIX analyzed enough to be used for predictions of volatility, we can now begin to make predictions for how a covered call strategy may perform once the FED begins raising interest rates. We can do this by seeing how BXM performs in relation to the S&P 500 on average and using VIX to predict what the S&P 500 will do 30 days in the future.

In a study by the Asset Consulting Group which back tested results from June 30th of 1988 to December 31st of 2011, it was found that BXM was not only far less volatile than the S&P 500, but also had slightly higher annual returns. BXM had far fewer negative months, and even when it did, the losses would be lighter than what the S&P 500 experienced. The same can be said for upside gains as well. BXM lags the S&P 500 in the number of months with returns of 4% or more. Put simply, BXM had a much narrower distribution of monthly returns compared to the S&P 500. It was far more likely to either be neutral or slightly positive. In general, BXM had about 30% less volatility than the S&P 500 (Asset Consulting Group, 2012).

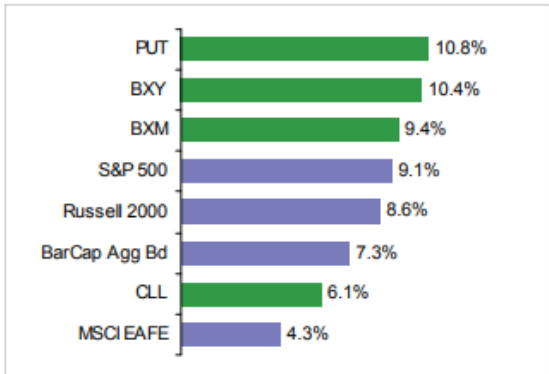


Exhibit 3: Compound annual returns for all asset classes from June 30, 1988 to December 31, 2011. The PUT, BXY and BXM indices had higher returns than various equity and fixed income benchmarks.

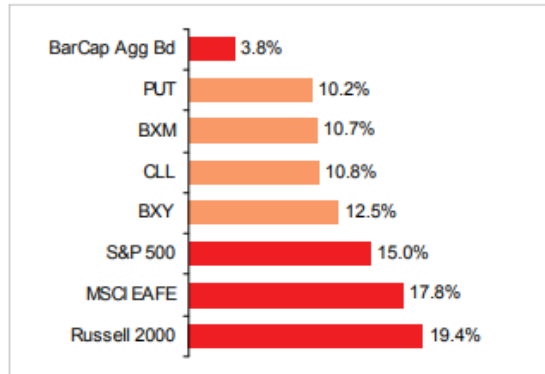


Exhibit 4: Standard deviation for all asset classes from June 30, 1988 to December 31, 2011. The PUT, BXM, and CLL indices all had much less volatility than the 3 stock indices.

Source: An Analysis of Index Option Writing for Liquid Enhanced Risk-Adjusted Returns

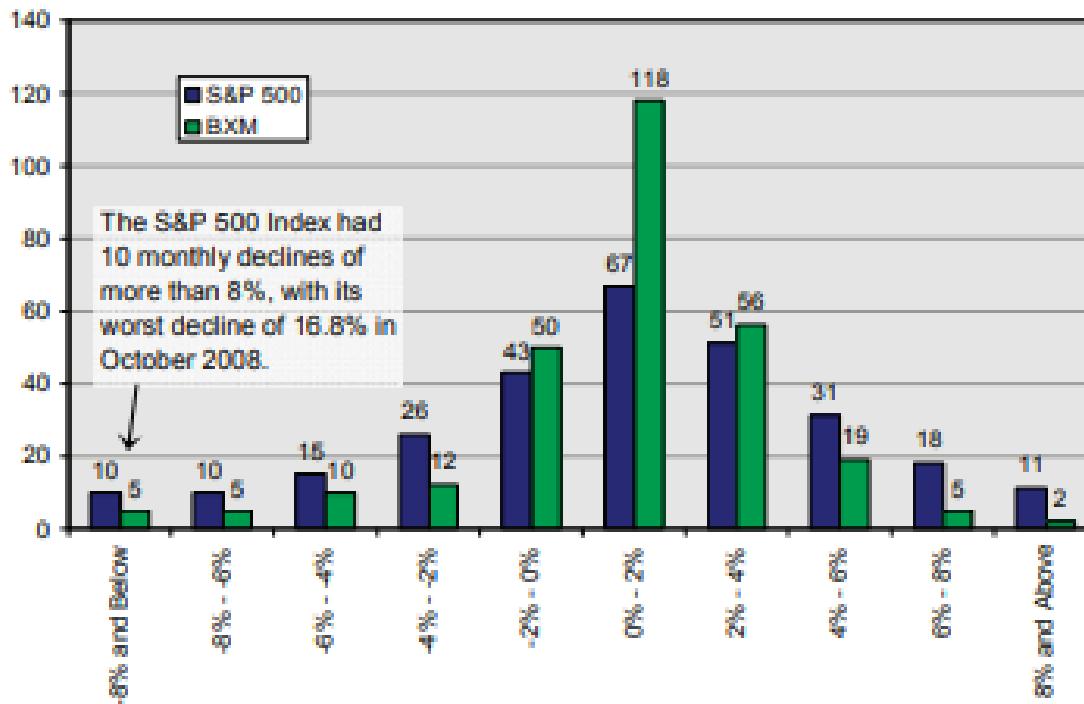


Exhibit 8a: The frequency of the BXM monthly returns is significantly greater in the -2.0% to +4.0% range highlighting the impact of the options. The distributions are tighter for the BXM reflecting cushion during declines and upside reduction.

Source: An Analysis of Index Option Writing for Liquid Enhanced Risk-Adjusted Returns

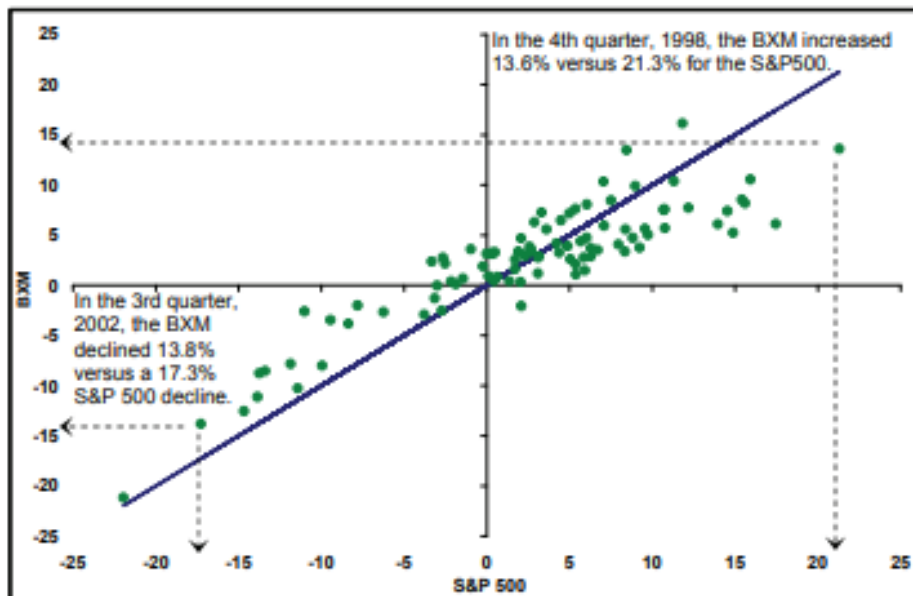


Exhibit 9a: The BXM pattern provides compelling evidence of the strategy's ability to cushion declining periods (dots above the blue line when the S&P 500 returns were negative). The cost to the cushion is illustrated in the modest upside participation (portion of the dots below the blue line when the S&P 500 returns were positive).

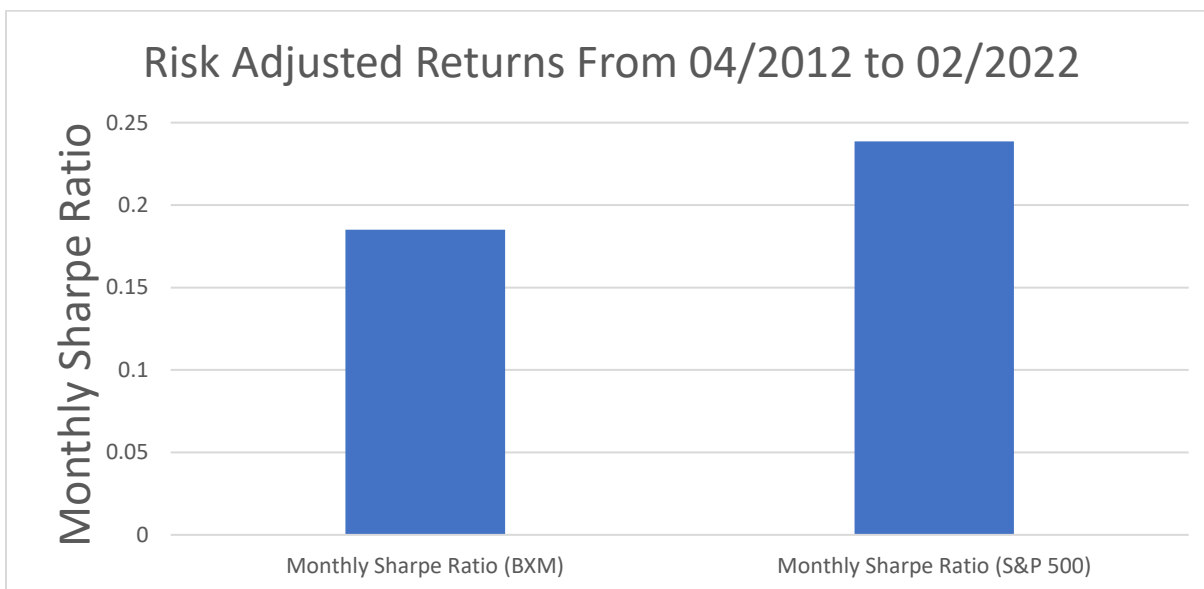
Source: An Analysis of Index Option Writing for Liquid Enhanced Risk-Adjusted Returns

A Recent Period for Analysis

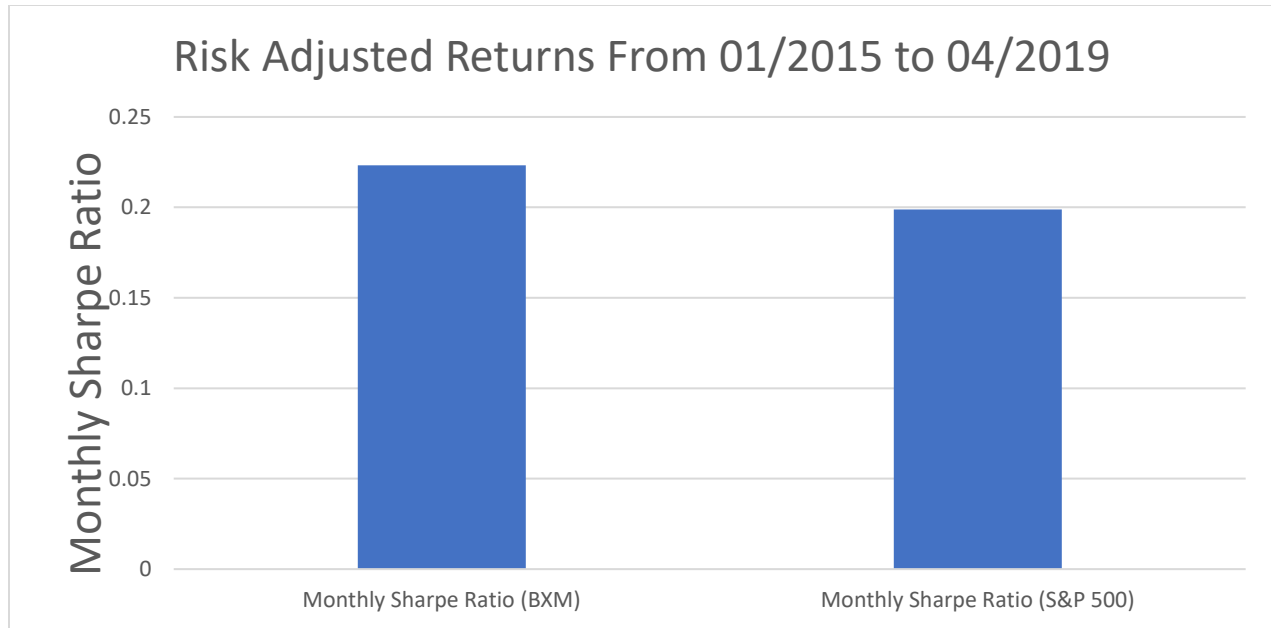
It is a common phrase that history repeats itself, and we as investors have a relatively recent period in which we experienced rising interest rates: from 2015 through 2019. By analyzing the monthly returns of the two indexes, their volatility, as well as the risk-free rate (measured by the monthly yield of 30-day T-Bills), we can find the risk-adjusted returns over this period and determine which was a better investment given the risk presented.

As a control, I measured a period spanning April 2012 to today, ending February 2022. This captures a period before rate hikes begin, the period of rate hikes, as well as the period following, containing rate cuts, a market crash, and the subsequent market run-up. Historic S&P 500 data was taken from Yahoo! Finance. Over this period, BXM had a month-to-month standard deviation of 2.72%, while the S&P 500 had a standard deviation of 3.84%. BXM also had a compounded monthly return of 0.55% while the S&P 500 returned about 0.96% compounded monthly. On average, monthly 30-day treasury yields were 0.047% (Federal

Reserve Economic Data, 2022). Using this information, we can find a monthly Sharpe ratio to get a risk adjusted return over the period.



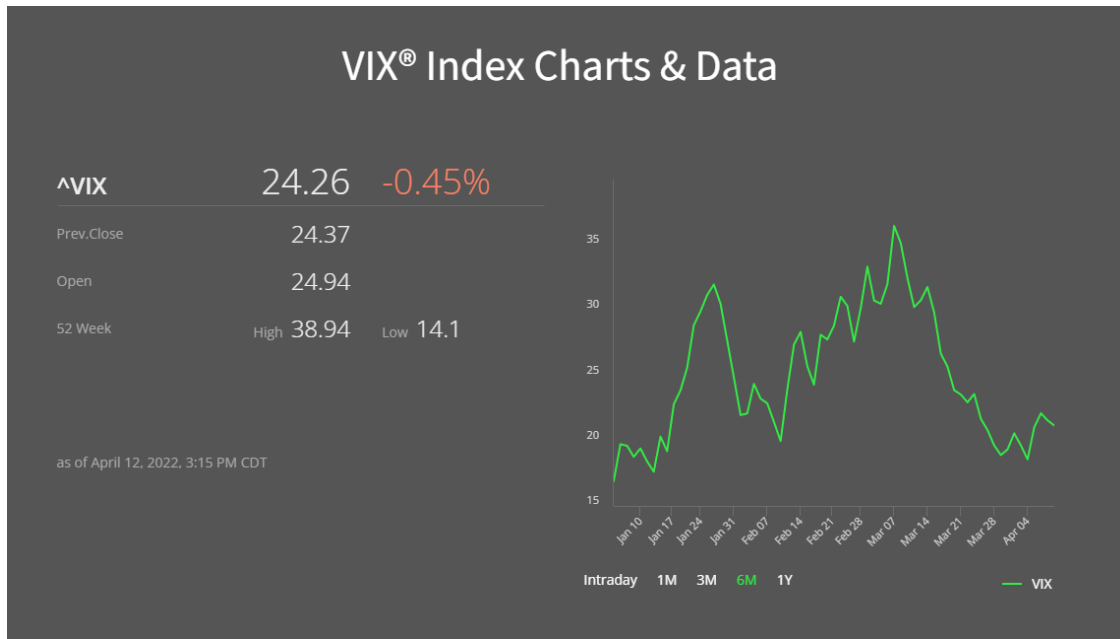
If we focus in on the period of rate hikes beginning in 2015 and end our observation date to just before rates began to fall drastically, we can observe how these two indices compare to one another. This period contains a market correction in 2018 caused by general market uncertainty led by tariffs against China as well as the aggressive rate hikes observed that year. Over this period, BXM had a month-to month standard deviation of 2.15%, while the S&P 500 had a standard deviation of 3.41%. BXM also had a compounded monthly return of 0.55% while the S&P 500 returned about 0.75% compounded monthly. On average, monthly 30-day treasury yields were 0.074% (Federal Reserve Economic Data, 2022).



Conclusions from the Data Collected

Given this data, I am confident in saying that, on a risk-adjusted basis, we will experience much better risk-adjusted returns from BXM or a similar strategy than from the S&P 500 directly in the next few years, if the FED continues with their current plan. Past performance leans towards BXM, and I would argue that much of the recent reversal we are seeing in the risk-adjusted performance of the two indices is an outlier likely fueled by the lowest interest rates we have seen in the nation's history. With record low interest rates, the call option strategy has no way to capture the swath of upside gains the S&P 500 was able to experience, and this was not made up for by the premium collected.

Given that VIX is calculated based on option premiums, a higher VIX also means that BXM is collecting higher premiums. An elevated VIX is also means there is a great deal of pessimism and uncertainty in the market, which correlates with negative market returns. Both factors combine to form the perfect environment for BXM outperformance. As an example, the S&P 500 has returned a -8.32% YTD (ended 04/12/2022) while BXM has returned 0.53%. This is accompanied by elevated VIX levels through most of the first quarter. Looking forward, trends indicate that we are going to see more volatility going into May, which bodes well for BXM outperformance.



Source: Chicago Board Options Exchange

Extraneous Events Contributing to Recent Volatility

There are other outside events besides rising interest rates contributing to the volatility we see today and will likely see for at least the next few months. The biggest and most obvious outside event contributing to volatility is Russia's invasion of Ukraine and what it could mean for the rest of the world (Congressional Research Service, 2022). People are fearful about other countries being dragged into the conflict and what that could mean for the world economy at large.

Outside of the conflict in Ukraine, we have also seen an inversion of treasury yields, which has many investors on edge about a potential recession (Subin and McKeever, 2022). This has caused quite a bit of uncertainty and will lead to volatility as investors look for other indicators of a recession. There are also many macroeconomic estimates that speculate that the current schedule of interest rate hikes is not aggressive enough to combat the rate of inflation the United States has been experiencing, and Chairman Powell has left the door open for more aggressive hikes if the need arises (Siegel, 2022). This is not unique to recent months, however. Extraneous events have been affecting the stock market for decades. It would be unfair to say that volatility due to recent events is somehow special or should be ignored for that reason.

References

- Asset Consulting Group. "An Analysis of Index Option Writing for Liquid Enhanced Risk-Adjusted Returns ." *CBOE S&P 500 BuyWrite Index*, Chicago Board Options Exchange, Jan. 2012, <https://cdn.cboe.com/resources/indices/documents/pap-assetconsultinggroup-cboe-feb2012.pdf>.
- Chicago Board Options Exchange. "VIX Index Charts & Data." *Cboe Global Markets*, Chicago Board Options Exchange, 2022, https://www.cboe.com/tradable_products/vix/.
- Congressional Research Service. "Russia's Invasion of Ukraine: Military and Intelligence Issues and Aspects." *Congressional Research Service*, Congressional Research Service, 7 Mar. 2022, <https://crsreports.congress.gov/product/pdf/IN/IN11872>.
- Edwards, Tim, and Hamish Preston. "Research Reading VIX Does VIX Predict Future Volatility." *S&P Dow Jones Indices* , S&P Dow Jones Indices , 2017, <https://www.spglobal.com/spdji/en/documents/research/research-reading-vix-does-vix-predict-future-volatility.pdf>.
- Federal Reserve Economic Data. "Market Yield on U.S. Treasury Securities at 1-Month Constant Maturity." *FRED*, 2022, <https://fred.stlouisfed.org/series/DGS1MO#0>.
- Siegel, Rachel. "Fed Raises Interest Rates Modestly, Plans Seven Rate Hikes in Total This Year." *The Washington Post*, WP Company, 17 Mar. 2022, <https://www.washingtonpost.com/us-policy/2022/03/16/fed-rate-hike/>.
- Subin, Samantha, and Vicky McKeever. "Treasury Yields Invert as Traders Weigh U.S. Recession Risk." *CNBC*, CNBC, 4 Apr. 2022, <https://www.cnbc.com/2022/04/04/us-bonds-treasury-yields-invert-ahead-of-fed-minutes.html>.
- Yahoo! Finance. "S&P 500 (^GSPC) Historical Data." *Yahoo! Finance*, Yahoo!, 2022, <https://finance.yahoo.com/quote/%5EGSPC/history?period1=1333238400&period2=1650067200&interval=1mo&filter=history&frequency=1mo&includeAdjustedClose=true>.