

Description of the CBOE S&P 500 BuyWrite Index (BXMSM)

Introduction. The CBOE S&P 500 BuyWrite Index (BXM) is a benchmark index designed to track the performance of a hypothetical buy-write strategy on the S&P 500[®] Index. Announced by the Chicago Board Options Exchange (CBOE) in April 2002, the BXM Index was developed by the CBOE in cooperation with Standard & Poor's. The BXM is a passive total return index based on (1) buying an S&P 500 stock index portfolio, and (2) "writing" (or selling) the near-term S&P 500 Index (SPXSM) "covered" call option, generally on the third Friday of each month.

To help in the development of the BXM Index, in 2001 the CBOE commissioned Professor Robert Whaley of Duke University to compile and analyze relevant data on a hypothetical buy-write strategy on the S&P 500 Index. Professor Whaley developed a methodology for the BXM index that is spelled out in his published paper "Risk and Return of the CBOE BuyWrite Monthly Index" *The Journal of Derivatives* (Winter 2002) pp. 35 – 42 (hereinafter referred to as the "Whaley Paper").

Revisions to the BXM Index. The BXM Index initially was referred to as the "CBOE BuyWrite Monthly Index" but its name later was changed to the "CBOE S&P 500 BuyWrite Index." The Whaley Paper originally set an initial value of 100.00 for the BXM Index as of June 1, 1988, because that was the date on which Standard & Poor's began reporting daily dividends for the S&P 500 Total Return Index (SPTR). However, some investors have suggested that the CBOE also provide historical data for the BXM Index for the year 1987, and in June 2008 CBOE extended the early daily price series for the BXM Index back 23 more months so that the new inception date for BXM price history now is June 30, 1986. To provide for continuity, the BXM Index still has a price of 100.00 on June 1, 1988, and all BXM prices for June 1988 and subsequent months remain unchanged. The closing price of the BXM Index on the revised inception date of June 30, 1986, is 92.21. The daily closing historical price series for the BXM Index is available at the website www.cboe.com/BXM, on Bloomberg terminals (at BXM <Index>), and from other price quote vendors.

The BXM methodology specified in the 2002 Whaley paper was used for the calculation of the BXM Index in all months from June 1986 through April 2004.

Beginning on May 21, 2004, the methodology for the BXM was revised. On the third Friday of the month, the new S&P call option generally was deemed sold at a price equal to the volume-weighted average of the traded prices ("VWAP") of the new call option during a half-hour period beginning at 11:30 a.m. Eastern Time (ET).

As of November 19, 2010, the VWAP period was extended from one-half hour to two hours beginning at 11:30 a.m. and ending at 1:30 p.m. ET. The VWAP process is explained in greater detail below.

For more information on the BXM Index, please visit the website www.cboe.com/bxm or send an e-mail to institutional@cboe.com.

CBOE Proprietary Information

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Index Design. The CBOE S&P 500 BuyWrite Index (the “BXMSM” or the “BXMSM Index”) measures the total rate of return of a hypothetical “covered call” strategy applied to the S&P 500 Composite Price Index® (the “S&P 500® Index”). This strategy, which we refer to as the “BXMSM covered call strategy,” consists of a hypothetical portfolio consisting of a “long” position indexed to the S&P 500 Index on which are deemed sold a succession of one-month, at-the-money call options on the S&P 500 Index listed on the Chicago Board Options Exchange (CBOE). We refer to this hypothetical portfolio as the “covered S&P 500 Index portfolio.” The BXMSM Index provides a benchmark measure of the total return performance of this hypothetical portfolio. Dividends paid on the component stocks underlying the S&P 500 Index and the dollar value of option premium deemed received from the sold call options are functionally “re-invested” in the covered S&P 500 Index portfolio. The BXMSM Index is based on the cumulative gross rate of return of the covered S&P 500 Index portfolio since the inception of the BXMSM Index on June 30, 1986, when it was set to an initial value of 92.21¹.

The BXMSM covered call strategy requires that each S&P 500 Index call option in the hypothetical portfolio be held to maturity, generally the third Friday of each month. The call option is settled against the Special Opening Quotation (or SOQ, ticker “SET”) of the S&P 500 Index used as the final settlement price of S&P 500 Index call options². The SOQ is a special calculation of the S&P 500 Index that is compiled from the opening prices of component stocks underlying the S&P 500 Index. The SOQ calculation is performed when all 500 stocks underlying the S&P 500 Index have opened for trading, and is usually determined before 11:00 a.m. ET³. The final settlement price of the call option at maturity is the greater of 0 and the difference between the SOQ minus the strike price of the expiring call option.

Subsequent to the settlement of the expiring call option, a new at-the-money call option expiring in the next month is then deemed written, or sold, a transaction commonly referred to as a “roll.” The strike price of the new call option is the S&P 500 Index call option listed on the CBOE with the closest strike price above the last value of the S&P 500 Index reported before 11:00 a.m. ET. For example, if the last S&P 500 Index value reported before 11:00 a.m. ET is 901.10 and the closest listed S&P 500 Index call option strike price above 901.10 is 905, then the 905 strike S&P 500 Index call option is selected as the new call option to be incorporated into the BXMSM Index. The long S&P 500 Index component and the short call option component are held in equal notional amounts, i.e., the short position in the call option is “covered” by the long S&P 500 Index component.

Once the strike price of the new call option has been identified, the new call option is deemed sold at a price equal to the volume-weighted average of the traded prices

¹ The strike used for the calculation on June 30, 1986 was selected at the previous theoretical roll date, June 20, 1986. As noted above, the value of the BXMSM on June 1, 1988, the previous inception date, remains 100.

² If the third Friday is an exchange holiday, the call option will be settled against the SOQ on the previous business day and the new call option will be selected on that day as well.

³ If one or more stocks in the S&P 500 Index do not open on the day the SOQ is calculated, the final settlement price for SPX options is determined in accordance with the Rules and By-Laws of the Options Clearing Corporation.

(“VWAP”) of the new call option during the two hour period beginning at 11:30 a.m. ET⁴. The CBOE calculates the VWAP in a two-step process: first, the CBOE excludes trades in the new call option between 11:30 a.m. and 1:30 p.m. ET that are identified as having been executed as part of a “spread”, and then the CBOE calculates the weighted average of all remaining transaction prices of the new call option between 11:30 a.m. and 1:30 p.m. ET, with weights equal to the fraction of total non-spread volume transacted at each price during this period. The source of the transaction prices used in the calculation of the VWAP is CBOE’s Market Data Retrieval (“MDR”) System⁵. If no transactions occur in the new call option between 11:30 a.m. and 1:30 p.m. ET, then the new call option is deemed sold at the last bid price reported before 1:30 p.m. ET. The value of option premium deemed received from the new call option is functionally “re-invested” in the portfolio.

Index Calculation. The BXM Index is calculated by the CBOE once per day at the close of trading [for the respective components of the covered S&P 500 Index portfolio]. The BXM Index is a chained index, i.e., its value is equal to 100 times the cumulative product of gross daily rates of return of the covered S&P 500 Index portfolio since the inception date of the BXM Index. On any given day, the BXM Index is calculated as follows:

$$BXM_t = BXM_{t-1}(1 + R_t)$$

where R_t is the daily rate of return of the covered S&P 500 Index portfolio. This rate includes ordinary cash dividends paid on the stocks underlying the S&P 500 Index that trade “ex-dividend” on that date.

On each trading day excluding roll dates, the daily gross rate of return of the BXM equals the change in the value of the components of the covered S&P 500 Index portfolio, including the value of ordinary cash dividends payable on component stocks underlying the S&P 500 Index that trade “ex-dividend” on that date, as measured from the close in trading on the preceding trading day. The gross daily rate of return is equal to:

$$1 + R_t = (S_t + Div_t - C_t)/(S_{t-1} - C_{t-1})$$

In this equation, S_t is the closing value of the S&P 500 Index at date t , Div_t represents the ordinary cash dividends payable on the component stocks underlying the S&P 500 Index that trade “ex-dividend” at date t expressed in S&P 500 Index points, and C_t is the arithmetic average of the last bid and ask prices of the call option reported before 4:00 p.m. ET at date t . S_{t-1} is the closing value of the S&P 500 Index on the preceding trading

⁴ The timing of the roll and the price used to sell the new call have changed over time. The monthly roll originally occurred at the close of trading on the third Friday of the month, i.e. the strike price of the new call was determined at 4:00 p.m. EST, and the new call was deemed to be sold at the last bid price before 4:00 p.m. EST. Since October 16, 1992, the call has been rolled at 11:00 a.m. instead. Since June 18, 2004, the new call has been deemed sold at the VWAP. This change was intended to facilitate execution of the BXM covered call strategy.

⁵ Time & Sales information from CBOE’s MDR System is disseminated through the Options Price Reporting Authority (OPRA) and is publicly available through most price quote vendors.

day and C_{t-1} is the average of the last bid and ask prices of the call option reported before 4:00 p.m. ET on the preceding trading day.

On roll dates, the gross daily rate of return is compounded from three gross rates of return, the gross rate of return from the previous close to the time the SOQ is determined and the expiring call is settled; the gross rate of return from the SOQ to the initiation of the new call position and the gross rate of return from the time the new call option is deemed sold to the close of trading on the roll date, expressed as follows:

$$1 + R_t = (1 + R_a) \times (1 + R_b) \times (1 + R_c)$$

where:

$$1 + R_a = (S^{SOQ} + Div_t - C_{Settle}) / (S_{t-1} - C_{t-1});$$

$$1 + R_b = (S^{VWAV}) / (S^{SOQ}); \text{ and}$$

$$1 + R_c = (S_t - C_t) / (S^{VWAV} - C_{VWAP})$$

In this equation, R_a is the rate of return of the covered S&P 500 Index portfolio from the previous close of trading through the settlement of the expiring call option. S^{SOQ} is the Special Opening Quotation used in determining the settlement price of the expiring call option. As previously defined, Div_t represents dividends on S&P 500 Index component stocks determined in the same manner as on non-roll dates, and C_{Settle} is the final settlement price of the expiring call option. S_{t-1} and C_{t-1} are determined in the same manner as on non-roll dates.

R_b is the rate of return of the un-covered S&P 500 Index portfolio from the settlement of the expiring option to the time the new call option is deemed sold. S^{VWAV} is the volume-weighted average value of the S&P Index based on the same time and weights used to calculate the VWAP in the new call option.

R_c is the rate of return of the covered S&P 500 Index portfolio from the time the new call option is deemed sold to the close of trading on the roll date. As defined above, S^{VWAV} is the volume-weighted average value of the S&P Index based on the same time and weights used to calculate the VWAP in the new call option. C_{VWAP} is the volume-weighted average trading price of the new call option between 11:30 a.m. and 1:30 p.m. ET and C_t refers to the average bid/ask quote of the new call option reported before 4:00 p.m. ET on the roll date.

The CBOE S&P 500 BuyWrite Index (BXMSM) is designed to represent a proposed hypothetical buy-write strategy. Like many passive indexes, the BXM Index does not take into account significant factors such as transaction costs and taxes and, because of factors such as these, many or most investors should be expected to underperform passive indexes. In the construction of the hypothetical BXM index, the SPX calls are assumed to be written at a certain price on the third Friday of the month. However, there is no guarantee that all investors will be able to sell at this price, and investors attempting to replicate the BXM Index should discuss with their brokers possible timing and liquidity issues. Transaction costs for a buy-write strategy such as the BXM could be significantly higher than transaction costs for a passive strategy of buying-and-holding stocks. Past performance does not guarantee future results. Standard & Poor's[®], S&P[®], and S&P 500[®] are registered trademarks of The McGraw-Hill Companies, Inc. and are licensed for use by the Chicago Board Options Exchange, Incorporated (CBOE). CBOE, not S&P, calculates and disseminates the BXM Index. CBOE[®] and Chicago Board Options Exchange[®] are registered trademarks of the CBOE, and SPXSM, and BXMSM is a servicemark of the CBOE. The methodology of the CBOE S&P 500 BuyWrite Index is owned by CBOE and may be covered by one or more patents or pending patent applications.

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