

### CBOE Strategy Benchmark Indexes

## The CBOE-SMA Large-Cap Weekly Index (SMLCW<sup>SM</sup> Index)

### Introduction

The CBOE-SMA Large-Cap Weekly Index (“SMLCW<sup>SM</sup> Index” or the “Index”) is a benchmark index designed to track the performance of a hypothetical strategy that buys a portfolio of 25 stocks with high SMA-S Scores (“SMLCW Portfolio”) on a weekly basis. Social Market Analytics, Inc. (SMA) applies its patented account certification algorithm to extract predicted signals from Twitter traffic by passing tweets through its proprietary NLP architecture to generate S-Scores that reflect investors’ sentiment about stocks. The SMLCW Portfolio is reconstituted every Friday at 8:30 am CT from stocks in CBOE’s Large-Cap Universe (as defined below) on the basis of the average 5-period SMA S-Scores at 8:10 am CT. The stocks are sold at the next Friday rebalancing, at 8:30 am CT. Friday is called the roll-date of the Index. However, if Friday is an exchange holiday, the portfolio is liquidated and reconstituted on Thursday instead.

### Index Design

On September 18, 2014 at 8:30 am CT, the inception date and time of the SMLCW Index, \$100 is invested in the SMLCW Portfolio. This portfolio is an equally-weighted portfolio of 25 stocks drawn from the CBOE Large-Cap Universe that have the highest 5-period average SMA S-Scores at 8:10 am CT. A period is a date on which there are a sufficient number of tweets to derive SMA-S-scores. The CBOE Large-Cap Universe is comprised of stocks that (a) are in the top 15% capitalization tranche of stocks that serve as underlying for options listed on the CBOE (approximately 3000 liquid stocks) and (b) whose market capitalization is greater than or equal to \$10 billion. The CBOE Large-Cap Universe is reconstituted quarterly on the third Friday of the month. The SMLCW Portfolio is reconstituted every Friday at 8:30 am CT.

### Index Calculation

The SMLC Index value is calculated by CBOE daily at 3:00 pm CT (the “close”).

On each trading day, the daily return of the Index is calculated as:

$$I_t = \frac{1}{D_t} I_{t-1} * (1 + R_t)$$

$R_t$  is the daily rate of return of the Index,  $D_t$  is the Index divisor,  $I_0 = 100$ , and  $D_0 = 1$ .

On non-roll dates, the daily return of the Index is calculated as:

$$R_t = \frac{\sum_{i=1}^{25} N_{it-1} P_{it}^{3pm}}{\sum_{i=1}^{25} N_{it-1} P_{it-1}^{3pm}}$$

Here,  $N_{it}$  denotes the number of shares of the  $i^{\text{th}}$  stock in the portfolio at the close of date  $t-1$ , post any corporate action, and  $P_{it}^x$  its price at time  $x$ .

On roll-dates, the daily rate of return of the Index is compounded from two rates, the rate of return from the close to the open and the rate of return from the open to the close.

On roll-dates,  $N_{it-1}$  denotes the number of shares in the portfolio at the close of date t-1, and  $M_{jt}$  denotes the number of shares of the  $j^{\text{th}}$  stock purchased at  $MOP_{jt}$ , the market-on-open price on date t. The subscript i refers to the 25 stocks before the roll, and the subscript j to the 25 stocks after the roll.

$$R_t = \frac{\sum_{i=1}^{25} N_{it-1} MOP_{it}}{\sum_{i=1}^{25} N_{it-1} P_{it-1}^{3pm}} * \frac{\sum_{j=1}^{25} M_{jt} P_{jt}^{3pm}}{\sum_{j=1}^{25} M_{jt} MOP_{jt}}$$

The number of shares of the  $j^{\text{th}}$  stock bought at the open on roll-date t is

$$M_{jt} = \frac{\sum_{i=1}^{25} N_{it-1} MOP_{it}}{25 * MOP_{jt}}$$

#### Divisor Adjustments

After the inception date, the divisor changes if there are corporate actions that change the value of the portfolio of 25 stocks. Let  $V_t$  be the closing market value of the portfolio before any corporate actions and  $W_t$  its value after the corporate actions. If  $W_t$  is not equal to  $V_t$ , then a new divisor  $D'_t$  is chosen to ensure continuity of the Index:

$$\frac{W_t}{D'_t} = \frac{V_t}{D_t}$$

From then on and until new corporate actions require a further adjustment,  $D'_t$  is the new Index divisor.

The CBOE-SMA Large-Cap Weekly Index (SMLCW<sup>SM</sup> Index) is designed to represent a hypothetical yield enhancement strategy. Like many passive indexes, the SMLCW Index does not take into account significant factors such as transaction costs and taxes. Transaction costs and taxes for a strategy such as that underlying the SMLCW Index could be significantly higher than transaction costs for a passive strategy of buying-and-holding stock over a longer period of time. In the construction of the hypothetical SMLCW Index, the stocks in the portfolio are assumed to be purchased weekly at the market-on-open and are then sold the next Friday at the market-on-open. However, there is no guarantee that all investors will be able to sell at these prices, and investors attempting to replicate the SMLCW Index should discuss with their brokers possible timing and liquidity issues. Past performance does not guarantee future results. It is not possible to invest directly in an index. Chicago Board Options Exchange, Incorporated (CBOE) calculates and disseminates the SMLCW Index.

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