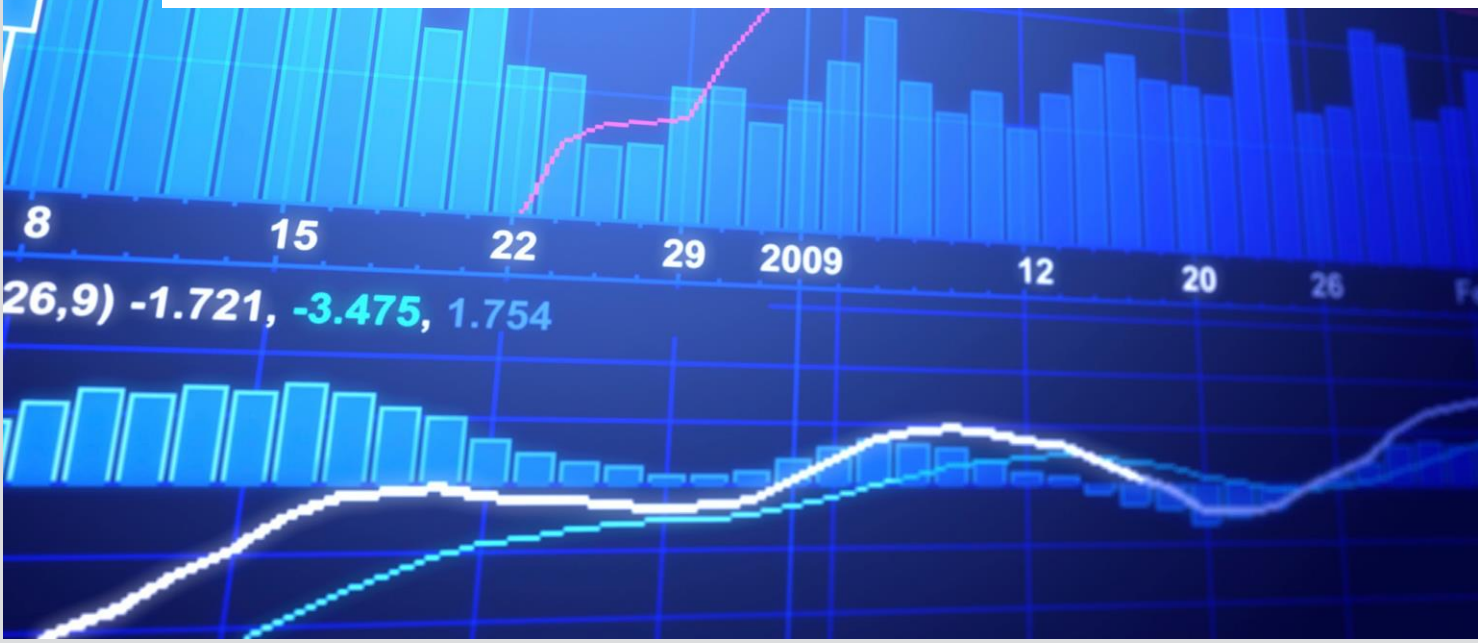
Index Methodology As of December/2016

CBOE Strategy Benchmark Indexes

The CBOE S&P 500 Enhanced Growth Index Series



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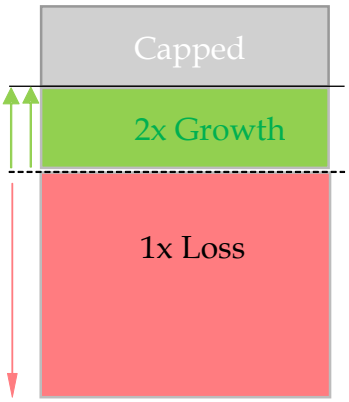
Introduction

The CBOE S&P 500 Enhanced Growth Index Series (the "*Indices*") is part of a family of Target Outcome Indices. The Indices are designed to provide target outcome returns linked to the US domestic stock market.



The Indices measure the performance of a portfolio of hypothetical exchange traded Flexible Exchange® Options ("FLEX® Options") that are based on the S&P 500® Index. Each index in the series is designed to track the returns of a hypothetical investment that over a period of approximately one year seeks to provide 2x leveraged returns on the appreciation of the S&P 500 Index up to a capped level while providing one-to-one exposure to any losses due to a decline in the index. The capped level is determined on each annual roll date such that there is no premium or discount to enter into the hypothetical investment compared to an investment in the Index.

The Index Series comprises 13 series.

There are 12 monthly series that roll on the third Wednesday of each month:

- CBOE S&P 500 Enhanced Growth Index January Series (Ticker: SPEN01)
- CBOE S&P 500 Enhanced Growth Index February Series (Ticker: SPEN02)
- CBOE S&P 500 Enhanced Growth Index March Series (Ticker: SPEN03)
- CBOE S&P 500 Enhanced Growth Index April Series (Ticker: SPEN04)
- CBOE S&P 500 Enhanced Growth Index May Series (Ticker: SPEN05)
- CBOE S&P 500 Enhanced Growth Index June Series (Ticker: SPEN06)
- CBOE S&P 500 Enhanced Growth Index July Series (Ticker: SPEN07)
- CBOE S&P 500 Enhanced Growth Index August Series (Ticker: SPEN08)
- CBOE S&P 500 Enhanced Growth Index September Series (Ticker: SPEN09)
- CBOE S&P 500 Enhanced Growth Index October Series (Ticker: SPEN10)
- CBOE S&P 500 Enhanced Growth Index November Series (Ticker: SPEN11)
- CBOE S&P 500 Enhanced Growth Index December Series (Ticker: SPEN12)

In addition, there is one balanced index that is a composite of the 12 monthly series, where each monthly series is allocated an equal weight at each monthly roll date:

- CBOE S&P 500 Enhanced Growth Balanced Series (Ticker: SPEN)

Highlights

An Enhanced Growth Option Strategy is a leveraged strategy that is generally used in a range-bound or modest bull market environment. It seeks to provide 2 times leveraged upside up to a predetermined cap and one-to-one exposure on the downside.

The Indices are part of the outcome based approach to investing. Many investments target speculative returns, with uncertain levels of risk, over an uncertain period of time. While opportunistic, this approach to investing brings a high degree of uncertainty. Outcome based investing encourages targeting a specific defined return or "payoff", with an allowance for a specific defined risk, at a specific point in time in the future.

The strategy seeks to provide similar returns to the S&P500 Index, with similar volatility and downside risk, but higher upside potential in market environments with modest gains.

Index Series Value and Return

First Roll Date and Starting Values

Each Monthly Index series will have an annual Roll Date(i) on the third Wednesday of the month of that index series(i.e. third Wednesday of January for the January series, third Wednesday of February for the February series and so on) and have a value that was set as of the following dates:

- CBOE S&P 500 Enhanced Growth Index January Series (Index[1])
  Set as of Roll Date (0) **January 19, 2005** at a value of 1000
- CBOE S&P 500 Enhanced Growth Index February Series (Index[2])
  Set as of Roll Date (0) **February 16, 2005** at a value of 1000
- CBOE S&P 500 Enhanced Growth Index March Series (Index[3])
  Set as of Roll Date (0**) March 16, 2005** at a value of 1000
- CBOE S&P 500 Enhanced Growth Index April Series (Index[4])
  Set as of Roll Date (0) **April 20, 2005** at a value of 1000
- CBOE S&P 500Enhanced Growth Index May Series (Index[5])
  Set as of Roll Date (0) **May 18, 2005** at a value of 1000
- CBOE S&P 500 Enhanced Growth Index June Series (Index[6])
  Set as of Roll Date (0) **June 15, 2005** at a value of 1000
- CBOE S&P 500 Enhanced Growth Index July Series (Index[7])
  Set as of Roll Date (0) **July 20, 2005** at a value of 1000
- CBOE S&P 500 Enhanced Growth Index August Series (Index[8])
  Set as of Roll Date (0) **August 17, 2005** at a value of 1000
- CBOE S&P 500 Enhanced Growth Index September Series (Index[9])
  Set as of Roll Date (0) **September 21, 2005** at a value of 1000
- CBOE S&P 500 Enhanced Growth Index October Series (Index[10])
  Set as of Roll Date (0) **October 19, 2005** at a value of 1000
- CBOE S&P 500 Enhanced Growth Index November Series (Index[11])
  Set as of Roll Date (0) **November 16, 2005** at a value of 1000
- CBOE S&P 500 Enhanced Growth Index December Series (Index[12])
  Set as of Roll Date (0) **December 21, 2005** at a value of 1000
- CBOE S&P 500 Enhanced Growth Index Balanced Series (Balanced Index)
  Set as of Roll Date (0) **December 21, 2005** at a value of 1000

On the subsequent Roll Date of each monthly series, the FLEX Option components expire and the index series simultaneously rolls to a new set of FLEX Options with the expiration of the Options as of the close on the next Roll Date.

The Balanced Index is a composite of the 12 monthly series where each monthly series is allocated an equal weight at each monthly roll date.

Components

Each Monthly Index series will consist of four FLEX Option components whose strike price and expiration date will be set on the Roll Date(i) relative to the closing level of S&P 500 Index on the Roll Date:

- *Purchased Call Option* with strike = 50% of S&P 500 Index closing price
- *Written Put Option* with strike = 50% of S&P 500 Index closing price
- *Purchased Put Option* with strike = 100% of S&P 500 Index closing price
- *Written Call Option* with strike = $\text{CapStrike}_{\text{RollDate(i)}}$

All FLEX Options are European-Style Options based on the S&P 500 Index and have an expiration date that is the next Roll Date for the respective Monthly series.

Non-Roll Date Calculations

The value of the monthly index series will be calculated as follows for *t = 1* (i.e. one day after the *Roll Date*) until *t = Roll Date(i+1)* (i.e. until the next *Roll Date*):

$$\text{Index}_t = \text{Index}_{RollDate(i)} \times \left[\frac{OptionPortfolioValue_t}{OptionPortfolioValue_{RollDate(i)}}\right]$$

The value of the *Balanced Index* will be a composite of each monthly index series, *Index*^{m} (m = 1 for January series, m = 2 for February series, … m = 12 for December series) and will be calculated as follows for *t = 1* and until *t = Roll Date (i+1)* (i.e. until the next *Roll Date*):

$$\text{BalancedIndex}_t = \text{BalancedIndex}_{RollDate(i)} \times \frac{\sum_{m=1}^{m=12}\left[\frac{Index_t^m}{Index_{RollDate(i)}^m}\right]}{12}$$

Where:

$$OptionPortfolioValue_{RollDate(i)} = 2 \times PurchasedCallOption_{RollDate(i)} - 2 \times WrittenPutOption_{RollDate(i)} + PurchasedPutOption_{RollDate(i)} - 2 \times WrittenCallOption_{RollDate(i)}$$

$$OptionPortfolioValue_t = 2 \times PurchasedCallOption_t - 2 \times WrittenPutOption_t + PurchasedPutOption_t - 2 \times WrittenCallOption_t$$

$<>_{RollDate(i)}$=Value on the last *Roll Date*
$PurchasedCallOption_t$= Closing value of the *Purchased Call Option* on day t
$WrittenPutOption_t$= Closing value of the *Written Put Option* on day t
$PurchasedPutOption_t$= Closing value of the *Purchased Put Option* on day t
$WrittenCallOption_t$= Closing value of the *Written Call Option* on day t

Roll Date Calculations:

On the subsequent *Roll Date* of each monthly series, the FLEX Option components expire and the index series simultaneously rolls to a new set of FLEX Options with the expiration of the Options as of the close on the next *Roll Date*.

On the Roll Date the Index value is calculated as follows:

$$\text{Index}_{RollDate(i+1)} = \text{Index}_{RollDate(i)} \times \left[Min\left(0, \frac{SPX_{RollDate(i+1)}}{SPX_{RollDate(i)}} - 1\right) + 2 \times Min\left(\frac{CapStrike_{RollDate(i)}}{SPX_{RollDate(i)}} - 1, Max\left(0, \frac{SPX_{RollDate(i+1)}}{SPX_{RollDate(i)}} - 1\right)\right) + 1\right]$$

On *Roll Dates* of each monthly series, the *Balanced Index* will be rebalanced and calculated as a composite of each monthly index series, *Index*^{m} (m = 1 for January series, m = 2 for February series, … m = 12 for December series) as follows:

$$\text{BalancedIndex}_{Rolldate(i+1)} = \text{BalancedIndex}_{RollDate(i)} \times \frac{\sum_{m=1}^{m=12}\left[\frac{Index_{RollDate(i+1)}^m}{Index_{RollDate(i)}^m}\right]}{12}$$

Calculation of the Cap

$\text{CapStrike}_{\text{RollDate(i)}}$ is the strike of the *Written Call Option* such that the following holds true on the Roll Date:

$$WrittenCallOption_{RollDate(i)} = \frac{1}{2}\left(2 \times PurchasedCallOption_{RollDate(i)} - 2 \times WrittenPutOption_{RollDate(i)} + PurchasedPutOption_{RollDate(i)} - SPX_{RollDate(i)}\right)$$

To determine the value and *CapStrike* of the *Written Call Option*, CBOE uses an interpolation methodology that it deems is most appropriate for the market conditions at the time. To do so, CBOE values at least two written call options. The value of these options is then used to estimate the value and strike of the *Written Call Option*.

Following is an illustration of the possible methodology that CBOE may use to interpolate using two option prices:

The value of two additional Options is determined on the Roll Date:

- *Written Call Option 1*
- *Written Call Option 2*

Denote the weights as: *W1* and *W2* for the *Written Call Option 1* and *Written Call Option 2* with Strike 1 = 105% of the S&P500 Index closing price and Strike 2 = 115% of the S&P500 Index closing price, respectively. The value and strike of the Written Call Option is interpolated such that the following equalities hold true:

Written Call Option = W1 x Written Call Option 1 + W2 x Written Call Option 2

Strike = W1 x Strike 1 + W2 x Strike 2

W1 + W2 = 1

While CBOE will use at least two options, as a matter of practice it will generally use three option prices, namely, *Written Call Option 0*, *Written Call Option 1* and *Written Call Option 2* to estimate the value of the *Written Call Option*. However, to determine the value and Strike of the *Written Call Option*, CBOE may use just two or more than two option prices if it deems it appropriate for the market conditions at the time.

Valuation

To value the component Options that comprise the Monthly index series, a model based valuation is used.

Model based valuation is used for valuing the options. CBOE constructs an implied volatility surface from listed S&P 500 option prices by applying the SABR model. The SABR model is a stochastic volatility model, which attempts to capture the volatility smile in derivatives markets. The name stands for "stochastic alpha, beta, rho", referring to the parameters of the model, introduced by Hagan et.al., as an attempt to model the volatility surface and capture the empirically observed dynamic behavior of the smile. Valuations are then calculated for the options on the roll dates and for the official close of CBOE each trading date.

Index Maintenance

Index Construction

CBOE gathers information for the option components and applies the methodology to create individual index series.

Valuation and Equations

CBOE determines an evaluated value for each component option and associated equation in the Indices.

Calculation and Dissemination

CBOE compiles, calculates, maintains and disseminates the values of the Indices. Calculation will occur once a day upon the official close of CBOE trading hours.

Options involve risk and are not suitable for all investors. Prior to buying or selling an option, a person must receive a copy of Characteristics and Risks of Standardized Options. Copies are available from your broker or from The Options Clearing Corporation, One North Wacker Drive, Suite 500, Chicago, Illinois 60606 or www.theocc.com. The CBOE S&P 500 Enhanced Growth Index Series (the "Indices") are designed to represent a proposed hypothetical yield enhancement strategy. Like many passive indexes, the Indices do 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 Indices, the options components of each monthly index series are assumed to be purchased and sold at a certain price on the third Wednesday of the month. However, there is no guarantee that all investors will be able to buy or sell at this price, and investors attempting to replicate the Indices should discuss with their brokers possible timing and liquidity issues. Transaction costs and taxes for a strategy such as the Indices could be significantly higher than transaction costs for a passive strategy of buying-and-holding stocks. Investors should consult their tax advisor as to how taxes affect the outcome of contemplated options transactions. 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 Indices.

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