

## CBOE Strategy Benchmark Indexes

- The CBOE S&P 500 Dividend Aristocrats Target Income Index

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## Introduction

The CBOE S&P 500 Dividend Aristocrat Target Income Index (“SPAI” or “SPAI Index”) is a benchmark index designed to track the performance of a hypothetical buy-write strategy on constituents of the S&P 500 Dividend Aristocrat Index. The S&P 500 Dividend Aristocrat Index, constructed and maintained by S&P Dow Jones Indices LLC, targets companies that are currently members of the S&P 500®, have increased dividend payments each year for at least 25 years, and meet certain market capitalization and liquidity requirements.

The SPAI Index is designed with the primary goal of generating an annualized level of income that is approximately 3.5% over the annual dividend yield of the S&P 500® Index and a secondary goal of generating price returns that are proportional to the price appreciation of the S&P 500 Index. The SPAI Index investment strategy includes (1) buying the stocks contained in the S&P 500 Dividend Aristocrat Index, and (2) partially “writing” (or selling) weekly “covered” call options on each stock, generally on the last trading day of each week. The number of call options overwritten per unit of stock exposure is varied periodically with the goal of generating a total yield from dividends and call option premiums that is 3.5% per annum higher than the yield from dividends of the S&P 500 Index. The percentage of each stock that is overwritten with call options will by design be always less than 20%.

## Index Design

SPAI Index measures the total rate of return of a hypothetical “partial covered call” strategy applied to stocks contained in the S&P 500 Dividend Aristocrat Index. The SPAI Index strategy consists of a hypothetical portfolio consisting of an equally weighted “long” position in stocks contained in the S&P 500 Dividend Aristocrat Index for which there exists a listed options market (i.e. has options that trade on a national options exchange). The dividend yields for each stock is determined by the equation below:

$$\text{Dividend Yield} = \frac{E(\text{Div})_{\text{Recon}}}{S_{\text{Recon}}}$$

Where  $E(\text{Div})_{\text{Recon}}$  is the expected dividend of the stock over the next year on the S&P 500 Dividend Aristocrat Index reconstitution date and  $S_{\text{Recon}}$  is the price of the stock on the reconstitution date<sup>1</sup>. We refer to this hypothetical portfolio as the “covered S&P 500 Dividend Aristocrat Index portfolio”.

The hypothetical portfolio is rebalanced at each reconstitution date ‘Recon’ and on each rebalance date ‘Rebal’ such that the dividends paid on the component stocks and the dollar value of option premium deemed received from the sold call options are functionally “re-invested” in the covered S&P 500 Dividend Aristocrat Index portfolio. The SPAI Index is based on the cumulative gross rate of return of the covered S&P 500 Dividend Aristocrat Index portfolio.

The SPAI partial covered call strategy requires that each equity call option in the hypothetical portfolio be held to maturity, generally the Friday of the following week.

After the settlement of the expiring call option, a new at-the-money call option expiring in the next week is then deemed written, or sold, a transaction commonly referred to as a “roll.” The strike price of the new call option is the current price of the underlying equity that it is written on.

The SPAI Index employs a partial covered call strategy. That is, the long equity and the short call option positions are not held in equal notional amounts. The short position in the call option will be written on a notional value of less than 20% of the underlying equity such that it is “covered” by some subset of the long equity component.

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1. See methodology for the S&P 500 Dividend Aristocrats Index at <http://us.spindices.com/documents/methodologies/methodology-sp-500-dividend-aristocrats.pdf>

## Index Calculation

The SPAI Index is calculated by the Chicago Board Options Exchange (“CBOE”) once per day at the close of trading for the respective components of the S&P 500 Dividend Aristocrat Target Income Index portfolio. On any given day, the SPAI Index is calculated as follows:

$$SPAI_t = SPAI_{t-1}(1 + R_t)$$

Where  $R_t$  is the daily rate of return of the covered S&P 500 Dividend Aristocrat Target Income Index portfolio. This rate includes ordinary cash dividends paid on the subset of stocks in the covered S&P 500 Dividend Aristocrat Target Income Index portfolio that trade “ex-dividend” on that date.

On each trading day excluding reconstitution dates, the daily gross rate of return of the SPAI equals the weighted average change in the value of the components of the S&P 500 Dividend Aristocrat Target Income Index portfolio, including the value of ordinary cash dividends payable on component stocks underlying the S&P 500 Dividend Aristocrat Index portfolio that trade “ex-dividend” on that date, as measured from the close in trading on the preceding trading day.

$$R_t = \sum_{i=1}^n \omega_{it-1} R_{it}$$

Where,  $\omega_{it-1}$  is the weight of the stock at time t-1,  $R_{it}$  is the return of the stock at time t, and n=number of stocks in the S&P 500 Dividend Aristocrat Index.

On each trading day excluding reconstitution dates,  $\omega_{it}$  is calculated as

$$\omega_{it} = [\omega_{it-1} * (1 + R_{it})] / \sum_{i=1}^n \omega_{it-1} (1 + R_{it})$$

The gross daily rate of return for each stock is equal to:

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

In this equation,  $S_t$  is the closing value of the stock at date t,  $Div_t$  represents the ordinary cash dividend payable on the stock if the stock has traded “ex-dividend” at date t,  $PO_i$  is the percentage of the portfolio overwritten set on the previous roll date, and  $C_t$  is the closing value of the written call option.  $S_{t-1}$  is the closing value of the stock on the preceding trading day and  $C_{t-1}$  is the closing value of the written call option on the preceding trading day.

## Rebalancing

**Annual Reconstitution:** The index’s stock portfolio constituent membership is reviewed once a year, with changes effective after the close of the last business day of January. The reference date for such additions and deletions is the Friday prior to the reconstitution date. On the reconstitution date the index’s option portfolio will be closed and reestablished at the next option roll date.

**Quarterly Rebalancing:** Index constituents are re-weighted to equal weight quarterly, effective after the close of the last business day of January, April, July and October. The reference date for such re-weightings is five business days prior to the last business day of the re-weighting month.

On reconstitution and rebalance dates:

$$\omega_{it} = 1/n$$

Where  $n$  = number of stocks in the S&P 500 Dividend Aristocrat Index

## Rolls

**Weekly Rolls:** The index's option portfolio constituent membership is rolled on the last business day of each week (generally a Friday). On the last business day, the intrinsic value of the expiring option is realized as a loss offsetting gain in the underlying stock position and a new option is

On roll dates, the return for each stock is equal to:

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

Where  $t = roll$

On roll dates  $PO_i$  is calculated as:

$$PO_i = \text{Min}[20\%, [3.5\% + E(Div_{SP}) - AD_T] / AP_T]$$

Where:

$E(Div_{SP})$  = the annualized expected dividend yield of the S&P 500 Dividend Aristocrats Target Income Index between the previous reconstitution date T and the next reconstitution date T+1

$$AD_T = 4 * \sum_{i=1}^n \omega_{it-1} Div_{Roll}$$

$$Div_{Roll} = \frac{\text{Next expected Quarterly Dividend}}{S_{Roll}}$$

$$AP_{Roll} = 52 * \sum_{i=1}^n \omega_{it-1} CP_{Roll}$$

$$CP_{Roll} = \frac{\text{Premium received from written call option}}{S_{Roll}}$$

## Corporate Actions

For constituent stocks where a delisting, acquisition or any other corporate action resulting in the deletion of the stock from the underlying S&P 500 Dividend Aristocrats Index, the stock will be deleted from the SPAI Index at the same time as it is deleted from the S&P 500 Dividend Aristocrats Index.

In case of a spin-off, both the parent and the spin-off entity will be removed from the SPAI index after the first day of regular way trading.

In case of an existing index constituent being acquired by another index constituent, the existing constituent is deleted from the SPAI Index on the effective date of acquisition.

For corporate actions such as delisting, acquisition or any other corporate action, including spin-offs, resulting in the deletion of the stock from the underlying index, the index buys back the corresponding option position at the closing offer price the day prior to the index corporate action effective date.

For corporate actions where the shares of a constituent are reduced resulting in a reduction in the weight of that constituent, the index buys back the proportionate number of contracts at the closing offer price on the day prior to the corporate action effective date.

For corporate actions where the shares of a constituent are increased resulting in an increase in the weight of that constituent, the index sells the proportionate number of contracts at the closing offer price on the day prior to the corporate action effective date.

For all other corporate actions, no adjustment is made to the existing options position. This includes, but is not limited to, stock splits/consolidation, rights offerings, share updates and special dividends. For example, in the case of a split or consolidation of a constituent, the option shares, strike price and/or the option multiplier would be adjusted automatically in a corresponding manner by the OCC to account for the corporate action. No other adjustment would be necessary by the index.

## Valuation

To value the component Options that comprise the SPAI Index, a model based valuation is used.

Model based valuation is used for valuing the options. CBOE constructs an implied volatility surface from listed 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 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.

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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](http://www.theocc.com). The CBOE S&P 500 Dividend Aristocrats Target Income Index (the “Index”) is designed to represent a proposed hypothetical buy-write strategy. Like many passive indexes, the 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 Index, the options components of each monthly index series are assumed to be purchased and sold at a certain price on the last day 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 Index should discuss with their brokers possible timing and liquidity issues. Transaction costs and taxes for a strategy such as the Index 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 Index.

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