

# **S&P Delta Hedged Straddle Indices** *Methodology*

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# Introduction

## Index Objective and Highlights

The S&P 500 Delta Hedged Straddle Index measures the performance of a short position in the three-month at-the-money (ATM) straddle on the S&P 500, with a delta hedge using S&P 500 E-mini futures.

The index takes short exposure in ATM calls and puts with designated Vega Exposure (VX) of index notional. The positions are delta hedged using futures and the futures position is adjusted once the net delta exposure exceeds the Delta Hedging Threshold (DHT).

## Exhibit 2: Parameters

Parameter	Description	Value
VX	Vega Exposure	1%
DHT	Delta Hedging Threshold	0.1

## Supporting Documents

This methodology is meant to be read in conjunction with supporting documents providing greater detail with respect to the policies, procedures and calculations described herein. References throughout the methodology direct the reader to the relevant supporting document for further information on a specific topic. The list of the main supplemental documents for this methodology and the hyperlinks to those documents is as follows:

Supporting Document	URL
S&P Dow Jones Indices' Options Indices Policies and Practices Methodology	<a href="#">Options Indices Policies &amp; Practices</a>
S&P Dow Jones Indices' Index Mathematics Methodology	<a href="#">Index Mathematics Methodology</a>
S&P Dow Jones Indices' Commodity Indices Policies and Practices Methodology	<a href="#">Commodity Indices Policies &amp; Practices</a>

This methodology was created by S&P Dow Jones Indices to achieve the aforementioned objective of measuring the underlying interest of each index governed by this methodology document. Any changes to or deviations from this methodology are made in the sole judgment and discretion of S&P Dow Jones Indices so that the index continues to achieve its objective.

# Index Calculation

On any business day  $t$ , the index value calculates as follows:

$$M_t = M_{t-1} + (-N_{t-1} * (C_t - C_{t-1})) * 100 + (-N_{t-1} * (P_t - P_{t-1})) * 100 + F_{(t-1)} * (SPX_{fut_t} - SPX_{fut_{t-1}}) * 50$$

where:

- $M_t$  = The index level on  $t$
- $N_{t-1}$  = The number of options on  $t-1$
- $C_t$  = The call price  $t$  (mid) (on a rebalancing day, this is the bid price of the new option)
- $P_t$  = The put price  $t$  (mid) (on a rebalancing day, this is the bid price of the new option)
- $F_{t-1}$  = The number of S&P 500 E-mini futures on  $t-1$
- $SPX_{fut_t}$  = The S&P 500 E-mini future level on  $t$

If  $t$  is not a Roll Day

The number of option contracts remains the same.

$$N_t = N_{t-1}$$

The number of futures contracts remains the same unless the Dollar Delta of the positions exceeded the threshold on  $t-1$ .

$$\text{If } \text{abs}\left(\frac{\$Delta_{t-1}}{M_{t-1}}\right) > DHT \quad \text{then}$$

$$F_t = \frac{-\$Delta_{t-1}}{50 * SPX_{fut_{t-1}}} + F_{t-1}$$

otherwise:

$$F_t = F_{t-1}$$

where:

- $F_t$  = The number of futures on  $t$
- $\$Delta_{t-1}$  = The dollar delta
- 50 = The E-mini S&P 500 futures multiplier
- $SPX_{fut_{t-1}}$  = The E-mini S&P 500 futures price on  $t-1$
- $F_{t-1}$  = The number of futures on  $t-1$

The Dollar Delta is the net delta exposure of the options and futures in U.S. dollars, and calculates as:

$$\text{\$Delta}_t = -N_t * SPX_{fut_t} * (\Delta_{C_t} + \Delta_{P_t}) * 100 + F_t * SPX_{fut_t} * 50$$

where:

$t$	= Current day
$N_t$	= The number of option contracts
$\Delta_C$	= The delta of the call position
$\Delta_P$	= The delta of the put position
100	= The SPX option multiplier
$F_t$	= The number of futures on $t$
$SPX_{fut_t}$	= The E-mini S&P 500 futures price on $t$
50	= The E-mini S&P 500 futures multiplier

### If $t$ is a Roll Day

On the rebalancing day, number of new options calculates as:

$$N_{new(t)} = \left( \frac{M_{t-1} * VX}{100 * (Vega_{C_{t-1}} + Vega_{P_{t-1}})} \right)$$

where:

$t$	= Rebalancing date
$N_{new(t)}$	= The new number of SPX calls and puts (each)
$M_{t-1}$	= The index level at time $t-1$
$VX$	= The Vega weighting factor
100	= The SPX options multiplier
$Vega_{C_{t-1}}$	= The Vega of the new call option on $t-1$
$Vega_{P_{t-1}}$	= The Vega of the new put option on $t-1$

Number of futures is set to zero on rebalancing day.

$$F_t = 0$$

### Strike Selection

On the Selection day, which is the index business day prior to the rebalancing date, the nearest at-the-money strike for both calls and puts are selected based on the SPX closing level on that date. If two strikes are equidistant, then the higher strike is selected.

# Total Return Calculation

A total return version of each index, which includes interest accrual on the notional value of the index based on the overnight U.S. Fed Funds rate, calculates as follows:

$$TRIV_t = TRIV_{rb} * EReturn_t + TRIV_{rb} * \prod_{rb+1}^t \left( 1 + \left( \frac{FF_{t-1} * D_{t-1,t}}{360} \right) \right)$$

where:

$TRIV_t$  = Total return index value as of the current date,  $t$ .

$TRIV_{rb}$  = Total return index value as of the last rebalancing date,  $rb$ .

$EReturn_t$  = Excess Return from the prior rebalancing date to  $t$ ,

$D_{t-1,t}$  = Count of calendar days from the previous trading date,  $t-1$ , to the current date,  $t$ .

$FF_{t-1}$  = Federal Funds Overnight Bank Rate as of the last trading date,  $t-1$ , as reported on Refinitiv, under RIC USONBFR=, under the open field.<sup>1</sup>

*For more information on the index calculation methodology, please refer to S&P Dow Jones Indices' Index Mathematics Methodology.*

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<sup>1</sup> Prior to 10/04/2016, the Fed Funds Effective Rate, USONFFE= was used.

# Option Analytics Calculations

The index uses the Black Model for the calculation of option analytics.

*For more information on the Black Model calculations, please refer to S&P Dow Jones Indices' Options Indices Policies & Practices Methodology.*

The interest rate input used in all option analytics calculation is the latest available Effective Fed Funds Rate, which is typically from  $t-2$ .

# Index Maintenance

## Rebalancing

The index rebalances quarterly, effective on the Wednesday before the second Friday of the quarter end month. Options and Futures are rolled on the Wednesday in the week prior to option expiry date (the third Friday of the month). In the case that this is a holiday, the options and futures will be rolled on the next business day. The Selection day is the index day prior to the rebalance day.

## Base Date

Index history availability, base dates, and base values are shown in the table below.

Index	Launch Date	First Value Date	Base Date	Base Value
S&P 500 Delta Hedged Straddle Index ER	02/10/2020	06/07/2006	06/06/2006	100
S&P 500 Delta Hedged Straddle Index TR	02/10/2020	06/08/2006	06/07/2006	100



# Index Governance

## **Index Committee**

An S&P Dow Jones Indices' Index Committee maintains the indices. The Committee meets regularly. At each meeting, the Committee reviews matters that may affect index constituents, statistics comparing the composition of the index to the market, and any significant market events. In addition, the Index Committee may revise index policy covering rules for selecting constituents, treatment of dividends, share counts or other matters.

S&P Dow Jones Indices considers information about changes to its indices and related matters to be potentially market moving and material. Therefore, all Index Committee discussions are confidential.

S&P Dow Jones Indices' Index Committees reserve the right to make exceptions when applying the methodology if the need arises. In any scenario where the treatment differs from the general rules stated in this document or supplemental documents, clients will receive sufficient notice, whenever possible.

In addition to the daily governance of indices and maintenance of index methodologies, at least once within any 12-month period, the Index Committee reviews the methodology to ensure the indices continue to achieve the stated objectives, and that the data and methodology remain effective. In certain instances, S&P Dow Jones Indices may publish a consultation inviting comments from external parties.

*For information on Quality Assurance and Internal Reviews of Methodology, please refer to S&P Dow Jones Indices' Options Indices Policies and Practices Methodology.*

# Index Policy

## **Holiday Schedule**

The indices are calculated on all U.S. equity market business days.

*A complete holiday schedule for the year is available at [www.spglobal.com/spdji/](http://www.spglobal.com/spdji/).*

## **Rebalancing**

The Index Committee may change the date of a given rebalancing for reasons including market holidays occurring on or around the scheduled rebalancing date. Any such change will be announced with proper advance notice where possible.

## **Unexpected Exchange Closures**

For information on Unexpected Exchange Closures, please refer to S&P Dow Jones Indices' Options Indices Policies & Practices Methodology.

## **Recalculation Policy**

For information on the recalculation policy, please refer to S&P Dow Jones Indices' Options Indices Policies & Practices Methodology.

*For information on Calculations and Pricing Disruptions, Expert Judgment and Data Hierarchy, please refer to S&P Dow Jones Indices' Options Indices Policies & Practices Methodology.*

## **Contact Information**

For questions regarding an index, please contact: [index\\_services@spglobal.com](mailto:index_services@spglobal.com).

# Index Dissemination

Index levels are available through S&P Dow Jones Indices' Web site at [www.spglobal.com/spdji/](http://www.spglobal.com/spdji/), major quote vendors (see codes below), numerous investment-oriented Web sites, and various print and electronic media.

## Tickers

The table below lists headline indices covered by this document. All versions of the below indices that may exist are also covered by this document. Please refer to the [S&P DJI Methodology & Regulatory Status Database](#) for a complete list of indices covered by this document.

Index	BBG	RIC
S&P 500 Delta Hedged Straddle Index ER	SPXDHSER	.SPXDHSER
S&P 500 Delta Hedged Straddle Index TR	SPXDHSTR	.SPXDHSTR

## Index Data

Index data is available via subscription.

For product information, please contact S&P Dow Jones Indices, [www.spglobal.com/spdji/en/contact-us](http://www.spglobal.com/spdji/en/contact-us).

## Web site

For further information, please refer to S&P Dow Jones Indices' Web site at [www.spglobal.com/spdji/](http://www.spglobal.com/spdji/).

# Disclaimer

## Performance Disclosure/Back-Tested Data

Where applicable, S&P Dow Jones Indices and its index-related affiliates (“S&P DJI”) defines various dates to assist our clients by providing transparency. The First Value Date is the first day for which there is a calculated value (either live or back-tested) for a given index. The Base Date is the date at which the index is set to a fixed value for calculation purposes. The Launch Date designates the date when the values of an index are first considered live: index values provided for any date or time period prior to the index’s Launch Date are considered back-tested. S&P DJI defines the Launch Date as the date by which the values of an index are known to have been released to the public, for example via the company’s public website or its data feed to external parties. For Dow Jones-branded indices introduced prior to May 31, 2013, the Launch Date (which prior to May 31, 2013, was termed “Date of introduction”) is set at a date upon which no further changes were permitted to be made to the index methodology, but that may have been prior to the Index’s public release date.

Please refer to the methodology for the Index for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations.

Information presented prior to an index’s launch date is hypothetical back-tested performance, not actual performance, and is based on the index methodology in effect on the launch date. However, when creating back-tested history for periods of market anomalies or other periods that do not reflect the general current market environment, index methodology rules may be relaxed to capture a large enough universe of securities to simulate the target market the index is designed to measure or strategy the index is designed to capture. For example, market capitalization and liquidity thresholds may be reduced. In addition, forks have not been factored into the back-test data with respect to the S&P Cryptocurrency Indices. For the S&P Cryptocurrency Top 5 & 10 Equal Weight Indices, the custody element of the methodology was not considered; the back-test history is based on the index constituents that meet the custody element as of the Launch Date. Also, the treatment of corporate actions in back-tested performance may differ from treatment for live indices due to limitations in replicating index management decisions. Back-tested performance reflects application of an index methodology and selection of index constituents with the benefit of hindsight and knowledge of factors that may have positively affected its performance, cannot account for all financial risk that may affect results and may be considered to reflect survivor/look ahead bias. Actual returns may differ significantly from, and be lower than, back-tested returns. Past performance is not an indication or guarantee of future results.

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