Cboe Global Indices

Cboe S&P 500 Put Protection Indices

METHODOLOGY

Contents

1 Introduction

This document provides a transparent and easily accessible view of the methodology used to calculate the Cboe S&P 500 5% Put Protection Index (PPUT) and the Cboe S&P 500 Tail Risk Index (PPUT3M), collectively referred to in this document as "the Indices".

1.1 Index Objective

The objectives of the Indices covered by this document are as follows:

- The **Cboe S&P 500 5% Put Protection Index (PPUT)** is designed to track the performance of a hypothetical risk-management strategy that consists of a long position indexed to the S&P 500 Index (SPX Index) and a long position in the monthly 5% Out-of-the-Money (OTM) SPX Put options.
- The **Cboe S&P 500 Tail Risk Index (PPUT3M)** is designed to track the performance of a hypothetical risk-management strategy that consists of (a) holding the S&P 500 portfolio and collecting dividends and (b) buying 10% out-of-the-money SPX puts that expire on the quarterly cycle, i.e. March, June, September and December.

1.2 Supporting Documentation

This Methodology should be read in conjunction with the following document:

Cboe_Index_Policies_Practices

2 Index Construction

The Indices are total return indices. Dividends paid on the component stocks of the underlying index are functionally re-invested in the index portfolio.

2.1 Index Constituents

The Indices consist of the components as listed below.

Index	Type	Position	Ticker	Underlying Index Name	Expiration	Option Type
Cboe S&P 500 5% Put Protection Index (PPUT)	Index	Long	SPX	S&P 500	n/a	n/a
	Option	Long	SPX	S&P 500	Monthly	Put
Cboe S&P 500 Tail Risk Index (PPUT3M)	Index	Long	SPX	S&P 500	n/a	n/a
	Option	Long	SPX	S&P 500	Quarterly	Put

2.2 Index Parameters

Index Name	Index Ticker	Option Settlement	Option Premium Determination
Cboe S&P 500 5% Put Protection Index	PPUT	At 9:30 a.m. ET against the Special Opening Quotation of the S&P 500 Index (SOQ). The option settlement value is determined as $Put\_old_{settle} = Max(0, K_{old} - SOQ_t)$ where K_{old} is the strike price of the old option.	Volume weighted average price (VWAP)* between 11:30 a.m. and 12:00 p.m. ET.
Cboe S&P 500 Tail Risk Index	PPUT3M	At 9:30 a.m. ET against the Special Opening Quotation of the S&P 500 Index (SOQ). The option settlement value is determined as $Put\_old_{settle} = Max(0, K_{old} - SOQ_t)$ where K_{old} is the strike price of the old option.	Volume weighted average price (VWAP)* from 11:30 a.m. to 1:30 p.m. ET.

* Cboe calculates the VWAP in two steps: first, Cboe excludes trades in the new SPX put option between the times as mentioned in the table above (different per index) that are identified as uppercase A – H and lowercase f – t. This will remove all forms of late, cancel and spread orders; and second, Cboe calculates the weighted average of all remaining transaction prices of the new SPX put option between the relevant times, with weights equal to the fraction of total remaining volume transacted at each price during this period. The source of the transaction prices used in the calculation of the VWAP is OPRA. If no transactions occur at the new put strike during the specified timeslot, then the new put options are deemed purchased at the last ask price reported before the VWAP period ends.

2.3 Index Rebalance

Rebalances timelines are performed according to the following table.

Index Name	Index Ticker	Roll Date	Strike Determination	Strike Price Selection
Cboe S&P 500 5% Put Protection Index	PPUT	Third Friday of each month. Should the third Friday fall on an exchange holiday, the roll date is the preceding Business Day.	Roll Date	First available strike below 95% of the last disseminated value of the SPX Index before 11:00 a.m. ET.
Cboe S&P 500 Tail Risk Index	PPUT3M	Third Friday of each quarter (March, June, September, December). Should the third Friday fall on an exchange holiday, the roll date is the preceding Business Day.	Roll Date	Strike at or above 90% of the value of the S&P 500 reported just before 11:00 a.m. ET. If this strike is not listed, the closest strike above is selected.

On the initial roll date of the Indices, a hypothetical long position in the underlying index is entered, while simultaneously a unit of an out-of-the-money (OTM) put option is purchased. The strike of the option is selected in line with the rules described in the table above.

On subsequent roll dates, the old option position settles and a new put option position is entered, following the same rule as on the initial roll date. The long position in the equity index remains unchanged.
Details on the option settlement and determination of the option premiums can be found in section 2.2.

2.4 Options Pricing

The put option quotes are sourced from the Cboe Options Exchange via the Options Price Reporting Authority (OPRA) feed.

3 Index Calculations

The Indices are calculated according to the following formula:

$$Index_t = Index_{t-1} * (1 + R_t)$$

where:

- $Index_t$ is the level of the Index on day t;
- $Index_{t-1}$ is the level of the Index on the previous day; and
- R_t is the return of the Index.

3.1 Non-Roll Date Calculations

The non-roll date return of the Indices is calculated as:

$$(1 + R_t) = (S_t + Div_t + Put\_S_t) / (S_{t-1} + Put\_S_{t-1})$$

where:

- S_t is the SPX Index close price on day *t*. For intraday calculations, the current reported value of the S&P 500 Index is used;
- S_{t-1} is the SPX Index close price on day *t-1*;
- 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;

- Put_S_t is the average of the last bid-ask quote of the OTM SPX Put option before 4:00 p.m. ET. For intraday calculations, the average of the current reported bid and ask prices of the put option is used; and
- Put_S_{t-1} is the average of the last bid-ask quote of the SPX Put option before 4:00 p.m. ET on the previous day.

3.2 Roll Date Calculations

The roll date return of the Indices is calculated in three steps. The following formula is used to calculate the return from the previous day's market close to present day's morning settlement:

$$(1 + R_1) = (SOQ_t + Div_t + Put\_S\_old_{settle}) / (S_{t-1} + Put\_S\_old_{t-1})$$

where:

- SOQ_t is the Special Opening Quotation of the SPX Index on the roll day;
- $Put\_S\_old_{settle}$ = Max (0, K_{old} – SOQ_t) is the settlement value of the expiring SPX Put option; and
- $Put\_S\_old_{t-1}$ is the average of the last bid-ask quote of the expiring SPX Put option before 4:00 p.m. ET on the previous day.

The following formula is used to calculate the return from morning settlement to the moment the new SPX Put option is deemed purchased:

$$(1 + R_2) = SPX_{vwap}/SOQ_t$$

where:

- SPX_{vwap} is the volume weighted average price of the SPX Index, calculated using disseminated values of the SPX Index based on the same time and weights used to calculate the new SPX Put option VWAP.

The following formula is used to calculate the return from the time the new SPX Put option position is deemed purchased to the market close:

$$(1 + R_3) = (S_t + Put\_S\_new_t) / (SPX_{vwap} + Put\_S\_new_{vwap})$$

where:

- $Put\_S\_new_t$ is the average of the last bid-ask quote of the new SPX Put option before 4:00 p.m. ET on the roll day. For intraday calculations, the average of the current reported bid and ask prices of the put option is used; and
- $Put\_S\_new_{vwap}$ is the VWAP of the new SPX Put option determined during the VWAP period as indicated in section 2.2.

The product of the three parts (i.e., $1 + R_t = (1 + R_1) * (1 + R_2) * (1 + R_3)$) is the total return of the roll day.

3.3 Intraday Calculations

On non-roll dates the intraday calculations follow the non-roll date calculations.

On roll dates, the intraday calculations follow the roll date calculations. On roll dates, the PPUT and PPUT3M indices will not tick intraday until after the VWAP period has ended and the SOQ value has been made available. A daily closing value will be disseminated on roll dates following the close of U.S. trading hours.

4 Calculation and Dissemination

The Indices are calculated and disseminated as follows on each Business Day. A Business Day is defined as a day when the Cboe Options Exchange is open for the Cboe Regular Trading Hours (RTH) session. The Indices follow the Cboe Options Exchange holiday schedule.

Index Name	Index Ticker	Dissemination Frequency	Dissemination Hours
Cboe S&P 500 5% Put Protection Index	PPUT	15 seconds	Between 9:31 a.m. and 4:15 p.m. ET
Cboe S&P 500 Tail Risk Index	PPUT3M	15 seconds	Between 9:31 a.m. and 4:15 p.m. ET

5 Index Information

Index Name	Index Ticker	Base Date	Launch Date	Base Value	Currency
Cboe S&P 500 5% Put Protection Index	PPUT	June 30, 1986	August 3, 2015	100	USD
Cboe S&P 500 Tail Risk Index	PPUT3M	March 19, 2004	Aug 2, 2021	100	USD

6 Appendix 1 - Changes

Major changes described in this document since November 19, 2024 are as follows:

Change Summary	Effective Date	Previous Language	Updated Language
-	-	-	-

7 Appendix 2 – Document Information

Version Number[1]	1.1
Last Revised Date	August 15, 2025

[1] *Prior to November 19, 2024, the methodologies of the Indices were separately maintained in a legacy format.*

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