Cboe Global Indices

Cboe S&P 500 PutWrite Indices

METHODOLOGY

© Cboe Global Indices, LLC. All rights reserved.

Contents

1 Introduction 2
1.1 Index Objective 2
1.2 Supporting Documentation 2
2 Index Construction 2
2.1 Index Constituents 2
2.2 Index Rebalance 3
2.3 Options Pricing 4
2.4 FX Rates 4
3 Index Calculations 4
3.1 Non-Roll Date Calculations 5
3.2 Roll Date Calculations 6
3.3 Intraday Calculations 7
4 Calculation and Dissemination 7
5 Index Information 7
6 Appendix 1 - Changes 8
7 Appendix 2 – Document Information 8

1 Introduction

This document provides a transparent and easily accessible view of the methodology used to calculate the Cboe S&P 500 PutWrite Index (PUT), the Cboe S&P 500 PutWrite T-W Index (PWT) and the Cboe S&P 500 PutWrite Index CAD (PUTCAD), collectively referred to in this document as "the Indices".

1.1 Index Objective

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

- The **Cboe S&P 500 PutWrite Index (PUT)** tracks the value of a passive investment strategy ("Cboe S&P 500 Collateralized Put Strategy") which consists of overlaying S&P 500 (SPX) short put options over a Treasury bills account invested in one-month and three-month Treasury bills. The SPX puts are struck at-the-money and are sold on a monthly basis, usually on the 3rd Friday of the month.
- The **Cboe S&P 500 PutWrite Index CAD (PUTCAD)** measures the performance of the Cboe S&P 500 PutWrite Index (PUT) in Canadian Dollars. The PUT Index tracks the value of a passive investment strategy ("Cboe S&P 500 Collateralized Put Strategy") which consists of overlaying S&P 500 (SPX) short put options over a Treasury bills account invested in one-month and three-month Treasury bills. The SPX puts are struck at-the-money and are sold on a monthly basis, usually on the 3rd Friday of the month.
- The **Cboe S&P 500 PutWrite T-W Index (PWT)** replicates the methodology used to calculate the PUT Index, with one exception. That is, on each roll date, the SPX puts are deemed to be sold at P_{twap}, a price equal to the time-weighted average of the reported bid prices of the selected SPX put option beginning at 11:30 a.m. ET and ending at 12:00 p.m. ET. Accordingly, P_{twap} is used in place of the P_{vwap} on PWT roll dates.

1.2 Supporting Documentation

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

Cboe_Index_Policies_Practices

2 Index Construction

2.1 Index Constituents

Index	Type	Position	Ticker	Underlying Name	Expiration	Option Type
Cboe S&P 500 PutWrite Index (PUT)	T-bills	Long	n/a	n/a	1-month and 3-month	n/a
	Option	Short	SPX	S&P 500	1 month	Put
Cboe S&P 500 PutWrite Index CAD (PUTCAD)	T-bills	Long	n/a	n/a	1-month and 3-month	n/a
	Option	Short	SPX	S&P 500	1 month	Put
Cboe S&P 500 PutWrite T-W Index (PWT)	T-bills	Long	n/a	n/a	1-month and 3-month	n/a
	Option	Short	SPX	S&P 500	1 month	Put

2.2 Index Rebalance

The Indices are rebalanced monthly according to the schedule outlined in the table below.

Index Name	Index Ticker	Roll Date	Strike Determination	Strike Selection
Cboe S&P 500 PutWrite Index	PUT	The third Friday of each month. Should the third Friday fall on an exchange holiday, the roll date is the preceding Business Day.	Roll Date	Strike price of listed SPX puts that is closest to but not greater than the last value of the S&P 500 Index reported before 11:00 a.m. ET.
Cboe S&P 500 PutWrite Index CAD	PUTCAD	The third Friday of each month. Should the third Friday fall on an exchange holiday, the roll date is the preceding Business Day.	Roll Date	Strike price of listed SPX puts that is closest to but not greater than the last value of the S&P 500 Index reported before 11:00 a.m. ET.
Cboe S&P 500 PutWrite T-W Index	PWT	The third Friday of each month. Should the third Friday fall on an exchange holiday, the roll date is the preceding Business Day.	Roll Date	Strike price of listed SPX puts that is closest to but not greater than the last value of the S&P 500 Index reported before 11:00 a.m. ET.

On the initial roll date of the Indices, an at-the-money (ATM) monthly put option is sold. At the same time, an investment in one-month and three-month treasury bills is set up. The Indices require that the put options in the hypothetical portfolio be held to maturity. The Special Opening Quotation ("SOQ") of the underlying index is used as the final settlement price of the index put options. The SOQ is a special calculation of the underlying index that is compiled from the opening prices of component stocks underlying the index. The SOQ calculation is performed when all the constituents underlying the equity index have opened for trading and is usually determined before 11:00 a.m. ET. The final settlement price of the put option at maturity is the greater of 0 and the strike price of the expiring put option minus the SOQ.

Subsequent to the settlement of the expiring put option, a new put option expiring in the next month is then deemed written, or sold, a transaction commonly referred to as a "roll." The option is selected in line with the rules described in the table above.

Once the strike price of the new put option has been identified, the new put option is deemed sold as follows:

- For the PUT and PUTCAD Index, the new put option is deemed sold against a price equal to the volume-weighted average of the traded prices ("VWAP") of the new put option between 11:30 a.m. and 12:00 p.m. ET. Cboe Global Indices uses the transaction prices and trade codes from the Options Price Reporting Authority (OPRA) feed to calculate the VWAP. The VWAP is calculated in two steps:

1. Orders categorized by OPRA as uppercase A – H and lowercase f – t in the new put option that occur during the VWAP period are excluded to remove late, cancel, and spread orders;

2. The weighted average for all remaining transaction prices of the new put option during the VWAP period is calculated, with weights equal to the fraction of total remaining volume transacted at each price during this period. If no transactions occur in the new put option during the VWAP period, then the new put option is deemed sold at the last bid price reported before the end of the VWAP period.

- For the PWT Index, the new put option is deemed sold against a price equal to the Time-Weighted Average Price (TWAP) beginning at 11:30 a.m. ET and ending at 12:00 p.m. ET. Cboe calculates the TWAP in two steps:

1. Cboe excludes trades in the new SPX put option between 11:30 a.m. and 12:00 p.m. ET that are identified as uppercase A – H and lowercase f – t. This will remove all forms of late, cancel and spread orders;
2. Cboe calculates the time-weighted average of all remaining transaction prices of the new SPX put option between 11:30 a.m. and 12:00 p.m. ET, with weights equal to the fraction of total elapsed time between each transaction at each price during this period, using second precision. The source of the transaction prices used in the calculation of the TWAP is OPRA. If no transactions occur at the new put strike between 11:30 a.m. and 12:00 p.m. ET, then the new put options are deemed sold at the last bid price reported before 12:00 p.m. ET.

2.3 Options Pricing

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

2.4 FX Rates

The index in the table below is converted from the local index currency to the index denominated currency using the foreign exchange pair in the table below. The foreign exchange rate used is the WMR Closing Spot Rate[1]. All other indices are calculated and denominated in their local currency.

Index Name	Index Ticker	FX Pair
Cboe S&P 500 PutWrite Index CAD	PUTCAD	USD/CAD

3 Index Calculations

The PUT and PWT Indices are calculated according to the following formula:

$$Index_t = M_t - N_{last}P_t \qquad (1a)$$

$$M_t = M_1 + M_3 \qquad (2a)$$

[1] *The WMR Closing Spot Rates are provided by Refinitiv. Refinitiv shall not be liable for any errors in or delays in providing or making available the data contained within this service or for any actions taken in reliance on the same.*

where:

- $Index_t$ is the level of the Index;
- M_t is the total Treasury bill balance at the close of date *t*;
- N_{last} is the number of put options sold at the last roll date; and
- P_t is the arithmetic average of the last bid and ask prices of the put options reported before 4:00 p.m. ET on date *t* for the closing value. For intraday calculations, the average of the current reported bid and ask prices of the put option is used.

Subsequent to the calculation of the PUT Index, the PUTCAD Index is calculated according to the following formula:

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

$$R_t = \frac{FX_t}{FX_{t-1}} * \frac{LocalIndex_t}{LocalIndex_{t-1}} - 1 \qquad (2b)$$

where:

- $Index_t$ is the level of the Index at the close of date *t*;
- R_t is the return of the Index at the close of date *t*;
- FX_t is the USD/CAD exchange rate on date *t*; and
- $LocalIndex_t$ is the Index level in its local currency, i.e. PUT index level in USD, at the close of date *t*.

3.1 Non-Roll Date Calculations

The non-roll date Treasury bill balance is calculated using the following formula:

$$M_t^i = (1 + r_{t-1}^i) * M_{t-1} \qquad (3)$$

$$r_{t-1}^i = \left(\left(\frac{1}{1 - \frac{n}{360} * USBR} \right)^{\frac{t-(t-1)}{n}} \right) - 1 \qquad (4)$$

where:

- $i = \{1, 3\}$ for one and three-month Treasury bills;
- r_{t-1}^i is the corresponding Treasury bill rate from the previous to the current close. The Treasury bill rates between two roll dates are obtained by compounding the daily rates;
- $USBR$ is the 4-week Bank discount rate for one-month Treasury bills, and the 13-week Bank discount rate for three-month Treasury bills, both obtained from the website of the U.S. Department of the Treasury;
- n is 28 days for the one-month Treasury bills and 91 days for the three-month Treasury bills; and
- M_{t-1} is the value of the Treasury bill balance at the close of date t-1.

3.2 Roll Date Calculations

The roll date return of the index is calculated in two steps using formulas (5), (6) and (7) on third roll dates. The third roll date is the date in which the options expiring in the following quarterly months (March, June, September and December) are sold. For example, for an option expiring in March, the third roll date is the SPX expiration date in February. Expiration calendars are available on Cboe's website.

Formula (5) is used to calculate the net cash balance available for reinvestment:

$$M_t = \sum_i (1 + r_{t-1}^i) * M_{t-1}^i \quad - N_{last} Max[0, K_{old} - SOQ_t] + N_{new} * P_{price} \qquad (5)$$

Formula (6) is used to calculate the number of new puts sold:

$$N_{new} = \left(\sum_i \left(1 + r_{t-1}^i\right) * M_{t-1}^i - N_{last} Max[0, K_{old} - SOQ_t]\right) / \left(\frac{K_{new}}{(1+R_3)} - P_{price}\right) \qquad (6)$$

$$N_{last} = N_{new} \qquad (7)$$

The roll date return of the index is calculated in three steps using formulas (8) through (14) on non-third roll dates. Formula (8) is used to calculate the number of new puts sold:

$$N_{new} = \left[M_{1_{Roll}} + M_{3_{Roll}}\right] / \left[K_{new} - P_{price} * (1 + R_1)\right] \qquad (8)$$

$$M_{1_Roll} = Max\left[0, (1 + r_{t-1}^1) * M_{t-1}^1 - N_{last} Max[0, K_{old} - SOQ_t]\right] * (1 + R_1) \qquad (9)$$

$$M_1 = Max\left[0, (1 + r_{t-1}^1) * M_{t-1}^1 - N_{last} Max[0, K_{old} - SOQ_t]\right] + \left(N_{new} * P_{price}\right) \qquad (10)$$

$$M_{3_Roll} = ((1 + r_{t-1}^3) * M_{t-1}^3 + Min\left[0, (1 + r_{t-1}^1) * M_{t-1}^1 - N_{last} * Max[0, K_{old} - SOQ_t]\right]) * (1 + R_3) \qquad (11)$$

$$M_3 = ((1 + r_{t-1}^3) * M_{t-1}^3 + Min\left[0, (1 + r_{t-1}^1) * M_{t-1}^1 - N_{last} * Max[0, K_{old} - SOQ_t]\right]) \qquad (12)$$

$$M_t = M_1 + M_3 \qquad (13)$$

$$N_{last} = N_{new} \qquad (14)$$

where:

- K_{old} is the strike price of the put options sold at the previous roll date;
- K_{new} is the strike price at which the new puts are sold;
- SOQ_t is the final SPX settlement price on roll date t;
- N_{new} is the number of new puts sold;

- N_{last} is the number of put options sold at the last roll date; and
- P_{price} is the price at which the new options are sold (see section 2.2; PUT uses a VWAP and PWT uses a TWAP); and
- R_1 and R_3 are the one- and three-month Treasury bill rates to the next roll date. The Treasury bill rates are obtained by compounding the daily rates;

3.3 Intraday Calculations

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

On the roll dates, the PUT intraday calculations follow the roll date calculations, and the index will not tick intraday until after the VWAP period has ended.

On the roll dates, the PWT intraday calculations follow the roll date calculations, and the index will not tick intraday until after the TWAP period has ended.

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.

Index Name	Index Ticker	Dissemination Frequency	Dissemination Hours
Cboe S&P 500 PutWrite Index	PUT	15 seconds	Between 9:31 a.m. and 4:30 p.m. ET
Cboe S&P 500 PutWrite Index CAD	PUTCAD	End-of-Day	RTH
Cboe S&P 500 PutWrite T-W Index	PWT	15 seconds	Between 9:31 a.m. and 4:30 p.m. ET

The Indices follow the Cboe Options Exchange holiday schedule.

5 Index Information

Index Name	Index Ticker	Base Date	Launch Date	Base Value	Currency
Cboe S&P 500 PutWrite Index	PUT	June 1, 1988	June 20, 2007	100	USD
Cboe S&P 500 PutWrite Index CAD	PUTCAD	June 1, 1988	August 15, 2025	100	CAD
Cboe S&P 500 PutWrite T-W Index	PWT	January 3, 2007	June 15, 2007	1000	USD

6 Appendix 1 - Changes

Major changes described in this document since August 9, 2024, are as follows:

Change Summary	Effective Date	Previous Language	Updated Language
Addition of new PUTCAD index	August 15, 2025	n/a	PUTCAD added to Cboe S&P 500 PutWrite Indices methodology

7 Appendix 2 – Document Information

Version Number[2]	3.1
Last Revised Date	September 21, 2026

[2] *Prior to August 9, 2024, the PUT and PWT methodologies were separately maintained in a legacy format.*

Disclosures and Disclaimers Related to Cboe Indices

Cboe Global Indices, LLC and Cboe Europe Indices, B.V. (collectively, the "Cboe Index Providers", and individually a "Cboe Index Provider"), are both subsidiaries of Cboe Global Markets, Inc. (Cboe Global Markets, Inc., the Cboe Index Providers, and the other subsidiaries and affiliates of Cboe Global Markets, Inc. are collectively referred to herein as the "Cboe Companies" and those entities are individually referred to as a "Cboe Company").

The Cboe Index Providers are each an index provider that administers, calculates and distributes indices and other values (as applicable) (collectively, "Cboe Indices" and individually a "Cboe Index"). Additional information regarding the Cboe Index Providers and their operations is available at **www.cboe.com/indices/**.

Nothing herein constitutes an offer of services. The information herein is provided solely for informational purposes. Cboe Indices are calculated and administered (as described in relevant methodologies, rules and other information) without regard to the needs of any particular person, entity, or group of persons, using market information, including, without limitation, market data from exchanges owned and operated by other Cboe Companies.

Index and benchmark values for dates or time periods prior to an index launch date, if any, are calculated using a theoretical approach involving back-testing historical data in accordance with the methodology in place on the launch date (unless otherwise stated). Back-testing involves the theoretical application of the index methodology in hindsight and therefore does not involve actual performance and may not produce performance commensurate with prospective application of the methodology. No back-tested approach can completely account for the impact of decisions that might have been made if calculations were made at the same time as certain underlying market conditions occurred. Supporting documentation for statements, comparisons, statistics or other technical data provided in this document is available by request at **www.cboe.com/contact/**.

Past performance of an index or financial product is not indicative of future results. Indices are not financial products that can be invested in directly, but they can be used as the basis for financial products (for example, without limitation, options, futures, mutual funds or exchange-traded funds) or to help manage portfolios.

The Cboe Index Providers are not investment advisers or tax advisers. No decision to buy, hold, or sell any financial product should be made in reliance on any of the information provided herein, and no representation is made regarding the advisability or tax consequences of any investment, whether based on an index or not. Nothing herein should be construed as investment advice. No representation or assurance is made that any financial product will accurately track the performance of an underlying index or provide positive investment returns. Index values and returns are theoretical, and do not reflect the results of actual trading of financial products, nor the value of an actual portfolio, and may not reflect the fees, taxes or other expenses associated with buying, holding or selling investments or the effect of actual market conditions or events. The Cboe Index Providers are not broker-dealers, intermediaries, investment firms or securities exchanges and they do not manage actual financial products. None of the Cboe Companies sponsor, endorse, promote, manage, sell or administer any financial product that is created, sponsored, issued or sold by a third-party, whether based on any Cboe Index or not.

No data, values, or other content contained herein ("Content") may be copied, modified, reverse-engineered, reproduced, distributed, or stored in a database or retrieval system, in any form or by any means, nor may any Content be used to create a derivative work (e.g., a financial product, service or index) or used to verify or correct other data or information, without the Cboe Index Provider's prior written consent. Without derogating from the aforementioned, Content shall not be used for any unlawful or unauthorized purposes.

The Cboe Companies, their third-party service or data providers, or any party from whom they have licensed trademarks or indices (collectively, the "Cboe Parties") do not guarantee the accuracy, completeness, or timeliness of the Content, trademarks, strategies or values, or the methodologies or input data used to calculate index values. The Cboe Parties are not responsible for any errors or omissions, regardless of the cause, or for the results obtained from the use of the Content, index strategies or values, methodologies or input data. THE CONTENT, INDICES AND RELATED STRATEGIES AND METHODOLOGIES ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY WARRANTY WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE. USERS OF CONTENT AND/OR THE CBOE INDICES BEAR ALL RISKS OF LOSS.

WITHOUT LIMITING THE FOREGOING AND TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, IN NO EVENT SHALL THE CBOE PARTIES BE RESPONSIBLE OR LIABLE TO ANY PERSON OR ENTITY FOR ANY DAMAGES OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, DIRECT, INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL, PUNITIVE, LOST PROFITS OR LOST OPPORTUNITIES, WHETHER OR NOT A CBOE PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THE FOREGOING LIMITATIONS SHALL APPLY REGARDLESS OF WHETHER A CLAIM ARISES IN CONTRACT, TORT, NEGLIGENCE, STRICT LIABILITY, OR OTHERWISE.

The Cboe Index Providers receive compensation in connection with licensing Cboe Indices to third parties and providing calculation services to third parties. Some Cboe Companies operate markets for the trading of financial products and provide services to many organizations, including issuers of securities, investment advisers, broker-dealers, investment banks, other financial institutions and financial intermediaries, and accordingly may provide or receive fees or other economic benefits to or from those organizations. These organizations may also be Cboe Index Provider licensees or customers, and the Cboe Index Providers may include securities of or relating to such organizations in Cboe Indices.

Cboe®, C2SM, Cboe ClearSM, Cboe Closing Cross®, Cboe DigitalSM, Cboe LIS®, Cboe Futures ExchangeSM, Cboe Global IndicesSM, Cboe Global Markets®, Cboe Options Institute®, Cboe Volatility Index®, Bats®, BIDS Trading®, Buffer ProtectSM, BuyWriteSM, BYX®, BZX®, CFE®, EDGA®, EDGX®, Eris Exchange®, ErisX®, f(t)optionsSM, FLEX®, FLexible EXchange®, HanweckSM, Hybrid®, LiveVol®, NANO®, Options Institute®, PutWriteSM, Silexx®, SRVIXSM, Trade AlertSM, VIX®, and XSPSM are trademarks and service marks of the Cboe Companies. Trademarks of the Cboe Companies may only be used with written permission, subject to applicable Cboe Company trademark usage guidelines as published from time to time. Third-party trademarks and service marks used in this document are described below. The values and methodologies for indices branded with the "Cboe" trademark are the property of the relevant Cboe Index Provider.

The Cboe Companies have licensed several trademarks from third parties from whom they have also licensed indices which may be included in this document or in other materials related to Cboe Indices, as follows:

- Dow Jones®, Dow Jones Industrial Average® and DJIA® are trademarks or service marks of Dow Jones Trademark Holdings LLC ("Dow Jones"), have been licensed for use for certain purposes by the Cboe Companies. Derivative indices created, used and distributed by Cboe Companies and any investment products based thereon are not sponsored, endorsed, sold or promoted by Dow Jones, and Dow Jones makes no representation regarding the advisability of investing in any investment product that is based on any such derivative indices.
- FTSE® and the FTSE indices are trademarks and service marks of FTSE International Limited, used under license.
- IHS, IHS Markit, CDX, iBoxx, and iTraxx are trademarks of IHS Markit Limited and its affiliates ("IHS") and have been licensed for use by the Cboe Companies. Any IHS Markit index referenced herein is the property of IHS Markit and is used under license. Any products that have an IHS Markit index as their underlying interest are not sponsored, endorsed, or promoted by IHS Markit.
- MSCI and the MSCI index names are service marks of MSCI Inc. ("MSCI") or its affiliates and have been licensed for use by the Cboe Companies. Any derivative indexes and any financial products based on the derivative indexes ("Products") are not sponsored, guaranteed or endorsed by MSCI, its affiliates or any other party involved in, or related to, making or compiling such MSCI index. Neither MSCI, its affiliates nor any other party involved in, or related to, making or compiling any MSCI index makes any representations regarding the advisability of investing in such Products; or any warranty, express or implied; or bears any liability as to the results to be obtained by any person or any entity from the use of any such MSCI index or any data included therein. No purchaser, seller or holder of any Product, or any other person or entity, should use or refer to any MSCI trade name, trademark or service mark to sponsor, endorse, market or promote Products without first contacting MSCI to determine whether MSCI's permission is required.
- Nasdaq®, Nasdaq-100®, and Nasdaq-100 Index®, are trademarks of Nasdaq, Inc. (together with its affiliates, the "Corporations") and are licensed for use by Cboe Exchange, Inc. The CBOE Nasdaq-100 Volatility Index (the "Volatility Index") and CBOE Nasdaq-100 BuyWrite Index (the "BuyWrite Index") are not derived, maintained, published, calculated or disseminated by the Corporations. Neither the Volatility Index, the BuyWrite Index nor any product based on such indexes have been passed on by the Corporations as to their legality or suitability. Such products are not issued, endorsed, sold, or promoted by the Corporations. THE CORPORATIONS MAKE NO WARRANTIES AND BEAR NO LIABILITY WITH RESPECT TO THE VOLATILITY INDEX OR BUYWRITE INDEX.
- Russell, Russell 1000®, Russell 2000®, Russell 3000® and Russell MidCap® are registered trademarks of the Frank Russell Company, used under license.
- S&P, S&P 500, US500, 500, THE 500, SPDR, SPX, and DSPX are trade names or trademarks of S&P Dow Jones Indices, LLC or its affiliates ("S&P"). Any products that have an S&P index as their underlying interest are not sponsored, endorsed, sold or promoted by S&P and S&P makes no representation regarding the advisability of investing in any investment product that is based on any such indices.

© 2026 Cboe Exchange, Inc. and its affiliates. All Rights Reserved.

v20230405

Cboe Global Indices

CONTACT US

IndexSupport@cboe.com
www.cboe.com/indices

