Cboe Global Indices

Cboe VIX Tail Hedge Index

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 2
2.3 Options Pricing 3
3 Index Calculations 3
3.1 Non-Roll Date Calculations 3
3.2 Roll Date Calculations 3
3.3 Intraday Calculations 4
4 Calculation and Dissemination 4
5 Index Information 4
6 Appendix 1 - Changes 5
7 Appendix 2 – Document Information 5

1 Introduction

This document provides a transparent and easily accessible view of the methodology used to calculate the Cboe VIX Tail Hedge Index (VXTH), referred to in this document as "the Index".

1.1 Index Objective

The **Cboe VIX Tail Hedge Index (VXTH)** tracks the performance of a portfolio that overlays one-month 30-delta VIX calls on the S&P 500 index. The Index is designed to provide an efficient tail risk hedge while also preserving capital. In order to reduce hedging cost, the weight of the VIX calls in the portfolio varies at each roll depending on the likelihood that a "black swan" event is about to occur, which historically has been linked to expected future volatility.

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

The Index consists of the components as listed below.

Type	Position	Underlying Ticker	Underlying Name	Option Expiration	Option Type
Index	Long	SPX	S&P 500 Index	n/a	n/a
Options	Long	VIX	Cboe Volatility Index	1 month	Call

2.2 Index Rebalance

The Index is rebalanced monthly in accordance with the table below.

Index Name	Index Ticker	Roll Date	Strike Determination
Cboe VIX Tail Hedge Index	VXTH	Roll date is in concurrence with the expiration of VIX options. Should this day fall on an exchange holiday, the roll date is the preceding business day.	On the roll date, the option listed on the Cboe Options Exchange with strike and delta closest to 0.30 is selected.[1] The Input used in the delta calculation using the Black formula are the values as of 9.30 a.m. ET.

[1] *If there are two options with deltas that have an equal distance to a delta of 0.30, the option with the higher strike is chosen.*

2.3 Options Pricing

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

3 Index Calculations

The Index is calculated according to the following formula:

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

where:

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

3.1 Non-Roll Date Calculations

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

$$(1 + R_t) = \frac{\left(S\&P500_t + Div_t + 100 * N_t * C_t^{mid}\right)}{\left(S\&P500_{t-1} + 100 * N_t * C_{t-1}^{mid}\right)}$$

Where:

- $S\&P500_t$ and $S\&P500_{t-1}$ are the last disseminated values of the S&P 500 index at market close on day *t* and *t-1,* respectively;
- N_t is the number of VIX calls in the portfolio;
- Div_t is the amount of dividends expressed in S&P 500 index points paid at the open on date t;
- C_t^{mid} is the midquote of the calls at the close of date t; and
- C_{t-1}^{mid} is the midquote of the calls at the close of date t-1.

3.2 Roll Date Calculations

The roll date daily return of the Index is calculated as follows:

$$(1 + R_t) = \frac{(S\&P500_{11am} + Div_t + 100 * N_{old} * \max[0, SOQ - K_{old}])}{\left(S\&P500_{t-1} + N_{old} * 100 * C_{t-1}^{mid}\right)} * \frac{S\&P500_t + N_{new} * 100 * C_t^{mid}}{S\&P500_{11am} + N_{new} * 100 * C_{ask}}$$

$$N_{new} = \frac{(S\&P500_{11am} + Div_t) * PctCall}{100 * C_{ask} * (1 - PctCall)}$$

where:

- N_{old} and N_{new} are the number of expiring VIX calls and the number of new VIX calls purchased, respectively;
- $S\&P500_{11am}$ is the value of the S&P 500 index at 11:00 a.m. ET;
- C_{ask} is the ask price of the purchased call at the close on the roll date;
- $PctCall\ (X)$ is the portfolio weights of VIX calls are determined according to the schedule below;
    - F is the new forward one-month VIX future's first mid-price observed after 9:30 a.m. ET on VIX roll days.

F = One Month Forward Value of VIX	X = Portfolio Weight of VIX Calls
F < = 15%	0%
15% < F <= 30%	1%
30% < F <= 50%	½%
F > 50%	0%

3.3 Intraday Calculations

On roll dates, the Index is not disseminated intraday. A daily closing value will be disseminated on roll dates following the close of U.S. trading hours.

4 Calculation and Dissemination

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

Index Name	Index Ticker	Dissemination Frequency	Dissemination Hours
Cboe VIX Tail Hedge Index	VXTH	15 seconds	Between 9:31 a.m. ET and 4:15 p.m. ET

The Index follows the Cboe Options Exchange holiday schedule.

5 Index Information

Index Name	Index Ticker	Base Date	Launch Date	Base Value	Currency
Cboe VIX Tail Hedge Index	VXTH	March 31, 2006	July 29, 2011	100	USD

6 Appendix 1 - Changes

Major changes described in this document since January 22, 2025, are as follows:

Change Summary	Effective Date	Preview Language	Updated Language
-	-	-	-

7 Appendix 2 – Document Information

Version Number	1.0
Last Revised Date	January 22, 2025

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.

© 2025 Cboe Exchange, Inc. and its affiliates. All Rights Reserved.

v20230405

Cboe Global Indices

CONTACT US

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

