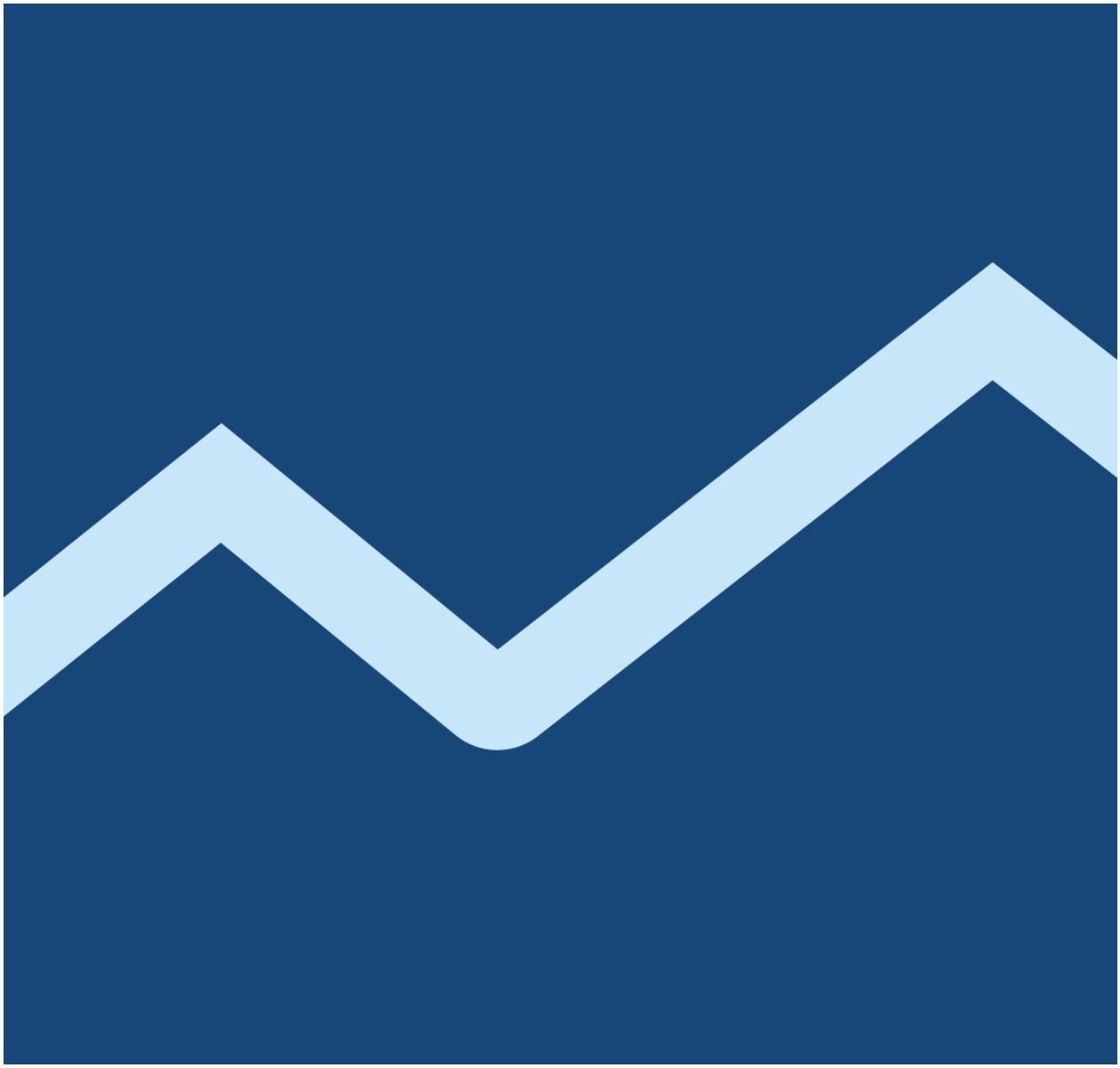
SEPTEMBER 2026

STOXX

STOXX® Strategy Index Guide

STOXX.com



ISS STOXX

Part of DEUTSCHE BÖRSE GROUP

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

1. INTRODUCTION TO THE STOXX INDEX GUIDES

The STOXX index guides are separated into the following sub-sets:

- The **STOXX Calculation guide** provides a general overview of the calculation of the STOXX equity indices, the dissemination, the index formulas and adjustments due to corporate actions
- The **STOXX Index Methodology guide** contains the equity index specific rules regarding the construction and derivation of the portfolio based indices, the individual component selection process and weighting schemes
- The **STOXX World Equity Index Methodology guide** contains the index specific rules regarding the construction and derivation of the STOXX World portfolio based indices, the individual component selection process and weighting schemes
- The **STOXX Strategy Index guide** contains the formulas and description of all strategy indices
- The **STOXX DVP Calculation guide** describes the dividend points products
- The **STOXX Distribution Points Calculation guide** describes the distribution points products
- The **iSTOXX Fund Indices Methodology guide** contains the index specific rules regarding the construction and derivation of the iSTOXX Fund indices, the individual component selection process and weighting schemes
- The **iSTOXX Strategy Indices Methodology guide** contains the index specific rules regarding the construction and derivation of the iSTOXX Strategy indices, the individual component selection process and weighting schemes
- The **iSTOXX Decrement Indices Methodology guide** contains the index specific rules regarding the construction and derivation of the iSTOXX Decrement indices, the individual component selection process and weighting schemes
- The **iSTOXX Equity Indices Methodology guide** contains the index specific rules regarding the construction and derivation of the iSTOXX Equity indices, the individual component selection process and weighting schemes
- The **STOXX Reference Rates guide** contains the rules and methodologies of the reference rate indices
- The **Guide to Reference Calculations used by STOXX Ltd.** provides a detailed view of definitions and formulas of the calculations as utilized in the reports, factsheets, indices and presentations produced by STOXX
- The **Guide to Industry Classifications Used by STOXX Ltd.** contains general information pertaining to industry classifications used in STOXX indices, together with any references and links to third-parties that create the data.
- The **STOXX Eligible Market Segments guide** contains the list of stock exchanges and market segments.

All rule books are available for download on http://www.stoxx.com/indices/rulebooks.html

2. CHANGES TO THE GUIDE BOOK

2.1. HISTORY OF CHANGES TO THE STOXX STRATEGY GUIDE

- May 2012: Update of 8.3.4 Adjustments due to Extreme Market Movements
- December 2012: Update of 5. STOXX Short and Leverage
- February 2013: Update of 5. STOXX Short and Leverage
- May 2013: Introduction of EURO STOXX 50 BuyWrite (100%) index as sub-index of existing EURO STOXX 50 BuyWrite index
- August 2013: Detailed listing of RIC codes used for Interbank Rates in Chapter
- November 2013: Introduction of EURO STOXX 50 Futures Roll
- March 2014: Chapter 5. STOXX Short and Leverage
- April 2014: Reformulation of EURO STOXX 50 Volatility (VSTOXX) methodology
- June 2014: Addition of index flag description to EURO STOXX 50 Volatility (VSTOXX) methodology
- July 2014: Addition of chapter 3 GENERAL PRINCIPLES
- August 2014: Adjustment of Risk Control indices; correction of EURO STOXX 50 Volatility (VSTOXX) main indices formula; addition of components' weights calculation for EURO STOXX 50 Volatility (VSTOXX) main indices; addition of STOXX Global 3D Printing Tradable Daily Short
- September 2014: Clarification of return types of risk control indices
- November 2014: Adjustment of thresholds for reverse splits for STOXX Leverage and Short indices in chapter 8.3.5
- March 2015: Expansion of STOXX Currency Hedged index with the introduction of STOXX Daily Hedged indices
- May 2015: Clarification of distinction between implied and realized volatility in the calculation of EURO STOXX 50 Risk Control indices
- June 2015: Clarification on interest rates applied to Risk Control indices
- June 2015 (2): Clarification regarding real-time calculation of Currency Hedged indices
- July 2015: Clarification regarding the weight capping in the Risk Control indices
- July 2015(2): Introduction of EURO STOXX 50 Protective Put 80% 18m 6/3
- October 2015: Update of real-time calculation rule for Currency Hedged indices
- October 2015 (2): Introduction of EURO STOXX 50 Volatility of Volatility (V-VSTOXX); amendments to EURO STOXX 50 Volatility (VSTOXX)
- April 2016: Introduction of EURO STOXX 50 Traded Futures Roll and EURO STOXX 50 Futures Replication
- May 2016: Introduction of EURO STOXX 50 Multi-Asset indices
- July 2016: Addition of STOXX Futures Roll and Futures Replication indices to sections 19 and 20
- August 2016: Addition of STOXX Global Basket
- August 2016: Enhancement of the EURO STOXX 50 Multi-Asset index family – introduction of EURO STOXX 50 Multi-Asset Momentum Risk Cap indices
- September 2016: Clarification on the inclusion criteria for OESX options in VSTOXX index and OSX options in V-VSTOXX index
- March 2017: Introduction of VSTOXX Short-Term Futures Investable indices
- September 2017: V-VSTOXX: change to options on VSTOXX futures with OVS2 as data source
- October 2017: Addition of EURO STOXX 50 Realized Variance Index (RVSTOXX)

2. CHANGES TO THE GUIDE BOOK

- November 2017: In line with the change to the STOXX Calculation Guide, addition of Dissemination Calendar to the following indices: EURO STOXX 50 BuyWrite, EURO STOXX 50 DVP Futures, EURO STOXX 50 Futures Roll, EURO STOXX 50 Investable Volatility, EURO STOXX 50 Protective Put 80% 18m 6/3, EURO STOXX 50 PutWrite, EURO STOXX 50 Quanto Futures Roll, EURO STOXX 50 Realized Variance (RVSTOXX), EURO STOXX 50 Traded Futures Roll, EURO STOXX 50 Volatility (VSTOXX), EURO STOXX 50 Volatility Mid-Term Futures, EURO STOXX 50 Volatility Short-Term Futures, EURO STOXX 50 Volatility-Balanced, EURO STOXX 50 Volatility-of-volatility (V-VSTOXX), EURO STOXX Banks Futures Roll, EURO STOXX Select Dividend 30 Futures Roll, STOXX Europe 600 Futures Roll, STOXX Global Select Dividend 100 Futures Roll, VSTOXX Short-Term Futures Inverse Investable, VSTOXX Short-Term Futures Investable
- November 2017 (2): Addition of index settlement value calculation for RVSTOXX (section 11)
- March 2018: VSTOXX: Correction of non-visible characters and harmonization of formula notations in section 8.5; V-VSTOXX: correction of section's 9.2.3 header and text to properly reflect V-VSTOXX peculiarities in contrast with VSTOXX.
- March 2018: STOXX Short and Leveraged Indices: rephrasing of negative leverage, correction of non-visible character in formula.
- May 2018: Addition of STOXX Decrement Indices calculation
- June 2018: Rule clarification: Section 7.3.2: Summation amended to include n
- August 2018: Addition of STOXX Local Currency Return Indices calculation
- October 2018: Effective December 3, 2018, removal of 2 and 9 month EURIBOR tenors from VSTOXX and V-VSTOXX indices due to discontinuation; effective December 3, 2018, replacement of "fast market" indicator with new "stressed market" indicator for VSTOXX indices
- December 2018: Addition of iSTOXX Increment Indices
- February 2019: Addition of EURO STOXX 50 Short Strangle Index
- October 2019: Clarifications relating to changes in the EONIA rate determination
- November 2019: Addition of EURO STOXX 50 Realized Dispersion Index
- December 2019: Addition of EURO iSTOXX 50 Short Strangle KWCDC Index
- March 2020: Addition of details regarding the existing treatment of disruptions for the EURO STOXX 50 Investable Volatility Index
- April 2020: Addition of iSTOXX Single Stock Leveraged Indices
- April 2020 (2): Addition of EURO iSTOXX 50 Total Return Futures Index
- July 2020: Decommissioning of EURO STOXX 50 Futures Replication Index
- September 2020: Decommissioning of the BRIC-related STOXX equity indices
- October 2020: Clarification of description of Decrement and Increment indices
- February 2021: Adjustments related to the addition of new iSTOXX Single Stock Leveraged Indices
- February 2021 (2): Addition of EURO STOXX 50 Futures Roll 5D Indices
- April 2021: Addition of the extreme movement trigger value for -3x leverage for iSTOXX Single Stock Leveraged Indices
- July 2021: Addition of section 4 Input Data; enhancement of index rules description in sections 9 (VSTOXX) and 10 (V-VSTOXX)
- July 2021: Clarification that Decrement indices have a floor value of zero
- November 2021: Addition of Hedging Multipliers to Hedge Ratio calculation for STOXX Currency Hedged Indices
- November 2021 (2): Changes related to the new risk-free rates transition, from EONIA to euro short-term Rate (€STR), USD LIBOR to USD Secured Overnight Financing Rate (SOFR), and LIBOR GBP to the GBP Sterling Overnight Index-Average (SONIA)

2. CHANGES TO THE GUIDE BOOK

- April 2021: Addition of the STOXX Europe 600 Oil & Gas Futures Roll Indices
- June 2022: Addition of the STOXX JPY TTM Currency Indices.
- July 2022: Correction in the formula of TTM currency conversion index
- July 2022(2): Section 1 updated with new guides
- August 2022: Addition of EURO STOXX Futures Switch Index
- September 2022: Update in section 33.2
- September 2022 (2): Addition of EURO STOXX Banks Futures Switch Index and EURO STOXX Oil & Gas Futures Switch Index in section 33
- December 2022: Deletion of STOXX Global 3D Printing Tradable Daily Short
- December 2022(2): Rule clarification of single stock leverage indices, addition of STOXX Europe 600 Oil & Gas Futures Switch Indices and added reference of STOXX Eligible Market Segments Guide.
- January 2023: Removed reference of iSTOXX Bond Index guide.
- February 2023: Removed reference of STOXX Bond Index guide and decommissioning of EURO STOXX 50 Multi-Asset indices
- July 2023: Minor correction in basic data of EURO STOXX 50 Investable Volatility
- August 2023: Minor formatting changes in guide
- October 2023: Change in the STOXX logo
- December 2023: Addition of iSTOXX Dynamic Exposure Volatility Indices
- March 2024: Rule clarification in the sub section 'Adjustments due to market movements' of STOXX Short and Leveraged indices and iSTOXX Single Stock Leveraged Indices
- June 2024: Rule clarification in EURO STOXX 50 Risk Control Index
- August 2024: Termination of EURO STOXX 50 Realized Variance Index (RVSTOXX)
- September 2024: Methodology change to the Calculation of Index Settlement Level of the EURO STOXX 50 Volatility (VSTOXX) indices
- September 2024(2): Rule clarification to the calculation of index settlement level for V-VSTOXX indices
- November 2024: Addition of EURO STOXX 50 Covered Call ATM index
- January 2025: Change in STOXX logo, alignment of fonts to STOXX Brandbooks
- March 2025: Formula clarification for EURO STOXX 50 Covered Call ATM Index and removed reference of STOXX ESG Index Methodology Guide
- March 2025(2): Enhancement in the index formula of EURO STOXX 50 BuyWrite Index
- July 2025: Addition of footnote in section STOXX Currency Hedged
- August 2025: Addition of footnote in EURO STOXX 50 Covered Call ATM Index
- December 2025: Update in the section of 'Introduction to the STOXX Index Guides'
- February 2026: Addition of EURO STOXX 50 Covered Call Target Income 8% Index
- March 2026: Addition of a footnote for clarifying calculation limitations on public holidays in section named 'STOXX Risk Control Indices'
- April 2026: Removed reference of STOXX Currency Rates Indices Methodology guide and Addition of EURO STOXX 50 Covered Call Dynamic Target Income 6% Index
- May 2026: Clarification in the Calculation section of 'Stoxx Short and Leveraged Indices'
- August 2026: Addition of EURO STOXX 50 PutWrite in Total Return USD
- August 2026(2): Addition of a footnote in section named 'STOXX Decrement Indices'
- September 2026: Addition of reference to the Guide to Reference Calculations used by STOXX Ltd.

3. GENERAL PRINCIPLES

3.1. INDEX RATIONALE

STOXX defines the index rationale as the basis for applying a certain methodology in order to achieve the index objective. STOXX performs intensive research and may conduct conversations with market participants and third parties for this purpose. STOXX discloses the index objective in every case.

3.2. METHODOLOGY REVIEW POLICIES

STOXX constantly monitors the execution of the index calculation rules in order to ensure the validity of the index methodology. STOXX also conducts general methodology reviews in a periodic and ad-hoc basis, to reflect economic and political changes and developments in the investment industry. As result of these activities, STOXX introduces changes to the methodology books. Material changes are notified to subscribers and the media through the usual communication channels. Clarifications of the methodology are updated in the rulebook. All changes are tracked in the section 2.1 History of changes to the STOXX Strategy Guide.

3.3. INDEX TERMINATION POLICY

For the termination of an index or index family for which outstanding products are present in the market to the knowledge of STOXX, a market consultation with the involved clients will be initiated by STOXX to take into account their views and concerns related to the termination or transition. A consultation period will be opened. Its duration depends on the specific issue. After the consultation period and in case of further action needed, a notification will be issued and the process defined above will be followed. In the case of a transition, STOXX will launch the alternative index and will notify of its character as a suitable replacement for an existing index whose calculation should be discontinued in the future. This notification advices clients on the alternative recommended by STOXX as replacement. The timeframe in which both indices will be calculated in parallel will be disclosed in the notification's text and will be no shorter than three months.

For the termination of an index or index family for which, to the knowledge of STOXX, no listed financial products are issued in the market, a press release notification or e-mail notification to subscribers will be communicated at least three months before coming into force. Clients or third parties with interest in the index or index family are urged to communicate as soon as possible their concerns to STOXX. Based on the feedback collected, STOXX may alter the index termination decision. For the termination of an index without financial product issued on there will be no market consultation. Changes to the original notification will be communicated in the same manner.

4. INPUT DATA

4.1. DERIVATIVES PRICES

The data hierarchy used to process derivatives prices and calculate the STOXX strategy indices are as follows (unless stated differently in the individual index methodologies).

The indices are calculated on the basis of exchange-traded derivative prices. In certain cases, however, it is deemed that the last available traded prices do not provide the best representation of the economic reality or market practices, e.g. due to less frequent trading, broader bid/ask spreads or preferred use of official settlement values. In such cases, the derivative instruments are evaluated on the basis of other levels of the input data hierarchy, such as best bid/ask quotes from the exchange order book or official exchange daily/final settlement prices, as detailed in the individual index methodology.

5. EURO STOXX 50 BUYWRITE

5.1. OVERVIEW

The EURO STOXX 50 BuyWrite Index reflects the so-called 'buy-write' option strategy. With this strategy, which is also referred to as covered call, an investor buys the EURO STOXX 50 index (price or total return indices) as an underlying instrument and simultaneously sells a EURO STOXX 50 call option.
The index is available as the original EURO STOXX 50 BuyWrite Index, with option struck at 105%, and the subsequently added EURO STOXX 50 BuyWrite Index (100%), with option struck at 100%.

The index is based on the EURO STOXX 50 price index or on the EURO STOXX 50 total return index and a EURO STOXX 50 call option traded at Eurex.

Dissemination Calendar: STOXX Eurex Calendar

5.2. BASIC DATA

Index	ISIN	Symbol
EURO STOXX 50 BuyWrite (Price)	CH0029148886	SX5EBP
EURO STOXX 50 BuyWrite (Net Return)	CH0026600970	SX5EBW
EURO STOXX 50 BuyWrite (100%) (Price)	CH0211959595	SX5EBP2
EURO STOXX 50 BuyWrite (100%) (Net Return)	CH0211959603	SX5EBW2

5.3. CALCULATION

5.3.1. INDEX FORMULA

Two versions of the indices are available, Total Return and Price.

Total Return

The Total Return version of the index combines the EURO STOXX 50 (Net Return) Index and a EURO STOXX 50 call option. On regular trading days the Total Return version is calculated as follows:

$$\mathrm{BW(TR)}_t = \frac{\left[\frac{\mathrm{ESTX50(NR)}_t}{\mathrm{ESTX50(NR)}_{\mathrm{EXP}}} \cdot \mathrm{ESTX50}(P)_{\mathrm{EXP}}\right] - C_t}{\mathrm{ESTX50}(P)_{\mathrm{EXP}} - C_0} \cdot \mathrm{BW(TR)}_{\mathrm{EXP}}$$

The rolling is carried out monthly on every third Friday, i.e., on the expiry date (EXP).

$$\mathrm{BW(TR)}_{\mathrm{EXP}} = \frac{\left[\frac{\mathrm{ESTX50(NR)}_{\mathrm{EXP}}}{\mathrm{ESTX50(NR)}_{\mathrm{EXP-1}}} \cdot \mathrm{ESTX50}(P)_{\mathrm{EXP-1}}\right] - C'_{\mathrm{EXP}}}{\mathrm{ESTX50}(P)_{\mathrm{EXP-1}} - C'_0} \cdot \mathrm{BW(TR)}_{\mathrm{EXP-1}}$$

Where:

$\mathrm{BW(TR)}_t$ = EURO STOXX 50 BuyWrite index or EURO STOXX 50 BuyWrite (100%) index at time (t)

5. EURO STOXX 50 BUYWRITE

$BW(TR)_{EXP}$	= Settlement value of EURO STOXX 50 BuyWrite index or EURO STOXX 50 BuyWrite (100%) index at the previous expiry date (EXP)
$BW(TR)_{EXP-1}$	= Settlement value of EURO STOXX 50 BuyWrite index or EURO STOXX 50 BuyWrite (100%) index at the last expiry date before the previous expiry date(EXP-1)
$ESTX50(NR)_t$	= Last price of EURO STOXX 50 (Net Return) index at time t
$ESTX50(NR)_{EXP}$	= Settlement price of EURO STOXX 50 (Net Return) index at the previous expiry date (EXP)
$ESTX50(NR)_{EXP-1}$	= Settlement price of EURO STOXX 50 (Net Return) index at the last expiry date before the previous expiry date (EXP-1)
$ESTX50(P)_{EXP}$	= Settlement price of EURO STOXX 50 (Price) index at the previous expiry date (EXP)
$ESTX50(P)_{EXP-1}$	= Settlement price of EURO STOXX 50 (Price) index at the last expiry date before the previous expiry date (EXP-1)
C_t	= last price of call option at time t; End of day index values are calculated using option settlement price
C_0	= Inclusion price of the EURO STOXX 50 call option, i.e. averages of all best bids quoted on Eurex between 12:15 – 12:45 CET on the last expiry date (EXP)
C'_{EXP}	= Settlement price of old EURO STOXX 50 call option at the last expiry date (EXP)
C'_0	= Inclusion price of the old EURO STOXX 50 call option; i.e. averages of all best bids quoted on Eurex between 12:15 – 12:45 CET on the last expiry date (EXP-1) before the previous expiry date (EXP)

Price

The Price version of the index combines the EURO STOXX 50 (Price) Index and a EURO STOXX 50 call option.

On regular trading days the Price version of the index is calculated as follows:

$$BW(P)_t = \frac{ESTX50(P)_t - C_t}{ESTX50(P)_{EXP} - C_0} \cdot BW(P)_{EXP}$$

The rolling is carried out monthly on every third Friday, i.e. on the expiry date (EXP).

$$BW(P)_{EXP} = \frac{ESTX50(P)_{EXP} - C'_{EXP}}{ESTX50(P)_{EXP\text{-}1} - C'_0} \cdot BW(P)_{EXP\text{-}1}$$

Where:

$BW(P)_t$	= EURO STOXX 50 BuyWrite (Price) index or EURO STOXX 50 BuyWrite (100%) (Price) index at time (t)
$BW(P)_{EXP}$	= Settlement value of EURO STOXX 50 BuyWrite (Price) index or EURO STOXX 50 BuyWrite (100%) (Price) index at the previous expiry date (EXP)
$BW(P)_{EXP-1}$	= Settlement value of EURO STOXX 50 BuyWrite (Price) index or EURO STOXX 50 BuyWrite (100%) (Price) index at the last expiry date before the previous expiry date (EXP-1)
$ESTX50(P)_{EXP}$	= Settlement price of EURO STOXX 50 (Price) index at the previous expiry date (EXP)

5. EURO STOXX 50 BUYWRITE

$ESTX50(P)_{EXP-1}$ = Settlement price of EURO STOXX 50 (Price) index at the last expiry date before the previous expiry date (EXP-1)

C_t = last price of call option at time t; End of day index values are calculated using option settlement price

C_0 = Inclusion price of the EURO STOXX 50 call option; i.e. averages of all best bids quoted on Eurex between 12:15 – 12:45 CET on the last expiry date (EXP)

C'_{EXP} = Settlement price of old EURO STOXX 50 call option at the last expiry date (EXP)

C'_0 = Inclusion price of the old EURO STOXX 50 call option; i.e. averages of all best bids quoted on Eurex between 12:15 – 12:45 CET on the last expiry date (EXP-1) before the previous expiry date (EXP)

5.3.2. ROLLING

The EURO STOXX 50 BuyWrite index requires a monthly rollover procedure, whereby the old EURO STOXX 50 call option ceases trading at noon (12:00 CET) on the pre-determined expiry date, i.e. the third Friday of a month, and is replaced by a new EURO STOXX 50 call option whose last trading day falls on the next expiry date. The new one-month EURO STOXX 50 call option must have a remaining lifetime of one month, and must be 5 percent out-of-the-money (i.e. the highest strike price below or equal to the EURO STOXX 50 settlement price plus 5 percent).
The EURO STOXX 50 BuyWrite (100%) index is subject to the same monthly rolling procedure, but the new one-month EURO STOXX 50 call option must be at-the-money (i.e. the highest strike price below or equal to the EURO STOXX 50 settlement price).

5.3.3. TRADING SUSPENSION

If there is a suspension of the EURO STOXX 50 Index (price or total return) or the EURO STOXX 50 call option that is included in the EURO STOXX 50 BuyWrite Index or EURO STOXX 50 BuyWrite (100%) index, the index will be calculated using the latest prices that were available.

If a suspension occurs on an expiry date during the averaging process, i.e. 12:15 - 12:45 CET, only bids made before the suspension will be considered.

In cases where the averaging procedure does not start at all (i.e. the suspension starts before 12:15 CET) then the averaging will be delayed until the end of the suspension on the same index business day. The averaging process will start 30 minutes after the end of the suspension and it will then take 30 minutes.

If the suspension continues until the end of trading, then the averaging will be delayed until the next index business day at 12:15 CET.

6. EURO STOXX 50 PROTECTIVE PUT 80% 18M 6/3

6.1. OVERVIEW

The EURO STOXX 50 Protective Put 80% 18m 6/3 index aims to replicate a combined investment in the EURO STOXX 50 index and a long position in a put option on the same index. The investment objective of the replicated strategy is to profit from the appreciation of the EURO STOXX 50, while simultaneously limit the losses in falling markets through the put option.
The put option is rolled quarterly in March, June, September and December. On each roll date, the existing option is sold and replaced by a new one with 80% strike. Additionally, the options purchased in June and December will mature in 18 months, while those purchased in March and September in 15 months (i.e., they keep the same maturity of the existing option).

The index is based on the EURO STOXX 50 price index or on the EURO STOXX 50 net return index and a EURO STOXX 50 put option traded at Eurex.

Dissemination Calendar: STOXX Eurex Calendar

6.2. BASIC DATA

Index	ISIN	Symbol
EURO STOXX 50 Protective Put 80% 18m 6/3 (Price)	CH0283626957	SX5PP8P
EURO STOXX 50 Protective Put 80% 18m 6/3 (Net Return)	CH0283626924	SX5PP8T

6.3. CALCULATION

Two versions of the indices are available, Net Return and Price.

Net Return

The Net Return version of the index combines the EURO STOXX 50 (Net Return) Index and a EURO STOXX 50 put option.
On regular trading days the index is calculated as follows:

$$\mathrm{PP(NR)}_t = \frac{\left[\frac{\mathrm{ESTX50(NR)}_t}{\mathrm{ESTX50(NR)}_{\mathrm{ROLL}}} \cdot \mathrm{ESTX50}(P)_{\mathrm{ROLL}}\right] + P_t}{\mathrm{ESTX50}(P)_{\mathrm{ROLL}} + P_0} \cdot \mathrm{PP(NR)}_{\mathrm{ROLL}}$$

On rolling days the index is calculated as follows:

$$\mathrm{PP(NR)}_{\mathrm{ROLL}} = \frac{\left[\frac{\mathrm{ESTX50(NR)}_{\mathrm{ROLL}}}{\mathrm{ESTX50(NR)}_{\mathrm{ROLL}-1}} \cdot \mathrm{ESTX50}(P)_{\mathrm{ROLL}-1}\right] + \mathrm{P'}_{\mathrm{ROLL}}}{\mathrm{ESTX50}(P)_{\mathrm{ROLL}-1} + \mathrm{P'}_0} \cdot \mathrm{PP(NR)}_{\mathrm{ROLL}-1}$$

Price

6. EURO STOXX 50 PROTECTIVE PUT 80% 18M 6/3

The Price version of the index combines the EURO STOXX 50 (Price) Index and a EURO STOXX 50 put option.

On regular trading days the index is calculated as follows:

$$\mathrm{PP}(P)_t = \frac{\mathrm{ESTX50}(P)_t + P_t}{\mathrm{ESTX50}(P)_{\mathrm{ROLL}} + P_0} \cdot \mathrm{PP}(P)_{\mathrm{ROLL}}$$

On rolling days the index is calculated as follows:

$$\mathrm{PP}(P)_{\mathrm{ROLL}} = \frac{\mathrm{ESTX50}(P)_{\mathrm{ROLL}} + P'_{\mathrm{ROLL}}}{\mathrm{ESTX50}(P)_{\mathrm{ROLL\text{-}1}} + P'_0} \cdot \mathrm{PP}(P)_{\mathrm{ROLL\text{-}1}}$$

Where:

$\mathrm{PP(TR)_t}$	= EURO STOXX 50 Protective Put (Total Return) index at time (t)
$\mathrm{PP(NR)_{ROLL}}$	= Settlement value of EURO STOXX 50 Protective Put (Net Return) index at the previous rolling date (ROLL)
$\mathrm{PP(NR)_{ROLL-1}}$	= Settlement value of EURO STOXX 50 Protective Put (Net Return) index at the last rolling date before the previous rolling date(ROLL-1)
$\mathrm{PP(P)_t}$	= EURO STOXX 50 Protective Put (Price) index at time (t)
$\mathrm{PP(P)_{ROLL}}$	= Settlement value of EURO STOXX 50 Protective Put (Price) index at the previous rolling date (ROLL)
$\mathrm{PP(P)_{ROLL-1}}$	= Settlement value of EURO STOXX 50 Protective Put (Price) index at the last rolling date before the previous rolling date (ROLL-1)
$\mathrm{ESTX50(NR)_t}$	= Last price of EURO STOXX 50 (Net Return) index at time t
$\mathrm{ESTX50(NR)_{ROLL}}$	= Settlement price of EURO STOXX 50 (Net Return) index at the previous rolling date (ROLL)
$\mathrm{ESTX50(NR)_{ROLL-1}}$	= Settlement price of EURO STOXX 50 (Net Return) index at the last rolling date before the previous rolling date (ROLL-1)
$\mathrm{ESTX50(P)_t}$	= Last price of EURO STOXX 50 (Price) index at time t
$\mathrm{ESTX50(P)_{ROLL}}$	= Settlement price of EURO STOXX 50 (Price) index at the previous rolling date (ROLL)
$\mathrm{ESTX50(P)_{ROLL-1}}$	= Settlement price of EURO STOXX 50 (Price) index at the last rolling date before the previous rolling date (ROLL-1)
$\mathrm{P_t}$	= Mid price of the EURO STOXX 50 put option at time t during the day or Settlement price of the EURO STOXX 50 put option for end-of-day calculation
$\mathrm{P_0}$	= Inclusion price of the EURO STOXX 50 put option on the last ROLL date (ROLL)
$\mathrm{P'_{ROLL}}$	= Exit price of old EURO STOXX 50 put option at the last rolling date (ROLL)
$\mathrm{P'_0}$	= Inclusion price of the old EURO STOXX 50 put option on the last rolling date (ROLL-1) before the previous rolling date (ROLL)

Inclusion price ($\mathrm{P_0}$, $\mathrm{P'_0}$): VWAP of best ask quotes between 12:15:00 and 12:45:00
Intraday price ($\mathrm{P_t}$): mid quote
End-of-day price ($\mathrm{P_t}$): settlement value
Exit price ($\mathrm{P'_{ROLL}}$): VWAP of best bid quotes between 12:15:00 and 12:45:00

6. EURO STOXX 50 PROTECTIVE PUT 80% 18M 6/3

6.3.1. ROLLING

The index requires a quarterly rollover procedure, on the pre-determined rolling date, i.e. the third Friday of March, June, September, December where the current option is sold and replaced by a new EURO STOXX 50 put option. If such a day is a non-trading day for EUREX, the preceding trading day is taken.

On each roll date, the purchased EURO STOXX 50 put option must be 20 percent out-of-the-money or less (i.e. the lowest strike price higher than or equal to the settlement price of the EURO STOXX 50 Price index minus 20 percent).

On the roll dates of June and December, the replacing option will mature on the 18th following month; on the roll dates of March and September the maturity will be 15 months ahead.

7. EURO STOXX 50 PUTWRITE

7.1. OVERVIEW

The EURO STOXX 50 PutWrite Index replicates the performance of a collateralized put option strategy. The index is based on a quarterly scheme with monthly put option tranches, i.e.

» the investment notional is invested into the three-month Euribor market;
» monthly put options are written in three tranches;
» intra-quarter put options are cash settled by borrowing in the one-month Euribor market if necessary.

The index is based on the EURO STOXX 50 put option traded at Eurex and Euribor.

Dissemination Calendar: STOXX Eurex Calendar

7.2. BASIC DATA

Index	ISIN	Symbol
EURO STOXX 50 PutWrite (Price)	CH0106231670	SX5E3P
EURO STOXX 50 PutWrite (Price)	CH1546181863	SX5E3PU

7.3. CALCULATION

7.3.1. INDEX FORMULA

At time t

Write a number N_t of puts with price p_t and strike K_t

» Invest $I_t + p_t N_t$ at the three-month EURIBOR rate r_t^3
» The number of puts N_t is given by the condition of total cash collateralization at t+1:

$$(I_t + p_t N_t)\left(1 + \frac{\Delta_{t,t+1}}{360} \cdot r_t^3\right) = N_t K_t \Rightarrow N_t = \frac{I_t\left(1 + \frac{\Delta_{t,t+1}}{360} \cdot r_t^3\right)}{K_t - p_t\left(1 + \frac{\Delta_{t,t+1}}{360} \cdot r_t^3\right)}$$

Where:

I_t = EURO STOXX 50 PutWrite index at time (t)

$\Delta_{t,t+1}$ = Actual number of calendar days of the first option tranche
The strike K_t is chosen 5 percent out-of-the-money, i.e. it represents the lowest strike of available EUREX put options that is above 95 percent of the EURO STOXX 50 settlement price.

7. EURO STOXX 50 PUTWRITE

At time t+1

» Write a number N_{t+1} of puts with price p_{t+1} and strike K_{t+1}
» Borrow/lend the cash balance

$$C_{t+1} = (N_{t+1}p_{t+1} - N_t p_t^s)$$

(can be positive or negative) from settling the N_t put options at price p_t^s (which is zero if the option matures out-of-the-money) of the previous tranche and writing the new tranche at the one-month Euribor market at rate r_{t+1}.

» The number of put options N_{t+1} is given by the condition of total cash collateralization at t+2:

$$C_{t+1}\left(1 + \frac{\Delta_{t+1,t+2}}{360} r_{t+1}^1\right) + (I_t + p_t N_t)\left(1 + \frac{\Delta_{t,t+2}}{360} \cdot r_t^3\right)$$

$$= (N_{t+1}p_{t+1} - N_t p_t^s) \cdot \left(1 + \frac{\Delta_{t+1,t+2}}{360} \cdot r_{t+1}^1\right) + (I_t + p_t N_t) \cdot \left(1 + \frac{\Delta_{t,t+2}}{360} \cdot r_t^3\right) = N_{t+1}K_{t+1}$$

$$\Rightarrow N_{t+1} = \frac{-N_t p_t^s \left(1 + \frac{\Delta_{t+1,t+2}}{360}\right) + (I_t + p_t N_t) \cdot \left(1 + \frac{\Delta_{t,t+2}}{360} \cdot r_t^3\right)}{K_{t+1} - p_{t+1}\left(1 + \frac{\Delta_{t+1,t+2}}{360} \cdot r_{t+1}^1\right)}$$

Where:

$\Delta_{t+1,t+2}$ = Actual number of calendar days of the second option tranche
$\Delta_{t,t+2}$ = Actual number of calendar days of the first and second option tranche
The strike K_{t+1} is chosen 5 percent out-of-the-money, i.e. it represents the lowest strike of available EUREX put options that is above 95 percent of the EURO STOXX 50 settlement price.

At t+1 the index level reads:

$$I_{t+1} = (I_t + p_t N_t)\left(1 + \frac{\Delta_{t,t+1}}{360} \cdot r_t^3\right) - N_t p_t^s$$

7. EURO STOXX 50 PUTWRITE

At time t+2

» Write a number N_{t+2} of puts with price p_{t+2} and strike K_{t+2}
» Borrow/lend the cash balance

$$C_{t+2} = \left(N_{t_{+2}} p_{t+2} - N_{t_{+1}} p^{s}_{t+1}\right) + C_{t+1}\left(1 + \frac{\Delta_{t+1,t+2}}{360} \cdot r^{1}_{t+1}\right)$$

(can be positive or negative) from settling the N_{t+1} put options at price p_{t+1}s (which is zero if the option matures out-of-the-money) of the previous tranche and writing the new tranche at the one-month EURIBOR market at rate $r_{t+2}{}^{1}$.

» The number of option N_{t+2} is given by the condition of total cash collateralization at t+3:

$$C_{t+2}\left(1 + \frac{\Delta_{t+2,t+3}}{360} \cdot r^{1}_{t+2}\right) + (I_t + p_t N_t)\left(1 + \frac{\Delta_{t,t+3}}{360} \cdot r^{3}_{t}\right) = N_{t+2} K_{t+2}$$

$$\Leftrightarrow \left(\left(N_{t+2} p_{t+2} - N_{t_{+1}} p^{s}_{t+1}\right) + C_{t+1}\left(1 + \frac{\Delta_{t+1,t+2}}{360} \cdot r^{1}_{t+1}\right)\right)\left(1 + \frac{\Delta_{t+2,t+3}}{360} \cdot r^{1}_{t+2}\right) + (I_t + p_t N_t) \cdot \left(1 + \frac{\Delta_{t,t+3}}{360} \cdot r^{3}_{t}\right)$$

$$= N_{t_{+2}} K_{t+2}$$

$$\Rightarrow N_{t+2} = \frac{\left(-N_{t_{+1}} p^{s}_{t+1} + C_{t+1}\left(1 + \frac{\Delta_{t+1,t+2}}{360} \cdot r^{1}_{t+1}\right)\right) \cdot \left(1 + \frac{\Delta_{t+2,t+3}}{360} \cdot r^{1}_{t+2}\right) + (I_t + p_t N_t) \cdot \left(1 + \frac{\Delta_{t,t+3}}{360} \cdot r^{3}_{t}\right)}{K_{t+2} - p_{t+2}\left(1 + \frac{\Delta_{t+2,t+3}}{360} \cdot r^{1}_{t+2}\right)}$$

Where:

$\Delta_{t+2,t+3}$ = Actual number of calendar days of the second option tranche
$\Delta_{t,t+3}$ = Actual number of calendar days of the first, second and third option tranche
The strike K_{t+2} is chosen 5 percent out-of-the-money, i.e. it represents the lowest strike of available EUREX put options that is above 95 percent of the EURO STOXX 50 settlement price.

At t+2 the index level reads:

$$I_{t+2} = (I_t + p_t N_t) \cdot \left(1 + \frac{\Delta_{t,t+2}}{360} \cdot r^{3}_{t}\right) + C_{t+1}\left(1 + \frac{\Delta_{t+1,t+2}}{360} \cdot r^{1}_{t+1}\right) - N_{t+1} p^{s}_{t+1}$$

7. EURO STOXX 50 PUTWRITE

At time t+3

The new index level reads (with p_{t+2}s denoting the settlement price of the third option tranche N_{t+2}):

$$I_{t+3} = (I_t + p_t N_t) \cdot \left(1 + \frac{\Delta_{t,t+3}}{360} \cdot r_t^3\right) + C_{t+2}\left(1 + \frac{\Delta_{t+2,t+3}}{360} \cdot r_{t+2}^1\right) - N_{t+2} p_{t+2}^s$$

Afterwards, the scheme is applied iteratively.

7.3.2. ROLLING

The EURO STOXX 50 PutWrite index requires a monthly rollover procedure, whereby the old EURO STOXX 50 put option ceases trading at noon (12:00 CET) on the pre-determined expiry date, i.e. the third Friday of a month, and is replaced by a new EURO STOXX 50 put option whose last trading falls on the next expiry date. The new one-month EURO STOXX 50 put option must have a remaining lifetime of one month, and must be 5 percent out-of-the-money (i.e. the lowest strike price above or equal to the EURO STOXX 50 settlement price minus 5 percent).

7.3.3. TRADING SUSPENSION/ NON-TRADING DAYS

If there is a suspension of the EURO STOXX 50 put option which is included in the EURO STOXX 50 PutWrite index, the index will be calculated using the latest prices available.

If a suspension occurs on an expiry date during the averaging process, i.e. 12:15 - 12:45 CET only bids made before the suspension will be considered.

In cases where the averaging procedure does not start at all (i.e. the suspension starts before 12:15 CET), the averaging will be delayed until the end of the suspension on the same index business day. The averaging process will start 30 minutes after the end of the suspension and it will then take 30 minutes.

If the suspension continues until the end of the trading, the averaging will be delayed until the next index business day at 12:15 CET.

Interest is accrued on all calculation dates of the EURO STOXX 50 PutWrite Index.

8. STOXX SHORT AND LEVERAGED INDICES

8.1. OVERVIEW

Leveraged indices are linked to the changes in the underlying index, applying a leverage factor to movements in the underlying index. Therefore, a positive change of the underlying index will result in the corresponding leveraged performance of leveraged indices compared to the closing level from the last rebalancing.

Short indices are linked inversely to the changes in the underlying index, applying a negative leverage factor to movements in the underlying index. Therefore, investing in short indices yields the reverse performance of the underlying index, compared to the closing level from the last rebalancing.

The leverage effect causes a disproportionate change in capital employed during positive and negative market movements. This effect can be achieved by raising additional capital and reinvesting into the underlying index (positive leverage) or by selling the shares in the index and receiving interest from lending the capital received (negative leverage). Investors can make use of this opportunity to employ a profitable investment strategy with low initial capital in order to multiply the chances of profit considerably. On the other hand, this leverage effect carries the inherent risk of a disproportionate capital loss ('downside risk').

8.2. BASIC DATA

Index	ISIN	Symbol	Leverage
EURO STOXX 50 Daily Leverage (Price)	CH0029194906	SX5EL	2
EURO STOXX 50 Daily Leverage (Net Return)	DE000A0Z3K43	SX5TL	2
EURO STOXX 50 Daily Short (Gross Return)	CH0029194971	SX5TS	-1
EURO STOXX 50 Daily Double Short (Gross Return)	CH0048222092	SX5T2S	-2
EURO STOXX 50 Optimal Daily Leverage (Net Return)	CH0123471655	SX5ODLEN	L*
EURO STOXX <Supersector> Daily Leverage x3 (Gross Return)	<see Vendor Code sheet>		3
EURO STOXX <Supersector> Daily Short x3 (Gross Return)	<see Vendor Code sheet>		-3
STOXX Europe 600 Daily Short (Gross Return)	CH0108503878	SXXGRS	-1
STOXX Europe 600 Daily Double Short (Gross Return)	CH0048222100	SXXR2S	-2
STOXX Europe 600 <Supersector> Daily Short (Gross Return)	<see Vendor Code sheet>		-1
STOXX Europe 600 <Supersector> Daily Double Short (Gross Return)	<see Vendor Code sheet>		-2
EURO STOXX 50 Monthly Leverage (Net Return)	CH0116915999	SX5TLM	2
EURO STOXX 50 Monthly Double Short (Gross Return)	CH0116916005	SX5GT2SM	-2
<further indices as listed in the STOXX vendor code sheet>			

8. STOXX SHORT AND LEVERAGED INDICES

8.3. CALCULATION

8.3.1. THE STOXX SHORT / LEVERAGE INDEX FORMULA

The Daily Leverage indices are calculated as follows:

$$\mathrm{LevIDX}_t = \mathrm{LevIDX}_T \cdot \Big[\underbrace{1 + L \cdot \left(\frac{\mathrm{IDX}_t}{\mathrm{IDX}_T} - 1\right)}_{\text{LEVERAGE TERM}} + \underbrace{((1 - L) \cdot \mathrm{IR}_T + L \cdot c_M) \cdot \frac{d}{360}}_{\text{FINANCE/INTEREST TERM}}\Big]$$

Where:

LevIDX	= Leverage index
IDX	= Underlying index
IR	= Interest rate (IR): For daily leverage indices, the interest rate term consists of an overnight interest rate plus a liquidity-spread[1)]. For daily short and optimal leverage indices, an overnight interest rate is applied. For monthly leveraged indices, 1 - monthly interest rates are applied The actual interest rate applied depends on the respective region. An overview of the interest rates can be found in the tables below.
c_M	= Cost to borrow (considered for European short indices only)
t	= Time of calculation
T	= Time of last rebalancing day prior to t (last trading day for the daily and third Friday for the monthly indices)
d	= Number of calendar days between t and T
L	= Leverage Factor (for details please consult the table on the previous page)

[1)] The liquidity Spread is updated on a monthly basis. It is determined using the average over the liquidity spreads of five index calculation days ranging from 5th-last to the last calculation day prior to each monthly rebalancing date (3rd Friday).[1]

The 'leverage term' describes the effect of Price index movements on the leveraged index portfolio.
The 'financing term' indicates the costs of raising capital and reinvesting in the index portfolio (positive leverage)
The 'interest term' indicates the interest received from lending capital and the cost to borrow the index portfolio (negative leverage)
The interest rate depends on the region:

Region / Country	Interest rate	RICs
Americas	SOFR	USDSOFR=
Europe / Eurozone	€STR[2]	EUROSTR=
UK	SONIA	SONIAOSR=
Oceania	AUD Domestic Interest Rate	AUCASH=RBAA
Asia	SOFR	USDSOFR=

[1] Latest Bid Price as of 23:15 CET used for EURIBOR1YD=, USDSROIS1Y= and AUD1YD=. Latest Ask Price as of 23:15 CET used for EUREST1Y=, USD1YOIS= and AUD1YOIS=.
[2] In case €STR is used in the calculation, the index will be calculated using €STR that is published on day T in respect of day T-1.

8. STOXX SHORT AND LEVERAGED INDICES

Latam	SOFR	USDSOFR=
Global	SOFR	USDSOFR=

Liquidity spreads as added for leveraged indices:

Region / Country	Liquidity spread	RICs
Americas	USD 1Y SOFR-based OIS Rate - USD 1Y Fed Fund OIS Rate	USDSROIS1Y= - USD1YOIS=
Europe/Eurozone	EURIBOR 1Y Rate – EUR 1Y ESTR OIS Rate	EURIBOR1YD= - EUREST1Y=
Oceania	AUD LIBOR 1Y Rate – AUD 1Y Swap Rate	AUD1YD= - AUD1YOIS=
Asia	USD 1Y SOFR-based OIS Rate - USD 1Y Fed Fund OIS Rate	USDSROIS1Y= - USD1YOIS=
Latam	USD 1Y SOFR-based OIS Rate - USD 1Y Fed Fund OIS Rate	USDSROIS1Y= - USD1YOIS=
Global	USD 1Y SOFR-based OIS Rate - USD 1Y Fed Fund OIS Rate	USDSROIS1Y= - USD1YOIS=

8.3.2. COST OF BORROWING

The STOXX Daily Short indices are designed to ensure a high degree of tradability and replicability.

Calculation:

$$c_M = \sum_{i=1}^{n} w_{i,M} \cdot c_{i,M}$$

Where:

n = Number of shares in the index
c_M = Cost of borrowing the index at time *M*
$c_{i,M}$ = Cost of borrowing of company *i* at time M
$w_{i,M}$ = Weight of the share *i* in the index

The cost of borrowing will be updated on a monthly basis after the close on the third Friday.

Data source: The data is provided to STOXX by data explorers, the aggregator of stock lending information.

8.3.3. CALCULATION OF THE OPTIMAL LEVERAGE FACTOR

The optimal leverage factor L* is determined every month based on the risk-return profile of the underlying index. Relevant factors are the growth rate of the underlying index and the volatility reflected by the VSTOXX index.

$$L^* = L_T^* = \min\left(4;\max\left(\frac{1}{2};\frac{1}{2}+\frac{\mu - r}{\sigma^2}\right)\right)$$

Where:

r =IR_T

8. STOXX SHORT AND LEVERAGED INDICES

μ = growth rate of the underlying index; $\mu = \left(\frac{\text{IDX}_T}{\text{IDX}_0}\right)^{\frac{365}{T-T_0}} - 1$

σ = volatility of the underlying index; $\sigma = \begin{cases}\text{implied volatily:if available} \\ \max\{\text{Vol}(20);\text{Vol}(60)\}\text{: else}\end{cases}$

Vol(n) = realized volatility over n days;$\text{Vol}(n) = \sqrt{\frac{252}{n-1} \cdot \sum_{k=T-n+1}^{T} \left(\ln \frac{\text{IDX}_k}{\text{IDX}_{k-1}}\right)^2}$

For the European STOXX indices the implied volatility as measured by the VSTOXX index is considered in the calculation of the optimal leverage.

8.3.4. ADJUSTMENTS DUE TO EXTREME MARKET MOVEMENTS

Daily Leverage and Daily Short Indices: The rebalancing is based on the calculation of average index values over a time window of 10 minutes. The time window to calculate the average starts 5 minutes after and ends 15 minutes after the trigger event occurs. The rebalancing is triggered when the underlying index loses more than x% (leverage indices) or appreciates by more than x% (short indices) compared to its previous day's close. The breach of the trigger is checked on a tick-by-tick basis. During this time window, the average of both the underlying index (IDX) and the Leveraged / Short (LevIDX) index are calculated. The two averages then substitute respectively IDX_T and LevIDX_T in the index calculation formula.
The respective trigger values (x) are given in the following table:

Leverage factor	Trigger value
2	x = -25,00%
3	x = -16,66%
4	x = -12,50%
5	x = -10,00%
6	x = -10,00%
7	x = -10,00%
8	x = -10.00%
-1	x = 50,00%
-2	x = 25,00%
-3	x = 16,66%
-4	x = 12,50%
-5	x = 10,00%
-6	x = 10,00%
-7	x = 10,00%
-8	x = 10.00%

Over the course of the 10 minute period in which the average is determined, the index is not disseminated. The index dissemination ends 5 minutes after the trigger event and is resumed with an index level equal to the determined average 15 minutes after the trigger event.
Should the intraday rebalancing be triggered less than 15 minutes prior to the end of the index calculation day, the regular overnight rebalancing is carried out.

8. STOXX SHORT AND LEVERAGED INDICES

If the leverage/short index reaches a value of 0, the index is set to a value of 0 and its calculation/dissemination is discontinued. The index suspension is announced immediately, and the index is terminated after 20 trading days of suspension.

Monthly Leverage Indices: If the reference index (closing value) rises or falls by more than 40% in the course of the month, the monthly leveraged and short indices will be subject to an extraordinary adjustment. If a breach occurs, the calculation of the leveraged index is suspended for that day. The index levels IDX_T and $LevIDX_T$ for the next day are set equal to the respective closing values on the day on which the breach occurred. If the monthly leveraged and short indices reach a floor value of zero its calculation/dissemination is discontinued. The index suspension is announced immediately, and the index is terminated after 20 trading days of suspension.

Optimal Leverage Indices: If daily leveraged or short indices drop by more than 50 percent at the time of calculation t in comparison to the closing prices on the last adjustment day T then the leverage will be adjusted. During the adjustment those prices are considered which were received last before time t. No additional refinancing costs ("Financing Term") are calculated and no additional interests are credited ("Interest Term").
The rebalancing will be carried out by simulating a new day:

t := T (i.e. $IDX_T = IDX_t$ and $LevIDX_T = LevIDX_t$)
d := 0

8.3.5. REVERSE SPLIT

If the closing value of a daily leverage or daily short index drops below 100 index points, a reverse split is carried out. The affected leverage or short index is multiplied with a factor of 1000.
The reverse split is carried out based on the index close ten trading days after the index initially dropped below a closing value of 100 points, notwithstanding whether the index rises above a level of 100 points in the meantime.
For optimal leverage indices as well as for monthly adjusted leverage and short indices, no reverse split is carried out.

8.3.6. TRADING SUSPENSION

The STOXX leverage and short indices are calculated on the same days and during the same time as the underlying STOXX indices are calculated.

If there is suspension of the underlying index, the leveraged and short indices will be calculated with the latest prices available.

9. EURO STOXX 50 VOLATILITY (VSTOXX)

9.1. OVERVIEW

9.1.1. CONCEPT

Volatility is a measure of the level of uncertainty prevailing in certain markets. In principle, there are two different approaches to estimate volatility. Historical volatility involves measuring the standard deviation of historical closing prices for any particular security over a given period of time. Implied volatility, on the other hand, is derived from option values. This kind of volatility represents the estimates and assumptions of market participants involved in a trade, on the basis of a given option value.

The EURO STOXX 50 Volatility Index (VSTOXX) does not measure implied volatilities of at-the-money EURO STOXX 50 options, but the implied variance across all options of a given time to expiry. The option contracts on the EURO STOXX 50 are among the Eurex products with highest trading volume.

The VSTOXX model has been jointly developed by Goldman Sachs and Deutsche Börse. It offers great advantages in terms of trading, hedging and introducing derivative products on this index.

Dissemination Calendar: STOXX Eurex Calendar

9.1.2. BASIC DATA

Index	Code	ISIN
VSTOXX	V2TX	DE000A0C3QF1
VSTOXX 60 days	VSTX60	DE000A1A4LU0
VSTOXX 90 days	VSTX90	DE000A1A4LV8
VSTOXX 120 days	VSTX120	DE000A1A4LW6
VSTOXX 150 days	VSTX150	DE000A1A4LX4
VSTOXX 180 days	VSTX180	DE000A1A4LY2
VSTOXX 210 days	VSTX210	DE000A1A4LZ9
VSTOXX 240 days	VSTX240	DE000A1A4L00
VSTOXX 270 days	VSTX270	DE000A1A4L18
VSTOXX 300 days	VSTX300	DE000A1A4L26
VSTOXX 330 days	VSTX330	DE000A1A4L34
VSTOXX 360 days	VSTX360	DE000A1A4L42
VSTOXX 1M	V6I1	DE000A0G87B2
VSTOXX 2M	V6I2	DE000A0G87C0
VSTOXX 3M	V6I3	DE000A0G87D8
VSTOXX 6M	V6I4	DE000A0G87E6
VSTOXX 9M	V6I5	DE000A0G87F3
VSTOXX 12M	V6I6	DE000A0G87G1
VSTOXX 18M	V6I7	DE000A0G87H9
VSTOXX 24M	V6I8	DE000A0G87J5

9.1.3. VSTOXX MAIN INDICES AND SUB-INDICES

The 12 VSTOXX main indices are calculated for rolling 30, 60, 90, 120, 150, 180, 210, 240, 270, 300, 330 and 360 days to expiry via linear interpolation of the suiting sub-indices. The VSTOXX main indices are therefore independent of a specific time to expiry, i.e. they do not expire.

9. EURO STOXX 50 VOLATILITY (VSTOXX)

Apart from the VSTOXX main indices, 8 sub-indices are calculated and distributed, covering the EURO STOXX 50 option expiries ranging from one month to two years. For options with longer time to expiry, no such sub-indices are currently available.

The VSTOXX sub-indices are calculated on the basis of all options available in the Eurex system.

9.2. CALCULATION OF INDEX TICKS

The model for VSTOXX aims at making pure volatility tradable - i.e. it should be possible to replicate the indices with an options portfolio which does not react to price fluctuations, but to changes in volatility only. This is not achieved through direct replication of volatility, but rather of variance. A portfolio of EURO STOXX 50 options with different strike levels and weighting meets this goal: the implied volatilities of all eligible options with a given time to expiry are considered.

9.2.1. INPUT DATA

During the calculation hours for the VSTOXX and the eight corresponding sub-indices (09:15 to 17:30 CET), the following data is used via snapshots every five seconds:

EURO STOXX 50	- EURO STOXX 50 Index
OESX	- Best bid, best ask, last trade and settlement price of all EURO STOXX 50 options - STOXX will exclude from their indices all options as soon as their delisting becomes known to STOXX (e.g. direct notification from the market, or unavailability of a settlement price)
€STR	- The euro short-term rate
EURIBOR	- EURIBOR - Euro Interbank Offered Rates – money market reference rates (calculated once a day, 11:00 CET, by the European Banking Federation)
REX	- Yield of the 2-year REX as the longer-term interest rate

9.2.1.1. PREPARATION OF OPTION INCLUSION PRICES

First, the trade price, the mid quote and settlement price of each option and corresponding timestamps are identified. A filter is applied in that any trade price, mid quote or settlement price below 0.5 points is ignored.

The mid quote is only calculated if the following requirements are fulfilled:

a. both the bid and ask quotes are available and
b. both the bid and ask quotes are equal to or greater than 0.1 points and
c. the bid-ask spread does not exceed the following thresholds:
    i. normal market: 8% of bid quote, with a minimum of 1.2 points and a maximum of 18 points and
    ii. stressed market: 16%, with a minimum value of 2.4 points and a maximum of 36 points.

If there are two or more options with different strikes and mid quotes that exactly equal the minimum value of 0.5, only the one closer to the at-the-money point is taken into consideration.

For each option used in the calculation of a sub-index, the Inclusion Price is then defined as the most recent among:

a. trade price, or
b. mid quote, or
c. settlement price.

9. EURO STOXX 50 VOLATILITY (VSTOXX)

If both a trade price and a mid quote exist with identical timestamp, preference is given to the trade price.

Example:

Strike	Settlement	Bid (time)	Ask (time)	Mid (time)		Last-traded (time)		Price
4050	76.70	-	-	-				76.70
4100	53.71	-	-	-		54.01	(09:05)	54.01
4150	37.51	33.70 (09:04)	34.40 (09:05)	34.05	(09:05)			34.05
4200	22.54	17.29 (09:04)	19.53 (09:05)	18.41	(09:05)	20.21	(09:01)	18.41

9.2.1.2. DISCOUNT RATES

Discount Rate	Period	ISIN
€STR	1 day	EU000A2X2A25
EURIBOR 1 month	1 month	EU0009659937
EURIBOR 3 months	3 months	EU0009652783
EURIBOR 6 months	6 months	EU0009652791
EURIBOR 12 months	12 months	EU0009652809
REX 2-year (Price index)	2 years	DE0008469149

9.2.2. CALCULATION OF VSTOXX MAIN INDICES

Twelve VSTOXX main indices are calculated with fixed time to expiry.
The main indices are calculated by linear interpolation of the sub-indices whose times to maturity better represent the targeted fixed time to expiry.

If two sub-indices exist whose time to maturity bracket the time to maturity targeted by the main index, then the main index is calculated as interpolation of the two sub-indices.
When the maturity of two sub-indices used in the calculation of a main index approaches, the respective time to maturities may not bracket the fixed time to maturity of the main index: in this case, the algorithm extrapolates between the two sub-indices.
However, as time passes by, as soon as an interpolation between two other sub-indices becomes possible, the algorithm switches to the new sub-index pair.

Each VSTOXX main index is calculated as a time-weighted average of two VSTOXX sub-indices, as shown in the following formula:

$$\text{MainIndex}_{tm} = 100 \cdot \sqrt{\left[\frac{T_{st}}{T_{365}} \cdot \left(\frac{\text{SubIndex}_{st}}{100}\right)^2 \cdot \frac{T_{lt}-T_{tm}}{T_{lt}-T_{st}} + \frac{T_{lt}}{T_{365}} \cdot \left(\frac{\text{SubIndex}_{lt}}{100}\right)^2 \cdot \frac{T_{tm}-T_{st}}{T_{lt}-T_{st}}\right] \cdot \frac{T_{365}}{T_{tm}}}$$

where:

tm	= Fixed time to maturity, expressed as number of days, targeted by the main index.
MainIndex_{tm}	= VSTOXX main index with fixed time to maturity of tm days.
SubIndex_{st}	= VSTOXX sub-index with shorter maturity used in the inter(extra)polation.
SubIndex_{lt}	= VSTOXX sub-index with longer maturity used in the inter(extra)polation.

9. EURO STOXX 50 VOLATILITY (VSTOXX)

T_{st} = Seconds to expiry of $\text{SubIndex}_{st.}$
T_{lt} = Seconds to expiry of $\text{SubIndex}_{lt.}$
T_{tm} = Seconds in tm (1 day = 86,400 sec.).
T_{365} = Seconds in a standard year of 365 days (31,536,000 sec.).

If one of or both the sub-indices required for the calculation of a main index are not available, the main index is not calculated.

9.2.3. CALCULATION OF VSTOXX SUB-INDICES

Each of the eight VSTOXX sub-indices is calculated according to the formula shown below:

$$\text{SubIndex}_i = 100 \cdot \sqrt{\sigma_i^2}$$

where:

i = i^{th} sub-index ($i = 1,...,8$).

σ_i^2 = Implied variance for the the i^{th} OESX expiry date:

$$\sigma_i^2 = \frac{2}{T_i/T_{365}} \cdot \sum_j \frac{\Delta K_{i,j}}{K_{i,j}^2} \cdot R_i \cdot M_{K_{i,j}} - \frac{1}{T_i/T_{365}} \cdot \left(\frac{F_i}{K_{i,0}} - 1\right)^2$$

T_i = Seconds to the i^{th} OESX expiry date.

F_i = Forward at-the-money price for the i^{th} OESX expiry date, derived from exercise price for which the absolute difference between call and put prices is smallest. If multiple pairs of calls and puts exist with identical price differences, a forward price will be calculated as the simple average of the corresponding implied forward prices:
$F_i = K_{\min|C-P|} + R_i \cdot (C-P)$

$K_{i,0}$ = Highest exercise price not exceeding F_i.

$K_{i,j}$ = Exercise price of the j^{th} out-of-the-money option, after sorting the options by their exercise prices in ascending order (i.e. call options for exercise prices above $K_{i,0}$, put options otherwise).

$\Delta K_{i,j}$ = Average distance between the exercise prices of the two options struck respectively immediately above and immediately below $K_{i,j}$. On the boundaries, the simple distance between the highest (lowest) and second-highest (lowest) exercise price for call (put) options is used:

$$\Delta K_{i,j} = \frac{1}{2} \cdot (K_{i,j+1} - K_{i,j-1})$$

$M_{K_{i,j}}$ = Inclusion price of the out-of-the-money option with exercise price $K_{i,j}$.

$M_{K_{i,0}}$ = Simple arithmetic average of put and call prices of the option with exercise price $K_{i,0}$.

R_i = Refinancing factor for the i^{th} OESX expiry date:
$R_i = e^{r_i \cdot T_i / T_{365}}$

r_i = Interpolated risk-free interest rate valid for the i^{th} OESX expiry date:

$$r_i = \frac{T_{lt} - T_{tm}}{T_{lt} - T_{st}} \cdot r_{st} + \frac{T_{tm} - T_{st}}{T_{lt} - T_{st}} \cdot r_{lt}$$

If less than five options can be used for the calculation of a sub-index, that sub-index is not calculated.

9. EURO STOXX 50 VOLATILITY (VSTOXX)

The sub-indices are calculated up to two days prior to expiry. Each new sub-index, i.e. an index calculated with newly issued options, is disseminated for the first time on the second trading day of the relevant EURO STOXX 50 options.

Example:

$T_i = 0.0605022831$

$r_i = 1.41296\%$

$R_i = e^{1.41296\% \text{ x } 0.0605022831} = 1.0008552403$

$K_{i,j}$	$\Delta K_{i,j}$	Call	Put	Call-Put	$M_{Ki,j,}$	$\frac{\Delta K_{i,j}}{K_{i,j}^2} \cdot R_i \cdot M_{K_{i,j}}$
2350	50	472.00	0.60	471.40	0.60	0.0000054370
2400	50	422.30	1.00	421.30	1.00	0.0000086880
2450	50	372.80	1.50	371.30	1.50	0.0000125055
2500	50	322.40	2.30	320.10	2.30	0.0000184157
2550	50	273.50	3.30	270.20	3.30	0.0000253966
2600	50	225.15	4.60	220.55	4.60	0.0000340528
2650	50	177.85	6.70	171.15	6.70	0.0000477446
2700	50	132.40	12.00	120.40	12.00	0.0000823749
2750	50	90.90	21.00	69.90	21.00	0.0001389617
2800	50	57.90	35.40	22.50	46.65	0.0002977672
2850	50	29.50	58.25	28.75	29.50	0.0001817497
2900	50	13.10	92.00	78.90	13.10	0.0000779501
2950	50	5.00	134.10	129.10	5.00	0.0000287520
3000	50	1.50	180.90	179.40	1.50	0.0000083405
3050	50	0.70	229.55	228.85	0.70	0.0000037656
3100	50	0.60	230.00	229.40	0.60	0.0000031244

$K_{i,\min|C-P|} = 2800$

$F_i = 2800 + 1.0008552403 \text{ x } (57.90 - 35.40) = 2822.51924290675$

$K_{i,0|} = 2800$

$$\sigma_i^2 = \frac{2}{0.0605022831} \cdot 0.0009750263 - \frac{1}{0.0605022831} \cdot \left(\frac{2822.51924290675}{2800} - 1\right)^2 = 0.0311619545863044$$

$$\text{SubIndex}_i = 100 \cdot \sqrt{0.0311619545863044} = 17.65274896$$

9.3. CALCULATION OF INDEX SETTLEMENT LEVEL

A Settlement Day is defined, for each main index, as the 30th calendar day preceding the expiry of the EURO STOXX 50 options.

Until September 13th 2024, the Settlement Level of each main index is calculated on the Settlement Day as the average of all valid ticks that index produced during an expanding time window starting at 11:30:00 CET up to the current calculation time and not later than 12:00:00 CET.

9. EURO STOXX 50 VOLATILITY (VSTOXX)

Beginning September 16th 2024, the Settlement Level of each main index is calculated on the Settlement Day as the average of all valid ticks that index produced during an expanding time window starting at 11:00:00 CET up to the current calculation time and not later than 12:00:00 CET:

$$\text{Settle}_{\text{index}} = \frac{1}{n_t}\sum_{i=1}^{n_t} \text{tick}_{\text{index},i}$$

where $\text{tick}_{\text{index},i}$ indicates the i^{th} tick for the relevant main index up to calculation time t.

Interim settlement values, i.e. values calculated on the expanding window before 12:00:00 CET, are disseminated with a "V" flag.
The final settlement value is marked as "F".

9.4. VERIFICATION OF INDEX TICKS

With reference to both sub- and main indices, each index tick is verified before being published. The process will result in the addition of a flag to the individual index tick, showing its status.
Status flags are updated at every index tick, i.e. they reflect the status of the tick they are associated to.

A tick can be flagged as either "A" (for "Approved" tick) or "U" (for "Unapproved" tick).

Any tick exceeding a certain deviation tolerance limit from the previous tick is flagged as "U".
The maximum deviation allowed is set respectively to ±20% for sub- and ±8% for main indices.

A sub-index tick flagged as "U" will still be used in the calculation of any derived main index. Any main index derived from an "Unapproved" sub-index will inherit the "U" status flag.
Index ticks flagged as "U" are displayed for information purpose only and are not meant to be considered as valid values.
However, main index ticks marked as "U" are used in the calculation of the respective index settlement level.

9.5. CALCULATION OF COMPONENT WEIGHTS

The weight of the individual options composing a VSTOXX main index can be obtained by simply expanding the index formula and rearranging its terms.
By neglecting the AtM adjustment term in the sub-index formula, variance can be approximated as:

$$\sigma_i^2 \approx \frac{2}{T_i/T_{365}} \cdot \sum_j \frac{\Delta K_{i,j}}{K_{i,j}^2} \cdot R_i \cdot M_{K_{i,j}} = \frac{2}{T_i/T_{365}} \cdot S_{K_{i,j}}$$

This expression can be plugged in the main index formula to obtain:

$$\text{MainIndex}_{tm} \approx 100 \cdot \sqrt{\left[\frac{T_{st}}{T_{365}} \cdot \frac{2}{T_{st}/T_{365}} \cdot S_{K_{st,j}} \cdot \frac{T_{lt}-T_{tm}}{T_{lt}-T_{st}} + \frac{T_{lt}}{T_{365}} \cdot \frac{2}{T_{lt}/T_{365}} \cdot S_{K_{lt,j}} \cdot \frac{T_{tm}-T_{st}}{T_{lt}-T_{st}}\right] \cdot \frac{T_{365}}{T_{tm}}}$$

which simplifies in:

9. EURO STOXX 50 VOLATILITY (VSTOXX)

$$\text{MainIndex}_{tm} \approx 100 \cdot \sqrt{2 \cdot \left[S_{K_{st,j}} \cdot \frac{T_{lt}-T_{tm}}{T_{lt}-T_{st}} + S_{K_{lt,j}} \cdot \frac{T_{tm}-T_{st}}{T_{lt}-T_{st}} \right] \cdot \frac{T_{365}}{T_{tm}}}.$$

By defining:

$$WS_{st} = \frac{T_{st}}{T_{tm}} \cdot \left(\frac{T_{lt} - T_{tm}}{T_{lt} - T_{st}} \right)$$

$$WS_{lt} = \frac{T_{lt}}{T_{tm}} \cdot \left(\frac{T_{tm} - T_{st}}{T_{lt} - T_{st}} \right)$$

and

$$RS_{j \in st} = 2 \cdot R_{st} \cdot \left(\frac{\Delta K_{st,j}}{K_j^2} \cdot M_{K_{i,j}} \right) \cdot WS_{st} \cdot \frac{T_{365}}{T_{st}}$$

$$RS_{j \in lt} = 2 \cdot R_{lt} \cdot \left(\frac{\Delta K_{lt,j}}{K_j^2} \cdot M_{K_{i,j}} \right) \cdot WS_{lt} \cdot \frac{T_{365}}{T_{lt}}$$

the main index approximation can be restated as:

$$\text{MainIndex}_{tm} \approx 100 \cdot \sqrt{RS_{st} + RS_{lt}}.$$

Terms RS_{st} and RS_{lt} represent the value of the two sub-portfolios of options in the main index: the main index is given by the time-weighted sum of all options' market values.

The contribution of each j^{th} option to the total market value of the portfolio is simply the portion of that option's RS_j over the total $RS_{st} + RS_{lt}$:

$$RS_{j \in st} = 2 \cdot R_{st} \cdot \left(\frac{\Delta K_{st,j}}{K_j^2} \cdot S_{K_j} \right) \cdot WS_{st} \cdot \frac{T_{365}}{T_{st}}$$

$$RS_{j \in lt} = 2 \cdot R_{lt} \cdot \left(\frac{\Delta K_{lt,j}}{K_j^2} \cdot S_{K_j} \right) \cdot WS_{lt} \cdot \frac{T_{365}}{T_{lt}}$$

and an individual option's weight is then obtained as:

$$w_j = \frac{RS_j}{RS_{st} + RS_{lt}}.$$

10.EURO STOXX 50 VOLATILITY OF VOLATILITY (V-VSTOXX)

10.1. OVERVIEW

10.1.1. CONCEPT

The EURO STOXX 50 Volatility of Volatility Index (V-VSTOXX) measures the implied volatility of the option contracts on the VSTOXX futures, traded on the Eurex Exchange. In general terms, the algorithm is the same as the one applied in the calculation of the VSTOXX index, but some differences exist, reflecting the specifications of the underlying contracts. For instance, the sub- and main indices cover different maturities and the options' price filters are applied with different thresholds. The following paragraphs will refer to the VSTOXX methodology and differentiate where required.

Dissemination Calendar: STOXX Eurex Calendar

10.1.2. BASIC DATA

Index	Code	ISIN
V-VSTOXX	VV2TX	DE000A13PCG9
V-VSTOXX 60 days	VVSTX60	DE000A13PCH7
V-VSTOXX 90 days	VVSTX90	DE000A13PCJ3
V-VSTOXX 120 days	VVSTX120	DE000A13PCK1
V-VSTOXX 150 days	VVSTX150	DE000A13PCL9
V-VSTOXX 180 days	VVSTX180	DE000A13PCM7
V-VSTOXX 210 days	VVSTX210	DE000A13PCN5
V-VSTOXX 1 month	VV6I1	DE000A13PCQ8
V-VSTOXX 2 months	VV6I2	DE000A13PCR6
V-VSTOXX 3 months	VV6I3	DE000A13PCS4
V-VSTOXX 4 months	VV6I4	DE000A13PCT2
V-VSTOXX 5 months	VV6I5	DE000A13PCU0
V-VSTOXX 6 months	VV6I6	DE000A13PCV8
V-VSTOXX 7 months	VV6I7	DE000A13PCW6
V-VSTOXX 8 months	VV6I8	DE000A13PCX4

10.1.3. V-VSTOXX MAIN INDICES AND SUB-INDICES

The 7 V-VSTOXX main indices are calculated for rolling 30, 60, 90, 120, 150, 180, 210 days to expiry via linear interpolation of the suiting sub-indices. The V-VSTOXX main indices are therefore independent of a specific time to expiry, i.e. they do not expire. This helps to eliminate effects that typically result in strong volatility fluctuations close to expiry.

Apart from the VSTOXX main indices, 8 sub-indices are calculated and distributed, covering the VSTOXX option expiries ranging from one month to eight months.

The V-VSTOXX sub-indices are calculated on the basis of all options available in the Eurex system.

10.2. CALCULATION OF INDEX TICKS

Please refer to VSTOXX methodology.

10.EURO STOXX 50 VOLATILITY OF VOLATILITY (V-VSTOXX)

10.2.1. INPUT DATA

During the calculation hours for the V-VSTOXX sub- and main indices (09:15 to 17:30 CET), the following data is used via snapshots every five seconds:

OVS2	- Best bid, best ask, last trade and settlement price of all VSTOXX futures options - STOXX will exclude from their indices all options as soon as their delisting becomes known to STOXX (e.g. direct notification from the market, or unavailability of a settlement price)
€STR	- The euro short-term rate
EURIBOR	- EURIBOR - Euro Interbank Offered Rates – money market reference rates (calculated once a day, 11:00 CET, by the European Banking Federation)

10.2.1.1. PREPARATION OF OPTION INCLUSION PRICES

First, the trade price, the mid quote and settlement price of each option and corresponding timestamps are identified. A filter is applied in that any trade price, mid quote or settlement price below 0.1 points is ignored.

The mid quote is only calculated if the following requirements are fulfilled:

a. both the bid and ask quotes are available and
b. both the bid and ask quotes are equal to or greater than 0.05 points and
c. the bid-ask spread does not exceed the following thresholds:
   i. normal market: 20% of bid quote, with a minimum of 0.4 points and a maximum of 4 points and
   ii. stressed market: 40%, with a minimum value of 0.8 points and a maximum of 8 points.

If there are two or more options with different strikes and mid quotes that exactly equal the minimum value of 0.1, only the one closer to the at-the-money point is taken into consideration.

For each option used in the calculation of a sub-index, the Inclusion Price is then defined as the most recent among:

a. trade price, or
b. mid quote, or
c. settlement price.

If both a trade price and a mid quote exist with identical timestamp, preference is given to the trade price.

10.2.1.2. DISCOUNT RATES

Please refer to VSTOXX methodology.

10.2.2. CALCULATION OF V-VSTOXX MAIN INDICES

Please refer to VSTOXX methodology.

10.2.3. CALCULATION OF V-VSTOXX SUB-INDICES

The calculation of the V-VSTOXX sub-indices follows the same procedure as the VSTOXX sub-indices.

10.EURO STOXX 50 VOLATILITY OF VOLATILITY (V-VSTOXX)

The sub-indices are calculated up to three days prior to expiry. Each new sub-index, i.e. an index calculated with newly issued options, is disseminated for the first time on the second trading day of the relevant VSTOXX futures options.

10.3. CALCULATION OF INDEX SETTLEMENT LEVEL

The Settlement Level of each V-VSTOXX main index is calculated on the Settlement Day as the average of all valid ticks that index produced during an expanding time window starting at 11:30:00 CET up to the current calculation time and not later than 12:00:00 CET.

10.4. VERIFICATION OF INDEX TICKS

Please refer to VSTOXX methodology.

10.5. CALCULATION OF COMPONENT WEIGHTS

Please refer to VSTOXX methodology.

11.EURO STOXX 50 VOLATILITY-BALANCED

11.1. OVERVIEW

The EURO STOXX 50 Volatility-Balanced index aims to provide superior risk-adjusted returns relative to the EURO STOXX 50 Index by coupling a base investment in EURO STOXX 50 with a dynamic allocation to equity volatility (VSTOXX Short-Term Futures Index) depending on the prevailing volatility regime.

The index is based on the EURO STOXX 50 Net Return (Symbol: SX5T) and the VSTOXX Short-Term Futures Excess Return Index (Symbol: VST1ME).

The volatility regime on any index business day is determined on the basis of Realised Volatility for the period of past 20-days ("RV") and 1-month Implied Volatility 1-month back ("IV") as reflected by the VSTOXX Index. The current volatility regime determines the Equity and Volatility Exposure.

Daily Indicator	Volatility Regime	Equity Exposure	Volatility Exposure
$RV < IV - 1\%$	Stable Volatility Regime	97.5%	2.5%
$IV - 1\% \leq RV \leq IV + 1\%$	Unpredictable Volatility Regime	90%	10%
$RV > IV + 1\%$	Increasing Volatility Regime	70%	30%

In addition, a stop-loss criterion is applied: if the weekly performance of the Excess Return Index shows a loss of 5% or more, both equity and volatility allocations are moved completely into a cash position.

Dissemination Calendar: STOXX Eurex Calendar

11.2. BASIC DATA

Index	ISIN	Symbol
EURO STOXX Volatility-Balanced (Excess Return)	CH0128045587	SX5EVBE
EURO STOXX Volatility-Balanced (Total Return)	CH0128045595	SX5EVBT

11.3. CALCULATION

The EURO STOXX 50 Volatility-Balanced index is calculated as excess and total return index on every Index Business Day ("t") where an Index Business Day is each Eurex VSTOXX futures trading day which is also a EURO STOXX 50 Index Publication Day.

11.3.1. INDEX FORMULAS

Excess Return Index ("ERI")

$$\mathrm{ERI}(t) = \mathrm{ERI}(t\text{-}1) \cdot \left[1 + \mathrm{EE}(t\text{-}2) \cdot \left(\frac{\mathrm{EI}(t)}{\mathrm{EI}(t\text{-}1)} - 1 - \mathrm{RI}(t\text{-}1) \cdot \frac{d}{360}\right) + \mathrm{VE}(t\text{-}2) \cdot \left(\frac{\mathrm{VI}(t)}{\mathrm{VI}(t\text{-}1)} - 1\right)\right]$$

11.EURO STOXX 50 VOLATILITY-BALANCED

Where:

EI	= equity index (EURO STOXX 50)
VI	= volatility index (VSTOXX Short-Term Futures index)
EE	= Equity Exposure
VE	= Volatility Exposure
RI	= Interest Rate (1 month Euribor)
d	= number of calendar days between index business day t-1 and t

Total Return Index ("TRI")

$$\mathrm{TRI}(t) = \mathrm{TRI}(t-1) \cdot \left[\frac{\mathrm{ERI}(t)}{\mathrm{ERI}(t-1)} + \mathrm{RI}(t-1) \cdot \frac{d}{360}\right]$$

11.3.2. EQUITY AND VOLATILITY EXPOSURE

Current 1-month Implied Volatility („CIV")

$$\mathrm{CIV}(t) = \frac{\mathrm{VSTOXX}(t)}{100}$$

Where:

VSTOXX	= VSTOXX index

Current 1-month Realised Volatility („CRV")

$$\mathrm{CRV}(t) = \sqrt{\frac{252}{20} \cdot \sum_{j=0}^{19}\left[ln\left(\frac{\mathrm{EI}(t-j)}{\mathrm{EI}(t-j-1)}\right)^2\right]}$$

Target Volatility Exposure („TVE")

$$\mathrm{TVE}(t) = \begin{cases} 2.5\%: \mathrm{CRV}(t) < \mathrm{CIV}(t-20) - 1\% \\ 30\%: \mathrm{CRV}(t) > \mathrm{CIV}(t-20) + 1\% \\ 10\%: \mathrm{else} \end{cases}$$

Stop loss

$$\mathrm{SL}(t) = \begin{cases} 1: \dfrac{\mathrm{ERI}(t)}{\mathrm{ERI}(t-5)} - 1 \leq -5\% \\ 0: \mathrm{else} \end{cases}$$

Volatility Exposure

$$\mathrm{VE}(t) = \begin{cases} max[0, \mathrm{VE}(t-1) - 10\%] : \mathrm{SL}(t) = 1 \\ max[\mathrm{TVE}(t), \mathrm{VE}(t-1) - 10\%] : \mathrm{SL}(t) = 0 \wedge \mathrm{TVE}(t) < \mathrm{VE}(t-1) \\ min[\mathrm{TVE}(t), \mathrm{VE}(t-1) + 10\%] : \mathrm{SL}(t) = 0 \wedge \mathrm{TVE}(t) \geq \mathrm{VE}(t-1) \end{cases}$$

Equity Exposure

$$\mathrm{EE}(t) = \begin{cases} 1 - \mathrm{VE}(t) : \mathrm{SL}(t) = 0 \\ 0: \mathrm{else} \end{cases}$$

12.EURO STOXX 50 DVP FUTURES

12.1. OVERVIEW

Dividends offer new opportunities to investors – either asset or retail managers – as they:

» are considered on a long-dated horizon as one of the main sources of performance in a portfolio;
» are considered as a good hedge against inflation;
» offer on a long-dated horizon some diversification against pure equity exposure;
» offer an attractive upside due to a structural imbalance in flows: the longer end of the curve tends to be under the net selling pressure coming from the issuance of structured products;
» tend to exhibit lower volatility than equities.

With the EURO STOXX 50 DVP Futures Index, STOXX Ltd. provides investors with synthetic exposure to the gross return (including income from interest) of the EURO STOXX 50 DVP futures listed for trading on Eurex.

The EURO STOXX 50 DVP Futures Index is designed to benefit from the characteristics of the dividends cycle and the dividends market.

» From the December expiry of year (n - 1) to the December expiry of year n, the index notional is invested in equal numbers of EURO STOXX 50 DVP futures corresponding to the years n, n+1, n+2, n+3, n+4, (Fn, Fn+1, Fn+2, Fn+3, Fn+4).
» The cash position is invested at €STR.
» In December of year n, when the future Fn expires, the index notional would be invested in the contract Fn+5, such that the adjusted numbers of contracts of Fn+1, Fn+2, Fn+3, Fn+4, Fn+5 are the same. For instance, in December 2010, when all the 2010 dividends have been paid, the index will get a new exposure to 2015 dividends.
» In line with the expiry structure of the EURO STOXX 50 DVP Futures, each of the five future contracts is assigned to a specific expiry. Ten maturities are available for dividend futures. The index only considers the five nearest maturities simultaneously.

Dissemination Calendar: STOXX Eurex Calendar

12.2. BASIC DATA

Index	ISIN	Symbol
EURO STOXX 50 DVP Futures (Price)	CH0109185402	SX5EDFT

12.3. CALCULATION

12.3.1. INPUT DATA

During the calculation hours of the EURO STOXX 50 DVP Futures Index, the following data is used via snapshots every 15 seconds:

12.EURO STOXX 50 DVP FUTURES

» Eurex futures prices (first five year contracts) on the EURO STOXX 50 DVP
» €STR - overnight interest rate - money market investment

If one or more Eurex DVP futures included in the index is no longer listed, STOXX Ltd. may decide on the appropriate measures in consultation with the STOXX management board and notify at that time.

12.3.2. INDEX FORMULA

From the December expiry of year (n-1) to the December expiry of year n:

$$\text{Index}_t = Index_{t-1}[1 + €STR(t-1)/360 \cdot d] + N_t \begin{bmatrix} F_n(t) - F_n(t-1) + F_{n+1}(t) - F_{n+1}(t-1) + \\ F_{n+2}(t) - F_{n+2}(t-1) + F_{n+3}(t) - F_{n+3}(t-1) + \\ F_{n+4}(t) - F_{n+4}(t-1) \end{bmatrix}$$

Where:

t	= Time of calculation
d	= Number of calendar days between t and t-1
n	= Maturity tranche
F	= Trade price of the futures contracts
€STR	= Overnight interest rate
N_t	= $\text{index}_{t-1}/[F_n(t-1)+F_{n+1}(t-1)+F_{n+2}(t-1)+F_{n+3}(t-1)+F_{n+4}(t-1)]$ is the numbers of contracts

12.3.3. ROLLING

On December expiry of year n, the number of contracts has to be adjusted by a rolling factor RF_{N-N+1} so that the index notional is invested in a new number of contracts in the next five EURO STOXX 50 DVP futures after the roll. The rolling factor RF_{N-N+1} is calculated as follows:

$$\text{RF}_{N-N+1} = \frac{F_n(t) + F_{n+1}(t) + F_{n+2}(t) + F_{n+3}(t) + F_{n+4}(t)}{F_{n+1}(t) + F_{n+2}(t) + F_{n+3}(t) + F_{n+4}(t) + F_{n+5}(t)}$$

Consequently, on the roll date in December, the switch of contract has no impact on the value of the index:

$$\text{Index}_t = €STR + N_t \cdot [F_n(t) + F_{n+1}(t) + F_{n+2}(t) + F_{n+3}(t) + F_{n+4}(t)] \; with \; €STR$$

$$= Index_{t-1} \cdot €STR(t-1)/360 \cdot d$$

$$= €STR + RF_{N-N+1} \cdot N_t \cdot [F_{n+1}(t)F_{n+2}(t) + F_{n+3}(t) + F_{n+4}(t) + F_{n+5}(t)]$$

On the following day, the index is computed normally, invested in year n+1 to n+5, thus we have entered a new period until the next expiry.

For instance, let's assume that the final close of the index on December expiry of year n is 500, €STR is zero and that each of the DVP futures corresponding to the years n, n+1, n+2, n+3, n+4 is equal to 100:
$F_n(t) = F_{n+1}(t) = F_{n+2}(t) = F_{n+3}(t) = F_{n+4}(t) = 100$ i.e. this means $N_t = 1$

12.EURO STOXX 50 DVP FUTURES

On this particular date, the index switches its indexation from the DVP futures corresponding to the year n to the indexation of year n+5. If we assume that $F_{n+5}(t) = 50$, we have a rolling factor equal to

$$RF_{N-N+1} = \frac{500}{450}$$

12.3.4. CONSEQUENCES OF AN INDEX DISRUPTION EVENT

If an index disruption event in relation to the Eurex futures contract occurs on index dissemination days, then STOXX Ltd. will calculate the value of the index based on the most recent prior futures prices published by the Eurex.

If an exchange fails to open due to unforeseen circumstances, STOXX Ltd. may determine not to publish the index for that day.

In situations where an exchange introduces a holiday during the month of the index calculation, the index will not be published on such a holiday.

13.STOXX VOLATILITY FUTURES

13.1. OVERVIEW

The EURO STOXX 50 Volatility (VSTOXX) Short-Term Futures Index replicates the performance of a long position in constant-maturity one-month forward, one-month implied volatilities on the underlying EURO STOXX 50 Index. The EURO STOXX 50 Volatility Mid-Term Futures Index replicates a constant 5-month forward, one-month implied volatility.

Both indices constantly roll over each month on a daily basis: the EURO STOXX 50 Volatility Short-Term Futures Index from the first month of the Eurex VSTOXX Futures contract to the second month, and the EURO STOXX 50 Volatility Mid-Term Futures Index from the fourth month to the seventh month.

The VSTOXX Short-Term Futures index is intended to provide a return of a long position in constant-maturity one-month forward one-month implied volatilities on the underlying EURO STOXX 50 Index.

The VSTOXX Short-Term Futures Index comprises the following:

VSTOXX Short-Term/Mid-Term Futures Excess Return Index: VSTOXX Short-Term Futures Index ER returns are calculated from a long Eurex VSTOXX futures position that is continuously rolled over the period between the first and second or fourth and seventh month Eurex VSTOXX Futures contracts.

VSTOXX Short-Term/Mid-Term Futures Total Return Index: VSTOXX Short-Term Futures Index TR returns are calculated from a long Eurex VSTOXX futures position that is continuously rolled over the period between the first and second or fourth and seventh month Eurex VSTOXX futures contracts. The VSTOXX Short-Term Futures Index TR also incorporates interest accrual on the notional value and reinvestment into the index.

Dissemination Calendar: STOXX Eurex Calendar

13.2. BASIC DATA

Index	ISIN	Symbol
EURO STOXX 50 Volatility Mid-Term Futures (Total Return)	CH0115971191	VMT5MT
EURO STOXX 50 Volatility Mid-Term Futures (Excess Return)	CH0115971233	VMT5ME
EURO STOXX 50 Volatility Short-Term Futures (Total Return)	CH0109515863	VST1MT
EURO STOXX 50 Volatility Short-Term Futures (Excess Return)	CH0110459747	VST1ME

13.3. CALCULATION

13.3.1. INPUT DATA

If one or more Eurex VSTOXX futures included in the index are no longer listed, STOXX Ltd. may decide on appropriate measures in consultation with the STOXX management board and notify at that time.

13.STOXX VOLATILITY FUTURES

13.3.2. INDEX FORMULAS

Excess Return Calculation

$$\text{IndexER}_t = \text{IndexER}_{t-1} \cdot \frac{\sum_{i=1}^{2} w_{i,t-1} \cdot F_{i,t}}{\sum_{i=1}^{2} w_{i,t-1} \cdot F_{i,t-1}}$$

Where:

IndexER_t	= VSTOXX Short-Term Futures Excess Return Index value on index business day t
T	= index business day on which the index is computed
$W_{i,t}$	= Weight of the i^{th} futures contract on index business day t
$F_{i,t}$	= Middle price of i^{th} futures contract on index business day t
Index Business Day	= A Eurex VSTOXX futures business day

Total Return Calculation

$$\text{IndexTR}_t = \text{IndexTR}_{t-1} \cdot \left[\frac{\sum_{i=1}^{2} w_{i,t-1} \cdot F_{i,t}}{\sum_{i=1}^{2} w_{i,t-1} \cdot F_{i,t-1}} + \frac{d}{360} \cdot €\text{STR}_{t-1} \right]$$

Where:

IndexTR_t	= VSTOXX Short-Term Futures Total Return Index value on index business day t
d	= Number of calendar days between index business day t and preceding index business day t-1
$€\text{STR}_{t-1}$	= The euro short-term rate.

13.3.3. ROLLING

The VSTOXX Short-Term Futures Index rolls futures positions on a daily basis. The roll period starts from, and includes, the monthly EUREX VSTOXX futures settlement date and runs up to, but excludes, the subsequent monthly Eurex VSTOXX futures settlement date.

Rolling between the first month future (F1) and the second month future (F2) takes place over n index business days. The weights allocated to each F1 and F2 on any given index business day t are determined as follows:

$$w_{1,t} = 100 \cdot \frac{p_t}{n}$$

$$w_{2,t} = 100 \cdot \frac{n\text{-}p_t}{n}$$

Where:

Roll period	= The period from, and including, the most recent Eurex VSTOXX futures settlement date up to, but excluding, the subsequent Eurex VSTOXX futures settlement date
n	= The total number of index business days in the current roll period
p_t	= The number of index business days remaining in the current roll period, starting with the following index business date up to and including the last index business day in the current roll period (Note:, on the last index business date of the period, $p_t = 0$)

13.STOXX VOLATILITY FUTURES

At the close of the last index business day of any roll period (the index business day immediately preceding a Eurex VSTOXX futures settlement date) all of the weight is allocated to the second month Eurex VSTOXX futures contract. On the Eurex VSTOXX futures settlement date, the second month contract position becomes the first month contract at settlement. On the Eurex VSTOXX futures settlement date and on each subsequent index business day of the new roll period, a fraction of the first month contract is sold and an equal notional amount of the second month Eurex VSTOXX futures contract is bought. This way the allocation to the first month contract is progressively rolled into the following month contract over the roll period.

13.3.4. CONSEQUENCES OF AN INDEX DISRUPTION EVENT

If an index disruption event in relation to the Eurex futures contract occurs on index dissemination days, then the following applies:

STOXX Ltd. will calculate the value of the index based on the most recent middle futures prices published by Eurex and the roll for that day will be carried to the next index business day, as described in the roll period section.

If an exchange fails to open due to unforeseen circumstances, STOXX Ltd. may determine not to publish the index for that day.

In situations where an exchange introduces a holiday during the month of the index calculation, the index will not be published and the roll for that day will be carried to the next index business day, as described in the roll period section.

14.VSTOXX SHORT-TERM FUTURES INVESTABLE INDICES

14.1. VSTOXX SHORT-TERM FUTURES INVESTABLE INDEX

14.1.1.OVERVIEW

The VSTOXX Short-Term Futures Investable Index replicates the performance of a long position in constant-maturity one-month forward, one-month implied volatilities on the underlying EURO STOXX 50 Index taking into account the bid-ask spread in the roll procedure.
The index continuously rolls over on a daily basis from the first month VSTOXX Futures contract to the second month contract.

Dissemination Calendar: STOXX Eurex Calendar

14.1.2. BASIC DATA

Index	ISIN	Symbol
VSTOXX Short-Term Futures Investable EUR (Excess Return)	CH0354759968	VST1MSE
VSTOXX Short-Term Futures Investable USD (Excess Return)	CH0354873926	VST1MSL

14.1.3.CALCULATION

14.1.3.1. INDEX FORMULA

The daily index level is defined as

$$IV_t = C_{1t}^{Post} P_{1t}^{M} + C_{2t}^{Post} P_{2t}^{M}$$

where

C_{xt}^{Post} = number of contracts of future x held at the end of day t after the roll[3]
P_{xt}^{M} = mid-price of future x on day t based on last bid and ask at 17:30:00 CET

The index base value is 10'000 as of December 30, 2016.

14.1.3.2. ROLL PROCEDURE

The roll period starts from, and includes, the monthly Eurex VSTOXX futures settlement date and runs up to, but excludes, the subsequent monthly Eurex VSTOXX futures settlement date.

The daily roll has to satisfy both the target allocation constraint and the self-financing constraint, as explained below:

Target allocation constraint (I)

$$w_{1t} = \frac{C_{1t}^{Post}}{C_{1t}^{Post} + C_{2t}^{Post}}$$

[3] On final settlement days the first and second futures refer to the contracts with one month and two months to expiration respectively.

14. VSTOXX SHORT-TERM FUTURES INVESTABLE INDICES

After the roll, the number of contracts of each future has to satisfy the target weights with $w_{1t} + w_{2t} = 1$.
The target weight after the roll on day *t* of contract 1, w_{1t}, is defined as $\frac{d}{T}$ where

d = number of index business days between t and the next settlement date excluding day t and excluding the next settlement date

T = the total number of index business days in the current roll period including the previous final settlement date and excluding the next

The futures' final settlement dates are as defined by Eurex[4]:
Final settlement day is 30 calendar days prior to the expiration day of the underlying options (i.e. 30 days prior to the third Friday of the expiration month of the underlying options, if this is an exchange day). This is usually the Wednesday prior to the second last Friday of the respective maturity month, if this is an exchange day; otherwise the exchange day immediately preceding that day.

Self-financing constraint (II)

$$C_{1t}^{Post} P_{1t}^{M} + C_{2t}^{Post} P_{2t}^{M} = C_{1t}^{Pre} P_{1t}^{M} + C_{2t}^{Pre} P_{2t}^{M} - (C_{1t}^{Post} - C_{1t}^{Pre})(P_{1t}^{B} - P_{1t}^{M}) - (C_{2t}^{Post} - C_{2t}^{Pre})(P_{2t}^{A} - P_{2t}^{M})$$

The post-roll index level has to be equal to the pre-roll index level minus the cost of trading (selling contract 1 at bid and buying contract 2 at ask).

C_{xt}^{Pre} = number of contracts of future x held at the end of day t before the roll; equivalent to number of contracts of the same futures contract held on day t-1 post roll

P_{xt}^{B} = bid price, last available at 17:30:00 CET

P_{xt}^{A} = ask price, last available at 17:30:00 CET

Determination of the Number of Contracts
The target allocation (I) and self-financing (II) constraint equations can be solved for the post-roll number of contracts:

$$C_{1t}^{Post} = \frac{C_{1t}^{Pre} P_{1t}^{B} + C_{2t}^{Pre} P_{2t}^{A}}{P_{1t}^{B} + \frac{1 - w_{1t}}{w_{1t}} P_{2t}^{A}}$$

$$C_{2t}^{Post} = \frac{C_{1t}^{Pre} P_{1t}^{B} + C_{2t}^{Pre} P_{2t}^{A}}{\frac{w_{1t}}{1 - w_{1t}} P_{1t}^{B} + P_{2t}^{A}}$$

At the close of the last index business day of any roll period (the index business day immediately preceding a Eurex VSTOXX futures settlement date) all of the weight is allocated to the second month Eurex VSTOXX futures contract:

$$C_{1t}^{Post} = 0$$

[4] See http://www.eurexchange.com/exchange-en/products/vol/vstoxx/vstoxx--futures-and-options/VSTOXX--Futures/14566, subject to any change by Eurex

14.VSTOXX SHORT-TERM FUTURES INVESTABLE INDICES

$$C_{2t}^{Post} = \frac{C_{1t}^{Pre} P_{1t}^{B} + C_{2t}^{Pre} P_{2t}^{A}}{P_{2t}^{A}}$$

On the Eurex VSTOXX futures settlement date, the second month contract position becomes the first month contract at settlement. On the settlement date the post-roll number of contracts is calculated by:

$$C_{1t}^{Post} = \frac{C_{1t}^{Pre} P_{1t}^{B}}{P_{1t}^{B} + \frac{1 - w_{1t}}{w_{1t}} P_{2t}^{A}}$$

$$C_{2t}^{Post} = \frac{C_{1t}^{Pre} P_{1t}^{B}}{\frac{w_{1t}}{1 - w_{1t}} P_{1t}^{B} + P_{2t}^{A}}$$

On the final settlement date, C_{1t}^{Pre} refers to the Eurex VSTOXX future which at the end of the settlement date is the contract with one-month to expiration which on the the prior day had been the second month contract, C_2.

14.2. VSTOXX SHORT-TERM FUTURES INVERSE INVESTABLE INDEX

14.2.1.OVERVIEW

The VSTOXX Short-Term Futures Inverse Investable Index replicates the performance of a short position in constant-maturity one-month forward, one-month implied volatilities on the underlying EURO STOXX 50 Index taking into account the bid-ask spread in the roll procedure.
The index continuously rolls over on a daily basis from a short position in the first month VSTOXX Futures contract to a short position in the second month contract.

Dissemination Calendar: STOXX Eurex Calendar

14.2.2. BASIC DATA

Index	ISIN	Symbol
VSTOXX Short-Term Futures Inverse Investable EUR (Excess Return)	CH0354760123	VST1MISE
VSTOXX Short-Term Futures Inverse Investable USD (Excess Return)	CH0354874031	VST1MISL

14.2.3.CALCULATION

14.2.3.1. INDEX FORMULA

The daily index level is defined as

$$IV_t^{Post} = -(C_{1t}^{Post} P_{1t}^{M} + C_{2t}^{Post} P_{2t}^{M})$$

Where

14.VSTOXX SHORT-TERM FUTURES INVESTABLE INDICES

C_{xt}^{Post} = number of contracts of future x held at the end of day t after the roll[5]
P_{xt}^{M} = mid-price of future x on day t based on last bid and ask at 17:30:00 CET

The index is available in EUR and USD.

The index base value is 10'000 as of December 30, 2016.

The pre-roll index level is calculated to replicate the performance of a hypothetical short selling of the contracts as

$$IV_t^{Pre} = IV_{t-1}^{Post} + C_{1t}^{Pre}\left(P_{1t}^{M} - P_{1,t-1}^{M}\right) + C_{2t}^{Pre}\left(P_{2t}^{M} - P_{2,t-1}^{M}\right)$$

C_{xt}^{Pre} = number of contracts of future x held at the end of day t before the roll; equivalent to number of contracts of the same futures contract held on day t-1 post roll

Substituting the post-roll index level formula, using the identity $C_{xt-1}^{Post} = C_{xt}^{Pre}$, and reordering yields:

$$IV_t^{Pre} = -C_{1t}^{Pre}\left(2P_{1,t-1}^{M} - P_{1t}^{M}\right) - C_{2t}^{Pre}\left(2P_{2,t-1}^{M} - P_{2t}^{M}\right)$$

14.2.3.2. ROLL PROCEDURE

The roll period starts from, and includes, the monthly Eurex VSTOXX futures settlement date and runs up to, but excludes, the subsequent monthly Eurex VSTOXX futures settlement date.

The daily roll has to satisfy both the target allocation constraint and the self-financing constraint, as explained below:

Target allocation constraint (I)

$$w_{1t} = \frac{C_{1t}^{Post}}{C_{1t}^{Post} + C_{2t}^{Post}}$$

After the roll, the number of contracts of each future has to satisfy the target weights with $w_{1t} + w_{2t} = 1$.
The target weight after the roll on day *t* of contract 1, w_{1t}, is defined as $\frac{d}{T}$ where

d = number of index business days between t and the next settlement date excluding day t and excluding the next settlement date
T = the total number of index business days in the current roll period including the previous final settlement date and excluding the next

The futures' final settlement dates are as defined by Eurex[6]:

[5] On final settlement days the first and second futures refer to the contracts with one month and two months to expiration respectively.
[6] See http://www.eurexchange.com/exchange-en/products/vol/vstoxx/vstoxx--futures-and-options/VSTOXX--Futures/14566, subject to any change by Eurex

14.VSTOXX SHORT-TERM FUTURES INVESTABLE INDICES

Final settlement day is 30 calendar days prior to the expiration day of the underlying options (i.e. 30 days prior to the third Friday of the expiration month of the underlying options, if this is an exchange day). This is usually the Wednesday prior to the second last Friday of the respective maturity month, if this is an exchange day; otherwise the exchange day immediately preceding that day.

Self-financing constraint (II)

$$IV_t^{Post} = IV_t^{Pre} - (C_{1t}^{Post} - C_{1t}^{Pre})(P_{1t}^* - P_{1t}^M) - (C_{2t}^{Post} - C_{2t}^{Pre})(P_{2t}^* - P_{2t}^M)$$

The post-roll index level has to be equal to the pre-roll index level minus cost the of trading. Hereby P_{xt}^* refers to either the bid price P_{xt}^B or ask price P_{xt}^A depending on whether the corresponding contract has to be bought (at ask) or sold (at bid); details at the end of this section.

P_{xt}^B = bid price, last available at 17:30:00 CET
P_{xt}^A = ask price, last available at 17:30:00 CET

Substituting the post-roll index into the self-financing constraint (II) and reordering yields:

$$C_{1t}^{Post}(2P_{1t}^M - P_{1t}^*) + C_{2t}^{Post}(2P_{2t}^M - P_{2t}^*) = C_{1t}^{Pre}\left(2P_{1,t-1}^M - P_{1t}^*\right) + C_{2t}^{Pre}\left(2P_{2,t-1}^M - P_{2t}^*\right)$$

Determination of the Number of Contracts

The above equation together with the target allocation constraint (I) can be solved for the post-roll number of contracts:

$$C_{1t}^{Post} = \frac{C_{1t}^{Pre}\left(2P_{1,t-1}^M - P_{1t}^*\right) + C_{2t}^{Pre}\left(2P_{2,t-1}^M - P_{2t}^*\right)}{(2P_{1t}^M - P_{1t}^*) + \frac{1 - w_{1t}}{w_{1t}}(2P_{2t}^M - P_{2t}^*)}$$

$$C_{2t}^{Post} = \frac{C_{1t}^{Pre}\left(2P_{1,t-1}^M - P_{1t}^*\right) + C_{2t}^{Pre}\left(2P_{2,t-1}^M - P_{2t}^*\right)}{\frac{w_{1t}}{1 - w_{1t}}(2P_{1t}^M - P_{1t}^*) + (2P_{2t}^M - P_{2t}^*)}$$

At the close of the last index business day of any roll period (the index business day immediately preceding a Eurex VSTOXX futures settlement date) all of the weight is allocated to the second month Eurex VSTOXX futures contract:

$$C_{1t}^{Post} = 0$$

$$C_{2t}^{Post} = \frac{C_{1t}^{Pre}\left(2P_{1,t-1}^M - P_{1t}^*\right) + C_{2t}^{Pre}\left(2P_{2,t-1}^M - P_{2t}^*\right)}{(2P_{2t}^M - P_{2t}^*)}$$

On the Eurex VSTOXX futures settlement date, the second month contract position becomes the first month contract at settlement. On the settlement date the post-roll number of contracts is calculated by:

14.VSTOXX SHORT-TERM FUTURES INVESTABLE INDICES

$$C_{1t}^{Post} = \frac{C_{1t}^{Pre}\left(2P_{1,t-1}^{M} - P_{1t}^{*}\right)}{(2P_{1t}^{M} - P_{1t}^{*}) + \frac{1-w_{1t}}{w_{1t}}(2P_{2t}^{M} - P_{2t}^{*})}$$

$$C_{2t}^{Post} = \frac{C_{1t}^{Pre}\left(2P_{1,t-1}^{M} - P_{1t}^{*}\right)}{\frac{w_{1t}}{1-w_{1t}}(2P_{1t}^{M} - P_{1t}^{*}) + (2P_{2t}^{M} - P_{2t}^{*})}$$

On the final settlement date, C_{1t}^{Pre} refers to the Eurex VSTOXX future which at the end of the settlement date is the contract with one-month to expiration which on the prior day had been the second month contract, C_2.

One has to note that in above formulas $P_{x,t-1}$ and P_{xt} refer to the futures prices on different days of contracts with identical expiration dates.

In order to determine whether bid or ask prices are to be used C_{1t}^{Post} and C_{2t}^{Post} are calculated for all four scenarios by using the appropriate bid and ask prices in above formulas.

Scenario	Self-financing constraint	Feasible if resulting
Buy 1st/Sell 2nd	$IV_t^{Post} = IV_t^{Pre} - (C_{1t}^{Post} - C_{1t}^{Pre})(P_{1t}^{A} - P_{1t}^{M}) - (C_{2t}^{Post} - C_{2t}^{Pre})(P_{2t}^{B} - P_{2t}^{M})$	$C_{1t}^{Post} - C_{1t}^{Pre} \geq 0$ and $C_{2t}^{Post} - C_{2t}^{Pre} \leq 0$
Buy 1st/Buy 2nd	$IV_t^{Post} = IV_t^{Pre} - (C_{1t}^{Post} - C_{1t}^{Pre})(P_{1t}^{A} - P_{1t}^{M}) - (C_{2t}^{Post} - C_{2t}^{Pre})(P_{2t}^{A} - P_{2t}^{M})$	$C_{1t}^{Post} - C_{1t}^{Pre} \geq 0$ and $C_{2t}^{Post} - C_{2t}^{Pre} \geq 0$
Sell 1st/ Sell 2nd	$IV_t^{Post} = IV_t^{Pre} - (C_{1t}^{Post} - C_{1t}^{Pre})(P_{1t}^{B} - P_{1t}^{M}) - (C_{2t}^{Post} - C_{2t}^{Pre})(P_{2t}^{B} - P_{2t}^{M})$	$C_{1t}^{Post} - C_{1t}^{Pre} \leq 0$ and $C_{2t}^{Post} - C_{2t}^{Pre} \leq 0$
Sell 1st/Buy 2nd	$IV_t^{Post} = IV_t^{Pre} - (C_{1t}^{Post} - C_{1t}^{Pre})(P_{1t}^{B} - P_{1t}^{M}) - (C_{2t}^{Post} - C_{2t}^{Pre})(P_{2t}^{A} - P_{2t}^{M})$	$C_{1t}^{Post} - C_{1t}^{Pre} \leq 0$ and $C_{2t}^{Post} - C_{2t}^{Pre} \geq 0$

On most days the inverse index roll procedure will have the first contract bought and the second contract sold. On a few occasions other trading scenarios might be required though (e.g. buy first contract and buy second contract). In those cases, the self-financing constraint needs to be adjusted and the correct bid or ask prices have to be used as one always buys at ask and sells at bid.

The second column shows each scenario's respective self-financing constraint that has to be used to derive the post-roll amount of contracts.
We say that a solution is feasible if the trading it implies is consistent with the scenario's assumption. For example, in the sell/sell scenario the solution is feasible if the calculated post-roll contracts imply that both contracts have to be sold.
In the case that there is more than one feasible solution we pick out of all feasible solutions the one that has the least negative cost (i.e. causes the highest post-roll index value).

14.3. CONSEQUENCES OF AN INDEX DISRUPTION EVENT

If an index disruption event in relation to the Eurex futures contract occurs on index dissemination days, then the following applies:

14.VSTOXX SHORT-TERM FUTURES INVESTABLE INDICES

STOXX Ltd. will repeat the end of day index value of the previous day and the roll for that day will be postponed to the next index business day (i.e. the number of contracts held of each contract remains unchanged).

Valid quotes not being available is considered an index disruption event.

If an exchange fails to open due to unforeseen circumstances, STOXX Ltd. may determine not to publish the index for that day.

In situations where an exchange introduces a holiday during the month of the index calculation, the index will not be published, and the roll for that day will be carried to the next index business day, as described in the roll procedure section.

15.EURO STOXX 50 RISK CONTROL

15.1. OVERVIEW

With STOXX Risk Control indices a target volatility concept is applied to the EURO STOXX 50 Index and other STOXX indices. Whereas the risk profile of a standard index like the EURO STOXX 50 Index is the outcome of the existing market-cap weighted index concept, the EURO STOXX 50 Risk Control Index supervises the risk up to a defined target volatility level. In order to control for risk, the index shifts between a money market and a risky investment (measured by the EURO STOXX 50 Index).

If on a daily basis the risk of the current EURO STOXX 50 Risk Control Index composition is below the targeted risk, the allocation will be adjusted towards the risky asset. If the current risk profile is above the targeted level, the allocation will be adjusted towards the money market component.

- To avoid extreme leveraged positions, a maximum exposure of 150 percent towards the risky asset is introduced.
- A tolerance level of 5 percent around the target volatility is implemented to avoid high allocation turnover due to minimal deviations from the targeted risk level.
- To control for outliers, an average volatility level is used.
- The indices are offered both as implied volatility and realized volatility based versions, the latter being distinguished by the "RV" wording in the name.

15.2. BASIC DATA

Index	ISIN	Symbol
EURO STOXX 50 Risk Control 10% (Total Return)	CH0118856118	RC10IVTR
EURO STOXX 50 Risk Control 10% (Excess Return)	CH0118856126	RC10IVER
EURO STOXX 50 Risk Control 12% (Total Return)	CH0118856134	RC12IVTR
EURO STOXX 50 Risk Control 12% (Excess Return)	CH0118856142	RC12IVER
EURO STOXX 50 Risk Control 15% (Total Return)	CH0117326766	RC15IVTR
EURO STOXX 50 Risk Control 15% (Excess Return)	CH0117326758	RC15IVER
EURO STOXX 50 Risk Control 20% (Total Return)	CH0116915981	SX5TRCTR
EURO STOXX 50 Risk Control 20% (Excess Return)	CH0116915973	SX5TRCER
EURO STOXX 50 Risk Control 5% (Total Return)	CH0118856159	RC05IVTR
EURO STOXX 50 Risk Control 5% (Excess Return)	CH0118856167	RC05IVER
EURO STOXX 50 Risk Control 10% RV (Excess Return)	CH0147246760	SX5R10EE
<further indices as listed in the STOXX vendor code sheet>		

15.3. CALCULATION

15.3.1. INDEX FORMULA FOR IMPLIED VOLATILITY INDICES

$$\mathrm{IndexTR}_t = \mathrm{IndexTR}_{t-1} \times \left[1 + w_{t-1} \times \left(\frac{\mathrm{SX5T}_t}{\mathrm{SX5T}_{t-1}} - 1\right) + (1 - w_{t-1}) \times \left((\mathrm{IR}_{t-1} + x)\frac{\mathrm{Diff}(t-1,\mathrm{t})}{360}\right)\right]$$

15.EURO STOXX 50 RISK CONTROL

$$\text{IndexER}_t = \text{IndexER}_{t-1} \times \left(1 - \text{IR}_{t-1}\frac{\text{Act}(t-1,t)}{360}\right) \times \left[1 + w_{t-1}\left(\frac{\text{SX5T}_t}{\text{SX5T}_{t-1}} - 1\right) + (1 - w_{t-1})\left((\text{IR}_{t-1} + x)\frac{\text{Diff}(t-1,t)}{360}\right)\right]$$

where:

IndexER_t	=	Excess Return Index level on index level determination date t
IndexTR_t	=	Net Return Index level on index level determination date t
w_t	=	Equity Weight on index level determination date t
SX5T_t	=	Level of the EURO STOXX 50 Net Return on index level determination date t
IR_t	=	Money-market rate on the index level determination date t
x	=	Cost of borrowing: If $w_{t-1} \leq 1$, then x=0, otherwise x=50 Basis Points
Diff(t-1,1)	=	Difference between determination date t-1 and t measured in calendar days

15.3.2. INDEX FORMULA FOR REALIZED VOLATILITY INDICES

$$\text{IndexTR}_t = \text{IndexTR}_{t-1} \times \left[1 + w_{t-1} \times \left(\frac{\text{SX5T}_t}{\text{SX5T}_{t-1}} - 1\right) + (1 - w_{t-1}) \times \left((\text{IR}_{t-1})\frac{\text{Diff}(t-1,t)}{360}\right)\right]$$

$$\text{IndexER}_t = \text{IndexER}_{t-1} \times \left(1 - \text{IR}_{t-1}\frac{\text{Act}(t-1,t)}{360}\right) \times \left[1 + w_{t-1}\left(\frac{\text{SX5T}_t}{\text{SX5T}_{t-1}} - 1\right) + (1 - w_{t-1})\left((\text{IR}_{t-1})\frac{\text{Diff}(t-1,t)}{360}\right)\right]$$

where:

IndexER_t	=	Excess Return Index level on index level determination date t
IndexTR_t	=	Net Return Index level on index level determination date t
w_t	=	Equity Weight on index level determination date t
SX5T_t	=	Level of the EURO STOXX 50 Net Return on index level determination date t
IR_t	=	Money-market rate on the index level determination date t
Diff(t-1,1)	=	Difference between determination date t-1 and t measured in calendar days

While €STR[7] rate will typically be applied as money-market rate to the EURO STOXX 50 Risk Control indices, some variants may adopt a different rate. Please refer to the individual index composition data for more details.

15.3.3. DETERMINATION OF THE TARGET WEIGHT (TGTW) USING IMPLIED VOLATILITY

On any index level determination date t, the target weight is to be determined as follows:

$$\text{Tgtw}_t = \frac{\text{TgtVol}}{\text{Max}_{i\in[t-19,t]}\left[\text{AverageVSTOXX}_{3,i}\right]}$$

[7] In case €STR is used in the calculation, the index will be calculated using €STR that is published on day T in respect of day T-1.

15.EURO STOXX 50 RISK CONTROL

where:

TgtVol = targeted volatility level

$\text{Average VSTOXX}_{3,I}$ = average of the close values of the VSTOXX for index level determination date i-2, i-1 and i

VSTOXX = close value of the VSTOXX index as published by STOXX under the symbol V2TX

$\text{Max}_{i\in[t-19,t]}\left[\text{AverageVSTOXX}_{3,i}\right]$ = maximum value of average VSTOXX $_{3,i}$ for i ranging from t-19 to t.

15.3.4. DETERMINATION OF THE TARGET WEIGHT (TGTW) USING REALIZED VOLATILITY

On any Index Level Determination Date t, the Target Weight shall be determined as follows:

$$\text{Tgtw}_t = \frac{\text{TgtVol}}{\text{Max Re a lizedVol}_{t,(20,60)}}$$

where:

TgtVol = targeted volatility level

$\text{Max Re a lizedVol}_{20,60}$ = maximum of the realized volatilities measured over 20 days and 60 days

$$\text{Realized Vol}_{t,n} = \sqrt{\frac{252}{n}\cdot\sum_s\left[\ln\left(\frac{\text{STOXX}_s}{\text{STOXX}_{s-1}}\right)\right]^2}$$

where:

n = 19 (59)

s = ranging from t-18 to t (t-58 to t)

15.3.5. DETERMINATION OF EQUITY WEIGHT (W) AND INDEX REBALANCING DAYS

The equity weight on the index start date is to be equal to the target weight at the index start date,

$$w_0 = \text{Min}(\text{Cap},\text{Tgtw}_0)$$

On any index level determination date t subsequent to the index start date, the equity weight is to be determined as follows:

$$\text{(i) If abs}\left\{1-\frac{w_{t-1}}{\text{Tgtw}_{t-1}}\right\} > \text{Tolerance}$$

then that index level determination date t will be an index rebalancing day and

$$w_t = \text{Min}(\text{Cap},\text{Tgtw}_{t-1})$$

(ii) Otherwise, index level determination date t will not be an index rebalancing day and

$$w_t = w_{t-1}$$

15.EURO STOXX 50 RISK CONTROL

Tolerance =	5%
w_t =	Equity weight on index level determination date t
$Tgtw_t$ =	Target weight on index level determination date t
Cap =	150%

16.STOXX RISK CONTROL INDICES

16.1. OVERVIEW

A target volatility concept is applied to the STOXX Risk Control Indices. Whereas the risk profile of the underlying index is the uncontrolled outcome of the existing market-cap weighted index concept, the Risk Control Indices controls for risk by aiming for a defined target volatility level. In order to control for risk, the index shifts between a risk free money market investment and a risky asset (measured by the respective underlying equity index).

16.2. BASIC DATA

Various versions of the STOXX Risk Control indices are available for a broad number of countries and target volatility levels. For more details please consult the Data Vendor Code sheet on the STOXX website[8].

16.3. CALCULATION

16.3.1. INDEX FORMULA

$$\text{STOXXTR}_t = \text{STOXXTR}_{t-1} \times \left[1 + w_{t-1}\left(\frac{\text{STOXX}_t}{\text{STOXX}_{t-1}} - 1\right) + (1 - w_{t-1})\left((\text{IR}_{t-1})\frac{\text{Diff}(t-1,t)}{360}\right)\right]$$

$$\text{STOXXER}_t = \text{STOXXER}_{t-1} \times \left(1 - \text{IR}_{t-1}\frac{\text{Diff}(t-1,t)}{360}\right) \times \left[1 + w_{t-1}\left(\frac{\text{STOXX}_t}{\text{STOXX}_{t-1}} - 1\right) + (1 - w_{t-1})\left((\text{IR}_{t-1})\frac{\text{Diff}(t-1,t)}{360}\right)\right]$$

where:

STOXXTR_t = Total Return STOXX Risk Control index level on index level determination date t

STOXXER_t = Excess Return STOXX Risk Control index level on index level determination date t

w_t = Equity Weight on index level determination date t

STOXX_t =Level of the underlying STOXX index on index level determination date t

IR_t = Money-market rate on index level determination date t[9]

$\text{Diff}(t-1, t)$ = Difference between t-1 and t measured in calendar days

The indices exist in different variants, given by the combination of the underlying index return type (P, NR, GR) and the risk control return type (ER, TR).

The money-market rate applicable to each individual index is typically chosen on the basis of the region / country covered by the underlying index, as represented in the below table; however, some variants may adopt a different rate. Please refer to the individual index composition data for more details.

[8] http://www.stoxx.com/

[9] If the IR used in index calculation on day t is unavailable, then the latest available IR value will be used

16.STOXX RISK CONTROL INDICES

Region / Country	Interest rate (currency)
Americas	SOFR
Europe / Eurozone / Nordic	€STR[10]
UK	SONIA
Oceania	AUD-LIBOR
Asia	SOFR
LatAm	SOFR
Global	SOFR

16.3.1. DETERMINATION OF THE TARGET WEIGHT

On any Index Level Determination Date t, the Target Weight shall be determined as follows:

$$Tgtw_t = \frac{TgtVol}{MaxRealizedVol_{t,(20,60)}}$$

where:

TgtVol = predetermined level of volatility

$Max\ Re\ a\ lizedVol_{20,60}$ is the maximum of the realized volatilities measured over 20 and 60 days

$$\text{Realized Vol}_{t,n} = \sqrt{\frac{252}{n} \cdot \sum_{s} \left[\ln\left(\frac{\text{STOXX}_s}{\text{STOXX}_{s-1}}\right)\right]^2}$$

where:

n = 19 (59)

s = ranging from t-18 to t (t-58 to t)

16.3.2. DETERMINATION OF THE EQUITY WEIGHT AND INDEX REBALANCING DAYS

The Equity Weight on the Index Start Date shall be equal to the Target Weight at the Index Start Date,

$$w_0 = Min(Cap, Tgtw_0)$$

On any Index Level Determination Date t subsequent to the Index Start Date, the Equity Weight shall be determined as follows:

(i) If $abs\left\{1 - \frac{w_{t-1}}{Tgtw_{t-1}}\right\} > Tolerance$

then the Index Level Determination Date t will be an Index Rebalancing Day and

$$w_t = Min(Cap, Tgtw_{t-1})$$

(ii) Otherwise, Index Level Determination Date t will not be an Index Rebalancing Day and

$$W_t = W_{t-1}$$

[10] In case €STRis used in the calculation, the index will be calculated using €STR that is published on day T in respect of day T-1.

16.STOXX RISK CONTROL INDICES

where:

Tolerance = allows a predefined deviation from the target weight, set to 5% and subject to the exceptions listed in the following table

w_t = Equity Weight on Index Level Determination Date t

$Tgtw_t$ = Target Weight on Index Level Determination Date t

Cap = the maximum portion that can be given to the risky asset, set to 150% and subject to the exceptions listed in the following table.

Index	Tolerance	Cap
STOXX Europe Large 200 Risk Control Index	5%	100%
STOXX Nordic Strong Quality 20 Risk Control Index	5%	100%

17.EURO STOXX 50 INVESTABLE VOLATILITY

17.1. OVERVIEW

Volatility is a measure of the level of uncertainty prevailing in certain markets. In principle, there are two different approaches to estimating volatility. Historical volatility involves measuring the standard deviation of historical closing prices for any particular security over a given period of time. Implied volatility is derived from option prices; this kind of volatility represents the estimates and assumptions of market participants involved in a trade, on the basis of a given option price.

The VSTOXX index (calculated by STOXX) is a measure of current implied volatility, as measured using EURO STOXX 50 index options. Because the VSTOXX index is calculated using spot implied volatility levels, however, the returns of the VSTOXX index are not directly replicable.

The EURO STOXX 50 Investable Volatility index is a volatility index which provides exposure to forward implied volatility in a form which can be directly replicated. The EURO STOXX 50 Investable Volatility index is designed as a rolling index which targets a constant 3-month (90-day) forward, 3-month maturity volatility exposure. The index is calculated entirely using VSTOXX sub-index levels calculated and published by STOXX.

The model for the EURO STOXX 50 Investable Volatility index aims at making volatility tradable – i.e. the daily returns of the index should be replicable through holding a portfolio of liquid derivative instruments. As a result, rather than linking the index level to current spot implied variance levels, as in the calculation of the main VSTOXX index, the EURO STOXX 50 Investable Volatility index returns on a daily basis are linked to the movement in forward volatility levels between EURO STOXX 50 option expiries determined using the spot implied variance level to each option expiry (as implied by the VSTOXX sub-index level for each expiry.)

The EURO STOXX 50 Investable Volatility index has been jointly developed by Bank of America Merrill Lynch and STOXX. It offers great advantages in terms of transparency and the trading and hedging of tracking products linked to the index.

Dissemination Calendar: STOXX Eurex Calendar

17.2. BASIC DATA

Index	ISIN	Symbol
EURO STOXX 50 Investable Volatility (Total Return)	CH0117221314	IVSTXTR
EURO STOXX 50 Investable Volatility (Excess Return)	CH0116915965	IVSTXER

17.3. CALCULATION

17.3.1. INPUT DATA

During the calculation time for the EURO STOXX 50 Investable Volatility index the following data are used (via snapshots every 60 seconds):

VSTOXX - EURO STOXX 50 Volatility index levels for the first, second and third month expiry and the second and third quarterly expiries.

17.EURO STOXX 50 INVESTABLE VOLATILITY

€STR - The euro short-term rate.

Index Name	Expiry	Code	ISIN
VSTOXX 1M	First month	VSTX1M	DE000A0G87B2
VSTOXX 2M	Second month	VSTX2M	DE000A0G87C0
VSTOXX 3M	Third month	VSTX3M	DE000A0G87D8
VSTOXX 6M	Second quarter	VSTX6M	DE000A0G87E6
VSTOXX 9M	Third quarter	VSTX9M	DE000A0G87F3

17.3.2. UNDERLYING VSTOXX SUB-INDICES

Apart from the main VSTOXX index (which has no specific time to expiry), sub-indices for each time to expiry of the EURO STOXX 50 options, ranging from one month to two years, are calculated and distributed. The various VSTOXX sub-indices are calculated on the basis of all options available. The calculations are based on the best bid and best ask available for these options in the Eurex system.

The EURO STOXX 50 Investable Volatility index is calculated using forward implied volatility levels between quarterly EURO STOXX 50 option expiry dates by directly referencing VSTOXX sub-index levels representing spot implied volatility for each option expiry date.

17.3.3. COMPOSITE VSTOXX 3M

The VSTOXX 3M Composite represents a quarterly rolling 'front quarter' variance contract, which rolls on the EURO STOXX 50 quarterly option expiry date in line with the VSTOXX 6M and VSTOXX 9M sub-indices.

The VSTOXX 3M Composite is calculated according to the formulas shown below:

$$\text{VSTOXX 3M Comp. (t)} = \begin{cases} \text{VSTOXX 1M* (t); if } t \leq 1M \text{ before the next quarterly expiry date} \\ \text{VSTOXX 2M (t); if } 1M < t \leq 2M \text{ before the next quarterly expiry date} \\ \text{VSTOXX 3M (t); if } 2M < t \leq 3M \text{ before the next quarterly expiry date} \end{cases}$$

and:

» VSTOXX 1M* (t) is equal to VSTOXX 1M* (t-1) where $t \leq 2D$ before the next quarterly expiry date
» VSTOXX 1M* (t) is equal to VSTOXX 1M (t) otherwise

17.3.4. FORWARD-STARTING IMPLIED VOLATILITY LEVELS

3-month forward-starting implied volatility levels for the period between the first quarter and second quarter, and second quarter and third quarter

1. $$\text{FSV}_{3M\text{-}6M}(t) = \sqrt{\frac{\text{TM}_{6M}(t) \times \text{VSTOXX 6M}^2(t) - \text{TM}_{3M}(t) \times \text{VSTOXX 3M Comp}^2(t)}{\text{TM}_{6M}(t) - \text{TM}_{3M}(t)}}$$

2. $$FSV_{6M-9M}(t) = \sqrt{\frac{TM_{9M}(t) \times VSTOXX\ 9M^2(t) - TM_{6M}(t) \times VSTOXX\ 6M^2(t)}{TM_{9M}(t) - TM_{6M}(t)}}$$

and:

17.EURO STOXX 50 INVESTABLE VOLATILITY

» $TM3M\ (t)$ is the number of calendar days remaining until the next quarterly EURO STOXX 50 options expiry date (in March, June, September or December).
» $TM6M\ (t)$ is the number of calendar days remaining until the subsequent quarterly EURO STOXX 50 options expiry date.

17.3.5. WEIGHTINGS

The weightings applied to each of the forward-volatility levels are calculated on the basis of the number of days to the forward-start date of each, with the target of a 3-month weighted average time to maturity, according to the formulas shown below.

1. $\omega_{3M\text{-}6M}\ (t) = \frac{TM_{6M}(t) - ATM}{TM_{6M}(t) - TM_{3M}(t)}$; where $TM_{3M}(t) \geq 7$ days

2. $\omega_{3M-6M}(t) = 0\%;\ otherwise$

3. $\omega_{6M-9M}(t) = 100\% - \omega_{3M-6M}(t)$

4. $U_{3M\text{-}6M}\ (t) = \frac{IV(t) \times \omega_{3M\text{-}6M}(t)}{FSV_{3M\text{-}6M}(t)}$;

5. $U_{6M\text{-}9M}\ (t) = [U_{6M\text{-}9M}\ (t\text{-}1) - U_{3M\text{-}6M}\ (t)] \times \frac{FSV_{3M\text{-}6M}(t)}{FSV_{6M\text{-}9M}(t) \times (1 + 0.75\%)}$.; if t-1 was a quarterly option expiry date

$U_{6M\text{-}9M}\ (t) = U_{6M\text{-}9M}\ (t\text{-}1) + [U_{3M\text{-}6M}\ (t\text{-}1) - U_{3M\text{-}6M}\ (t)] \times \frac{FSV_{3M\text{-}6M}(t)}{FSV_{6M\text{-}9M}(t) \times (1 + 0.75\%)}$; otherwise

and:

» ATM=90 days (the target time to expiry);
» $TM3M\ (t)$ is the number of calendar days remaining until the next quarterly EURO STOXX 50 options expiry date (in March, June, September or December);
» $TM6M\ (t)$ is the number of calendar days remaining until the subsequent quarterly EURO STOXX 50 options expiry date;
» $IV(t)$ is the EURO STOXX 50 Investable Volatility index base index level, calculated as described below (where $IV(0) = 100$ as at the index inception date).

17.3.6. INDEX CALCULATION

The EURO STOXX 50 Investable Volatility index levels are calculated according to the formulas shown below.

1. $IV \rightleftarrows (t) = U_{6M\text{-}9M}(t-1) \times FSV_{3M\text{-}6M}\ (t)$; if t-1 was a quarterly option expiry date
2. $IV \rightleftarrows (t) = U_{3M\text{-}6M}(t-1) \times FSV_{3M\text{-}6M}\ (t) + U_{6M\text{-}9M}(t-1) \times FSV_{6M\text{-}9M}\ (t)$; otherwise
3. $IVSTX\ ER\ (t) = IVSTX\ ER \rightleftarrows (t-1) \times \left(1 + 1.5 \times \left[\left(\frac{IV\ (t)}{IV\ (t-1)} - 1\right)\right]\right)$
4. $IVSTX\ TR\ (t) = IVSTX\ TR\ (t-1) \times \left(\frac{IVSTX\ ER\ (t)}{IVSTX\ ER\ (t-1)} + €STR(t-1) \times \frac{DC(t)}{360}\right)$
5. $(IVSTXVOL = \omega_{3M-6M}(t) \cdot FSV_{3M-6M}(t) + \omega_{6M-9M}(t) \cdot FSV_{6M-6M}(t)$

and:

17.EURO STOXX 50 INVESTABLE VOLATILITY

» $IVSTX\ ER(0)$ = 100 as at the index inception date
» $IVSTX\ TR(0)$ = 100 s at the index inception date
» $DC(t)$ is the number of calendar days from (and including) day t-1 to (but excluding) day t
» €STR (t-1) is the daily euro short-term rate (€STR) fixing for day t-1

17.3.7. INDEX DISRUPTIONS

In order to account for abnormal market conditions (e.g. mistrades) a suspension mechanism is applied.
The index dissemination is suspended in the following cases:

- one of the relevant VSTOXX sub-index is disseminated as Unapproved ("U" flag), or
- the calculated index value deviates by more than 10% from the preceding value (intraday), or
- the calculated index value deviates by more than 20% from the last End of Day value.

The index is resumed if:

- the relevant VSTOXX sub-indices resume being disseminated as Approved ("A" flag") and calculated index value does not exceed any of the 10% or 20% deviation thresholds any longer, or
- the disruption, both in the underlying sub-indices and calculated indices, is considered to be caused by regular market conditions.

18.STOXX CURRENCY HEDGED

18.1. OVERVIEW

A currency-hedged index is designed to represent returns for global index investment strategies that involve hedging currency risk, but not the underlying constituent risk. The currency-hedged strategy indices eliminate the risk of currency fluctuations at the cost of potential currency gains.

An investor who will receive a payment in a foreign currency at a future date and expects the domestic (hedged) currency to appreciate against that foreign currency, can enter a forward contract to sell the foreign currency in the future at a predefined exchange rate. If, at the maturity of the forward contract, the domestic currency has appreciated against foreign currency, the investor can make a profit by selling the payment proceeds (in foreign currency) at a lower rate than the one prevailing on the market.

STOXX offers two types of currency-hedged indices : accordingly, the reset of hedge notional and currency exposures occurs either on a daily or monthly basis.

While all currency hedged indices are calculated as end-of-day, some may be updated intraday. For the indices updated intraday, only the value of the underlying -unhedged- index is updated, based on its calculation frequency, while the currency rates remain fixed throughout the day. More specifically, the previous day's WM fixings for spot and forward rates are used. The current day's WM fixings for spot and forward rates are only applied in the calculation of the end-of-day index calculation.

The STOXX currency-hedged indices are typically available in the following versions:

- AUD Hedged
- CHF Hedged
- EUR Hedged
- GBP Hedged
- JPY Hedged
- USD Hedged

Other versions are available upon request.

18.2. BASIC DATA

Index	ISIN	Symbol
< indices as listed in the STOXX vendor code sheet>		

For iSTOXX® PPF Responsible SDG Monthly Hedged index the currency exposures are 50% hedged, with the exception of USD exposure, which is 75% hedged. USD exposure was hedged 50% prior to August 1st 2025.

18.STOXX CURRENCY HEDGED

18.3. CALCULATION

18.3.1. DEFINITIONS

The following definitions will be used throughout the chapter:

H_IDX_t = hedged index for day t
UH_IDX_t= unhedged reference index (in hedged currency) for day t
$t=0$ = last calculation day of preceding month (reset date)
t = day of index calculation / number of calendar days since $t=0$
T = number of calendar days in current month
C = number of foreign currencies in the unhedged index
AF_t = notional adjustment factor for day t
$HR_{c,t}$ = hedge ratio of currency c for day t
$HM_{c,t}$ = hedge multiplier of currency c for day t
$FX_{c,t}$ = spot currency rate for day t
$FF_{c,t}$ = 1-month forward currency rate for day t
$IFF_{c,t}$ = interpolated forward currency rate for day t
R_t = return from hedging for day t

All currency rates are expressed as units of foreign currency c per one unit of domestic (hedged) currency.

The adjustment factor AF_t reflects the changes in the notional value to be hedged between the $t=0$ and t:

$$AF_t=\frac{UH\_IDX_t}{UH\_IDX_0}$$

The hedge ratio $HR_{c,t}$ can be varied to arrive at index portfolios that are over- or under-hedged to varying degrees. Furthermore, it can be used to hedge multi-currency portfolios.
To fully hedge a multi-currency portfolio, the hedge ratio of each currency is calculated as the sum of weights of the securities quoted in that currency multiplied by the hedge multiplier of the currency to over- or under-hedge the multi-currency portfolio:

$$HR_{c,t}=HM_{c,t}\cdot\sum_{i:ccy_i=c} w_{i,t}$$

The hedge multipliers are set to 1 by default unless otherwise specified.

The interpolated forward currency rate $IFF_{c,t}$ corrects the 1-month forward rate – traded with a fixed 1-month maturity – to reflect the progressively closer expiry ($t=T$) of the hedge. In other words, the interpolated 1-month forward rate linearly converges to the spot rate as $t=T$ approaches:

$$IFF_{c,t}=FX_{c,t}+\left(1-\frac{t}{T}\right)\cdot\left(FF_{c,t}-FX_{c,t}\right)$$

From the above definition, it follows that $IFF_{c,0}=FF_{c,0}$ and $IFF_{c,T}=FX_{c,T}$.

18.STOXX CURRENCY HEDGED

For each currency c, the contribution of hedging to the index return is defined as the product of the relevant hedge ratio by the return on the forward currency trade.
For instance, an investor knows in t=0 that she will receive a payment of 1 unit of foreign currency in t=T. She could wait and convert it at the then prevailing spot rate $FX_{c,T}$ and obtain $1/FX_{c,T}$ units of domestic currency. Alternatively, she could enter a forward trade in t=0 to sell the foreign currency in t=T at $FF_{c,0}$, thus obtaining $1/FF_{c,0}$ units of domestic currency.
The P&L from the forward trade, as compared to a spot conversion, is thus $P\&L_{c,[0,T]} = \frac{1}{FF_{c,0}} - \frac{1}{FX_{c,T}}$.
By expressing the forward trade P&L as percentage of the payment value in domestic currency in t=0 and rearranging the terms, the returns on the forward trade can be expressed as $\frac{FX_{c,0}}{FF_{c,0}} - \frac{FX_{c,0}}{FX_{c,T}}$.
The expression for forward trade returns can then be generalized as:

$$R_t = \sum_{c=1}^{C} HR_{c,t-1} \cdot \left(\frac{FX_{c,0}}{IFF_{c,t-1}} - \frac{FX_{c,0}}{IFF_{c,t}} \right)$$

18.3.2. DAILY HEDGED INDICES

With daily hedged indices, the hedging trade is entered at the end of each calendar month. From that day onwards, the returns of the underlying, unhedged index are integrated by the returns from hedging. Moreover, the notional amount being hedged and the weight of the individual underlying currencies are adjusted on a daily basis.
At the cost of an increased trading activity, the daily hedging aims to timely and precisely offset the currency exposures of the index and is thus particularly suited to volatile markets.

The daily currency hedged indices are thus calculated as:

$$H\_IDX_t = H\_IDX_0 \cdot \left(\frac{UH\_IDX_t}{UH\_IDX_0} + \sum_{d=1}^{t} AF_{d-1} \cdot R_d \right)$$

An alternative, but mathematically identical, formulation, which expresses the index level of a day as function of the previous day's level, can be obtained as follows.

First, the index formula can be rewritten as:

$$H\_IDX_t = \frac{H\_IDX_0}{UH\_IDX_0} \cdot \left(UH\_IDX_t + \sum_{d=1}^{t} UH\_IDX_{d-1} \cdot R_d \right)$$

which can be expanded as:

$$H\_IDX_t = \frac{H\_IDX_0}{UH\_IDX_0} \cdot \left(UH\_IDX_t + UH\_IDX_{t-1} \cdot R_t + \sum_{d=1}^{t-1} UH\_IDX_{d-1} \cdot R_d \right)$$

By noting that:

18.STOXX CURRENCY HEDGED

$$H\_IDX_{t-1} = \frac{H\_IDX_0}{UH\_IDX_0} \cdot \left(UH\_IDX_{t-1} + \sum_{d=1}^{t-1} UH\_IDX_{d-1} \cdot R_d \right)$$

The index formula can finally be rewritten as:

$$H\_IDX_t = H\_IDX_{t-1} + \frac{H\_IDX_0}{UH\_IDX_0} \cdot [UH\_IDX_t - UH\_IDX_{t-1} \cdot (1 - R_t)]$$

or equivalently as:

$$H\_IDX_t = H\_IDX_{t-1} + H\_IDX_0 \cdot \frac{UH\_IDX_t - UH\_IDX_{t-1}}{UH\_IDX_0} - H\_IDX_0 \cdot AF_{t-1} \cdot \sum_{c=1}^{C} HR_{c,t-1} \cdot \left(\frac{FX_0}{IFF_t} - \frac{FX_0}{IFF_{t-1}} \right)$$

18.3.3. MONTHLY HEDGED INDICES

In the monthly hedged version, the forward hedge is set up once a month and remains unchanged until the next reset: the currency weights are fixed at each reset, as well as the notional hedge amount.

The monthly currency hedged indices are thus calculated as:

$$H\_IDX_t = H\_IDX_0 \cdot \left[\frac{UH\_IDX_t}{UH\_IDX_0} + \sum_{c=1}^{C} HR_{c,0} \cdot \left(\frac{FX_{c,0}}{FF_{c,0}} - \frac{FX_{c,0}}{IFF_{c,t}} \right) \right]$$

The expression can be directly derived from the formula for daily currency hedged indices, by setting $AF_t = AF_0 = 1$ and $HR_{c,t} = HR_{c,0}$ □t.

The expression of the monthly indices can also be rewritten as a function of the previous day's value as:

$$H\_IDX_t = H\_IDX_{t-1} + H\_IDX_0 \cdot \frac{UH\_IDX_t - UH\_IDX_{t-1}}{UH\_IDX_0} - H\_IDX_0 \cdot AF_0 \cdot \sum_{c=1}^{C} HR_{c,0} \cdot \left(\frac{FX_0}{IFF_t} - \frac{FX_0}{IFF_{t-1}} \right)$$

which simplifies to:

$$H\_IDX_t = H\_IDX_{t-1} + H\_IDX_0 \cdot \frac{UH\_IDX_t - UH\_IDX_{t-1}}{UH\_IDX_0} - H\_IDX_0 \cdot \sum_{c=1}^{C} HR_{c,0} \cdot \left(\frac{FX_0}{IFF_t} - \frac{FX_0}{IFF_{t-1}} \right)$$

19.STOXX FUTURES ROLL INDICES

19.1. OVERVIEW

The STOXX Futures Roll indices are designed to reflect the returns generated over time through notional investments in a long position in a series of STOXX index futures contracts.

The excess return index replicates the financial outcome of a portfolio rolling the 1st nearby STOXX index futures contract into the 2nd nearby contract; the total return index, in addition, replicates the remuneration of the cash component at risk-free rate.

The futures contracts series is not amended between roll dates. Rolling period refers to the length of transition from the 1st nearby futures contract into the 2nd contract. The futures roll is completed on the date preceding the last trading day of each futures contract series.

Dissemination Calendar: STOXX Eurex Calendar

19.2. BASIC DATA

Index	ISIN	Index symbol	Futures symbol	Rolling Period (days)
EURO STOXX 50 Futures Roll EUR Excess Return	CH0230373265	SX5EFEER	FESX	4
EURO STOXX 50 Futures Roll EUR Total Return	CH0226976477	SX5EFETR	FESX	4
EURO STOXX 50 Traded Futures Roll EUR Excess Return	CH0313264233	SX5ETFER	FESX	5
EURO STOXX 50 Traded Futures Roll EUR Total Return	CH0313264225	SX5ETFTR	FESX	5
EURO STOXX 50 Futures Roll 5D EUR Excess Return	CH0596712205	SX5EF5ER	FESX	5
EURO STOXX 50 Futures Roll 5D EUR Total Return	CH0596712130	SX5EF5TR	FESX	5
EURO STOXX 50 Quanto Futures Roll USD Excess Return	CH0328366148	SX5HFEER	FESQ[12]	4
EURO STOXX 50 Quanto Futures Roll USD Total Return	CH0328366155	SX5HFETR	FESQ[2]	4
EURO STOXX Select Dividend 30 Futures Roll EUR Excess Return	CH0328366064	SD3EFEER	FEDV	4
EURO STOXX Select Dividend 30 Futures Roll EUR Total Return	CH0328366072	SD3EFETR	FEDV	4
STOXX Global Select Dividend 100 Futures Roll EUR Excess Return	CH0328366080	SDGPFEER	FGDV	4

[12] The EURO STOXX 50 Index Quanto Futures (FESQ) are calculated and distributed by EUREX Exchange since 17 March 2016. The historical data of the EURO STOXX 50 Quanto Futures Roll indices for the period between 2 January 2001 and 16 March 2016 was calculated using simulated values for the futures FESQ series, which were derived as follows:

$$\mathrm{FESQ}_t = \mathrm{FESX}_t \cdot \left(1 - \rho(\mathrm{SX5E}, \mathrm{EURUSD}) \cdot V6I3 \cdot EURUSD3mV \cdot \frac{d}{365}\right)$$

Where:
FESQ_t= EURO STOXX 50 Index Quanto Futures on day (t)
FESX_t= EURO STOXX 50 Index Futures on day (t)
$\rho(\mathrm{SX5E}, \mathrm{EURUSD})$ = Correlation of 90 days of EURO STOXX 50 index (SX5E) returns and EURUSD exchange rate returns
$V6I3$ = EURO STOXX 50 Volatility index (VSTOXX 3 months)
$EURUSD3mV$ = EURUSD exchange rate 3 month at-the-market (ATM) implied volatility
d = number of calendar days between (t) and the expiry date of the FESX contract

19.STOXX FUTURES ROLL INDICES

STOXX Global Select Dividend 100 Futures Roll EUR Total Return	CH0328366098	SDGPFETR	FGDV	4
STOXX Europe 600 Futures Roll EUR Excess Return	CH0328366106	SXXPFEER	FXXP	4
STOXX Europe 600 Futures Roll EUR Total Return	CH0328366114	SXXPFETR	FXXP	4
EURO STOXX Banks Futures Roll EUR Excess Return	CH0328366122	SX7EFEER	FESB	4
EURO STOXX Banks Futures Roll EUR Total Return	CH0328366130	SX7EFETR	FESB	4
STOXX Europe 600 Oil & Gas Futures Roll EUR Total Return	CH1123124310	SXEPFETR	FSTE	4
STOXX Europe 600 Oil & Gas Futures Roll EUR Excess Return	CH1123124328	SXEPFEER	FSTE	4

19.3. CALCULATION

$$I_t^{\mathrm{ER}} = I_{t-1}^{\mathrm{ER}} \cdot \left(\sum_{k=1}^{N+1} w_{\mathrm{k,t-1}} \cdot \frac{F_{\mathrm{k,t}}}{F_{\mathrm{k,t-1}}} \right)$$

$$I_t^{\mathrm{TR}} = I_{t-1}^{\mathrm{TR}} \cdot \left(\sum_{k=1}^{N+1} w_{\mathrm{k,t-1}} \cdot \frac{F_{\mathrm{k,t}}}{F_{\mathrm{k,t-1}}} + \frac{d}{360} \cdot R_{\mathrm{f,\,t-1}} \right)$$

where:
I_t^{ER}=excess return index value on day (t)
I_t^{TR} =total return index value on day (t)
$w_{\mathrm{k,t}}$=weight of contract k on close of day (t)
$F_{\mathrm{k,t}}$=settlement value of futures contract k on day (t)
d =number of actual days between day (t) and day (t-1)
$R_{\mathrm{f,\,t}}$= fixing of risk-free rate on day (t). SOFR is used as risk-free rate for EURO STOXX 50 Quanto Futures Roll and €STR for the rest of indices

Weights calculation for the STOXX Futures Roll indices (except EURO STOXX 50 Traded Futures Roll indices):
The futures contracts weights $w_{\mathrm{k,t}}$ are determined as follows:

$$w_{\mathrm{k,t-1}} = \begin{cases} \frac{R-r}{R} \cdot \frac{1}{N} = \left(1 - \frac{r}{R}\right) \cdot \frac{1}{N} : k = 1 \\ \frac{r}{R} \cdot \frac{1}{N} = \frac{1}{N} - w_{1,\mathrm{t-1}} : k = N+1 \\ \frac{1}{N} : \mathrm{else} \end{cases}$$

where:
R =length of roll period
r =rth roll day (0 if not in roll period)
N =number of futures contracts permanently in the index (1)

Weights calculation for the EURO STOXX 50 Traded Futures Roll indices:
The futures contracts weights $w_{\mathrm{k,t}}$ are determined as follows:

$$: \mathrm{k} = 1$$

19.STOXX FUTURES ROLL INDICES

$$w_{k,t-1} = \begin{cases} w_{k,t-2} - \left[10\% + \left(7\% - \frac{r-2}{100}\right) \cdot (r\text{-}1)\right] \cdot \frac{1}{N} & \\ \frac{1}{N} - w_{1,t-1} & :k = N + 1 \\ \frac{1}{N} & :else \end{cases}$$

where:
w_1= 1/N when r = 0
R=length of roll period (5)
r =r[th] roll day (0 if not in roll period)
N=number of futures contracts permanently in the index (1)

20.STOXX FUTURES REPLICATION INDICES

20.1. OVERVIEW

The STOXX Futures Replication indices aim to replicate the performance of STOXX Indices by simulating an investment into the a STOXX Futures Roll Total Return index, adjusted for dividends.

Index types, currencies, base values and dates:

Index	Types	Currency	Base value and date
EURO STOXX 50 Quanto Futures Replication	Price, net and gross return	USD	100 as of 02.01.2001
EURO STOXX Select Dividend 30 Futures Replication	Price, net and gross return	EUR	100 as of 12.07.2007
STOXX Global Select Dividend 100 Futures Replication	Price, net and gross return	EUR	100 as of 16.07.2015
STOXX Europe 600 Futures Replication	Price, net and gross return	EUR	100 as of 20.07.2010
EURO STOXX Banks Futures Replication	Price, net and gross return	EUR	100 as of 19.03.2001

20.2. BASIC DATA

Index	ISIN	Symbol
EURO STOXX 50 Quanto Futures Replication Price USD	CH0328366288	SX5HPREP
EURO STOXX 50 Quanto Futures Replication Net Return USD	CH0328366296	SX5HNREP
EURO STOXX 50 Quanto Futures Replication Gross Return USD	CH0328366304	SX5HGREP
EURO STOXX Select Dividend 30 Futures Replication Price EUR	CH0328366163	SD3EREP
EURO STOXX Select Dividend 30 Futures Replication Net Return EUR	CH0328366171	SD3TREP
EURO STOXX Select Dividend 30 Futures Replication Gross Return EUR	CH0328366189	SD3GTREP
STOXX Global Select Dividend 100 Futures Replication Price EUR	CH0328366197	SDGPREP
STOXX Global Select Dividend 100 Futures Replication Net Return EUR	CH0328366205	SDGRREP
STOXX Global Select Dividend 100 Futures Replication Gross Return EUR	CH0328366213	SDGGRREP
STOXX Europe 600 Futures Replication Price EUR	CH0328366221	SXXPREP
STOXX Europe 600 Futures Replication Net Return EUR	CH0328366239	SXXRREP
STOXX Europe 600 Futures Replication Gross Return EUR	CH0328366247	SXXGRREP
EURO STOXX Banks Futures Replication Price EUR	CH0328366254	SX7EREP
EURO STOXX Banks Futures Replication Net Return EUR	CH0328366262	SX7TREP
EURO STOXX Banks Futures Replication Gross Return EUR	CH0328366270	SX7GTREP

20.3. CALCULATION

The STOXX Futures Replication indices are calculated by using the performance of the STOXX Futures Roll Total Return Index. The Price and Net Return version are being adjusted for dividends by using the performance of the corresponding STOXX Price, Net Return and Gross Return indices as follows:

20.STOXX FUTURES REPLICATION INDICES

Futures Replication Index	Indices symbols for dividend adjustment
EURO STOXX 50 Quanto Futures Replication	Price: SX5HUP; net return: SX5HUN; gross return: SX5HUG
EURO STOXX Select Dividend 30 Futures Replication	Price: SD3E; net return: SD3T; gross return: SD3GT
STOXX Global Select Dividend 100 Futures Replication	Price: SDGP; net return: SDGR; gross return: SDGGR
STOXX Europe 600 Futures Replication	Price: SXXP; net return: SXXR; gross return: SXXGR
EURO STOXX Banks Futures Replication	Price: SX7E; net return: SX7T; gross return: SX7GT

$$PR\_REP_t = PR\_REP_{t-1} \times \left(\frac{STX\_FTR_t}{STX\_FTR_{t-1}} - \frac{GR_t}{GR_{t-1}} + \frac{PR_t}{PR_{t-1}} \right)$$

$$NR\_REP_t = NR\_REP_{t-1} \times \left(\frac{STX\_FTR_t}{STX\_FTR_{t-1}} - \frac{GR_t}{GR_{t-1}} + \frac{NR_t}{NR_{t-1}} \right)$$

$$GR\_REP_t = GR\_REP_{t-1} \times \left(\frac{STX\_FTR_t}{STX\_FTR_{t-1}} \right)$$

With:

PR_REP_t	STOXX Futures Replication Price Index at time t
NR_REP_t	STOXX Futures Replication Net Return Index at time t
GR_REP_t	STOXX Futures Replication Gross Return Index at time t
STX_FTR_t	STOXX Futures Roll Total Return Index at time t. The EURO STOXX 50 Futures Replications index uses the EURO STOXX 50 Traded Futures Roll Total Return
PR_t	STOXX Price index for dividend adjustment at time t
NR_t	STOXX Net Return index for dividend adjustment at time t
GR_t	STOXX Gross Return index for dividend adjustment at time t

21.STOXX GLOBAL BASKET

21.1. OVERVIEW

The STOXX Global Basket Select & Diversification Select EUR Index aims to invest a fixed proportion into each STOXX Regional Select & Diversification Select EUR Index.

The STOXX Global Basket Select EUR index invests 40% into the STOXX North America Select 50 EUR Index, 30% into the STOXX Asia/Pacific Select 50 EUR Index and 30% into the STOXX Europe Select 50 EUR Index at each quarterly review.

The STOXX Global Basket Diversification Select EUR index invests 40% into the STOXX North America Diversification Select 50 EUR Index, 30% into the STOXX Asia/Pacific Diversification Select 50 EUR Index and 30% into the STOXX Europe Diversification Select 50 EUR Index at each quarterly review.

Index types and currencies: price, net return and gross return in EUR, rebalanced on a quarterly basis.

Base values and dates: The following base values and dates apply: 100 on June 21, 2004

21.2. BASIC DATA

Index	ISIN	Symbol
STOXX Global Basket Select EUR Price	CH0321426923	SXW1BSEE
STOXX Global Basket Select EUR Net Return	CH0321426980	SXW1BSER
STOXX Global Basket Select EUR Gross Return	CH0321427038	SXW1BSEG
STOXX Global Basket Diversification Select EUR Price	CH0321427079	SXW1BDSE
STOXX Global Basket Diversification Select EUR Net Return	CH0321427129	SXW1BDSR
STOXX Global Basket Diversification Select EUR Gross Return	CH0321427145	SXW1BDSG

21.3. CALCULATION

The index values are calculated as following:

$$IV_t = IV_{reb} \times \sum_{i=1}^{3} w_i \times \frac{U_{t,i}}{U_{reb,i}}$$

With

w_i	target weight of sub-index i
U_{reb}	close value of sub-index i on rebalancing day
IV_t	Index value
IV_{reb}	Index value on rebalancing day

21.STOXX GLOBAL BASKET

STOXX Europe Basket Select EUR index	weight
STOXX North America Select 50 EUR Index	40%
STOXX Europe Select 50 EUR Index	30%
STOXX Asia/Pacific Select 50 EUR Index	30%

STOXX Europe Basket Diversification Select EUR index	weight
STOXX North America Diversification Select 50 EUR Index	40%
STOXX Europe Select Diversification 50 EUR Index	30%
STOXX Asia/Pacific Diversification Select 50 EUR Index	30%

22.STOXX DECREMENT INDICES

22.1. OVERVIEW

STOXX Decrement Indices[13] replicate the performance of their underlying index assuming a constant deduction per annum. The performance deduction accrues constantly on a daily basis (using an Actual/365 Fixed day count convention). The amount of deduction can either be a performance deduction, in which case it is expressed in percentage points, or it can be an index points deduction in which case it is expressed in index points. Decrement indices have floor value of zero. Please see the STOXX Quality Charter on http://www.stoxx.com/indices/rulebooks.html for further information on STOXX Decrement Indices.

22.2. BASIC DATA

Index	ISIN	Symbol
<indices as listed in the STOXX vendor code sheet>		

22.3. CALCULATION

22.3.1. DECREMENT INDEX CALCULATION (DECREMENT IN INDEX POINTS)

The Decrement Index calculation (when the decrement is expressed in index points) for each calculation day t is as follows:

$$\mathrm{IV_t} = \left(IV_{t-1} \times \frac{U_t}{U_{t-1}}\right) - \left(D\frac{Act(t-1,t)}{365}\right)$$

where:

IV_t = The value of the Decrement Index for calculation day t

IV_{t-1} = The value of the Decrement Index for the day immediately preceding calculation day t

IV_0 = The value of the Decrement Index for the base date

U_t = The value of the Underlying Index for calculation day t

U_{t-1} = the value of the Underlying Index for calculation day t-1

$Act(t-1,t)$ = The number of calendar days between calculation day t-1 and calculation day t

D = The Decrement Amount expressed in index points

22.3.2. DECREMENT INDEX CALCULATION (DECREMENT IN PERCENTAGE POINTS)

The Decrement Index calculation (when the decrement is expressed in percentage points) for each calculation day t is as follows:

[13] For indices intended for usage in Canada, the term 'AR' (Adjusted Return) may be used in place of 'Decrement'

22.STOXX DECREMENT INDICES

$$IV_t = IV_{t-1} \times \left(\frac{U_t}{U_{t-1}} - D\frac{Act(t-1,t)}{365}\right)$$

where:

IV_t = The value of the Decrement Index for calculation day t

IV_{t-1} = The value of the Decrement Index for the day immediately preceding calculation day t

IV_0 = Value of the Decrement Index on the base date

U_t = Value of the Underlying Index on calculation day t

U_{t-1} = Value of the Underlying Index for calculation day t-1

$Act(t-1,t)$ = Number of calendar days between calculation day t-1 and calculation day t

D = The Decrement amount expressed in percentage points

23.STOXX LOCAL CURRENCY RETURN INDICES

23.1. OVERVIEW

A local currency return index is a theoretical index designed to represent hypothetical returns for global index investment strategies by considering only the underlying constituent local return and excludes any impact from currency movements.

STOXX can calculate local currency return indices on a price, net return and gross return basis.

23.2. BASIC DATA

Index	ISIN	Symbol
< indices as listed in the STOXX vendor code sheet>		

23.3. CALCULATION

The following definitions will be used throughout the chapter:

t-1	= previous index calculation date
t	= current index calculation date
LC_IDX_t	= local currency index for time (t)
RF_IDX_t	= reference index for time (t)
N	= Number of companies in the reference index
$adjp_{it}$	= Adjusted closing price of company (i) at time (t) in local currency reflecting a stock's corporate action that will be effective the next calculation day
p_{it}	= Closing price of company (i) at time (t) in local currency
s_{it}	= Number of shares of company (i) at time (t)
ff_{it}	= Free float factor of company (i) at time (t)
cf_{it}	= Weighting cap factor of company (i) at time (t)
x_{it}	= Exchange rate from local currency into reference index currency for company (i) at time (t)
$InitM_t$	= Initial Free float market capitalization of the index at time (t) in the reference index currency
$LocalM_t$	= Free float market capitalization of the index at time (t) in the reference index currency converted using the initial exchange rate, x_{it-1}

The local currency return index is calculated as follows:

$$\mathrm{LC\_IDX}_t = \mathrm{LC\_IDX}_{\mathrm{t\text{-}1}} * \left(\frac{\sum_{i=1}^{n} (p_{\mathrm{it}} \cdot s_{\mathrm{it}} \cdot \mathrm{ff}_{\mathrm{it}} \cdot \mathrm{cf}_{\mathrm{it}} \cdot x_{\mathrm{it\text{-}1}})}{\sum_{i=1}^{n} (\mathrm{adjp}_{\mathrm{it\text{-}1}} \cdot s_{\mathrm{it}} \cdot \mathrm{ff}_{\mathrm{it}} \cdot \mathrm{cf}_{\mathrm{it}} \cdot x_{\mathrm{it\text{-}1}})} \right) = \mathrm{LC\_IDX}_{\mathrm{t\text{-}1}} * \left(\frac{\mathrm{LocalM}_t}{\mathrm{InitM}_t} \right)$$

where the companies that go into the calculation of the index are derived from the reference index at time t, RF_IDX_t.

24.ISTOXX INCREMENT INDICES

24.1. OVERVIEW

iSTOXX Increment Indices replicate the performance of their Underlying Index assuming a constant addition per annum. The addition accrues constantly on a daily basis (using an Actual/365 Fixed day count convention). The increment amount is a performance addition and is expressed in percentage points.

24.2. BASIC DATA

Index	ISIN	Symbol
EURO iSTOXX 50 NR Increment 0.69% EUR Net Return	CH0313264704	ISX5NI
iSTOXX Europe 600 NR Increment 0.38% EUR Net Return	CH0313264712	ISXRNI

24.3. CALCULATION

The Increment Index calculation for each calculation day t is as follows:

$$IV_t = IV_0 \times \left(\frac{U_t}{U_0}\right) \times (1 + D)^{\frac{ACT(0,t)}{365}}$$

where:

IV_t = The value of the Increment Index on day t
IV_0 = The base value of the Increment Index (value on the base date)
U_t = The value of the Underlying Index on day t
U_0 = The value of the Underlying Index on the base date
Act(0,t) = The number of calendar days between calculation day t and the base date
D = The Increment amount expressed in percentage points

The index is disseminated in 2 decimal digits.

25.EURO STOXX 50 SHORT STRANGLE

25.1. OVERVIEW

The EURO STOXX 50 Short Strangle Index reflects the performance of a strategy which sells EURO STOXX 50 call and put options, each with 5% out of the money strikes, while the investment notional is invested at the €STR rate.

25.2. BASIC DATA

Index types and currencies: Excess and Total Return in EUR

Base values and dates: 10,000 as of January 18, 2008

Dissemination calendar: STOXX Eurex Calendar

25.3. CALCULATION

Excess return:

$$1 + R_{ER.t} = \frac{S_{exp} + (C_{exp} - C_t) + (P_{exp} - P_t)}{S_{exp} + (C_{exp} - C_{t-1}) + (P_{exp} - P_{t-1})}$$

$$IV_{ER.t} = IV_{ER.t-1} \cdot (1 + R_{ER.t})$$

Total Return:

$$IV_{TR.t} = IV_{TR.t-1} \cdot \left(\frac{IV_{ER.t}}{IV_{ER.t-1}} + \frac{€\mathrm{STR}_{t-2}}{360} \cdot d\right)$$

where:

$IV_{ER.t}$	= index value on day *t* of excess return version
$€STR_{t-2}$	= Euro short-term rate on day *t-2*
d	= number of calendar days between *t* and *t-1*
C_t	= call option daily settlement price on day *t*
P_t	= put option daily settlement price on day *t*
S_{exp}	= 12:00 CET value of EURO STOXX 50 EUR Price on previous expiry date
C_{exp}	= call option inclusion price on previous expiry date (VWAP of best bid prices from 12:15 – 12:45 CET)
P_{exp}	= put option inclusion price on previous expiry date (VWAP of best bid prices from 12:15 – 12:45 CET)

On expiration days the index return reflects the return of the position of expiring options until settlement and the return of newly sold options until end-of-day:

$$1 + \mathrm{R_{ER.t}} = \frac{\mathrm{S_{exp}} + (\mathrm{C_{exp}} - \mathrm{C_{settlement}}) + (\mathrm{P_{exp}} - \mathrm{P_{settlement}})}{\mathrm{S_{exp}} + (\mathrm{C_{exp}} - \mathrm{C_{t-1}}) + (\mathrm{P_{exp}} - \mathrm{P_{t-1}})} \cdot \frac{\mathrm{S_{new.exp}} + (\mathrm{C_{new.exp}} - \mathrm{C_{new.t}}) + (\mathrm{P_{new.exp}} - \mathrm{P_{new.t}})}{\mathrm{S_{new.exp}}}$$

25.EURO STOXX 50 SHORT STRANGLE

where:

$C_{settlement}$	= call option settlement price on expiry date
$P_{settlement}$	= put option settlement price on expiry date
$S_{new.exp}$	= 12:00 CET value EURO STOXX 50 EUR Price on current expiration day
$C_{new.exp}$	= new call option inclusion price on current expiry date (VWAP of best bid prices from 12:15 – 12:45 CET)
$P_{new.exp}$	= new put option inclusion price on current expiry date (VWAP of best bid prices from 12:15 – 12:45 CET)
$C_{new.t}$	= new call option daily settlement price on day *t*
$P_{new.t}$	= new put option daily settlement price on day *t*

When written in an equivalent form, the portfolio can be thought of as combination of a cash position, premia from option sales $(C_{exp} + P_{exp})$, and a short option position $(-(C_t + P_t))$.

$$IV_t = IV_{exp} + \frac{IV_{exp}}{S_{exp}} \cdot \left[\left(C_{exp} + P_{exp}\right) - (C_t + P_t)\right]$$

$\frac{IV_{exp}}{S_{exp}}$ determines the number of option contracts to be sold. The ratio relates the index level to the underlying.

Rolling

The EURO STOXX 50 Short Strangle Index requires a monthly rollover procedure, whereby the old EURO STOXX 50 call and put option cease trading at noon (12:00 CET) on the pre-determined expiry date, i.e. typically the third Friday of a month, and are replaced by a new EURO STOXX 50 call and put option whose last trading day falls on the next expiry date. The new one-month EURO STOXX 50 call and put option must have a remaining lifetime of one month, and must be 5 percent out-of-the-money (i.e. the lowest (highest) strike price above (below) or equal to the EURO STOXX 50 12:00 CET value plus (minus) 5 percent for the call (put)).

History

Before November 28, 2011 S_{exp} was the end-of-day index value of the EURO STOXX 50 EUR Price Index. Before the September 2018 rolling, the call and put option inclusion prices were the daily settlement prices on the expiry date established by Eurex.

Trading Suspension

If there is a suspension of the EURO STOXX 50 Index or the EURO STOXX 50 call or put option that are included in the EURO STOXX 50 Short Strangle Index. the index will be calculated using the latest prices that were available.
If a suspension occurs on an expiry date during the averaging process. i.e. 12:15 - 12:45 CET, only bids made before the suspension will be considered.
In cases where there is no valid bid-price in the averaging period the last available bid-price is used.
In case there is no such price the previous day's settlement price is used.

26.EURO STOXX 50 REALIZED DISPERSION

26.1. OVERVIEW

The EURO STOXX 50 Realized Dispersion Index measures the difference between the market-cap weighted sum of the index constituents' absolute returns and the absolute index return. The index is reset annually.
Absolute returns serve as a measure for daily realized volatility and the index represents a long position in a series of at-the-money straddles with one day to maturity on the components of the EURO STOXX 50 Index and a short position in at-the-money straddles on the EURO STOXX 50 Index. At-the-money straddles are traditionally used to trade volatility.

26.2. BASIC DATA

Index types and currencies: Price return in EUR

Dissemination calendar: STOXX Europe calendar

Base values and dates: 100 as of December 19, 2008

Reset dates: First dissemination date following the third Friday in December.

26.3. CALCULATION

On any Dissemination Day *t* the index value is calculated as follows:

$$\begin{cases} IV_t = 100 & \text{if } t \text{ is base date} \\ IV_t = IV_{t-1} + 100 * r_{disp,t} & \text{if } t \text{ is not a reset date} \\ IV_t = 100 + 100 * r_{disp,t} & \text{if } t \text{ is a reset date} \end{cases}$$

$$r_{disp,t} = \left(\sum_{i=1}^{n} w_{i,t-1} \cdot \left| r_{i,t} \right| \right) - \left| r_{idx,t} \right|$$

Where:

IV_t = index value on day *t* (unrounded)

$r_{disp,t}$ = dispersion return on day *t*

$w_{i,t}$ = adjusted close weight of EURO STOXX 50 component *i* on day *t*

$r_{i,t}$ = log gross return of EURO STOXX 50 component *i* on day *t*
The return is adjusted for corporate actions affecting the gross return index.
The log return is capped/floored at +/-15%.

$r_{idx,t}$ = log return of the EURO STOXX 50 Gross Return Index
The log return is capped/floored at +/-15%.

n = number of components of the EURO STOXX 50 index

The adjusted close weights are calculated based on the EURO STOXX 50 Price index (SX5E) component data:

$$w_{i,t} = \frac{mc_{i,t}^{a}}{MC_{t}^{a}}$$

26.EURO STOXX 50 REALIZED DISPERSION

where:

$mc_{i,t}^{a}$ = adjusted close index market cap units for stock *i* on day *t* in SX5E

MC_{t}^{a} = adjusted close index market cap units on day *t* of SX5E

The index is calculated in real-time every 15 seconds. The daily end of day index value is the index value rounded to two decimals.

26.4. MARKET DISRUPTION EVENTS

If one of the conditions below apply, the end of day index level is updated using $IV_t = IV_{t-1}$:

Trading Disruption:
EURO STOXX 50 index futures or index options are not available for trading any time during the last hour of trading (from 16:30 to 17:30 CET) except on a Eurex holiday.

Exchange Disruption:
Eurex is down any time during the last hour of trading (from 16:30 to 17:30 CET) except on a Eurex holiday.

27.EURO ISTOXX 50 SHORT STRANGLE KWCDC INDEX

27.1. OVERVIEW

The EURO iSTOXX 50 Short Strangle KWCDC Index reflects the performance of a strategy which sells EURO STOXX 50 call and put options, each with 5% out of the money strikes, while the in-vestment notional is invested at the Korean 3-Month CD rate. The index is not meant to be used as benchmark under the definition of ESMA Benchmark Regulation.

27.2. BASIC DATA

Index types and currencies: Total Return in EUR

Base values and dates: 10,000 as of January 18, 2008

Dissemination calendar: STOXX Eurex Calendar

27.3. CALCULATION

$$IV_t = IV_{t-1} \cdot \left(\frac{IV_{ER,t}}{IV_{ER,t-1}} + \frac{KWCDC_{t-1}}{360} \cdot d \right)$$

where:

$IV_{ER.t}$ = Value of the EURO STOXX 50 Short Strangle ER Index (SX5ESSE) on day t

$KWCDC_t$ = Korean 3-Month Certificate of Deposit rate (RIC: KRCD3M=KFIA)[14] on day t

d = number of calendar days between t and t-1

[14] KRCD3M=KFIA is a submission-based benchmark

28.ISTOXX SINGLE STOCK LEVERAGED INDICES

28.1. OVERVIEW

The objective of the iSTOXX Single Stock Leveraged Indices is to replicate the return of a daily leveraged investment strategy. The indices consider interest earned on the index notional as well as brokerage margin fee and stock borrowing fee. UK stocks are represented by their US-traded ADRs.

28.2. BASIC DATA

Index types and currencies: Net Total Return in the currency of the underlying stock.

Base values and dates: See Vendor Code Sheet

Dissemination calendar: Respective Stock Exchange calendar of the underlying stock

28.3. CALCULATION

28.3.1. CALCULATION FORMULA

$$IV_t = max\left(IV_{t-1} \cdot \left(1 + L \cdot r_t + \left((1-L) \cdot (IR_{t-2} + BMF) + IND \cdot L \cdot COB_{t-2}\right) \cdot d\right), 0\right)$$

where:

IV_t	= Index value on day t
L	= Leverage
r_t	= Net return of underlying stock on day t, calculated as unadjusted stock price on day t over the net-dividend adjusted price of day t-1
IR_t	= Interest Rate[15] on day t
BMF	= Brokerage Margin Fee (1% for leveraged indices, -1% for inverse leveraged)
COB_t	= Cost of Borrowing on day t
IND	= Inverse Indicator (0 for leveraged indices, 1 for inverse leveraged)
d	= number of calendar days between t and t-1

28.3.2. ADJUSTMENTS DUE TO EXTREME MARKET MOVEMENTS

Rebalancing is based on the calculation of average index values over a time window of 10 minutes. The time window to calculate the average starts 5 minutes after and ends 15 minutes after the trigger event occurs. The rebalancing is triggered when the underlying index loses more than x% (leverage indices) or appreciates by more than x% (short indices) compared to its previous day's close. The breach of the trigger is checked on a tick-by-tick basis. During this time window, the average of both the underlying index and the Leveraged / Short index are calculated. The two averages are then used to calculate respectively r_t and IV_t in the index calculation formula.
The respective trigger values (x) are given in the following table:

[15] US Fed Funds rate (USONFFE=) for USD-denominated stocks, €STR (EUROSTR=) for EUR-denominated stocks

28.iSTOXX SINGLE STOCK LEVERAGED INDICES

Leverage factor	Trigger value
2	x = -25,00%
3	x = -16,66%
-1	x = 50,00%
-2	x = 25,00%
-3	x = 16,66%

Over the course of the 10-minute period in which the average is determined, the index is not disseminated. The index dissemination ends 5 minutes after the trigger event and is resumed with an index level equal to the determined average 15 minutes after the trigger event.
Should the intraday rebalancing be triggered less than 15 minutes prior to the end of the index calculation day, the regular overnight rebalancing is carried out.
If the leverage/short index reaches a value of 0, the index is set to a value of 0 and its calculation/dissemination is discontinued. The index suspension is announced immediately, and the index is terminated after 20 trading days of suspension.

28.3.3. REVERSE SPLIT

If the closing value of a daily leverage or daily short index drops below 10 index points, a reverse split is carried out. The affected leverage or short index is multiplied with a factor of 100.
The reverse split is carried out based on the index close ten trading days after the index initially dropped below a closing value of 10 points, notwithstanding whether the index rises above a level of 10 points in the meantime.

28.3.4. TRADING SUSPENSION

The STOXX leverage and short indices are calculated on the same days and during the same time as the underlying STOXX indices are calculated.

If there is suspension of the underlying index, the leveraged and short indices will be calculated with the latest prices available.

The index is terminated when the underlying index is terminated.

29.EURO ISTOXX 50 TOTAL RETURN FUTURES INDEX

29.1. OVERVIEW

The EURO iSTOXX 50 Total Return Futures Index is designed to replicate the level of the hypothetical instrument underlying the EURO STOXX 50 Total Return Futures (TESX). The purpose of the replication is to enable futures traders with a benchmark for the settlement value of the TESX contract. In order to achieve this, the EURO iSTOXX 50 Total Return Futures Index combines the value of the EURO STOXX 50 Price index with the value of the EURO STOXX 50 Distribution index, so that the returns from both the price appreciation of the underlying constituents and their overall distributions to shareholders are reflected, while at the same time deducting on a daily basis the funding cost of the futures contract to account for the cost of funding of the futures position. The base value of the index is such that the index level equates the one of the EURO STOXX 50 Price index on the base date.

29.2. BASIC DATA

Index types and currencies: Total Return in EUR

Base values and dates: 3015.13 as of December 2, 2016

Dissemination calendar: STOXX Eurex Calendar

29.3. CALCULATION

$$IL_t = SX5E_t + SX5EDD_t - SX5EDD_{t_0} - \sum_{i=t_0}^{t-1} SX5E_i * (€STR_i) * \frac{ACT(i+2, i+3)}{360}$$ [16]

where:

t_0	= December 2nd, 2016
$SX5E_t$	= Value of the EURO STOXX 50 (PR) EUR index on day t
$SX5EDD_t$	= Value of the EURO STOXX 50 Distribution Points index on day t
$€STR_t$	= Value of the euro short-term rate on day t

[16] The offset in the ACT calculation is implemented to reflect the fact that the EURO STOXX 50 Total Return Futures are settled on a t+2 basis.

30.STOXX JPY TTM CURRENCY INDICES

30.1. OVERVIEW

The EURO STOXX® 50 JPY TTM is a currency conversion of the EURO STOXX® 50 Index . The currency fixing rate is the JPY TTM spot rate retrieved from Refinitiv through EURTTM=BTMJ around 06:00 CET.

The actual currency conversion is then calculated based on the previous days index close value. Hence conversion calculation is based on the official index level closing value at t-1, published between 17:55 CET and 22:00 CET and the currency fixing rate at t. The converted index close value which is calculated at t and published realtime from 07:00 CET to 19:15 CET.

30.2. BASIC DATA

Index Types and Currencies: Price, Net and Gross Return in JPY.

Base Values and Dates: 1000 on 29/12/2011.

Index Rounding: 2 d.p.

Dissemination Calendar: STOXX Global Calendar.

30.3. CALCULATION

The EURO STOXX® 50 JPY TTM currency conversion index is created according to the following formula:

$$IV_t = IV_{t0}\left(\frac{UL_{t-1}}{UL_{t_0-1}} \cdot \frac{FX_t}{FX_{t_0}}\right)$$

Where:
IV_t = Index value on day t.
UL_t = Underlying Index value on day t (EURO STOXX 50 Index).
FX_t = Spot currency rate on day t (JPY TTM Rate – RIC = EURTTM=BTMJ).
IVt_0 = Index base date (29/12/2011).

31.EURO STOXX FUTURES SWITCH INDICES

31.1. OVERVIEW

The STOXX Futures Switch Indices replicate a hypothetical portfolio of a series of long position STOXX futures contracts traded on Eurex. The portfolio is invested into the first nearby futures contract and then switched to the next nearby contract after the close on the 4th day preceding the expiry date of the futures contracts series, which is the 3rd Friday in March, June, September and December.

The excess return index replicates the financial outcome of a portfolio switching the 1st nearby STOXX index futures contract into the 2nd nearby contract; the total return index, in addition, replicates the remuneration of the cash component at risk-free rate. The futures contracts series is not amended between switch dates.

31.2. BASIC DATA

Index Types and Currencies: Total Return, Excess Return in EUR.

Base Values and Dates: 1000 on 29/12/2000.

Dissemination Calendar: STOXX Eurex Calendar.

Index Rounding : 3 d.p.

ISIN	Symbol	Index Name
CH1169655581	SX5EFSTR	EURO STOXX 50 Futures Switch Total Return EUR
CH1169655599	SX5EFSER	EURO STOXX 50 Futures Switch Excess Return EUR
CH1169655672	SX7EFSTR	EURO STOXX Banks Futures Switch Total Return EUR
CH1169655664	SX7EFSER	EURO STOXX Banks Futures Switch Excess Return EUR
CH1169655698	SXEEFSTR	EURO STOXX Oil & Gas Futures Switch Total Return EUR
CH1169655680	SXEEFSER	EURO STOXX Oil & Gas Futures Switch Excess Return EUR
CH1169655839	SXEPFSTR	STOXX Europe 600 Oil & Gas Futures Switch Total Return EUR
CH1169655821	SXEPFSER	STOXX Europe 600 Oil & Gas Futures Switch Excess Return EUR

Further information can be found in the STOXX Vendor Code Sheet.

31.3. CALCULATION

In formulaic terms:

$$I_t^{\mathrm{ER}} = I_{t-1}^{\mathrm{ER}} \cdot \frac{F_{\mathrm{k,t}}}{F_{\mathrm{k,t-1}}}$$

$$I_t^{\mathrm{TR}} = I_{t-1}^{\mathrm{TR}} \cdot \left(\frac{F_{\mathrm{k,t}}}{F_{\mathrm{k,t-1}}} + \frac{d}{360} \cdot R_{\mathrm{f,\,t-1}} \right)$$

31.EURO STOXX FUTURES SWITCH INDICES

where:

I_t^{ER}= Excess return index value on day (t) – Unrounded t-1 value used for calculation.
I_t^{TR}= Total return index value on day (t) - Unrounded t-1 value used for calculation.
$F_{k,t}$= Settlement value of futures contract k on day (t).
d = Number of actual days between day (t) and day (t-1).
$R_{f,\,t}$= Fixing of risk-free rate on day (t) (€STR (t-1) used).

32. iSTOXX DYNAMIC EXPOSURE VOLATILITY INDICES

32.1. OVERVIEW

The indices aim to provide a dynamic leveraged exposure to the underlying index, based on the underlying volatility. The index exposure is rebalanced on a daily basis, ranging from a minimum of 100%, to a maximum of 200%. The maximum exposure is reached when the volatility of the underlying index is less than or equal to the target volatility, which is calculated as the maximum of the 20 and 60 day volatilities.

32.2. BASIC DATA

Index Types and Currencies: Price, Net and Gross Return.

Dissemination Calendar: Underlying Index Calendar.

Index Rounding: 2 d.p.

ISIN	Symbol	Index Name	Underlying Index	Volatility Target	Base Date and Value
CH1213358786	ISXEDE10	EURO iSTOXX 50 Dynamic Exposure Volatility 10% Index	SX5E	10%	100 on 27/03/2003
CH1213358794	ISXTDE10	EURO iSTOXX 50 Dynamic Exposure Volatility 10% Index	SX5T	10%	100 on 27/03/2003
CH1213358802	ISXGDE10	EURO iSTOXX 50 Dynamic Exposure Volatility 10% Index	SX5GT	10%	100 on 27/03/2003

32.3. CALCULATION

Index Formula
The index is calculated as follows:

$$IV_t = IV_{t-1} \cdot \left(1 + w_{t-1} \cdot \left(\frac{IDX_t}{IDX_{t-1}} - 1\right) + (1 - w_{t-1}) \cdot IR_{t-1} \cdot \frac{ACT(t-1,t)}{360}\right)$$

Where:
IV_t = The index value as of day t.
w_t = The leveraged weight as of day t.
IDX_t = The underlying index value as of day t.
IR_t = Money Market Rate[17].
$ACT(t-1,t)$ = The number of actual calendar days between t-1 and t.

[17] In case €STRis used in the calculation, the index will be calculated using €STR that is published on day T in respect of day T-1.

32.iSTOXX DYNAMIC EXPOSURE VOLATILITY INDICES

Determination of Leveraged Target Weight
On any index calculation date t, the leveraged target weight is calculated as follows:

$$Tgtw_t = \frac{TgtVol}{MaxRealizedVol_{t,(20,60)}} + 100\%$$

Where:

$TgtVol$ = The pre-determined Target Volatility (10%).

And:

$$MaxRealizedVol_{t,(20,60)} = \max(RealizedVol_{20}, RealizedVol_{60})$$

And finally the Realized Volatility is calculated as:

$$Realized\ Vol_{t,n} = \sqrt{\frac{252}{n} \cdot \sum_{s} \left(\ln\left(\frac{IDX_s}{IDX_{s-1}}\right)\right)^2}$$

Where:
n = 19 or 59.
s = Ranging from t to t-18 or t to t-58.

Determination of Leveraged Weight
On any index calculation date t, the leveraged weight is calculated as follows:

$$w_t = \min(Cap, Tgwt_{t-1})$$

Where the Cap is set at 200% and the Tolerance is 0%, so the weight is rebalanced daily.

The indices are not subject to review.

33. EURO STOXX 50 COVERED CALL ATM INDEX

33.1. OVERVIEW

The EURO STOXX 50 Covered Call ATM Index reflects the so-called 'buy-write' option strategy. With this strategy, an investor buys the EURO STOXX 50 index (price or total return indices) as an underlying instrument and simultaneously sells a EURO STOXX 50 call option. The index is based on the EURO STOXX 50 price index or on the EURO STOXX 50 net total return index and a EURO STOXX 50 call option traded at Eurex.

33.2. BASIC DATA

Index Types and Currencies: Total Return and Price Return in EUR

Base Values and Dates: 100 as of January 18, 2019

Underlying Index Data:

Instrument	Name	ISIN
Underlying	EURO STOXX 50 Price Return	EU0009658145
Underlying	EURO STOXX 50 Net Return	EU0009658152
New Strike Determination	EURO STOXX 50 12:00 Price Return	CH0138276917
Option	EURO STOXX 50 Option	DE0009652396

Dissemination Calendar[18]: The index follows STOXX Eurex Calendar and is disseminated real-time between 09:00 - 19:15 CET Europe. On roll dates, the indexes will not be disseminated intraday after the old EURO STOXX 50 call option ceases trading at noon (12:00 CET) until 14:00 CET, after which, the calculation shall follow the respective non-roll day calculations based on the new EURO STOXX 50 call option

33.3. CALCULATIONS

Total Return Version

The Total Return version of the index combines the EURO STOXX 50 (Net Return) Index and a EURO STOXX 50 call option. On regular trading days the Total Return version is calculated as follows:

$$Index(TR)_t = \frac{\left[\frac{ESTX50(NR)_t}{ESTX50(NR)_{EXP}} ESTX50(P)_{EXP}\right] - C_t}{ESTX50(P)_{EXP} - C_0} Index(TR)_{EXP}$$

The rolling is carried out monthly on every third Friday, i.e., on the expiry date (EXP)

[18] Index levels on roll dates prior to index launch date follow roll day formula.

33.EURO STOXX 50 COVERED CALL ATM INDEX

$$Index(TR)_{EXP} = \frac{\left[\frac{ESTX50(NR)_{EXP}}{ESTX50(NR)_{EXP-1}} ESTX50(P)_{EXP-1}\right] - C'_{EXP}}{ESTX50(P)_{EXP-1} - C'_0} Index(TR)_{EXP-1}$$

Where:

$Index(TR)_t$ = EURO STOXX 50 Covered Call ATM Index at time (t)

$Index(TR)_{EXP}$ = Settlement value of EURO STOXX 50 Covered Call ATM Index at the previous expiry date (EXP)

$Index(TR)_{EXP-1}$ = Settlement value of EURO STOXX 50 Covered Call ATM Index at the last expiry date before the previous expiry date (EXP-1)

$ESTX50(NR)_t$ = Last price of EURO STOXX 50 (Net Return) index at time t

$ESTX50(NR)_{EXP}$ = Settlement price of EURO STOXX 50 (Net Return) index at the previous expiry date (EXP)

$ESTX50(NR)_{EXP-1}$ = Settlement price of EURO STOXX 50 (Net Return) index at the last expiry date before the previous expiry date (EXP-1)

$ESTX50(P)_{EXP}$ = Settlement price of EURO STOXX 50 (Price) index at the previous expiry date (EXP)

$ESTX50(P)_{EXP-1}$ = Settlement price of EURO STOXX 50 (Price) index at the last expiry date before the previous expiry date (EXP-1)

C_t = Last price of the EURO STOXX 50 call option at time t during intraday calculation; when available, daily settlement price received is used in index level calculation.

C_0 = Inclusion price of the EURO STOXX 50 call option, as calculated in the next section

C'_{EXP} = Settlement price of old EURO STOXX 50 call option at the last expiry date (EXP)

C'_0 = Inclusion price of the old EURO STOXX 50 call option on the last expiry date (EXP-1) before the previous expiry date (EXP)

Price version

The Price version of the index combines the EURO STOXX 50 (Price) Index and a EURO STOXX 50 call option. On regular trading days the Price version is calculated as follows:

$$Index(P)_t = \frac{ESTX50(P)_t - C_t}{ESTX50(P)_{EXP} - C_0} Index(P)_{EXP}$$

The rolling is carried out monthly on every third Friday, i.e., on the expiry date (EXP)

33.EURO STOXX 50 COVERED CALL ATM INDEX

$$Index(P)_{EXP} = \frac{ESTX50(P)_{EXP} - C'_{EXP}}{ESTX50(P)_{EXP-1} - C'_0} Index(P)_{EXP-1}$$

Where:

$Index(P)_t$ = EURO STOXX 50 Covered Call ATM (Price) Index at time (t)

$Index(P)_{EXP}$ = Settlement value of EURO STOXX 50 Covered Call ATM (Price) Index at the previous expiry date (EXP)

$Index(P)_{EXP-1}$ = Settlement value of EURO STOXX 50 Covered Call ATM (Price) Index at the last expiry date before the previous expiry date(EXP-1)

$ESTX50(P)_{EXP}$ = Settlement price of EURO STOXX 50 (Price) index at the previous expiry date (EXP)

$ESTX50(P)_{EXP-1}$ = Settlement price of EURO STOXX 50 (Price) index at the last expiry date before the previous expiry date (EXP-1)

C_t = Last price of the EURO STOXX 50 call option at time t during intraday calculation; when available, daily settlement price received is used in index level calculation.

C_0 = Inclusion price of the EURO STOXX 50 call option, as calculated in the next section

C'_{EXP} = Settlement price of old EURO STOXX 50 call option at the last expiry date (EXP)

C'_0 = Inclusion price of the old EURO STOXX 50 call option on the last expiry date (EXP-1) before the previous expiry date (EXP)

Rolling

The EURO STOXX 50 Covered Call ATM index requires a monthly rollover procedure, whereby the old EURO STOXX 50 call option ceases trading at noon (12:00 CET) on the pre-determined expiry date, i.e. the third Friday of a month, and is replaced by a new EURO STOXX 50 call option whose last trading day falls on the next expiry date. The new one-month EURO STOXX 50 call option must have a remaining lifetime of one month, and must be at-the-money (determined as the highest strike price below or equal to EURO STOXX 50® 12:00[19]).

On Roll Day t, the call option inclusion price is calculated as

$$InclusionPrice_t = \frac{\sum_{k=1}^{N}(MidPrice_{t,k} - TransactionCost_{t,k})}{N}$$

$$TransactionCost_{t,k} = Vega_{t,k} * VolSpread_{k,iv}$$

Where:

k is the interval (every minute) during the intraday window 12:15-12:45 CET

$VolSpread_{k,iv}$ is based on the implied volatility level and according to the table below

[19] https://stoxx.com/index/sx5e1200/

33.EURO STOXX 50 COVERED CALL ATM INDEX

Implied Volatility Level	Volatility Spread
IV ≤ 20%	0.30%
20% < IV ≤ 30%	0.50%
30% < IV ≤ 50%	0.7%
IV > 50%	1.4%

The calculation of the option $Vega_{t,k}$ is based on Black 76 model and follows:

For each k interval from the intraday window at roll day t, we find $MidPrice_{t,k}$ of Puts and Calls with the same time to expiry T as the selected call, the mid price is calculated as follows if both the bid and ask quotes are equal to or greater than 0.1 points:

$$MidPrice_{t,k} = \begin{cases} \frac{(BidPrice_{t,k} + AskPrice_{t,k})}{2} & if\ BidPrice_{t,k}\ and\ AskPrice_{t,k}\ both\ exist \\ NA, otherwise \end{cases}$$

For strike X where abs $(Call_{t,k,x} - Put_{t,k,x})$ is the smallest, we find implied at the money $FowardPrice_{t,k,x} = (Call_{t,k,x} - Put_{t,k,x})\ e^{rT} + X$, which shall be our $ForwardPrice_{t,k}$.
If multiple pairs of calls and puts exist with identical price differences, a forward price will be calculated as the simple average of the corresponding implied forward prices

$$Vega_{t,k} = FowardPrice_{t,k} e^{-rT}\ PDF(d_{1,k})\sqrt{T}$$

Where

$$d_{1,k} = \frac{log(\frac{ForwardPrice_{t,k}}{X}) + \frac{\sigma_k^2}{2}T}{\sigma_k\sqrt{T}}$$

and σ_k is the implied volatility for the underlying forward at interval k
and T is the time to maturity as fraction of days in years (ACT/365)
and r is the interest rate EURIBOR 1M[20]
and X is the strike of the selected option

Trading Suspension

If there is a suspension of the EURO STOXX 50 Index (price or net return) or the EURO STOXX 50 call option that is included in the EURO STOXX 50 Covered Call ATM index, the index will be calculated using the latest prices that were available.

If a suspension partially covers the averaging time window (12:15-12:45 CET), only the available ticking values during the averaging time window (12:15-12:45 CET) will be considered.
In cases where the average procedure does not start (i.e., the suspension starts before 12:15 CET), if the suspension covers the whole initial averaging time window (12:15-12:45 CET), the averaging will be delayed until the end of the suspension on the same index business day. The average process will start 30 minutes after the end of the suspension, and it will take 30 minutes.

[20] In case the value published on day t is not received before calculation starts, the last available value is used

33.EURO STOXX 50 COVERED CALL ATM INDEX

The index will then resume ticking on the next day after the suspension.
If the suspension continues until 16:30 CET. Then the averaging will be delayed until the next index business day at 12:15 CET.

34.EURO STOXX 50 COVERED CALL TARGET INCOME 8% INDEX

34.1. OVERVIEW

The EURO STOXX 50 Covered Call Target Income 8% Index reflects the so-called 'buy-write' option strategy with dynamically adjusted notional to target a predefined income yield level. With this strategy, an investor buys the EURO STOXX 50 index as an underlying instrument and simultaneously sells a EURO STOXX 50 call option. During the monthly rollover procedure, the expiring call option is bought to close and a new option is sold. The index is based on the EURO STOXX 50 index and a EURO STOXX 50 call option traded at Eurex.

34.2. BASIC DATA

Index Types and Currencies: Net Return version in EUR

Base Values and Dates: 100 as of December 13, 2016

Underlying Index Data:

Instrument	Name	ISIN
Underlying	EURO STOXX 50 Price Return	EU0009658145
Underlying	EURO STOXX 50 Net Return	EU0009658152
Option	EURO STOXX 50 Option	DE0009652396

Dissemination Calendar: The index follows STOXX Eurex Calendar and is disseminated real-time between 09:00 – 22:30 CET Europe. On roll dates, the indexes will not be disseminated from 17:30 to 22:30 CET; after which, the calculation shall follow the respective non-roll day calculations based on the new EURO STOXX 50 call option.[21]

34.3. CALCULATIONS

Total Return

On regular trading days t (non-roll day), the index is calculated as follows:

$$\mathrm{Index_t} = \frac{\left[\frac{\mathrm{SX5T_t}}{\mathrm{SX5T_{PrevRoll}}}\mathrm{SX5E_{PrevRoll}}\right] - \mathrm{N_{PrevRoll}C_t}}{\mathrm{SX5E_{PrevRoll}} - \mathrm{N_{PrevRoll}C^{Sold}_{PrevRoll}}}\mathrm{Index_{PrevRoll}}$$

The rolling is carried out monthly on the 3rd business day ahead of the 3rd Friday expiry date (i.e., generally the Tuesday).

[21] Intraday data for both the options and underlying indexes are approximated with end of day values prior to 2025 in the history

34.EURO STOXX 50 COVERED CALL TARGET INCOME 8% INDEX

On roll day $t = \text{Roll}$, during the rollover procedure at 17:30 CET, the old expiring option position is closed at price $C_{\text{Roll}}^{\text{Bought}}$ with notional coverage determined at previous rollover procedure N_{PrevRoll} and a new option position is initiated at price $C_{\text{Roll}}^{\text{Sold}}$ with the notional coverage N_{Roll}:

$$\text{Index}_{\text{Roll}} = \frac{\left[\frac{\text{SX5T}_{\text{Roll}}}{\text{SX5T}_{\text{PrevRoll}}}\text{SX5E}_{\text{PrevRoll}}\right] - N_{\text{PrevRoll}}C_{\text{Roll}}^{\text{Bought}}}{\text{SX5E}_{\text{PrevRoll}} - N_{\text{PrevRoll}}C_{\text{PrevRoll}}^{\text{Sold}}}\text{Index}_{\text{PrevRoll}}$$

Where:

- Index_t is the index level at time t
- $\text{Index}_{\text{Roll}}$ and $\text{Index}_{\text{PrevRoll}}$ are the index level values at rollover on roll day $t = \text{Roll}$ and previous roll day $t = \text{PrevRoll}$, respectively
- SX5T_t is the last price of EURO STOXX 50 (Net Return) index at time t
- C_t = Last price of the EURO STOXX 50 call option at time t during intraday calculation; when available, daily settlement price received is used in index level calculation
- $\text{SX5E}_{\text{PrevRoll}}$ is the EURO STOXX 50 (Price Return) index value at 17:30 CET on previous roll day $t = \text{PrevRoll}$
- $\text{SX5T}_{\text{Roll}}$ and $\text{SX5T}_{\text{PrevRoll}}$ are the EURO STOXX 50 (Net Return) index values at 17:30 CET on roll day $t = \text{Roll}$ and previous roll day $t = \text{PrevRoll}$, respectively

As described in the next sections:

- $C_{\text{PrevRoll}}^{\text{Sold}}$ is the inclusion price of the new EURO STOXX 50 call option sold on previous roll day $t = \text{PrevRoll}$
- $C_{\text{Roll}}^{\text{Bought}}$ is the price at which the old EURO STOXX 50 call option is bought on day $t = \text{Roll}$
- N_{PrevRoll} is the notional coverage of the EURO STOXX 50 call option on previous roll day $t = \text{PrevRoll}$

After the monthly rollover procedure, the index resumes dissemination based on the non-roll day formula where $C_{\text{Roll}}^{\text{Sold}}$ and N_{Roll} becomes $C_{\text{PrevRoll}}^{\text{Sold}}$ and N_{PrevRoll}, respectively.

Rolling

On roll day t, the new EURO STOXX 50 call option $C_{\text{Roll}}^{\text{Sold}}$ must have a remaining lifetime of one month (i.e., on the next expiry Friday after the imminent expiry Friday) and must be at-the-money, determined as the highest strike price below or equal to $\overline{\text{SX5E}_t}$. The price at which $C_{\text{Roll}}^{\text{Sold}}$ and $C_{\text{Roll}}^{\text{Bought}}$ are respectively sold and bought is calculated as follows:

$$\text{Price}_t = \text{DailySettlementPrice}_t + L * \text{TransactionCost}_t$$
$$\text{TransactionCost}_t = \text{Vega}_t * \text{VolSpread}_{\text{iv}}$$

Where:

34.EURO STOXX 50 COVERED CALL TARGET INCOME 8% INDEX

- $\overline{SX5E_t}$ is the EURO STOXX 50 (Price Return) index TWAP over the window 16:15-16:35 CET on day t
- $DailySettlementPrice_t$ is the daily settlement price
- $L = -1$ for C_{Roll}^{Sold} and $L = 1$ for C_{Roll}^{Bought}
- $VolSpread_{iv}$ is based on the implied volatility level and according to the table below

Implied Volatility Level	Volatility Spread
IV ≤ 20%	0.30%
20% < IV ≤ 30%	0.50%
30% < IV ≤ 50%	0.7%
IV > 50%	1.4%

The calculation of the option $Vega_t$ is based on Black 76 model and follows:

1. We find the daily settlement prices of puts and calls with the same time to expiry T as the selected call, respectively, as $Put_{t,x}$ and $Call_{t,x}$ for all available strikes $x \in X$
2. For strike x^* where $abs(Call_{t,x^*} - Put_{t,x^*})$ is the smallest, we find implied at the money $FowardPrice_{t,x^*} = (Call_{t,x^*} - Put_{t,x^*})\, e^{rT} + x^*$, which shall then be $ForwardPrice_t$. If multiple pairs of calls and puts exist with identical price differences, a forward price will be calculated as the simple average of the corresponding implied forward prices
3. $$Vega_t = FowardPrice_t e^{-rT}\, PDF(d_1)\sqrt{T}$$

   Where:

   - $d_1 = \frac{\log\left(\frac{ForwardPrice_t}{k}\right) + \frac{\sigma^2}{2}T}{\sigma\sqrt{T}}$
   - σ is the implied volatility for the underlying forward
   - T is the time to maturity as fraction of days in years (ACT/365)
   - r is the interest rate EURIBOR1M[22]
   - k is the strike of the selected option

Notional coverage

The notional coverage for the new option to sell is defined as follows on roll day t:

$$N_{Roll} = \min\left(100\%, \frac{TargetMonthlyYield_t}{PremiumYield_t}\right)$$

$$PremiumYield_t = \frac{\bar{C}_t}{\overline{SX5E_t}}$$

$$TargetMonthlyYield_t = \frac{8\%}{12}$$

Where:

[22] In case the value published on day t is not received before calculation starts, the last available value is used

34.EURO STOXX 50 COVERED CALL TARGET INCOME 8% INDEX

- $\bar{C}_t$ is the average based on the selected option mid prices over the window 16:15-16:35 CET on day t; the mid price is calculated only if the following conditions are met:
    a) If both the bid and ask prices are available
    b) If both the bid and ask prices are equal to or greater than 0.1 points
- $\overline{SX5E}_t$ is the EURO STOXX 50 (Price Return) index TWAP over the window 16:15-16:35 CET on day t

Index Disruption

If there is an index disruption event in relation to the EURO STOXX 50 Index (price or net return) or the EURO STOXX 50 call options that are included in the EURO STOXX 50 Covered Call Target Income 8%, the index will be calculated using the latest prices that were available.

If the index disruption event partially covers the averaging time window (16:15-16:35 CET), only the available values during the window will be considered.

If the index disruption event prevents the rollover averaging procedure from being initiated, the procedure is delayed until the next dissemination day at 16:15 CET.

35.EURO STOXX 50 COVERED CALL DYNAMIC TARGET INCOME 6% INDEX

35.1. OVERVIEW

The EURO STOXX 50 Covered Call Dynamic Target Income 6% Index reflects the so-called 'buy-write' option strategy with daily adjusted notional to target a predefined income yield level. With this strategy, an investor buys the EURO STOXX 50 index (price return) as an underlying instrument and simultaneously sells two EURO STOXX 50 call options. The index is based on the EURO STOXX 50 price index and next two immediate EURO STOXX 50 call options with different maturities traded at Eurex.

Underlying Index

Instrument	Name	ISIN
Underlying	EURO STOXX 50 Price Return	EU0009658145
Underlying	EURO STOXX 50 Net Return	EU0009658152
Option	EURO STOXX 50 Option	DE0009652396

Base Values and Dates :100 as of January 18, 2019.

Index Types and Currencies: Net Return version in EUR.

Dissemination: The index follows STOXX Eurex Calendar and is disseminated end-of-day at 22:30 CET Europe.[23]

The index is to be calculated with full precision and reported/disseminated rounded to 2 decimal places.

35.2. CALCULATIONS

The index requires daily review and rebalancing on each dissemination date, whereby the new ATM call options are selected and sold at the designated amount. The calculation is described as follows.

TARGET MATURITY

On each review/rebalancing day t, the next two immediate monthly options expiry dates on the 3rd Fridays are identified, respectively referred to as the shorter-term maturity D_t^{ST} and the longer-term maturity $\mathrm{D}_t^{\mathrm{LT}}$.

Target Maturity D_t^{TM} is targeted to be 30 calendar days $t + 30$ from the rebalancing day with the below adjustments:

[23] Intraday data for both the options and underlying indexes are approximated with end of day values prior to 2025 in the history

35.EURO STOXX 50 COVERED CALL DYNAMIC TARGET INCOME 6% INDEX

$$D_t^{TM} = \begin{cases} \max\left(t + 30, D_t^{ST}\right), & t < D_t^{ST} - 2 \text{ and } t < D_t^{LT} - 30 \\ D_t^{LT}, & t \in \left[D_t^{ST} - 2, D_t^{ST} - 1\right] \text{ or } t \geq D_t^{LT} - 30 \end{cases}$$

Where

- D_t^{TM} is the Target Maturity date, which can fall on a non-trading day
- D_t^{ST} is the shorter-term option maturity date (i.e., the next immediate 3rd Friday expiry)
- D_t^{LT} is the longer-term option maturity date (i.e., the next 3rd Friday expiry after D_t^{ST})

When t falls on D_t^{ST}, a new pair of D_t^{ST} and D_t^{LT} is identified upon the review/rebalancing procedure at 16:15 CET, where $D_{t<16:15CET}^{LT}$ becomes D_t^{ST}, followed by the calculation outlined above to find the updated D_t^{TM}.

Example:

- As $t \in \left[D_t^{ST} - 2, D_t^{ST} - 1\right]$ or $t \geq D_t^{LT} - 30$, $D_t^{TM} = D_t^{LT}$ from 2025-03-18 to 2025-03-20
- A new pair of D_t^{ST} and D_t^{LT} is identified on 2025-03-21

t	$t+30$	D_t^{TM}	D_t^{ST}	D_t^{LT}
18/03/2025	17/04/2025	17/04/2025	21/03/2025	17/04/2025
19/03/2025	18/04/2025	17/04/2025	21/03/2025	17/04/2025
20/03/2025	19/04/2025	17/04/2025	21/03/2025	17/04/2025
21/03/2025	20/04/2025	20/04/2025	17/04/2025	16/05/2025
24/03/2025	23/04/2025	23/04/2025	17/04/2025	16/05/2025
25/03/2025	24/04/2025	24/04/2025	17/04/2025	16/05/2025

Example:

- As $t + 30 \leq D_t^{ST}$, $D_t^{TM} = D_t^{ST}$ from 2025-01-17 to 2025-01-22

t	$t+30$	D_t^{TM}	D_t^{ST}	D_t^{LT}
17/01/2025	16/02/2025	21/02/2025	21/02/2025	21/03/2025
20/01/2025	19/02/2025	21/02/2025	21/02/2025	21/03/2025
21/01/2025	20/02/2025	21/02/2025	21/02/2025	21/03/2025
22/01/2025	21/02/2025	21/02/2025	21/02/2025	21/03/2025
23/01/2025	22/02/2025	22/02/2025	21/02/2025	21/03/2025

DAILY INDEX REVIEW/REBALANCING

After Target Maturity D_t^{TM} is determined, the shorter-term and longer-term expiry options are selected and rebalanced with respect to the designated notional allocation in the following steps:

35.EURO STOXX 50 COVERED CALL DYNAMIC TARGET INCOME 6% INDEX

1. The at-the-money (ATM) options expiring on D_t^{ST} and D_t^{LT} are identified as $C_{t,k^{ST}}^{ST}$ and $C_{t,k^{LT}}^{LT}$ respectively:
   - $\mathrm{C}_{\mathrm{t,k^{LT}}}^{\mathrm{LT}}$: $\mathrm{k^{LT}}$ selected as the highest strike price below or equal to $\overline{SX5E_t}$ that expires on $\mathrm{D_t^{LT}}$
   - $C_{t,k^{ST}}^{ST}$: k^{ST} selected as the highest strike price below or equal to $\overline{SX5E_t}$ that expires on $\mathrm{D_t^{ST}}$

   For k^{ST} and k^{LT}only strikes of the 25 index points are considered

   Where:
   - $\overline{\mathrm{SX5E_t}}$ is the EURO STOXX 50 (PR) index TWAP over the window 16:15-16:35 CET on day t
   - $\mathrm{k^{ST}}$ and $\mathrm{k^{LT}}$are respectively the strike price for the shorter-term and longer-term option
2. The Weighting Factor with respect to the shorter-term and longer-term maturities are respectively:

$$\mathrm{w_t^{LT}} = \frac{\mathrm{T_t^{TM}} - \mathrm{T_t^{ST}}}{\mathrm{T_t^{LT}} - \mathrm{T_t^{ST}}}; \mathrm{w_t^{ST}} = 1 - \mathrm{w_t^{LT}}$$

   Where:
   - T_t^{TM} is the number of days to Target Maturity D_t^{TM}
   - T_t^{ST} is the number of days to the shorter-term option maturity date D_t^{ST}
   - T_t^{LT} is the number of days to the longer-term option maturity date D_t^{LT}
3. The option Premium Yield for the shorter-term and longer-term options are respectively:

$$\mathrm{y_{t,k^{ST}}^{ST}} = \frac{\bar{\mathrm{C}}_{\mathrm{t,k^{ST}}}^{\mathrm{ST}}}{\overline{\mathrm{SX5E_t}}}; \mathrm{y_{t,k^{LT}}^{LT}} = \frac{\bar{\mathrm{C}}_{\mathrm{t,k^{LT}}}^{\mathrm{LT}}}{\overline{\mathrm{SX5E_t}}}$$

   Where
   - $\bar{\mathrm{C}}_{\mathrm{t,k^{ST}}}^{\mathrm{ST}}$ and $\bar{\mathrm{C}}_{\mathrm{t,k^{LT}}}^{\mathrm{LT}}$ are the average based on selected option mid prices over the window 16:15-16:35 CET on day t, respectively, for the shorter-term and longer-term expiry options with strike k^{ST} and k^{LT}

     The mid-price is calculated only if the following conditions are met:
     a) If both the bid and ask prices are available
     b) If both bid and ask prices are equal to or greater than 0.1 points
   - $\overline{\mathrm{SX5E_t}}$ is the EURO STOXX 50 (PR) index TWAP over the window 16:15-16:35 CET on day t
4. The interpolated Premium Yield y_t^{TM} for the Target Maturity is:

35.EURO STOXX 50 COVERED CALL DYNAMIC TARGET INCOME 6% INDEX

$$y_t^{TM} = w_t^{ST} y_{t,k^{ST}}^{ST} + w_t^{LT} y_{t,k^{LT}}^{LT}$$

5. To meet the target yield requirement, the target is translated to a daily yield target:

$$\text{TargetDailyYield}_t = \frac{\frac{6\%}{12}}{20} = 0.025\%$$

6. A scaling factor $q_t = \frac{0.025\%}{y_t^{TM}} \text{UnitEq}_{t-1}$ is applied[24] to the interpolated Premium Yield to find the notional allocation $x_{t,k^{ST}}^{ST}$ and $x_{t,k^{LT}}^{LT}$ for the shorter-term and longer-term options respectively:

$$q_t(w_t^{ST} y_{t,k^{ST}}^{ST} + w_t^{LT} y_{tk^{LT}}^{LT}) = x_{t,k^{ST}}^{ST} y_{t,k^{ST}}^{ST} + x_{tk^{LT}}^{LT} y_{t,k^{LT}}^{LT}$$

$$x_{t,k^{ST}}^{ST} = q_t w_t^{ST};\ x_{t,k^{LT}}^{LT} = q_t w_t^{LT}$$

7. The sum of cumulative notional coverage across strikes for the options of maturity $m \in \{ D_t^{ST}, D_t^{LT}\}$ on day t must not exceed 100%, that is:

$$\sum_{k \in K} n_{t,k}^{m} \leq 100\%$$

In case the sum of cumulative notional coverage across strikes for the options of maturity m including the notional allocation on day t exceeds 100%, the notional allocation $x_{t,k}^{m}$ on day t is set to be the remaining available amount for allocation $v_{t,k}^{m}$:

$$\textit{If } \sum_{k \in K} n_{t,k}^{m} > 100\%, \textit{ then } x_{t,k}^{m} = v_{t,k}^{m}$$

Where:

- $n_{t,k}^{m} = \sum_{t=0}^{t=Today} x_{t,k}^{m}$; the cumulative notional allocation to option of maturity m with strike k up till day t inclusive of the rebalancing
- $n_{t-1,k}^{m} = \sum_{t=0}^{t=Today-1} x_{t,k}^{m}$; the cumulative notional allocation to option of maturity m with strike k up till day $t-1$ inclusive of the rebalancing
- K is the set of strikes selected for the options
- $v_{t,k}^{m} = 100\% - \sum_{k \in K} n_{t-1,k}^{m}$; the remaining available amount for allocation calculated as the difference between 100% and the sum of cumulative notional allocation to options of maturity m across all selected strikes on day $t-1$

DAILY INDEX CALCULATION

The index reflects the performance of the "buy-write" option strategy with daily adjusted notional to target a predefined income yield level, which, along with dividends received, are reinvested into

[24] When t falls on a pre-determined expiry date, the equity index units should first reflect the final option settlement adjustment for that day; on day $t = 1, UnitEq_{t-1} = 1$

35.EURO STOXX 50 COVERED CALL DYNAMIC TARGET INCOME 6% INDEX

the underlying long EURO STOXX 50 Index (Price Return); the daily index calculation is distinguished between the regular dissemination days and the pre-determined option expiry dates (i.e., monthly 3rd Fridays):

Regular Dissemination Day

On each day t, the index portfolio $Index_t$ is calculated as:

$$\mathrm{Index_t} = \mathrm{Equity_t} + \mathrm{Option_t^{ST}} + \mathrm{Option_t^{LT}}$$

$$\mathrm{IV_t} = \frac{\mathrm{Index_t}}{\mathrm{Index_{t=1}}} * 100$$

Where:

- $Equity_t = UnitEq_t * SX5E_t$; the equity exposure ($Equity_t$) is computed as the number of underlying equity index units ($UnitEq_t$), multiplied by the last price of EURO STOXX 50 (PR) ($SX5E_t$); on first day $t = 1, UnitEq_t$ is set at 1
- $C_{t,k}^m$ is the end-of-day daily settlement price for the option of maturity m with strike k
- $\mathrm{Option_t^m} = -\sum_{\mathrm{k \in K}} \mathrm{n_{t,k}^m C_{t,k}^m}$; the option position of maturity m, $Option_t^m$ is computed as the sum product of the cumulative notional allocation to option of maturity m with strike k and their respective price across all selected strikes; on first day $t = 1, n_{1,k}^m = x_{1,k}^m$ for either maturity m
- IV_t; the index level is rescaled with respect to the index portfolio on day $t = 1$, i.e., $\mathrm{Index_{t=1}}$; and $\mathrm{IV_{t=1}} = 100$

Upon review/rebalancing at 17:30 CET, the underlying equity index units ($UnitEq_t$) is updated to reflect the option premiums/dividend reinvestment:

$$\mathrm{UnitEq_t} = \mathrm{UnitEq_{t-1}} + \frac{\mathrm{x_{t,k^{ST}}^{ST}} * \mathrm{O_{t,k^{ST}}^{ST}} + \mathrm{x_{t,k^{LT}}^{LT}} * \mathrm{O_{t,k^{LT}}^{LT}} + \mathrm{Dvd_t}}{\mathrm{SX5E_{t=17:30}}}$$ [25]

Where

- $\mathrm{Dvd_t} = \max(\left(\frac{\mathrm{SX5T_{t=17:30}}}{\mathrm{SX5T_{t-1}}} - \frac{\mathrm{SX5E_{t=17:30}}}{\mathrm{SX5E_{t-1}}}\right) * \mathrm{SX5E_{t-1}}, 0)\ \mathrm{UnitEq_{t-1}}$; proxy for net dividend earned on day t
- $\mathrm{O_{t,k}^m}$ is the option inclusion price of maturity m with strike k, as described in the next section
- $\mathrm{SX5E_{t=17:30}}$ and $\mathrm{SX5T_{t=17:30}}$ are the EURO STOXX 50 (PR) and (NR) indexes at 17:30 CET

Pre-determined option expiry dates (i.e., monthly 3rd Fridays):

When t falls on a pre-determined expiry date (i.e. D_t^{ST}), the index formula incorporates the adjustment for the time window below to reflect option position settlement:

[25] When t falls on a pre-determined expiry date, the equity index units should reflect the final option settlement adjustment for that day; proxy for net dividend earned remains based on equity index units from the previous day

35.EURO STOXX 50 COVERED CALL DYNAMIC TARGET INCOME 6% INDEX

At 12:00 CET:

$$\mathrm{UnitEq_t} = \mathrm{UnitEq_{t-1}} - \frac{\mathrm{OptionSettlement_t}}{\mathrm{SX5E_{t=settlement}}}$$

- $\mathrm{OptionSettlement_t} = \sum_{k \in K} \mathrm{n_{t,k}^{D_t^{ST}}} \mathrm{F_{t,k}^{D_t^{ST}}}$; the final settlement of options of maturity $\mathrm{D_t^{ST}}$ is computed as the sum product of the cumulative notional allocation to the options of maturity D_t^{ST} with strike k and their respective final settlement prices across all selected strikes
- $\mathrm{F_{t,k}^{D_t^{ST}}}$ is the final settlement price of the option of maturity D_t^{ST} with strike k
- $\mathrm{SX5E_{t=settlement}}$ is the EURO STOXX 50 (PR) index settlement price on day t

The index then goes through the same daily review/rebalancing process at 17:30 CET, as described in previous section, based on the newly defined pair of D_t^{ST} and D_t^{LT} as updated at 16:15 CET.

OPTION INCLUSION PRICE

Inclusion prices of the sold options are calculated as follows, which applies to both the shorter-term or longer-term options:

$$\mathrm{O_{t,k}^m} = (\mathrm{DailySettlementPrice_{t,k}^m} - \mathrm{TransactionCost_{t,k}^m})$$

$$\mathrm{TransactionCost_{t,k}^m} = \mathrm{Vega_{t,k}^m} * \mathrm{VolSpread_{iv^m}}$$

Where:

$DailySettlementPrice_{t,k}^{m}$ is the daily settlement price of the option of maturity m with strike k

$VolSpread_{iv^m}$ is based on the implied volatility level iv^m for maturity m and according to the table below:

Implied Volatility Level	Volatility Spread
IV ≤ 20%	0.30%
20% < IV ≤ 30%	0.50%
30% < IV ≤ 50%	0.7%
IV > 50%	1.4%

The calculation of the option $Vega_{t,k}^{m}$ is based on Black 76 model and follows:

1. We find the daily settlement prices of puts and calls with the same maturity m as the selected call, respectively, as $\mathrm{Put_{t,k}^m}$ and $\mathrm{Call_{t,k}^m}$
2. For strike k^* where $\mathrm{abs(Call_{t,k^*}^m - Put_{t,k^*}^m)}$ is the smallest, we find implied at the money $\mathrm{ForwardPrice_t^m} = (\mathrm{Call_{t,k^*}^m} - \mathrm{Put_{t,k^*}^m})\, \mathrm{e^{r^m \tau_m}} + \mathrm{k^*}$. If multiple pairs of calls and puts exist with

35.EURO STOXX 50 COVERED CALL DYNAMIC TARGET INCOME 6% INDEX

identical price differences, a forward price will be calculated as the simple average of the corresponding implied forward prices

$$\mathrm{Vega}_{t,k}^{m} = \mathrm{ForwardPrice}_{t}^{m} e^{-r^{m}\tau_{m}} \mathrm{PDF}(d_{1,m})\sqrt{\tau_{m}}$$

Where:

$$d_{1,m} = \frac{\log(\frac{\mathrm{ForwardPrice}_{t}^{m}}{k}) + \frac{\sigma_{t,m}^{2}}{2}\tau_{m}}{\sigma_{t,m}\sqrt{\tau_{m}}}$$

and $\sigma_{t,m}$ is the implied volatility for the underlying forward with respect to maturity m

and τ_m is the time to maturity m as fraction of days in years (ACT/365)

and k is the strike of the selected option

and PDF is the probability density function

and r^m is €STR[26] (EUROSTR=)

INDEX DISRUPTION

If there is an index disruption event in relation to the EURO STOXX 50 Index (price or net return) or the EURO STOXX 50 call options that are included in the EURO STOXX 50 Covered Call Dynamic Target Income 6%, the index will be calculated using the latest prices that were available.

If the index disruption event partially covers the averaging time window (16:15-16:35 CET), only the available values during the window will be considered.

If the index disruption event prevents the rollover averaging procedure from being initiated, no call is sold on that day.

[26] In case the value published on day t is not received before calculation starts, the last available value is used; in case €STR is used in the calculation, the calculation is based on €STR that is published on day t in respect of t-1; prior to 2019-10-01, EONIA is used in place of €STR