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STOXX

iSTOXX® Credit Spread Indices Methodology Guide

STOXX.com

ISS STOXX

Part of DEUTSCHE BÖRSE GROUP

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 **STOXX Reference Calculations guide** 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** 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.
- The **STOXX Digital Asset Methodology guide** contains the index specific rules regarding the construction and calculation of the STOXX Digital Asset Indices.

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

2. GENERAL PRINCIPLES

2.1. 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.

2.2. 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 a 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 History of changes to the guide.

2.3. 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 consider 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.

2.4. PARTY RESPONSIBILITIES

STOXX, as the benchmark administrator, 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 on a periodic and an 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 Investors. Clarifications of the methodology are updated in the rulebook.

3. INDEX METHODOLOGY

3.1. iSTOXX SOFR ACADEMY USD ACROSS-THE-CURVE CREDIT SPREAD INDICES (AXI)AND iSTOXX SOFR ACADEMY USD FINANCIAL CONDITIONS CREDIT SPREAD INDICES (FXI) INDEX

3.1.1. OVERVIEW

iSTOXX SOFR Academy USD Across-the-Curve Credit Spread Indices (AXI) is a fully transaction-based measure of the recent cost of wholesale unsecured debt funding for US bank holding companies and commercial banks. It is the weighted average of credit spreads for unsecured debt instruments with maturities ranging from overnight to five years, with weights that reflect both transaction and issuance volumes.

The primary underlying input data source is obtained from Financial Industry Regulatory Authority's (FINRA) Trade Reporting and Compliance Engine (TRACE) which is a mandatory post-trade transparency requirement. This long-term bond component is complemented by the short-term component obtained from the Depository Trust & Clearing Corporation (DTCC). No transactions from private markets or unregulated proprietary exchanges / platforms are used.

iSTOXX SOFR Academy USD Financial Conditions Credit Spread Indices (FXI) is constructed through the same methodology as AXI, however coverage is widened to include non-bank financial issuers and US corporate debt. AXI and FXI are generally highly correlated.

3.1.2. DISSEMINATION CALENDAR

The dissemination calendar for the index family follows US fixed income calendar.

3.1.2.1. PUBLICATION TIME

For a complete list and its corresponding data, please consult the data vendor code sheet on the website[1] . Customized solutions can be provided upon request.

3.1.2.2. REVIEW AND REBALANCING FREQUENCY

The index family requires daily calculations, during which the daily spreads, volumes and maturities for the short-term and long-term basket are defined.

On the first dissemination of each month, the basket universe of the long-term basket is defined.

3.1.3. INPUT DATA

3.1.3.1. TRANSACTION DATA

[1] https://www.stoxx.com/documents/stoxxnet/Documents/Resources/Data_Vendor_Codes/vendor_codes_sheet.csv

1. INDEX METHODOLOGY

The transactions of instruments based on which the AXI/FXI index family is computed comprises the baskets of short-term and long-term securities, which are sourced separately as described in their respective sections.

3.1.3.1.1. SHORT-TERM BASKET

Transactions relevant for the short-term basket are sourced from Depository Trust & Clearing Corporation's (DTCC's) Money Market Kinetics.

3.1.3.1.2. LONG-TERM BASKET

Transactions relevant for the long-term basket are sourced from Financial Industry Regulatory Authority's (FINRA's) Trade Reporting and Compliance Engine (TRACE).

3.1.3.2. BOND REFERENCE DATA

Bond reference data is sourced to identify transactions of securities that are relevant for the long-term basket universe as well as required for the daily calculation.

3.1.3.3. TREASURY YIELD CURVE

The Daily Treasury Rates are published by the U.S. Department of the Treasury[2], with respect to the following input, as mentioned in the next sections.

- Daily Treasury Par Yield Curve Rates
- Daily Treasury Bill Rates

3.1.4. CALCULATION

The AXI and FXI indexes differ in their eligible coverage of issuers, where the latter is widened to include non-bank financial issuers and US corporate debt, as described in the subsequent section.

3.1.4.1. iSTOXX SOFR ACADEMY USD ACROSS-THE-CURVE CREDIT SPREAD INDICES (AXI)

Short-Term Basket

On each dissemination day, the short-term basket universe is established by considering all secondary market USD dollar transactions of commercial paper (CP) and certificates of deposit (CD) issued by a US entity that occurred the previous transaction day. This is done using DTCC data. To be eligible for the inclusion of the basket universe, transactions in securities with the below features are excluded:

- Days to maturity larger than 365 days
- Puttable or Callable
- Indexed or periodic principal
- Extended maturity or renewable note
- Repayment put upon death
- Changeable interest payment, interest rate reset, interest step-up

[2] https://home.treasury.gov/resource-center/data-chart-center/interest-rates/TextView?type=daily_treasury_yield_curve&field_tdr_date_value=all

1. INDEX METHODOLOGY

- Exchangeable
- Periodic (pre-maturity) coupons

Long-Term Basket

The long-term basket component requires both a monthly and a daily process. For the monthly process, on the first dissemination day of each calendar month, the long-term basket universe is established by considering all secondary market USD dollar transactions of senior unsecured corporate bonds issued by a US entity that occurred over the prior 21 transaction days.

To be eligible for the inclusion of the basket universe, transactions in securities with the below features are excluded:

- Days to maturity less than one year and greater than five years
- Puttable
- Perpetual
- Convertible or Exchangeable
- Private Placement
- In default

For the daily process, on each dissemination day, the composition is selected from monthly process.

The daily calculations use first short-term and long-term spreads based on their respective basket universes, and subsequently the weighted-average based on 21 days of such spreads to arrive at the core AXI. The core AXI is then extended to calculate the standard scaled tenors as well as n-day average versions, as described in subsequent sections.

Index Types

Term	Index
Core	iSTOXX Core AXI
Standard Tenors	iSTOXX Overnight AXI
Standard Tenors	iSTOXX 1-Month AXI
Standard Tenors	iSTOXX 3-Month AXI
Standard Tenors	iSTOXX 6-Month AXI
Standard Tenors	iSTOXX 12-Month AXI
n-Day Average	iSTOXX 30-Day Avg Overnight AXI
n-Day Average	iSTOXX 90-Day Avg Overnight AXI
n-Day Average	iSTOXX 180-Day Avg Overnight AXI

Short-Term Basket

On each transaction day t, the daily calculation of volume-weighted spread for the short-term basket follows the below steps:

1. INDEX METHODOLOGY

1. For each transaction j, the transaction yield (yield_j) is calculated based on its income payment type:

$$\text{yield}_{j,t} = \begin{cases} (\frac{x_{j,t}^{\text{principal}}}{x_{j,t}^{\text{settlement}}} - 1) * \frac{360}{\text{dtm}_{j,t}} * 100, & j \in S_{\text{zero coupon}} \\ (1 - \frac{x_{j,t}^{\text{settlement}}}{x_{j,t}^{\text{principal}}}) * \frac{360}{\text{dtm}_{j,t}} * 100, & j \in S_{\text{discount}} \\ (\frac{x_{j,t}^{\text{principal}} * (1 + i_{j,t}\frac{\text{dtm}_{j,t}}{360})}{x_{j,t}^{\text{settlement}}} - 1) * \frac{360}{\text{dtm}_{j,t}} * 100, & j \in S_{\text{income at maturity only}} \end{cases}$$

   Where:
   - $x_{j,t}^{\text{principal}}$ is the principal amount
   - $x_{j,t}^{\text{settlement}}$ is the settlement amount
   - $\text{dtm}_{j,t}$ is the number of days to maturity
   - $i_{j,t}$ is the interest-rate of the security (as in 0.01=1%)
   - $S_{\text{zero coupon}}$, S_{discount}, $S_{\text{income at maturity only}}$ are the set of securities with income payment type that are zero-coupon, discount and income at maturity type, respectively

2. The spread for the transaction j is calculated as $\text{spread}_{j,t} = \text{yield}_{j,t} - r_{j,t}$, where $r_{j,t}$ is the interpolated risk free rate of the same tenor as the transaction j, based on the US Treasury Par yield curve.

3. Transactions' spreads are ranked in ascending order and only transactions whose spreads fall within the 97.5th and the 2.5th percentile (inclusive of both boundaries) are considered for the subsequent calculation.

4. Only the transactions issued by banking entities are considered.

The daily spread calculation results in three values for the short-term basket as formulated below:

- Short-term Spread: $\text{spread}_t^{ST} = \frac{\sum_j \text{spread}_{j,t} * x_{j,t}^{\text{principal}}}{\text{volume}_t^{ST}}$
- Short-term Years to Maturity: $\text{mat}_t^{ST} = \frac{\sum_j \frac{\text{dtm}_{j,t}}{365} * x_{j,t}^{\text{principal}}}{\text{volume}_t^{ST}}$
- Short-term Principal Amount: $\text{volume}_t^{ST} = \sum_j x_{j,t}^{\text{principal}}$

Long-Term Basket

The daily calculation for the long-term basket is carried out through the below steps:

1. Basket Universe Spread & Maturity Bucketing Calculation
   - For each transaction j on transaction day t in the long-term basket universe, the transaction yield ($\text{yield}_{j,t}$) is identified and taken from the source.
   - The spread for the transaction j on transaction day t is calculated as $\text{spread}_{j,t} = \text{yield}_{j,t} - r_{j,t}$, where $r_{j,t}$ is the interpolated risk free rate of the same tenor as the transaction j, based on the US Treasury Par yield curve.

1. INDEX METHODOLOGY

- On the first dissemination day of each calendar month, each transaction j is assigned to one of the four below maturity buckets based on remaining years to maturity. Remaining years of maturity is defined as: $\text{ttm}_j = \frac{\text{maturity\_date}_j - \text{Date of First Dissemniation day}}{365.25}$
  - Maturity Bucket 1-2: $1 \leq \text{ttm}_j < 2$
  - Maturity Bucket 2-3: $2 \leq \text{ttm}_j < 3$
  - Maturity Bucket 3-4: $3 \leq \text{ttm}_j < 4$
  - Maturity Bucket 4-5: $4 \leq \text{ttm}_j < 5$
- On each transaction day t, transactions' spreads are ranked in ascending order within each maturity bucket, and only transactions whose spreads fall within the 97.5th and the 2.5th percentile (inclusive of both boundaries) are considered to calculate Maturity Bucket Median Spread and Maturity Bucket Median Years to Maturity
- Only the transactions issued by banking entities are considered.
- Maturity Bucket Median Spread for each maturity bucket is the simple average of spread of the transactions that fall immediately before and immediately after the cumulative 50th percentile of transaction volume
- Maturity Bucket Median Years of Maturity for each maturity bucket is the simple average of the year to maturity of the transactions that fall immediately before and immediately after the cumulative 50th percentile of transaction volume

2. Weight Calculation using Annual Primary Issuance Amount
   - From the long-term basket universe, select the securities transactions which were issued within the most recent 12 months ending as on the first dissemination day of the calendar month, $\text{age}_j = \frac{\text{Date of First Dissemniation day} - \text{issue\_date}_j}{365.25}$ where $\text{age}_j \leq 1$
   - Amount issued for these securities are identified
   - Each selected transaction j is assigned to one of the four below maturity buckets based on their years-to-maturity at issuance,

$$\text{ttm}_j^{\text{issuance}} = \frac{\text{maturity\_date}_j - \text{issue\_date}_j}{365.25}$$

     - Maturity Bucket 1-2: $1 \leq \text{ttm}_j^{\text{issuance}} < 2$
     - Maturity Bucket 2-3: $2 \leq \text{ttm}_j^{\text{issuance}} < 3$
     - Maturity Bucket 3-4: $3 \leq \text{ttm}_j^{\text{issuance}} < 4$
     - Maturity Bucket 4-5: $4 \leq \text{ttm}_j^{\text{issuance}} < 5$
   - For each Maturity at Issuance Bucket, the amount issued is summed up to determine the annual primary issuance for each of the corresponding buckets
     - The weight of Maturity Bucket, b is the annual primary issuance for Maturity Bucket, b divided by the sum of the annual primary issuance across all four Maturity Bucket,

$$W_{b,t}^{\text{issue}} = \frac{x_{b,t}^{\text{issue}}}{\sum_b x_{b,t}^{\text{issue}}}$$

       where:
       - $x_{b,t}^{\text{issue}} = \sum_j^{j \in S_t^b} x_{j,t}^{\text{issue}}$ is the total issue amount for bucket b
       - $x_{j,t}^{\text{issue}}$ is the issue amount for the security underlying transaction j
       - S_t^b is the set of transactions belonging to b

The daily spread calculation results in three values for the long-term basket as formulated below:

1. INDEX METHODOLOGY

- Long-term Spread: $\text{spread}_t^{LT} = \sum_b \text{spread}_{b,t}^{LT} * W_{b,t}^{issue}$
- Long-term Years to Maturity: $\text{mat}_t^{LT} = \sum_b \text{maturity}_{b,t}^{LT} * W_{b,t}^{issue}$
- Long-term Transaction Volume: $\text{volume}_t^{LT} = \sum_b X_{b,t}^{quantity}$

Daily Index Value Calculation

The daily index calculation first calculates a single core AXI value based on the short-term and long-term spread and their respective weighting, which is subsequently scaled to different standard tenors and computed for the n day average versions.

1. Core AXI Value

   The core AXI index values combine the short-term and long-term spreads into a weighted-average spread.

$$UV_t = \frac{\sum_{t=t-20}^{t} \frac{\left(\text{spread}_t^{ST} * \text{mat}_t^{ST} * \text{volume}_t^{ST}\right) + \left(\text{spread}_t^{LT} * \text{mat}_t^{LT} * \text{volume}_t^{LT}\right)}{\left(\text{mat}_t^{ST} * \text{volume}_t^{ST}\right) + \left(\text{mat}_t^{LT} * \text{volume}_t^{LT}\right)}}{21}$$

   The core AXI average maturity is formulated as:

$$UM_t = \frac{\sum_{t=t-20}^{t} \frac{\left(\text{mat}_t^{ST} * \text{mat}_t^{ST} * \text{volume}_t^{ST}\right) + \left(\text{mat}_t^{LT} * \text{mat}_t^{LT} * \text{volume}_t^{LT}\right)}{\left(\text{mat}_t^{ST} * \text{volume}_t^{ST}\right) + \left(\text{mat}_t^{LT} * \text{volume}_t^{LT}\right)}}{21}$$

2. Scaled AXI Value

   The core AXI values UV_t are scaled and extended to create standard tenors index versions, IV_t^M, for tenor M as available for 1M, 3M, 6M, 1Y. The standard tenors rates are derived by multiplying the core AXI of the day by the corresponding 3-year average of the weekly scaling ratio.

$$IV_t^M = UV_t * \overline{R}_t^M$$

   Overnight AXI is interpolated from a curve comprised of 1-month AXI and 3-month AXI. The time to maturity of Overnight AXI is one business day. When this interpolation would result in a negative yield, Overnight AXI is interpolated from a curve comprised of a zero yield and 1-month AXI.

   On each dissemination day t, the daily n day average AXI values IV_t^n is based on the trailing n day compounding average of $IV_t^{M=overnight}$,where n is available as 30, 90, 180 calendar days. The AXI averages for a given publication date incorporate all the AXI values starting exactly 30, 90 and 180 calendar days before the publication date, regardless of whether or not that date is a weekend or holiday and extend through the AXI published that day.

$$\text{OvernightIndex} = \left[\prod_{i=1}^{n_i}\left(1 + \frac{\text{OverNightRate}_i * n_i}{360}\right)\right]$$

   Where:
   OverNightRate_i= Overnight Rate AXI applicable on business day i
   n_i= number of calendar days between transaction day and previous business day)

1. INDEX METHODOLOGY

The following formula can be used to calculate compounded averages of the Overnight Index over custom time periods between any two dates within the publication calendar:

$$\text{Overnight Index Average between x and y} = \left(\frac{\text{Overnight Index}_x}{\text{Overnight Index}_y} - 1\right) * \left(\frac{360}{d_c}\right)$$

Where:
x = start date of calculation period
y = end date of calculation period
dc = the number of calendar dates in the calculation period, 30, 90 and 180 days

3.1.4.1.1. WEEKLY SCALING RATIO

A weekly scaling ratio is required in order to scale the core AXI value to the standard tenors during the daily index value calculation described above. The weekly scaling ratio is calculated by following below steps:

1. From the Short-Term Basket, after putting the additional exclusion criteria on variable interest rate type, for each transaction j, the transaction yield (yield_j) is calculated as discussed in Short-Term Basket yield calculation section above.

2. The spread for the transaction j is calculated as $\text{spread}_{j,t} = \text{yield}_{j,t} - r_{j,t}$, where $r_{j,t}$ is the interpolated risk free rate of the same tenor as the transaction j, based on the US Treasury Bill curve.

3. Transactions' spreads are ranked in ascending order and only transactions whose spreads fall within the 97.5th and the 2.5th percentile (inclusive of both boundaries) are considered for grouping in the respective tenors as per the below mentioned table.

4. Only the transactions issued by banking entities are considered.

5. The above transactions are grouped into the following tenors based on their days to maturity

Tenor	Minimum Days	Maximum Days	Comment
1-month	15 days	45 days	+-15 days around 360-day target
3-months	75 days	105 days	+-15 days around 360-day target
6-months	165 days	195 days	+-15 days around 360-day target
12-months	330 days	390 days	+-30 days around 360-day target

6. Volume weighted average credit spread in each tenor bucket is calculated weekly, together with the averages of the core AXI for the same week.

7. A weekly scaling ratio R_w^M is calculated as the ratio between tenor-specific average credit spread and corresponding average core AXI spreads for the same week. The final scaling ratio for each tenor is the historical average of these weekly ratios over last 3 years.

1. INDEX METHODOLOGY

$$\overline{R}_t^M = \sum_{w=1}^{w=156} R_w^M$$

3.1.4.2. ISTOXX SOFR ACADEMY USD FINANCIAL CONDITIONS CREDIT SPREAD INDICES (FXI) INDEX

Short-Term Basket

On each dissemination day, the short-term basket universe is established by considering all secondary market USD dollar transactions of commercial paper (CP) and certificates of deposit (CD) issued by a US entity that occurred the previous transaction day. This is done using DTCC data. To be eligible for the inclusion of the basket universe, transactions in securities with the below features are excluded:

- Days to maturity larger than 365 days
- Puttable or Callable
- Indexed or periodic principal
- Extended maturity or renewable note
- Repayment put upon death
- Changeable interest payment, interest rate reset, interest step-up
- Exchangeable
- Periodic (pre-maturity) coupons

Long-Term Basket

The long-term basket component requires both a monthly and a daily process. For the monthly process, on the first dissemination day of each calendar month, the long-term basket universe is established by considering all secondary market USD dollar transactions of senior unsecured corporate bonds issued by a US entity that occurred over the prior 21 transaction days.

To be eligible for the inclusion of the basket universe, transactions in securities with the below features are excluded:

- Days to maturity less than one year and greater than five years
- Puttable
- Perpetual
- Convertible or Exchangeable
- Private Placement
- In default

For the daily process, on each dissemination day, the composition is selected from monthly process.

The daily calculations use first short-term and long-term spreads based on their respective basket universes, and subsequently the weighted-average based on 21 days of such spreads to arrive at the core FXI. The core FXI is then extended to calculate the standard scaled tenors as well as n-day average versions, as described in subsequent sections.

1. INDEX METHODOLOGY

Index Types

Term	Index
Core	iSTOXX Core FXI
Standard Tenors	iSTOXX Overnight FXI
Standard Tenors	iSTOXX 1-Month FXI
Standard Tenors	iSTOXX 3-Month FXI
Standard Tenors	iSTOXX 6-Month FXI
Standard Tenors	iSTOXX 12-Month FXI
n-Day Average	iSTOXX 30-Day Avg Overnight FXI
n-Day Average	iSTOXX 90-Day Avg Overnight FXI
n-Day Average	iSTOXX 180-Day Avg Overnight FXI

Short-Term Basket

On each transaction day t, the daily calculation of volume-weighted spread for the short-term basket follows the below steps:

1. For each transaction j, the transaction yield (yield_j) is calculated based on its income payment type:

$$\text{yield}_{j,t} = \begin{cases} (\frac{x_{j,t}^{\text{principal}}}{x_{j,t}^{\text{settlement}}} - 1) * \frac{360}{\text{dtm}_{j,t}} * 100, & j \in S_{\text{zero coupon}} \\ (1 - \frac{x_{j,t}^{\text{settlement}}}{x_{j,t}^{\text{principal}}}) * \frac{360}{\text{dtm}_{j,t}} * 100, & j \in S_{\text{discount}} \\ (\frac{x_{j,t}^{\text{principal}} * (1 + i_{j,t}\frac{\text{dtm}_{j,t}}{360})}{x_{j,t}^{\text{settlement}}} - 1) * \frac{360}{\text{dtm}_{j,t}} * 100, & j \in S_{\text{income at maturity only}} \end{cases}$$

   Where:
   - $x_{j,t}^{\text{principal}}$ is the principal amount
   - $x_{j,t}^{\text{settlement}}$ is the settlement amount
   - $\text{dtm}_{j,t}$ is the number of days to maturity
   - $i_{j,t}$ is the interest-rate of the security (as in 0.01=1%)
   - $S_{\text{zero coupon}}$, S_{discount}, $S_{\text{income at maturity only}}$ are the set of securities with income payment type that are zero-coupon, discount and income at maturity type, respectively

2. The spread for the transaction j is calculated as $\text{spread}_{j,t} = \text{yield}_{j,t} - r_{j,t}$, where $r_{j,t}$ is the interpolated risk free rate of the same tenor as the transaction j, based on the US Treasury Par yield curve.

3. Transactions' spreads are ranked in ascending order and only transactions whose spreads fall within the 97.5th and the 2.5th percentile (inclusive of both boundaries) are considered for the subsequent calculation.

1. INDEX METHODOLOGY

The daily spread calculation results in three values for the short-term basket as formulated below:

- Short-term Spread: $\text{spread}_t^{ST} = \frac{\sum_j \text{spread}_{j,t} * x_{j,t}^{principal}}{\text{volume}_t^{ST}}$
- Short-term Years to Maturity: $\text{mat}_t^{ST} = \frac{\sum_j \frac{\text{dtm}_{j,t}}{365} * x_{j,t}^{principal}}{\text{volume}_t^{ST}}$
- Short-term Principal Amount: $\text{volume}_t^{ST} = \sum_j x_{j,t}^{principal}$

Long-Term Basket

The daily calculation for the long-term basket is carried out through the below steps:

1. Basket Universe Spread & Maturity Bucketing Calculation

- For each transaction j on transaction day t in the long-term basket universe, the transaction yield ($\text{yield}_{j,t}$) is identified and taken from the source.
- The spread for the transaction j on transaction day t is calculated as $\text{spread}_{j,t} = \text{yield}_{j,t} - r_{j,t}$, where $r_{j,t}$ is the interpolated risk free rate of the same tenor as the transaction j, based on the US Treasury Par yield curve.
- On the first dissemination day of each calendar month, each transaction j is assigned to one of the four below maturity buckets based on remaining years to maturity. Remaining years of maturity is defined as: $\text{ttm}_j = \frac{\text{maturity\_date}_j - \text{Date of First Dissemniation day}}{365.25}$
  - Maturity Bucket 1-2: $1 \leq \text{ttm}_j < 2$
  - Maturity Bucket 2-3: $2 \leq \text{ttm}_j < 3$
  - Maturity Bucket 3-4: $3 \leq \text{ttm}_j < 4$
  - Maturity Bucket 4-5: $4 \leq \text{ttm}_j < 5$
- On each transaction day t, transactions' spreads are ranked in ascending order within each maturity bucket, and only transactions whose spreads fall within the 97.5th and the 2.5th percentile (inclusive of both boundaries) are considered to calculate Maturity Bucket Median Spread and Maturity Bucket Median Years to Maturity
- Maturity Bucket Median Spread for each maturity bucket is the simple average of spread of the transactions that fall immediately before and immediately after the cumulative 50th percentile of transaction volume
- Maturity Bucket Median Years of Maturity for each maturity bucket is the simple average of the year to maturity of the transactions that fall immediately before and immediately after the cumulative 50th percentile of transaction volume

2. Weight Calculation using Annual Primary Issuance Amount

- From the long-term basket universe, select the securities transactions which were issued within the most recent 12 months ending as on the first dissemination day of the calendar month, $\text{age}_j = \frac{\text{Date of First Dissemniation day} - \text{issue\_date}_j}{365.25}$ where $\text{age}_j \leq 1$
- Amount issued for these securities are identified
- Each selected transaction j is assigned to one of the four below maturity buckets based on their years-to-maturity at issuance,

$$\text{ttm}_j^{\text{issuance}} = \frac{\text{maturity\_date}_j - \text{issue\_date}_j}{365.25}$$

  - Maturity Bucket 1-2: $1 \leq \text{ttm}_j^{\text{issuance}} < 2$

1. INDEX METHODOLOGY

- Maturity Bucket 2-3: $2 \leq \text{ttm}_j^{\text{issuance}} < 3$
- Maturity Bucket 3-4: $3 \leq \text{ttm}_j^{\text{issuance}} < 4$
- Maturity Bucket 4-5: $4 \leq \text{ttm}_j^{\text{issuance}} < 5$

- For each Maturity at Issuance Bucket, the amount issued is summed up to determine the annual primary issuance for each of the corresponding buckets
  - The weight of Maturity Bucket, b is the annual primary issuance for Maturity Bucket, b divided by the sum of the annual primary issuance across all four Maturity Bucket,

$$W_{b,t}^{\text{issue}} = \frac{x_{b,t}^{\text{issue}}}{\sum_b x_{b,t}^{\text{issue}}}$$

where:

- $x_{b,t}^{\text{issue}} = \sum_j^{j \in S_t^b} x_{j,t}^{\text{issue}}$ is the total issue amount for bucket b
- $x_{j,t}^{\text{issue}}$ is the issue amount for the security underlying transaction j
- S_t^b is the set of transactions belonging to b

The daily spread calculation results in three values for the long-term basket as formulated below:

- Long-term Spread: $\text{spread}_t^{LT} = \sum_b \text{spread}_{b,t}^{LT} * W_{b,t}^{\text{issue}}$
- Long-term Years to Maturity: $\text{mat}_t^{LT} = \sum_b \text{maturity}_{b,t}^{LT} * W_{b,t}^{\text{issue}}$
- Long-term Transaction Volume: $\text{volume}_t^{LT} = \sum_b X_{b,t}^{\text{quantity}}$

Daily Index Value Calculation

The daily index calculation first calculates a single core FXI value based on the short-term and long-term spread and their respective weighting, which is subsequently scaled to different standard tenors and computed for the n day average versions.

1. Core FXI Value

   The core FXI index values combine the short-term and long-term spreads into a weighted-average spread.

$$UV_t = \frac{\sum_{t=t-20}^{t} \frac{(\text{spread}_t^{ST} * \text{mat}_t^{ST} * \text{volume}_t^{ST}) + (\text{spread}_t^{LT} * \text{mat}_t^{LT} * \text{volume}_t^{LT})}{(\text{mat}_t^{ST} * \text{volume}_t^{ST}) + (\text{mat}_t^{LT} * \text{volume}_t^{LT})}}{21}$$

   The core FXI average maturity is formulated as:

$$UM_t = \frac{\sum_{t=t-20}^{t} \frac{(\text{mat}_t^{ST} * \text{mat}_t^{ST} * \text{volume}_t^{ST}) + (\text{mat}_t^{LT} * \text{mat}_t^{LT} * \text{volume}_t^{LT})}{(\text{mat}_t^{ST} * \text{volume}_t^{ST}) + (\text{mat}_t^{LT} * \text{volume}_t^{LT})}}{21}$$

2. Scaled FXI Value

   The core FXI values UV_t are scaled and extended to create standard tenors index versions, IV_t^M, for tenor M as available for 1M, 3M, 6M, 1Y. The standard tenors rates are derived by multiplying the core FXI of the day by the corresponding 3-year average of the weekly scaling ratio.

$$IV_t^M = UV_t * \bar{R}_t^M$$

1. INDEX METHODOLOGY

Overnight FXI is interpolated from a curve comprised of 1-month FXI and 3-month FXI. The time to maturity of Overnight FXI is one business day. When this interpolation would result in a negative yield, Overnight FXI is interpolated from a curve comprised of a zero yield and 1-month FXI.

On each dissemination day t, the daily n day average FXI values IV_t^n is based on the trailing n day compounding average of $IV_t^{M=overnight}$,where n is available as 30, 90, 180 calendar days. The FXI averages for a given publication date incorporate all the FXI values starting exactly 30, 90 and 180 calendar days before the publication date, regardless of whether or not that date is a weekend or holiday and extend through the FXI published that day.

$$\text{OvernightIndex} = \left[\prod_{i=1}^{n_i}(1 + \frac{\text{OverNightRate}_i * n_i}{360})\right]$$

Where:
OverNightRate_i= Overnight Rate FXI applicable on business day i
n_i= number of calendar days between transaction day and previous business day)

The following formula can be used to calculate compounded averages of the Overnight Index over custom time periods between any two dates within the publication calendar:

$$\text{Overnight Index Average between x and y} = \left(\frac{\text{Overnight Index}_x}{\text{Overnight Index}_y} - 1\right) * (\frac{360}{d_c})$$

Where:
x = start date of calculation period
y = end date of calculation period
dc = the number of calendar dates in the calculation period, 30, 90 and 180 days

3.1.4.2.1. WEEKLY SCALING RATIO

A weekly scaling ratio is required in order to scale the core FXI value to the standard tenors during the daily index value calculation described above. The weekly scaling ratio is calculated by following below steps:

1. From the Short-Term Basket, after putting the additional exclusion criteria on variable interest rate type, for each transaction j, the transaction yield (yield_j) is calculated as discussed in Short-Term Basket yield calculation section above.

2. The spread for the transaction j is calculated as $\text{spread}_{j,t} = \text{yield}_{j,t} - r_{j,t}$, where $r_{j,t}$ is the interpolated risk free rate of the same tenor as the transaction j, based on the US Treasury Bill curve.

3. Transactions' spreads are ranked in ascending order and only transactions whose spreads fall within the 97.5th and the 2.5th percentile (inclusive of both boundaries) are considered for grouping in the respective tenors as per the below mentioned table.

4. The above transactions are grouped into the following tenors based on their days to maturity

1. INDEX METHODOLOGY

Tenor	Minimum Days	Maximum Days	Comment
1-month	15 days	45 days	+-15 days around 360-day target
3-months	75 days	105 days	+-15 days around 360-day target
6-months	165 days	195 days	+-15 days around 360-day target
12-months	330 days	390 days	+-30 days around 360-day target

5. Volume weighted average credit spread in each tenor bucket is calculated weekly, together with the averages of the core FXI for the same week.

6. A weekly scaling ratio R_w^M is calculated as the ratio between tenor-specific average credit spread and corresponding average core FXI spreads for the same week. The final scaling ratio for each tenor is the historical average of these weekly ratios over last 3 years.

$$\overline{R}_t^M = \sum_{w=1}^{w=156} R_w^M$$

Interpolation Method

The interpolation method is based on monotone convex methodology and is applied in both the interpolation of US Treasury Par Yield and Bill Rates, as well as the calculation of overnight AXI/FXI value. The Monotone Convex (MC) method is a robust interpolation technique developed by Hagan & West (2006), primarily used to construct smooth, positive, and monotonic yield curves in finance. It bootstraps forward rates at input maturity points and fits quadratic parabolas between them, guaranteeing that forward curves remain positive and largely continuous.

4. GOVERNANCE

4.1. AXI/FXI – INVESCO ACQUISITION HISTORY

Prior to April 30, 2026, the AXI/FXI indices were calculated by Invesco Indexing, LLC. In order to maintain index continuity, STOXX makes the index levels calculated by Invesco Indexing from March 2nd, 2020, available as part of the overall index history. STOXX makes no representations about the accuracy of these levels and is not associated with Invesco Indexing.

4.2. GOVERNANCE

Save for the cases expressly described in this guide, the index methodology is entirely rule-based and automatic. Discretion only applies if expressly stated and must be exercised as provided for in this guide.

4.2.1. USAGE OF DISCRETION

Discretion may be exercised by STOXX Committee(s) (as defined hereafter) with a view to resolve issues arising in maintaining the prevailing index methodology in response to events, with an overarching aim to accurately and reliably measure the market or economic realities as defined in this guide.

Discretion shall be exercised in line with the following principles:

- The body or person(s) exercising discretion must not be affected by a conflict of interest;
- The body or person(s) exercising discretion must have the requisite skills, knowledge and experience to exercise such discretion;
- All facts and circumstances relevant for the exercise of discretion must have been established and properly documented prior to the exercise of discretion;
- The exercise of discretion must comply with all applicable laws and regulations;
- The body or person(s) exercising discretion must act on the basis of the relevant facts and circumstances only, must give proper weight to the various considerations and ignore irrelevant facts and circumstances;
- The body or person(s) exercising discretion must act with a view to maintain the integrity of the market or economic reality by aiming to ensure that indices remain representative and can be replicated, taking into account, inter alia, some, or all of the following:
    - Relevance of the event to the STOXX indices;
    - Trading accessibility of the affected market;
    - Availability of alternative markets;
    - Ability of market participants to replicate the index or, where applicable, the results of the index review;
    - Public information related to the events and their development in the foreseeable future ;

4. GOVERNANCE

- The body or person(s) exercising discretion must act honestly, reasonably, impartially and in good faith. As part of the decision-making process, STOXX may consult with external stakeholders.

Discretionary Rule: Any exercise of discretion must take into account the rationale of the index, the purpose of the rules with regard to which discretion is exercised, the objective to preserve market integrity and reliability of the index calculation to avoid undue market impact, the technical feasibility and economic reasonability, and the interest of licensees or investors.

The following committees (hereafter also referred to as "STOXX Committee(s)") are involved in the decision-making process relevant for the indices governed by this Guide:

- Index Operations Committee (IOC),
- Index Management Committee (IMC),
- Index Governance Committee (IGC),
- Product Approval Committee (PAC),
- Oversight Committee (OC),
- Management Board (MB).

The description of STOXX Governance Structure is available on www.stoxx.com in the section Resources / Index Regulations.

4.2.2. INDEX CORRECTION POLICIES

This section outlines the rules and procedures applicable in case of a calculation error, meaning the provision of index values, usage of index constituents or other elements or the application of weightings, capping, or other aspects of the index methodology in a manner that is not in line with this index methodology, e.g. due to a mistake, incorrect input data, etc.

4.2.3. RULE-BASED CORRECTION

STOXX corrects a calculation error without delay on the dissemination day it occurred, provided that STOXX becomes aware of the calculation error before 15:30 CET of that dissemination day, and insofar as technically and operationally feasible. STOXX does not change intraday index composition of an index.

If STOXX becomes aware of a calculation error at or after 15:30 CET, STOXX aims to correct the calculation error as of the end of the next dissemination day, including any corrections to index constituents.

4. GOVERNANCE

STOXX amends, without undue delay, previous incorrect index values or input data only if they are required for the subsequent index value calculation. Incorrect real-time index values disseminated before the effective time of the correction are not restated.

4.2.4. NON RULE-BASED CORRECTION

If the above-outlined rule-based error correction cannot be applied, relevant STOXX Committees assesses without undue delay:

▪ If and how the calculation error should be corrected, including if the index shall be restated, and/or

▪ If the dissemination of index values shall be suspended (Discretionary Rule).

An index should be restated when the performance of the index can no longer be replicated. A suspension of index dissemination is triggered when STOXX Committee decides that the correction will take significant time, during which misleading index values could lead to financial, legal and reputational risks (Discretionary Rule).

At the latest, STOXX suspends the dissemination of an index at the end of the dissemination day after it became aware of a calculation error, if the calculation error has not been corrected by then. STOXX will resume the dissemination of the index as soon as the correct index calculation is feasible, and the correct historical values are available.

4.2.5. LIMITATIONS

This section applies in the event of limitations that occur due to:

- Insufficient rules, meaning the absence of a methodology rule, provision or procedure which leads to a failure when determining the respective index value or which leads to an index value that does not properly reflect the concept/nature of the index, e.g.:
  - Performance of the index can no longer be physically replicated,
  - Insufficient index constituents to fulfil the requirements of the index methodology;

- Unclear rules, meaning a situation in which the rules leave multiple possible interpretations on how a certain rule shall be applied to a specific situation;

- Data insufficiency, meaning a scenario in which the calculation of an index is no longer possible due to insufficient data quantity or quality;

- Failure to produce index values as intended;

- Market disruption which results in the performance of the index being unable to be tracked;

- Events with a market impact that by their nature could reasonably not be foreseen, or events whose impact on an index or the economic reality the index intends to represent, cannot be determined in advance. Events covered in this section include, but are not limited to, events of natural, social, political, economic nature that may negatively impact regional or global societies or economies. Examples may be, but are not limited to, the

4. GOVERNANCE

following: (i) change to currency convertibility or restriction on capital flows announced by a country; (ii) market disruption, e.g. an event that materially negatively influences the aggregated liquidity, capitalization or tradability of an entire market; (iii) exchange closure, (iv) government intervention, (v) pandemic, (vi) natural catastrophe.

If a limitation has occurred, the IGC shall decide if and how the limitation shall be rectified (Discretionary Rule). Any such rectification may comprise deviations from the index methodology which may apply as long as the limitation persists (Discretionary Rule).

In this context, STOXX may also decide to cancel an index review. If a limitation that could justify the cancellation of an index review occurs two or fewer dissemination days before the scheduled review implementation day, the review will be performed as planned, if reasonably possible. This aims to avoid last minute changes and not undermine the trading activity that may have already been performed.

If a review is cancelled, STOXX aims to perform it at the next scheduled review of the index or at the next quarterly review date (3rd Friday of March, June, September and December), whichever comes first and subject to the then prevailing market conditions.

If a decision to deviate from the index methodology is taken, it will be communicated as soon as possible in form of an announcement or press release. STOXX will refrain from the issuance of a notification if it reaches the view that the issuance of a notification is not in line with applicable laws and may decide to issue such notification at a later point in time when such reasons have lapsed (Discretionary Rule). By reason of force majeure or other events beyond the control of STOXX it might become impossible for STOXX to issue a notification in due time or by the means set out herein. In such cases STOXX may exceptionally issue the notification either subsequently immediately following such event or in any case by other means. Any measures will be implemented two dissemination days later and will enter into effect the next dissemination day after implementation, unless a different effective date is specified in the notification.

5. CHANGES TO THE INDEX GUIDE

5.1. HISTORY OF CHANGES TO iSTOXX® CREDIT SPREAD INDICES METHODOLOGY GUIDE

April 2026: Creation of 'iSTOXX® Credit Spread Indices Methodology Guide' and addition of section named 'iSTOXX SOFR ACADEMY USD ACROSS-THE-CURVE CREDIT SPREAD INDICES (AXI)and iSTOXX SOFR ACADEMY USD FINANCIAL CONDITIONS CREDIT SPREAD INDICES (FXI) INDEX'