



# **Invesco / SOFR Academy USD Across-the-Curve Credit Spread Index Methodology**

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## Index Overview

### Description

The Invesco / SOFR Academy USD Across-the-Curve Credit Spread Index (“the Index”) is a broad-based index measuring the aggregate recent average cost of wholesale unsecured debt funding for US bank holding companies and their banking subsidiaries. The Index is a weighted average of credit spreads for unsecured debt instruments with maturities ranging from overnight to five years, with weights that reflect both transaction and primary issuance volumes.

### Index Universe

The Index Universe is comprised of a Short-Term Basket Index Universe and Long-Term Basket Index Universe. The Short-Term Basket Index Universe includes all secondary market, US dollar transactions of commercial paper (CP) and certificates of deposit (CDs) with a maturity less than or equal to 365 days issued by a US banking entity<sup>1</sup>. The Long-Term Basket Index Universe includes all secondary market, US dollar transactions of senior unsecured corporate bonds with a remaining maturity greater than or equal to one year and less than or equal to five years issued by a US banking entity<sup>2</sup>.

### Transaction Selection

Spreads and years to maturity for a Short-Term Basket and Long-Term Basket are determined according to the following rules:

#### *Short-Term Basket*

Starting from the Short-Term Basket Index Universe, transactions in securities with the following features are excluded:

- Puttable or callable
- Indexed or periodic principal
- Extendable maturity or renewable note
- Repayment put upon death, changeable interest payment, interest rate reset, step-up, or exchangeable
- Periodic (pre-maturity) coupons

For each remaining transaction, 1) the yield-to-maturity (YTM) is calculated based on the transaction price and 2) the yield of a US Treasury bill with the same maturity as the transacted security is interpolated<sup>3</sup> from the current US Treasury yield curve<sup>4</sup>. The difference between the YTM and interpolated US Treasury yield is the spread.

Transactions are then grouped by settlement date. Within these groupings, transactions are ranked by their spread and the 2.5% largest and 2.5% smallest spreads are excluded. The weighted averages of the remaining spreads and years to maturity (the Short-Term Spread and Short-Term

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<sup>1</sup> Source: Depository Trust & Clearing Corporation’s (DTCC’s) Money Market Kinetics

<sup>2</sup> Source: Financial Industry Regulatory Authority’s (FINRA’s) Trade Reporting and Compliance Engine (TRACE)

<sup>3</sup> Using the monotone convex methodology

<sup>4</sup> Source: [https://home.treasury.gov/resource-center/data-chart-center/interest-rates/TextView?type=daily\\_treasury\\_yield\\_curve&field=tdr\\_date\\_value=all](https://home.treasury.gov/resource-center/data-chart-center/interest-rates/TextView?type=daily_treasury_yield_curve&field=tdr_date_value=all)

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Years to Maturity, respectively) are calculated based on the principal value of the individual transactions.

### *Long-Term Basket*

Starting from the Long-Term Basket Index Universe, transactions in securities with the following features are excluded:

- Puttable, convertible, exchangeable, perpetual
- Private placement
- USD debt issued by a non-US entity in the US
- Bonds in default

Based on the remaining transactions, a Calendar Month Index Universe is created. On the first business day of a calendar month, M, transactions occurring over the prior 21 business days (i.e. - all occurring in month M - 1) are identified. The Calendar Month Index Universe is comprised of all bonds for which a transaction occurred over this 21-day period.

On each business day in month M, for each transaction in a Calendar Month Index Universe security, 1) the yield is identified (the Transaction Yield) and 2) the yield of a US Treasury bill with the same maturity as the transacted security is interpolated<sup>5</sup> from the current US Treasury yield curve<sup>6</sup>. The difference between the Transaction Yield and interpolated US Treasury yield is the spread.

Each transaction is assigned to one of four Maturity Buckets based on remaining years to maturity on the first business day of the month:

- Maturity Bucket 1: 1 - 2 years to maturity
- Maturity Bucket 2: >2 - 3 years to maturity
- Maturity Bucket 3: >3 - 4 years to maturity
- Maturity Bucket 4: >4 - 5 years to maturity

On each transaction date, transactions are grouped by Maturity Buckets. Within these groupings, transactions are ranked by their spread and the 2.5% largest and 2.5% smallest spreads are excluded.

All remaining transactions are ranked by spread within each Maturity Bucket. The transactions that fall immediately before and immediately after the cumulative 50<sup>th</sup> percentile of transaction volume in each Maturity Bucket are identified. Of these two transactions, the simple average spread is the Maturity Bucket Median Spread and the simple average years to maturity is the Maturity Bucket Median Years to Maturity.

All Calendar Month Index Universe bonds which were issued within the most recent 12 months ending as of the first business day of the calendar month are identified. The amount issued for these securities also is identified. Years to maturity at issuance is determined and grouped into four Maturity-at-Issuance Buckets (1-2, >2-3, >3-4, >4-5). For each Maturity-at-Issuance Bucket, the amount issued is summed to determine the annual primary issuance for each corresponding Maturity Bucket.

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<sup>5</sup> Using the monotone convex methodology

<sup>6</sup> Source: [https://home.treasury.gov/resource-center/data-chart-center/interest-rates/TextView?type=daily\\_treasury\\_yield\\_curve&field=tdr\\_date\\_value=all](https://home.treasury.gov/resource-center/data-chart-center/interest-rates/TextView?type=daily_treasury_yield_curve&field=tdr_date_value=all)

The weighted-average spread and years to maturity across Maturity Buckets are determined. The weight for Maturity Bucket  $n$  is the annual primary issuance for Maturity-at-Issuance Bucket  $n$  divided by the sum of the annual primary issuance across all four Maturity-at-Issuance Buckets. These weights are applied to the Maturity Bucket Median Spreads and Maturity Bucket Median Years to Maturity to determine the Long-Term Spread and Long-Term Years to Maturity, respectively.

### Transaction Weighting

Each business day  $t$ , the Short-Term and Long-Term Spreads are combined into a weighted-average spread. The weight applied to the Short-Term Spread is the total principal amount of the relevant transactions multiplied by the Short-Term Years to Maturity. The weight applied to the Long-Term Spread is the total volume of the relevant transactions multiplied by the Long-Term Years to Maturity. These weights are applied to the Short-Term Spread and Long-Term Spread to determine the Index Spread on day  $t$ .

$$Unscaled\ AXI_t = \frac{\sum_{t=1}^{21} \frac{(Spd_{ST,t} * Mat_{ST,t} * Vol_{ST,t}) + (Spd_{LT,t} * Mat_{LT,t} * Vol_{LT,t})}{(Mat_{ST,t} * Vol_{ST,t}) + (Mat_{LT,t} * Vol_{LT,t})}}{21}$$

$$Unscaled\ AXI\ Average\ Maturity_t = \frac{\sum_{t=1}^{21} \frac{(Mat_{ST,t} * Mat_{ST,t} * Vol_{ST,t}) + (Mat_{LT,t} * Mat_{LT,t} * Vol_{LT,t})}{(Mat_{ST,t} * Vol_{ST,t}) + (Mat_{LT,t} * Vol_{LT,t})}}{21}$$

Spd<sub>ST,t</sub>: Short-term component average spread  
 Spd<sub>LT,t</sub>: Long-term component average spread  
 Mat<sub>ST,t</sub>: Short-term component average maturity  
 Mat<sub>LT,t</sub>: Long-term component average maturity  
 Vol<sub>ST,t</sub>: Short-term component total daily volume (USD)  
 Vol<sub>LT,t</sub>: Long-term component total daily volume (USD)

### History

The Index was launched on July 12, 2022. History is available for the Index since its base date of July 1, 2016.

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## Index Details

The Invesco / SOFR Academy USD Across-the-Curve Credit Spread Index is available as unscaled and in standard tenors of overnight, and 1-, 3-, 6-, and 12-months.

To calculate  $n$ -month AXI, first a US Treasury yield curve is created for which each standard point on the curve up to five years (i.e. - 1M, 3M, 6M, 1Y, 2Y, 3Y, and 5Y) reflects the three-year simple daily average of the yield at the relevant point (in combination, the 3Y Average Yield Curve and, for each specific point, the Average Treasury Yield). The three-year simple daily average of the lower bound of the Federal Funds rate also is calculated (Average Fed Funds). The weighted-average years to maturity of Unscaled AXI is then determined. The weights applied to the Short-Term Years to Maturity and Long-Term Years to Maturity to determine the Unscaled AXI Years to Maturity are described on page 5. The yield of a US Treasury security with the same maturity as the Unscaled AXI Years to Maturity is interpolated<sup>7</sup> from the 3Y Average Yield Curve (the Interpolated Yield).  $n$ -month AXI is determined as:

$$\left[ \frac{(n\text{-month Average Treasury Yield} - \text{Average Fed Funds})}{(\text{Interpolated Yield} - \text{Average Fed Funds})} \right] (\text{Unscaled AXI})$$

Overnight AXI is interpolated<sup>7</sup> from a curve comprised of 1-month AXI and 3-month AXI<sup>8</sup>. The time to maturity of Overnight AXI is one business day.

The Invesco / SOFR Academy USD Across-the-Curve Credit Spread Index also is available as 30-, 90-, and 180-day averages. The  $n$ -day Average AXI is calculated as the trailing  $n$ -day simple average of Overnight AXI.

The Invesco / SOFR Academy USD Across-the-Curve Credit Spread Index also is available in combination with the Federal Reserve Bank of New York's Overnight SOFR and 30-, 90-, and 180-day Average SOFR (Overnight SOFRx and 30-, 90-, and 180-day Average SOFRx, respectively)<sup>9</sup>. Overnight SOFRx is calculated as the sum of Overnight AXI and Overnight SOFR.  $n$ -day Average SOFRx is calculated as the sum of  $n$ -day Average AXI and  $n$ -day Average SOFR.

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<sup>7</sup> Using the monotone convex methodology

<sup>8</sup> 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

<sup>9</sup> The Overnight SOFR and  $n$ -day Average SOFR data are sourced from [newyorkfed.org](http://www.newyorkfed.org) and are subject to the Terms of Use posted at [www.newyorkfed.org](http://www.newyorkfed.org). The New York Fed is not responsible for publication of the Overnight SOFR and  $n$ -day Average SOFR data by Invesco Indexing, does not sanction or endorse any particular republication, and has no liability for use.

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## Updates

The Index is rebalanced daily.

### Index Rebalance

During the daily Index Rebalance, the Short-Term Basket Index Universe and Long-Term Basket Index Universe are selected, Index transactions are refreshed, and the new Index Spread is determined according to the construction methodology described in the Index Overview section (see page 3).

### Index Key Dates

The key dates are as follows. The Index Review Team (see Governance on page 10) may change these dates for reasons including market holidays. Any such changes will be publicly announced with as much advance notice as possible under the circumstances. All events take place after the close.

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<b>Event</b>	<b>Day</b>	<b>Description</b>
Reference Date	Each business day	Data is captured for Index construction
Effective Date	Each business day	Rebalanced spread is finalized

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## **Index Calculation and the Role of the Calculation Agent**

The calculation agent for the Index (“the Calculator”) is Invesco Indexing LLC. The Calculator evaluates the closing value of the Index, updates the Index each business day based on transaction selections and weightings determined by Invesco Indexing LLC, and disseminates the values of the Index to major index data distribution partners (see Index Information and Data Dissemination on page 12).

### **Calculator Input Data Used and Hierarchy of Input Data**

The Index is calculated using market transactions reflected in publicly available data sources<sup>10</sup>. Should this type of data be unavailable, the Calculator reserves the right to carry forward the latest available Index value.

### **Use of Discretion and/or Expert Judgement**

No discretion or expert judgement is exercised by Invesco Indexing LLC in the determination of daily index pricing. Rules-based index methodologies, which cover index construction, maintenance and calculation, provide that discretion is not used in the daily pricing of the indexes except in unusual cases not effectively addressed by the methodology, which could be exercised by the Calculator. These include, but may not be limited to:

- Structural changes to the underlying markets,
- Operational issues at data vendors,
- Geo-political events,
- Technological problems / failures, or
- Natural disaster or other business continuity process-related event.

### **Potential Limitations of the Methodology and Benchmark Calculation**

The potential limitations of daily Index calculation include circumstances in which the underlying transaction constituents of the benchmark credit spreads are not available because there are insufficient participants, or because the exchange(s) / exchange equivalent(s) suffers an unexpected outage or closure, or Invesco Indexing is denied permission to use such data for determining the Index, or the universe of transaction volumes for each respective input data source decline below the minimum threshold. The minimum threshold for the long-term bond component obtained from the Financial Industry Regulatory Authority’s Trade Reporting and Compliance Engine is defined as 50% of the historical minimum notional dollar volume of the universe of financial instruments for the relevant daily input file. The minimum threshold for the short-term component obtained from Depository Trust & Clearing Corporation is defined as 50% of the historical minimum notional dollar volume of the universe of financial instruments for the relevant daily input file. In such circumstances an announcement will be made to notify clients, including whether the Index will not be published or delayed in publication.

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<sup>10</sup> Source: Depository Trust & Clearing Corporation’s (DTCC’s) Money Market Kinetics and Financial Industry Regulatory Authority’s (FINRA’s) Trade Reporting and Compliance Engine (TRACE).



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## Index Policy

All Index inputs are evaluated daily for data needed to calculate the Index. The Index follows the general Index policies as described below.

### Announcements

Best efforts are made to announce any changes to Index methodology well ahead of time via the Invesco Indexing website and via email to all Index clients.

### Delayed Publication

Circumstances giving rise to a delay in publication until after 9 am ET may include, but are not limited to, technology issues, a lack of input data availability, or an ongoing investigation of an unusually large daily change in Index value. The Index value will be published upon successful resolution of the underlying issue, should that resolution occur before 2:30 pm ET. Should the resolution occur after 2:30 pm ET, the prior business day's Index value will be published for that day. Upon successful resolution of the underlying issue, the Index value will be restated retroactively.

In the unlikely event that the benchmark administer determines that USD-AXI is unable to be calculated and or published on a permanent basis, USD-AXI shall fall back to USD-FXI minus the 5-year historical median of the difference between USD-FXI and USD-AXI of the unscaled index or the relevant tenor.<sup>11</sup> A corresponding announcement will be made by the relevant benchmark administrator.

In the unlikely event that the benchmark administer determines that USD-FXI is unable to be calculated and / or published on a permanent basis, USD-FXI shall fall back to the 5-year historical median of USD-FXI of the unscaled index or the relevant tenor. A corresponding announcement will be made by the relevant benchmark administrator.

### Restatements

The Index follows a zero tolerance restatement policy. Any issue that otherwise would have led to a change in the Index value - however slight - will be addressed through a restatement. Circumstances giving rise to the consideration of a restatement may include, but are not limited to, technology issues and a lack of input data availability. Typically, a restatement will occur as soon as the underlying issue is resolved. For an issue that is identified then resolved after 2:30 pm ET on the same day, the Index will maintain the prior business day's value for that day and be restated retroactively on the next business day. For an issue that is resolved on a subsequent day, the restatement will be applied retroactively back to the date on which the issue first arose.

### Holiday Schedule

The Index is calculated on all business days except for holidays<sup>12</sup> as determined by the Securities Industry and Financial Markets Association (SIFMA).

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<sup>11</sup> As at 26 February 2024, the 5-year historical median of the difference between unscaled USD-FXI and unscaled USD-AXI was approximately 16.1333 basis points.

<sup>12</sup> See: <https://www.sifma.org/resources/general/holiday-schedule/>

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## **Governance**

The Index is managed by the Index Review Team (IRT). The IRT consists solely of members of Invesco Indexing. The IRT meets at least annually to review and revise Index methodology described in this document as appropriate. All daily changes to the Index are subject to the approval of the IRT, and the IRT may make adjustments to the Index at its discretion when such changes are reasonable.

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## **Index Methodology Update and Cessation Policy**

Invesco Indexing periodically, at least annually, reviews each Index and its accompanying methodology, in addition to periodic rebalancing (if applicable), in an effort to ensure the Index continues to accurately represent that portion of the market it was originally intended to, and delivers the outcomes one would expect from the Index's exposures.

The procedures for the internal review of the methodologies, changes to the methodologies and procedures performed when the Index administered is ceasing publication are described in detail in the Changes to Benchmark Methodology and Cessation Policy.

## Rate Types and Tickers

Invesco Indexing computes several rates daily, all of which are available in base currency USD.

Rate Type	Ticker		
	Invesco Indexing	Bloomberg	Refinitiv
Unscaled AXI	AXI	AXIIUNS	.IIAXI
Overnight AXI	AXIO	AXIIION	.IIAXION
1-Month AXI	AXI1	AXIIT1M	.IIAXI1M
3-Month AXI	AXI3	AXIIT3M	.IIAXI3M
6-Month AXI	AXI6	AXIIT6M	.IIAXI6M
12-Month AXI	AXI12	AXIIT12M	.IIAXI1Y
30-Day Average AXI	AXI30A	AXIIA1M	.IIAXI30A
90-Day Average AXI	AXI90A	AXIIA3M	.IIAXI90A
180-Day Average AXI	AXI180A	AXIIA6M	.IIAXI180A
Overnight SOFRx	SOFRXO	SFRXON	.IISOFRXON
30-Day Average SOFRx	SOFRX30A	SFRX30A	.IISOFRX30A
90-Day Average SOFRx	SOFRX90A	SFRX90A	.IISOFRX90A
180-Day Average SOFRx	SOFRX180A	SFRX180A	.IISOFRX180A

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## Index Information and Data Dissemination

### Data Vendors

Daily Index values are available from major quote vendors and at [www.InvescoIndexing.com](http://www.InvescoIndexing.com).

### FTP

Daily Index values are available via the Invesco Indexing secure FTP site for Index subscribers. Please contact Invesco Indexing customer service at [IndexSupport@invesco.com](mailto:IndexSupport@invesco.com) for more information.

### File Type

The Invesco Indexing secure FTP site for Index subscribers will distribute the standard overnight Index file:

File Description	File Extension
Daily rates	AXI_Invesco_yyyymmdd.xlsx

Please contact Invesco Indexing customer service at [IndexSupport@invesco.com](mailto:IndexSupport@invesco.com) for more information.

### Website

Index information is available on the Invesco Indexing website at [www.InvescoIndexing.com](http://www.InvescoIndexing.com).

## Definitions of Key Terms

Terms used in this document but not otherwise defined are defined in the following table. Definitions, that are marked with a ( \* ) are sourced from Regulation (EU) 2016/1011 (“EU Benchmark Regulation”) Article 3. Definitions, that are marked with a ( \*\* ) are sourced from IOSCO Principles for Financial Benchmarks<sup>13</sup>.

Term	Definition
<b>Administrator *</b>	‘Administrator’ means a natural or legal person that has control over the provision of a benchmark;
<b>Benchmark *</b>	‘Benchmark’ means any index by reference to which the amount payable under a financial instrument or a financial contract, or the value of a financial instrument, is determined, or an index that is used to measure the performance of an investment fund with the purpose of tracking the return of such index or of defining the asset allocation of a portfolio or of computing the performance fees;
<b>Calculation Agent **</b>	A legal entity with delegated responsibility for determining a Benchmark through the application of a formula or other method of calculating the information or expressions of opinions provided for that purpose, in accordance with the Methodology set out by the Administrator;
<b>Contribution of Input Data *</b>	‘Contribution of input data’ means providing any input data not readily available to an administrator, or to another person for the purposes of passing to an administrator, that is required in connection with the determination of a benchmark, and is provided for that purpose.
<b>Corporate Action</b>	A Corporate Action occurs when there is a change to a company’s capital structure. Unlike Corporate Events, Corporate Actions have a prescribed ex-date. The share price will be subject to an adjustment on the ex-date and Invesco Indexing and/or the calculating agent will adjust the index to counteract the effect that the price change would otherwise have on the index. Examples of corporate actions include rights or entitlement issues, consolidations, stock splits and capital repayments.
<b>Expert Judgment *</b>	‘Expert judgement’ means the exercise of discretion by an administrator or a contributor with respect to the use of data in determining a benchmark, including extrapolating values from prior or related transactions, adjusting values for factors that might influence the quality of data such as market events or impairment of a buyer or seller’s credit quality, and weighting firm bids or offers greater than a particular concluded transaction;
<b>Index*</b>	‘Index’ means any figure: (a) that is published or made available to the public; (b) that is regularly determined: (i) entirely or partially by the application of a formula or any other method of calculation, or by an assessment; and (ii) on the basis of the value of one or more underlying assets or prices, including estimated prices, actual or estimated interest rates, quotes and committed quotes, or other values or surveys;
<b>Input Data *</b>	‘Input data’ means the data in respect of the value of one or more underlying assets, or prices, including estimated prices, quotes, committed quotes or other values, used by an administrator to determine a benchmark;
<b>Material Change to Methodology</b>	In determining whether a change to an Index is material, the following factors shall be taken into account: <ul style="list-style-type: none"> <li>• Economic impact of the change;</li> <li>• Whether the change affects the original purpose of the Index.</li> </ul>
<b>Methodology **</b>	The written rules and procedures according to which information is collected and the Benchmark is determined;
<b>Rebalance</b>	The regular process (typically quarterly, semi-annually or annually) in which the eligibility and weights of constituent elements of indexes are reassessed;
<b>Subscriber **</b>	A person or entity that purchases Benchmark determination services from an Administrator;
<b>Transaction Data *</b>	‘Transaction data’ means observable prices, rates, indices or values representing transactions between unaffiliated counterparties in an active market subject to competitive supply and demand forces;

<sup>13</sup> <http://www.iosco.org/library/pubdocs/pdf/IOSCOPD415.pdf>

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The Invesco / SOFR Academy USD Across-the-Curve Credit Spread Index (the "Index") is calculated by Invesco Indexing LLC.

Invesco Indexing LLC is not affiliated with SOFR Academy or The New York Fed.

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Upon each update to this methodology, the most recent version shall be deemed to supersede the preceding version from the date of such update such that, in the event of any conflict between an earlier version of the methodology and the most recent version, the most recent version shall prevail.

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