June 2023

Invesco/SOFR Academy USD Across-the-Curve Credit Spread Indexes (AXI)

Helping borrowers and lenders in a SOFR-based economy.

The USD Across-the-Curve Credit Spread Indexes (AXI), and its extension the USD Financial Conditions Credit Spread Indexes (FXI), represent forward-looking dynamic credit sensitive spreads that can be used in conjunction with the Secured Overnight Finance Rate (SOFR) to form a credit-sensitive interest rate benchmark.

Robust
Computed from a sufficiently large pool of market transactions across the yield curve from short term to multiple years.

Representative
Highly correlated with banks' cost of funds, as determined by recent market credit spreads for wholesale unsecured issues of U.S. banks and bank holding companies.

Sustainable
Maintains its robustness and representativeness in all market conditions even as banks change the maturity and instrument composition of their issuances.

About AXI

AXI is the weighted average of the credit spreads for unsecured US bank funding transactions, with maturities ranging from overnight to five years, and with weights that reflect both transactions volumes and issuance volumes.

AXI can be added to Term SOFR (or other SOFR variants) to form a credit-sensitive interest rate benchmark for loans, derivatives, or other products.

How it works

Robust

AXI captures bank funding across the yield curve

AXI is computed from a sufficiently large pool of market transactions so that it can underly actively traded derivatives instruments used by banks and their borrowing customers to hedge their floating-rate exposures, without significant risk of statistical corruption or manipulation. Expert judgement is not used nor are executable quotes. Adopting an across-the-curve methodology ensures that the maximum number of transactions are captured within the index. AXI is not limited to the short-term unsecured markets that once underpinned LIBOR.

Representative

AXI always reflects banks' true costs of funds

Since the 2008 Financial Crisis, banks no longer fund themselves at LIBOR and have shifted their funding further out the yield curve. AXI is highly correlated with banks' funding costs because it captures this deeper pool of funding transactions. The index is a weighted average of credit spreads for U.S. bank unsecured debt instruments with maturities ranging from overnight to five years, with weights that reflect both transactions volumes and issuance volumes. The input data for AXI is obtained only from publicly available sources.

Sustainable

AXI automatically adapts to changes in bank funding composition

AXI reference rates were designed to maintain their hedge effectiveness and robustness over time and can be reliably computed in all economic conditions, including in times of market stress. The indexes automatically adapt to future changes in bank funding composition ensuring the representativeness and robustness of the indexes are sustained through time. AXI works in conjunction with the Secured Overnight Financing Rate (SOFR) which was identified by the Alternative Reference Rates Committee (ARRC) and is therefore suitable for usage in a wide variety of products.

Why Reference AXI or FXI in SOFR-based financial products?

For lenders

- Mitigates potential asset-liability mismatches in times of markets stress
- Works in conjunction with SOFR
- Enhances pricing transparency and clarity
- Can improve efficiency of loan negotiations
- Provides market participants with pre-trade pricing visibility
- Provides a reliable market-based indicator of credit conditions
- Can be hedged via ISDA swaps[1]

For borrowers

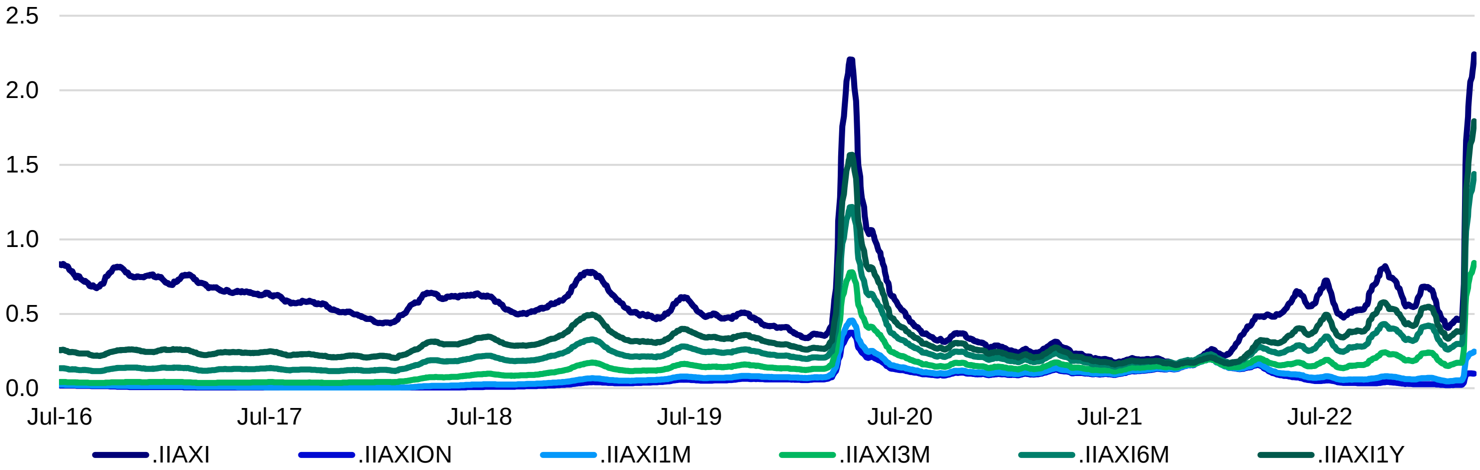
- May reduce the average cost of funding[2]
- Works in conjunction with SOFR
- May receive more funding in times of stress[2]
- Enhances pricing transparency and clarity
- Provides market participants with pre-trade pricing visibility
- Easily accessible on Invesco AXI website
- Can be hedged via ISDA swaps[1]

1 USD-AXI and USD-FXI are reflected in the International Swaps and Derivatives Association's (ISDA's) Floating Rate Options Definitions
2 Cooperman, Duffie, Luck, Wang & Yang (2022)

Performance through time

USD Across-the Curve Credit Spread Index (AXI)

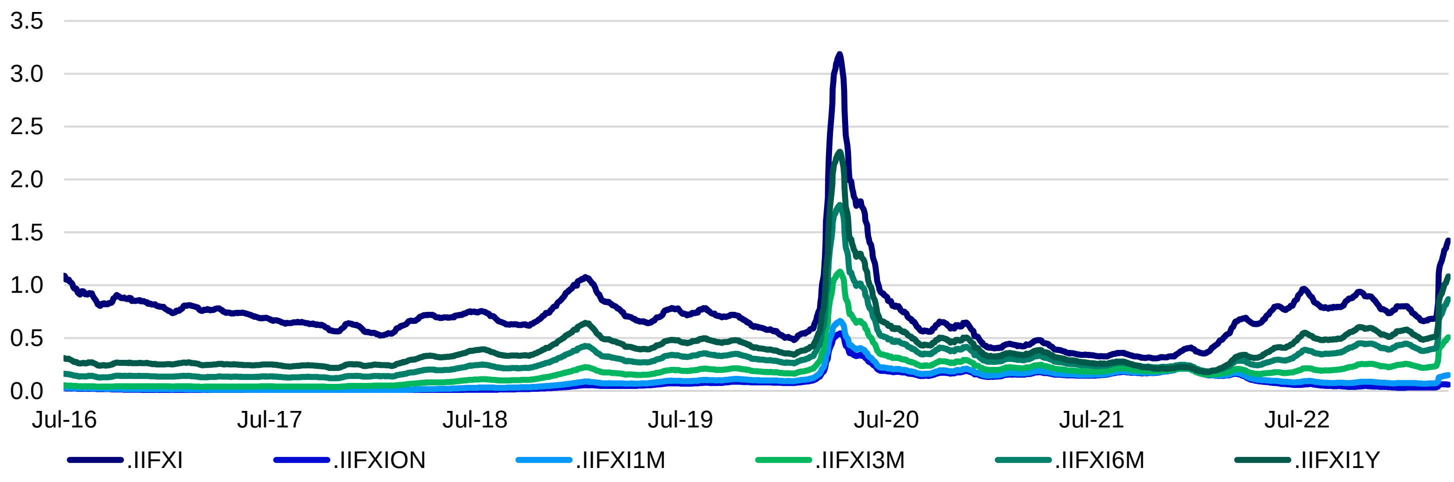
AXI is, by definition, highly correlated with banks' contemporaneous marginal costs of funds.



Source: Invesco Indexing. July 5, 2016, to March 31, 2023. The AXI Index was launched on July 12, 2022. The chart illustrated the daily rates of the AXI index. All data prior to a launch date is back-tested (i.e., calculations of how the index might have performed over that time period had the index existed). Back-tested performance is subject to inherent limitations because it reflects retroactive application of an index methodology and selection of index constituents with the benefit of hindsight. Past performance, actual or back-tested, is no guarantee of future performance. Please see the attached for the Ticker Codes Information.

USD Financial Conditions Credit Spread Index (FXI)

FXI follows the same methodology as AXI, but the underlying transactions are expanded beyond banks to include all financial institutions as well as corporate funding transactions.



Source: Invesco Indexing. July 5, 2016, to March 31, 2023. The FXI Index was launched on July 12, 2022. The chart illustrated the daily rates of the FXI index All data prior to a launch date is back-tested (i.e., calculations of how the index might have performed over that time period had the index existed). Back-tested performance is subject to inherent limitations because it reflects retroactive application of an index methodology and selection of index constituents with the benefit of hindsight. Past performance, actual or back-tested, is no guarantee of future performance. Please see the attached for the Ticker Codes Information.

Potential use cases

- Commercial bank lending applications
- Banks may choose to hedge their balance sheet risk with derivatives that include swaps linked to AXI
- Private Credit and Private Equity financing applications
- Supply Chain and Trade Finance activities
- Hedge funds and asset managers may wish to express views on bank funding conditions (AXI) and broader credit conditions (FXI)
- Floating Rate Note (FRN) issuers may wish to reference AXI or FXI
- A special purpose vehicle may wish to reference AXI or FXI in conjunction with SOFR in collateralized loan obligation (CLO) issuances
- Internal funds transfer pricing
- Related derivatives risk management applications (ISDA swap definitions available)
- Regulators, policy makers and other market participants can use AXI as indicators to gauge the marginal funding costs for commercial banks
- Can be replicated in certain other currencies to work in conjunction with respective local risk-free rates

A special purpose vehicle may wish to reference AXI or FXI in conjunction with SOFR in collateralized loan obligation (CLO) issuances

Note: AXI and FXI are not available for usage in consumer or retail products at this time

Financial stability considerations

Built from a large pool of underlying transactions

Large banks no longer fund themselves at LIBOR, and there are not enough transactions to calculate it. Regulations have induced banks to "term out" most of their unsecured funding to longer maturities[1]. AXI and FXI are not limited to short term funding markets such as Commercial Paper (CP) and Certificates of Deposit (CD). Rather, AXI and FXI are based on a broad set of debt issuances with maturities ranging from short term to multiple years.

Can be calculated in all economic conditions

Utilizing transactions from across the yield curve maximizes the underlying transaction volumes that are used to calculate the benchmarks. Transaction volume increased during the most recent market stress period. In mid-March 2023, underlying transaction volumes for the longer-term bond component of AXI increased by approximately 500%. FXI follows the same methodology as AXI, but the underlying transactions are expanded beyond banks to include all financial institutions as well as corporate funding transactions.

Always accurately reflects wider funding conditions

Recent research shows that in a SOFR-only regime, borrowers might be adversely affected during stress periods.[2] AXI and FXI can help counteract the adverse impact on bank lending in distress times.[3]
AXI is, by definition, highly correlated with banks' contemporaneous marginal costs of funds. FXI is, by definition, a direct reflection of wider funding conditions across the United States.

Uses high-quality independent input data

Input data for AXI and FXI is obtained only from publicly available sources. The long-end component data comes from Financial Industry Regulatory Authority (FINRA) Trade Reporting and Compliance Engine (TRACE). The short-end component is obtained from Depository Trust & Clearing Corporation (DTCC) Money Market Kinetics. This provides a single, daily feed of anonymized CP and CD secondary settlement transactions data. No proprietary data is used in the construction of AXI or FXI. Neither AXI nor FXI rely on models or quoted rates.

Adapts to future structural market shifts

AXI and FXI automatically adapt to changes in funding composition for banks (AXI) and the broader United States economy (FXI). The benchmarks were designed to maintain their hedge effectiveness and robustness over time and can be reliably computed in all economic conditions, including in times of market stress. If, for example, money market fund reforms or Basel III implementation resulted in banks shifting the maturity of volume weighted funding, AXI and FXI would automatically weight that part of the yield curve.

Leverages the robust foundation of SOFR

AXI and FXI are available only as credit spread supplements to SOFR, and therefore leverage the robust foundation of SOFR. Whenever a loan is indexed to an across-the-curve credit spread index, it would also reference SOFR. So, use of a credit spread index does not imply less frequent reference to SOFR.

1 Committee on the Global Financial System (2018)
2 Cooperman, Duffie, Luck, Wang & Yang (2022)
3 Ghamami (2023)

Additional materials

The following additional materials are available at invescosofracademyaxi.com

- The latest USD-AXI and USD-FXI reference rate data
- USD-AXI methodology document
- USD-FXI methodology document
- Market data vendor ticker codes
- 60-second AXI explainer video
- Frequently asked Questions (FAQs)
- SOFR Academy Insights
- Contact form

To review Invesco Indexing governance information visit: invescoindexing.com/en/governance

To submit questions, feedback, requests for licensing documentation or historical data please completed the 'Contact Us' form.

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1 Source: Invesco Ltd., AUM of $1,483.0 billion. AUM includes all assets under advisement, distributed and overseen by Invesco.

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Darrell Duffie, who is the Adams Distinguished Professor of Management and Professor of Finance at the Stanford Graduate School of Business and a co-author of the proposal for AXI and FXI, has no related compensation or affiliation with its operationalization.

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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.