

Across-The-Curve Credit Spread Indexes (AXI)

The transition away from LIBOR must be sustainable. The Across-The-Curve Credit Spread Indexes (AXI)[™] are robustly defined, forward-looking dynamic credit sensitive add-ons to the Secured Overnight Financing Rate (SOFR) that automatically adapt to future changes in bank funding composition.

October 2021 | Version 1.0



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Acknowledgment

SOFR Academy is grateful to the team of leading academics that authored the paper in which the Across-the-Curve Credit Spread Index (AXI)TM and the Financial Conditions Credit Spread Index (FXI)TM were conceived. Antje Berndt is a Professor of Finance at the College of Business and Economics, Australian National University. Darrell Duffie¹ is the Adams Distinguished Professor of Management and a Professor of Finance at the Graduate School of Business, Stanford University, as well as a research fellow of the National Bureau of Economic Research. Yichao Zhu is a Senior Lecturer in finance at the College of Business and Economics, Australian National University.

Berndt, Antje and Duffie, James Darrell and Zhu, Yichao, Across-the-Curve Credit Spread Indices (July 23, 2020). Stanford University Graduate School of Business Research Paper No. 3884, Available at SSRN: <https://ssrn.com/abstract=3662770> or <http://dx.doi.org/10.2139/ssrn.3662770>

Approach

The London Interbank Offered Rate (LIBOR) is no longer tenable as a benchmark index for numerous reasons, notably because regulatory and structural market changes have compelled banks to “term out” most of their unsecured funding to longer maturities. The volume of underlying transactions needed to make LIBOR a sufficiently robust benchmark has ceased to exist. As a result, LIBOR is not representative of today’s actual costs of funds for banks, and it will soon be discontinued.

The Official Sector has endorsed SOFR as the rate to replace US-dollar LIBOR. To that end, the priority of market participants should be its operationalization. A menu of credit sensitive add-ons, including the Across-the-Curve Credit Spread Indexes (AXI), serves to support that goal.

The fundamental premise behind AXI, as highlighted above, is the longer-term nature of funding for today’s banks. The distinctive component of the AXI methodology is capturing those transactions that occur further out the yield curve, which represent their true funding costs. It is this feature that makes AXI fundamentally different in construction from any other credit sensitive rate or spread proposal currently in the market.

AXI is a forward-looking, term credit-sensitive spread that reflects banks’ recent marginal funding costs at 1-month, 3-month, 6-month and 12-month tenors. It is a weighted average of the credit spreads of *unsecured* bank funding transactions with maturities out to five years, with weights that reflect both transactions volumes and issuance volumes.

AXI is a spread which is added to SOFR. For example, it could be used on top of CME Term SOFR², simple daily SOFR, SOFR compounded in arrears, or other SOFR variants to form a credit-sensitive interest rate benchmark for loans. Eventually, it could be expanded to include derivatives and other products. Most importantly, AXI is not confined to the thin, short-term bank funding markets that once underpinned LIBOR. SOFR plus AXI is referred to as SOFRxTM.

¹ Duffie chaired a Market Participants Group on Reforming Interest Rate Benchmarks (or the Market Participants Group on Reference Rate Reform). The group was established by the Financial Stability Board ([Market Participants Group \(2014\)](#)). Duffie is not affiliated with SOFR Academy Inc. nor the operationalization of AXI.

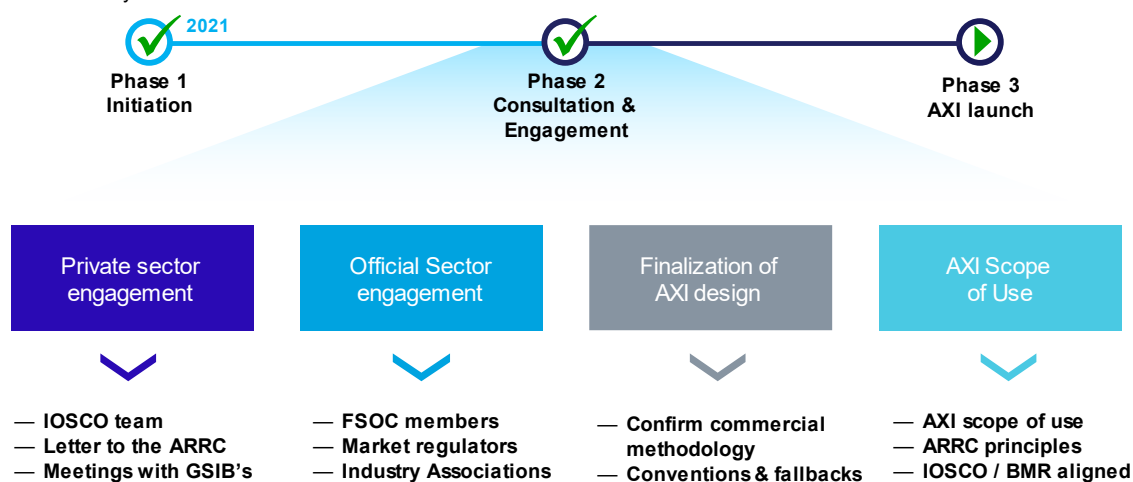
² See CME Term SOFR website: <https://www.cmegroup.com/market-data/cme-group-benchmark-administration/term-sofr.html>

In a June 21, 2021 letter ([Burnett, 2021](#)) to the Alternative Reference Rates Committee (ARRC), SOFR Academy committed to operationalizing AXI in a considered and measured way that incorporates feedback and guidance from a wide range of stakeholders (Exhibit 1). This may involve alignment with the ARRC's Key Principles for a forward-looking SOFR Term Rate and licensing AXI for use in derivative markets, initially for end-user-facing derivatives that hedge cash products referencing SOFR + AXI.

Exhibit 1

A measured approach to AXI operationalization

SOFR Academy has committed to operationalizing AXI in a measured way that promotes the stability of the U.S. financial system on a sustained basis.



Credit Sensitivity Group Workshops

In September 2019, to address the concerns³ of some U.S. Regional banks around using SOFR on a stand-alone basis, Credit Sensitivity Group workshops ([FRBNY, 2020](#)) were hosted by the Federal Reserve Bank of New York. AXI was first introduced at these workshops as fundamentally different in construction methodology to other credit sensitive proposals. By design, AXI does not correlate highly with LIBOR. This means that SOFR + AXI results in both a less volatile index and one which is more reflective of broader credit conditions.

Key features

- **High correlation with bank funding** – By definition, AXI is highly correlated with U.S. bank cost of funds, as determined by recent credit spreads in transactions for wholesale unsecured issues of U.S. banks and bank holding companies. Banks no longer solely fund themselves in the short-term interbank markets as they did historically. Now they fund themselves further out the curve.
- **Highly robust** – AXI is computed from a large enough pool of market transactions to underlie actively traded derivatives instruments used by banks and their

³ Credit Sensitivity Letter: <https://www.newyorkfed.org/medialibrary/media/newsevents/events/markets/2020/credit-sensitivity-letters.pdf>

customers to hedge floating-rate exposures, without significant risk of corruption or manipulation.

- **Adaptable to changes in bank issuance patterns** - AXI maintains its high correlation with bank funding costs and its robustness even as banks adjust the maturity and instrument composition of their issuances in response to changes in regulation and market conditions.
- **Publicly available input data** - Proprietary transaction data is not used in the construction of AXI. Input data comes from publicly available sources such as FINRA's Trade Reporting and Compliance Engine (TRACE). This provides Regulators and market participants with greater transparency and confidence in AXI's integrity.
- **Available only as a spread to SOFR** – Consistent with the desires of the Official Sector, which has fully endorsed SOFR, AXI will only be made available as a spread to SOFR. Producing an all-in rate would be far simpler, however, this would impede the broader adoption of SOFR. Utilizing a spread add-on to SOFR aligns us with the Official Sector and is consistent with our commitment to operationalize AXI in a way that prioritizes the safety and soundness of the financial system. SOFR Academy has confirmed that a spread add-on is feasible from an operations, technology, and documentation perspective.

Input data

As highlighted above, input data used in the construction of AXI comes from publicly available sources, a summary of which follows:

- Financial Industry Regulatory Authority (FINRA), the Trade Reporting and Compliance Engine (TRACE) – Secondary-market corporate bond price and volume data (<https://www.finra.org/filing-reporting/trace>)
- Depository Trust & Clearing Corporation (DTCC) – Money market data (<https://www.dtcc.com/>)
- The Center for Research in Security Prices (CRSP) - (<http://www.crsp.org/>)
- Fixed Income Securities Database (FISD) – Used to filter for bond characteristics (<https://www.ftserussell.com/data>)

Construction methodology

AXI is made up of two components: The long end bond component (out to five years), and the short end money market component which is designed to complement the longer end. Each part is computed separately. AXI is the average of the shorter term and long-term spreads.

For the long end component, identifying the appropriate population of bank funding transactions involves enhancing the FINRA TRACE data with additional bond attributes and then filtering and sorting accordingly. The filters strike a balance between (i) basing spread index computation on a homogenous set of bonds and (ii) retaining as many observations as possible.

Consider four one-year maturity ranges from one to five years, based on secondary market trading of wholesale unsecured bonds issued by bank holding companies and their commercial banking subsidiaries. The underlying debt instruments are those that:

- are senior unsecured corporate debentures, medium term notes (MTNs), or medium-term zeros.
- are not foreign currency, private placement, convertible, exchangeable, perpetual, unit deal, defaulted, rule 144a, putable, Yankee, or Canadian.
- can be linked to data provided by CRSP, FISD, and TRACE.

The bond-component of AXI is the weighted sum of credit spreads across the four maturity buckets, where the weights are calculated based on the percentage in each maturity bucket of total issuance in the previous year. Specifically:

1. For each maturity bucket m , we compute the volume-weighted median credit spread s_m among all secondary market transactions in the trailing month that include securities whose *remaining* maturities are in the chosen bucket.
2. The combined across-the-curve credit spread index $S = \sum q_m s_m$, where q_m is the fraction in maturity bucket m of total issuance in the previous year.
3. Turning to the short-term component, we use DTCC data. For money-market maturities, such as 1 day, 1 month, 3 months, and 6 months, spreads on issues of CP, wholesale CDs, and interbank deposits are determined by using a volume-weighted average based on transaction volume in the most recent 20 business days:
 - Weighting is by principal amount
 - Transactions with statistically abnormal spreads (high or low) are removed
 - Spread is CP/CD yield minus the risk-free rate on the day of trading
 - Only includes issues with fixed interest rates (not variable)

To combine the long end and the short end, we take the simple average.

Practical considerations⁴

Because AXI is across the curve, a typical loan would not use AXI flat. For example, it may be desirable to have a "3-month AXI" on a floating-rate commercial loan with quarterly interest payments. A simple solution would be to scale down AXI to fit the interest frequency. The scaling factor of 3-month maturity is chosen such that the average 3-month AXI is approximately equal to the 3-month LIBOR-term SOFR spread over the last two years.

Looking ahead, the discontinuation of LIBOR will preclude the recalibration of the scaling factor. However, market feedback indicates a continued demand for a 3-month AXI, pre-scaled. We therefore plan to permanently fix the scaling factor prior to LIBOR cessation, the advantages of which are twofold. First, it eliminates LIBOR dependency. Second, the fixed scaling factor simplifies hedging. To use a numerical example, suppose that 3-month AXI is equal to 0.5 times unscaled AXI. A bank making a \$10 million loan based

⁴ Please note that on December 6, 2021, SOFR Academy issued a public notification of a technical enhancement to the AXI scaling methodology. See <https://sofracademy.com/wp-content/uploads/2021/12/AXI-Technical-Note-Enhancement-to-Scaling-Methodology.pdf>

on 3-month AXI can hedge the interest rate risk by buying \$5 million notional of the AXI futures contract.

The ostensible disadvantage of fixing a scaling factor is a divergence of implied credit spreads from instruments of similar maturity. In the case of the 3-month AXI, credit spreads on 3-month commercial paper might differ. For example, in a liquidity crisis, short-term credit spreads are likely to spike relative to the long end, so the scaled 3-month AXI might be substantially lower than credit spreads on 3-month commercial paper. However, this imperfect correlation with short-term funding credit is by design and a benefit of the methodology. It will dampen the unexpected surge in funding cost that borrowers must bear in a funding crisis. Moreover, the borrower-specific spread on top of pre-scaled AXI can be adjusted to so that the all-in credit spread reflects the lender's view of fair value over the tenure of the loan.

While a pre-scaled AXI is calculated and available, market participants are free to employ their own versions of scaled AXI. For example, a bank may use 0.4 times AXI on a loan with a quarterly interest frequency. SOFR Academy will not dictate contract terms; rather, we offer enough variety of possible solutions to meet market needs.

Since bond yield spreads tend to move in a wider range than money-market credit spreads, it makes sense to scale down an across-the-curve credit spread index when contracting monthly, quarterly, or semi-annual floating-rate interest payments. For example, a bank loan linked to an across-the-curve credit spread index X would have a floating interest payment $R(t)$ on date t of the contractual form

$$R(t) = \text{SOFR}_n(t) + B_n X(t) + \text{borrower fixed spread},$$

where B_n is a constant scaling factor specific to the n -month length of coupon periods and $\text{SOFR}_n(t)$ is SOFR for the n -month coupon period ending on date t , obtained from daily SOFR compounded in arrears over the coupon period. With this construction of loan terms, floating-rate risk can be managed with combinations of derivatives linked to SOFR and derivatives linked to X . For example, a loan of principal P paying a fixed spread over $\text{SOFR}_n + B_n X$ can be swapped to a fixed rate by entering a SOFR payer swap with notional P and an X payer swap with notional $B_n P$.

Notes on methodology

- **Financial Condition Credit Spread Index (FXI)** – An evolution of AXI is FXI. Incorporating transaction data for non-bank issuers scales up the dollar volume covered transactions by a factor of nearly 500%. The resulting FXI spreads are highly correlated with AXI, especially over the past few years ([Berndt, Duffie and Zhu, 2020](#)). FXI is virtually the most robust credit sensitive rate that is possible to construct because it is comprised of transactions from banks, financials, and corporates.
- **Short term component of AXI can be removed** - Please note that AXI can be computed without the short-term component. Regulators in the U.K. and U.S. have expressed concerns that liquidity in short term unsecured markets may continue to deteriorate ([Williams, 2021](#)). SOFR Academy considered eliminating the short-term component of AXI and held discussions with regulators and market participants. On balance, a decision was made to retain the short-term component, consistent with the methodology outlined in the original academic paper ([Berndt, et al 2020](#)). This maximizes the number of underlying transactions and therefore enhances the overall robustness of the index.

- **TRACE data is cleaned** - The TRACE data (i.e., the TRACE data with uncapped transaction sizes) is scraped to remove cancellations, corrections, reversals, and double counting of agency trades from the trade records. WRDS provides a [manual](#) and [SAS code](#) for cleaning the Enhanced TRACE data. It follows the data cleaning procedures outlined in [Asquith, Covert and Pathak \(2013\)](#) and [Dick-Nielsen \(2014\)](#). Dick-Nielsen also provides SAS code, which contains a few more options such as the removal of commissioned trades.
- **Underlying bonds will be updated monthly** – The bond transactions that underpin AXI will change over time as certain bonds roll off and other bonds come into scope. The specific bond transactions used to calculate AXI will be updated monthly, and the list made publicly available on the AXI administrator’s website.

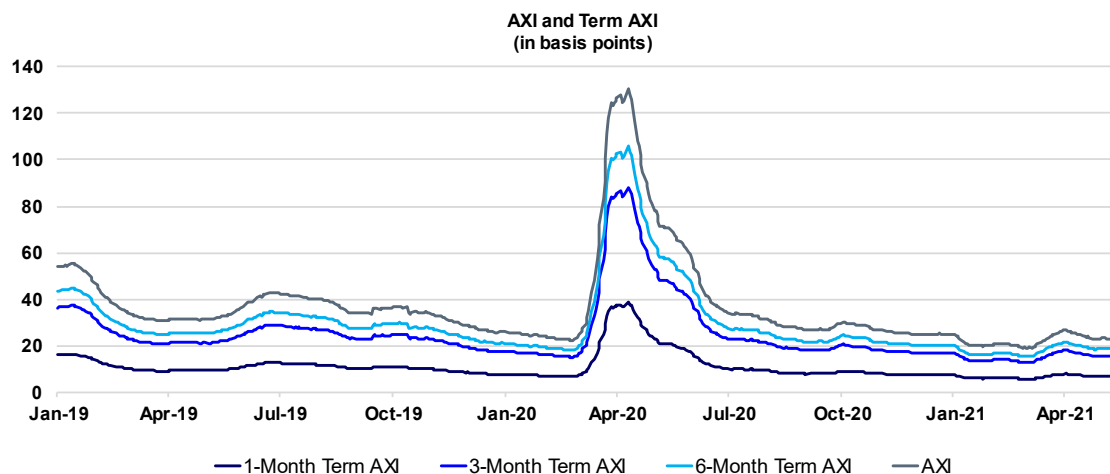
AXI historical performance

Publishing AXI prior to being scaled down to standard money market tenors will allow market participants to choose the scaling factor themselves. SOFR Academy therefore intends to publish AXI unscaled in addition to Term AXI in standard money market tenors.

Exhibit 2

AXI and Term AXI historical performance

AXI looks further out the yield curve to where the actual banks funding transactions occur

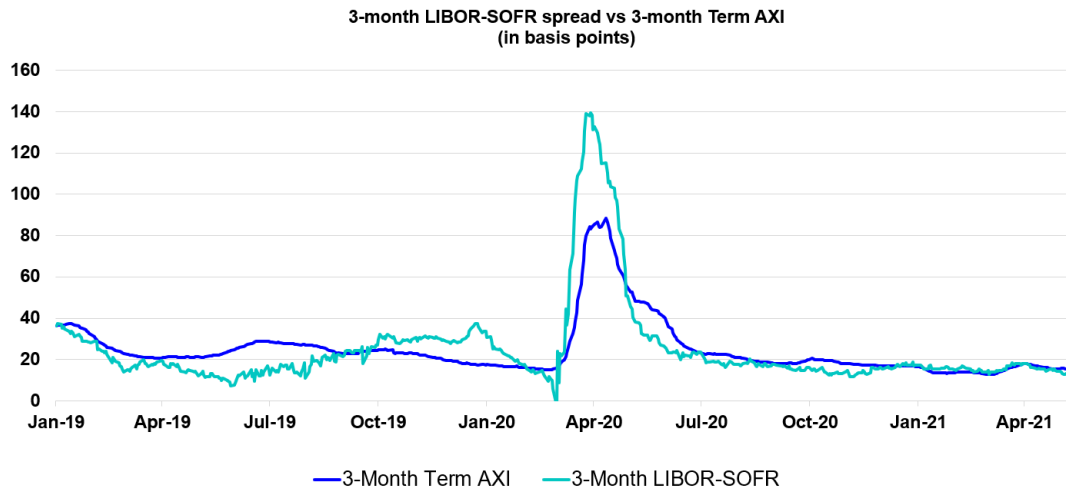


Term AXI is reactive to market conditions, yet smoother and less volatile than other short-term rates as shown in Exhibit 3, which compares it to the 3-month LIBOR-SOFR spread. Note that 3-month AXI moved higher during the onset of the COVID pandemic around March 2020 but that the move was not as rapid or as violent as LIBOR or a LIBOR-like rate. We know that during this period, the number of short-term bank funding transactions that occurred declined ([Schooling Latter, 2021](#)) however longer term transaction volume did not appear to experience the same deterioration (Exhibit 4).

Exhibit 3

3-Month Term AXI vs 3-Month LIBOR-SOFR spread historical performance

AXI looks further out the yield curve to where the *actual* bank funding transactions occur

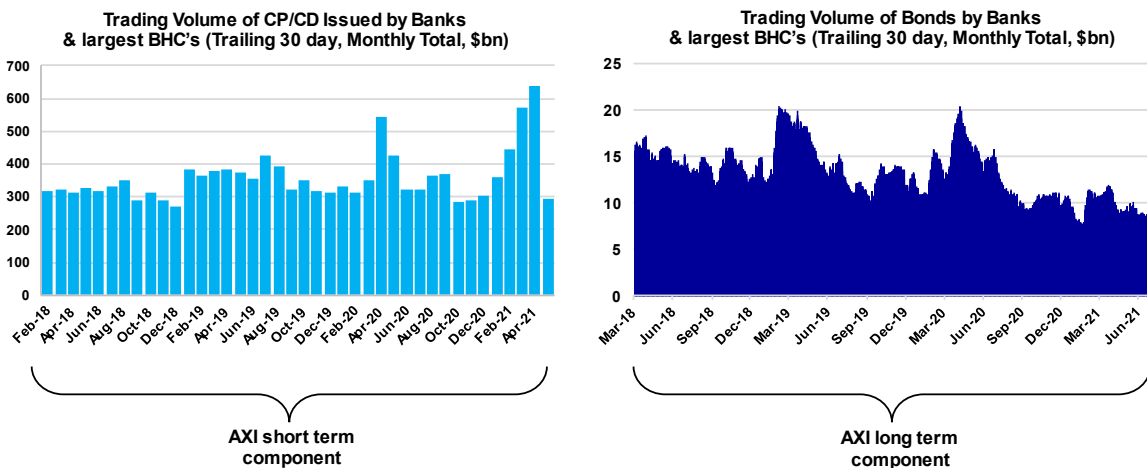


Transaction volumes

Exhibit 4

AXI Transaction Volumes

AXI is not limited to short term markets, and includes the deeper and longer bank bond funding transactions that occur further out the yield curve

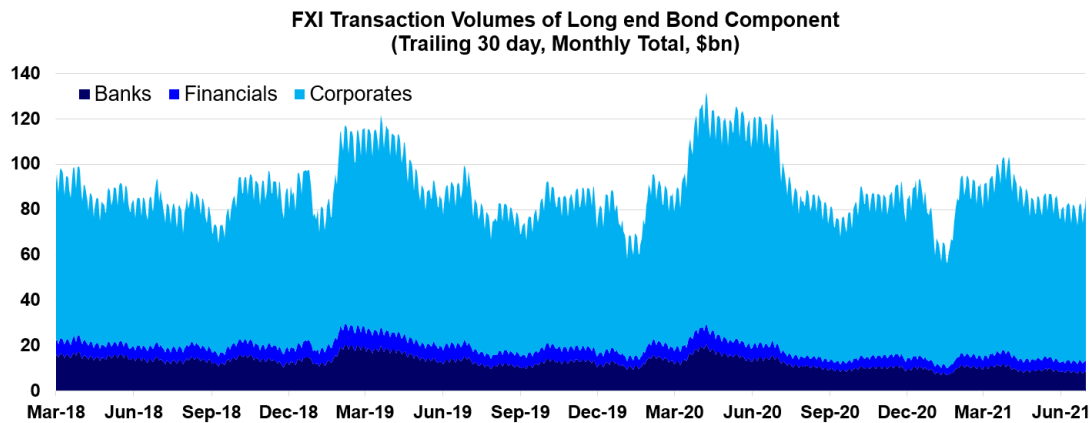


An extension of AXI is FXI, which includes transaction data from non-financial corporates. As shown in Exhibit 5, it closely tracks AXI while increasing the underlying volumes used by five-fold.

Exhibit 5

AXI can be expanded to the Financial Conditions Credit Spread Index (FXI)

FXI is constructed using the same methodology and widening the coverage to include all financials & corporate bonds.



Key takeaways:

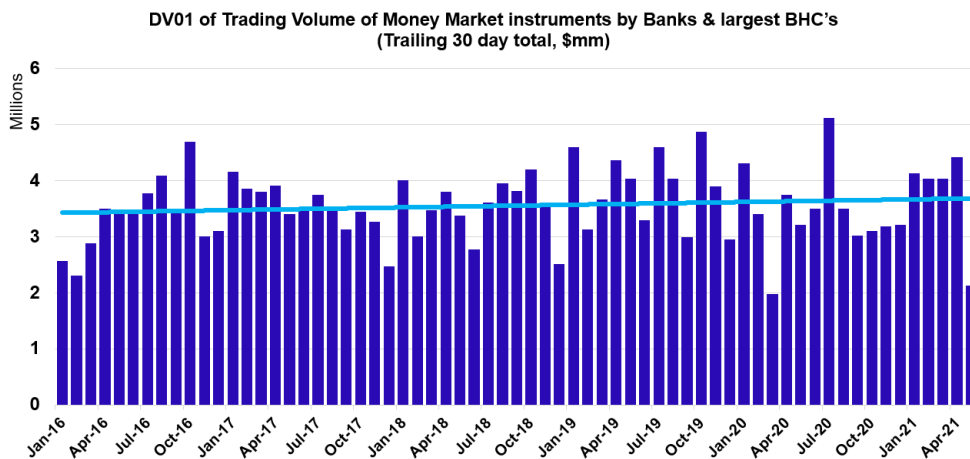
- FXI scales up the dollar transaction volume of covered transactions over the period by approximately 500%
- AXI and FXI are highly correlated, especially over the past few years (Berndt, Duffie, Zhu, 2020)

Interest rate risk (DV01)

Exhibit 6

Approximating the DV01 of AXI's short term component

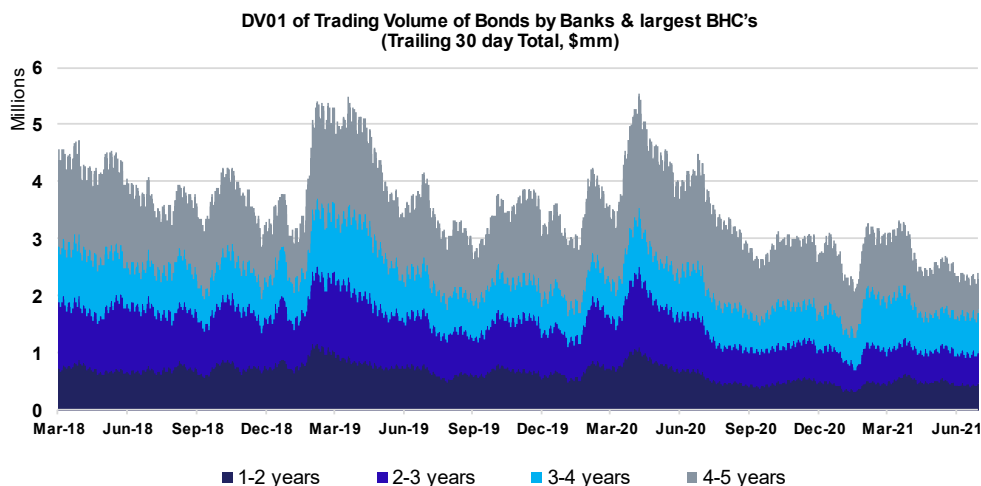
AXI's robustness is unmatched from an interest rate risk perspective metric because it is not limited to short term funding markets



Tracking the DV01's of AXI's long term component illustrates the shifting distribution of bank funding composition across the four maturity buckets over time, as shown in Exhibit 7.

Approximating the DV01 of AXI's long term component

Accessing a deeper pool of transactions means that AXI is well positioned to support a derivatives market



Recommended loan conventions

In general, AXI conventions for use in loans will align with existing industry standards. The AXI rate is known in advance of the interest period, much like it is for LIBOR-based loans today, and thus most of the loan conventions can mirror LIBOR and Term SOFR loan conventions. It is also worth noting that parties who wish to adopt the SOFR Academy-recommended conventions may still need to make certain modifications so that they are administratively feasible in particular transactions.

- **Business day definition** - "U.S. Government Securities Business Day" should be defined as any day except for a Saturday, Sunday, or a day on which the Securities Industry and Financial Markets Association (SIFMA) recommends that the fixed-income departments of its members be closed for the entire day for purposes of trading in U.S. government securities
- **Temporary unavailability of AXI** - There should be a temporary fallback if AXI is not available as of 5 pm (New York time) on an interest rate determination date, such as falling back to the applicable AXI that was published on the first preceding U.S. Government Securities Business Day, as long as such day is not more than three U.S. Government Securities Business Days prior to the interest rate determination date. Alternatively, some parties may prefer to use interpolation where AXI for a particular tenor is temporarily unavailable.
- **AXI determination date** – For AXI, the recommended convention is to use the spread published two U.S. Government Securities Business Days prior to the first day of the interest period and held for the entirety of the interest period, similar to the Term SOFR convention.
- **Drawdown notices** – For AXI, the recommended convention is for the borrower to provide notice of a borrowing request three U.S. Government Securities Business Days prior to the borrowing date, similar to the LIBOR and Term SOFR convention today

- **Rounding** - Term SOFR and AXI are published to five decimal places and dollar amounts can be calculated to two decimal places and, thus, parties may consider using their current rounding practices.
- **Day count convention** – Day count recommendation is Actual/360 days for AXI, which is the standard convention in U.S. money markets. However, it is possible to use other day counts such as Actual/365. Finalized conventions for AXI will be published with guidance from industry associations such as the Loan Syndications and Trading Association (LSTA).

Scope of use

Use of AXI should be in proportion to the depth of transactions in the underlying derivatives market.

SOFR Academy will seek counsel and input from key stakeholders on AXI scope of use and provide market updates in due course in partnership with AXI's administrator. The ARRC invested a considerable amount of time determining scope of Use for Term SOFR taking into account a views from a range of participants. One option that SOFR Academy is considering is aligning scope of use for AXI and FXI with the ARRC's Term SOFR scope of use including the definition of end-user.

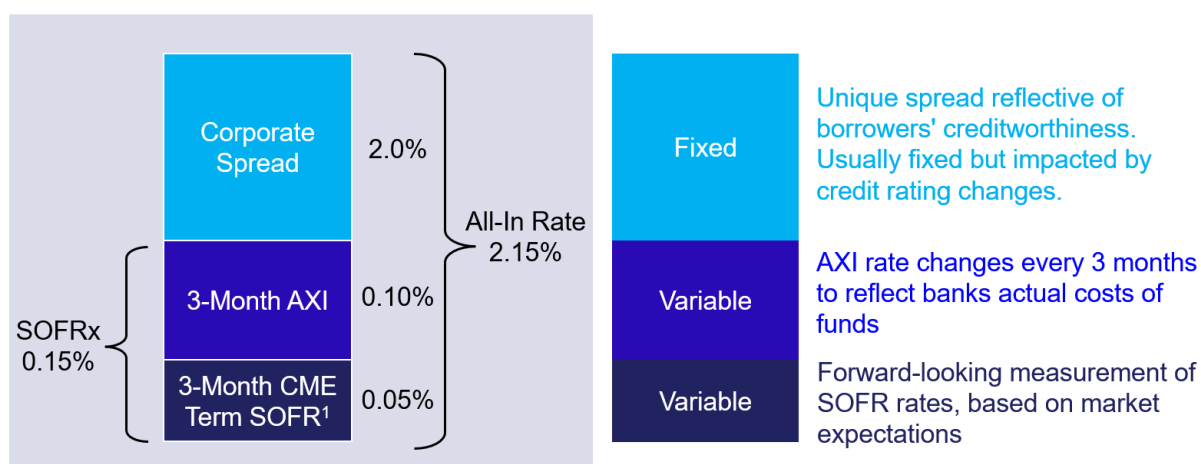
Worked example

AXI is a simple and effective way for lenders to avoid mismatches in their funding. In the following example (Exhibit 8), an American Regional Bank lends USD 20 million to a Non-financial Corporate for 3 months at 3-month Term SOFRx plus the existing credit spread margin that the Non-financial Corporate would borrow over LIBOR.

Exhibit 8

Case Study: Using SOFR + AXI in a loan

5-year USD Loan, referencing 3-month Term SOFR and 3-month Term AXI



(1) CME Term SOFR is used in this example, however market participants may use other SOFR variants such as Daily simple SOFR.

Data availability

AXI will be available for licensing via the AXI administrator. AXI will also be available on a delayed basis on SOFR Academy's [website](#).

AXI licensing fees

SOFR Academy is committed to bringing AXI to market at a reasonable commercial cost. Any period where AXI is provided to market participants at zero costs will be determined after seeking consultation with market regulators and relevant groups such as the ARRC. Any institution that utilizes AXI data for any purpose, including internal use or as an input in a financial market product, will be required to obtain a relevant AXI license.

Implementation considerations

To thrive in a post-LIBOR world, financial institutions must fundamentally understand the alternative benchmarks they choose to use.

Financial institutions are familiar with “Know Your Customer” (KYC) requirements. The overall objective of KYC guidelines is to prevent banks from being used by bad actors for money laundering. They also enable financial institutions to prudently manage their risks and better serve their customers. LIBOR transition has catalysed heightened industry focus from market regulators and the Official Sector ([Financial Stability Oversight Council, 2021](#)) on the new benchmarks and indexes that financial institutions reference in their financial products.

Leaders at financial institutions have an obligation to understand the behaviour of new benchmarks under a range of economic scenarios, as well as explain their selection to employees, regulators, counterparts, auditors, investors, and shareholders. Like KYC, the concept of Know Your Benchmark (KYB) will become important, and we sketch out three actions for market participants to consider:

- **Implement strong governance** – Financial Institutions should ensure that there is an appropriate level of internal governance relating to their financial benchmark selection. Expectations by regulators on the robustness of documented rationale are heightened for benchmarks that are not SOFR-based.
- **Ensure clear fallbacks are in place** – There must be clarity in the steps and actions that occur in the event that a rate or index is not available to be published on both a temporary and permanent basis.
- **Clearly document discussions with clients and customers** – These conversations should include regulatory considerations as well as explanations about the expected behaviour of rates under different economic cycles. These interactions should be integrated within firms’ conduct risk management framework.

Additional materials

- **Frequently Asked Questions** – SOFR Academy maintains a list of frequently asked questions on its website, which is continually updated. Available at: <https://sofracademy.com/axi/axi-faq/>

- **Educational Video** – Across-the-Curve Credit Spread Index (AXI) YouTube video (40 minutes in direction). Available at: <https://www.youtube.com/watch?v=9OpOAEwcwVY&t=12s>
- **Credit Sensitivity Group Workshops** – A series of workshops hosted by the Federal Reserve Bank of New York to discuss needs and concerns with stakeholders in relation to LIBOR transition. The original intention of these workshops was to explore a credit sensitive supplement or spread add-on to SOFR. Available here: <https://www.newyorkfed.org/newsevents/events/markets/2020/0225-2020>

Regulatory considerations

Regulators in both the United Kingdom and the United States have recently intensified their concerns about Credit Sensitive Rates. However, these are, by and large, applicable to rates that exhibit LIBOR-like qualities and do not apply to an Across-the-Curve approach like AXI or FXI (which are added to SOFR and references a larger and deeper pool of transactions across a much wider range of maturities).

Specific concerns voiced by regulators in the United Kingdom and United States generally centre around three elements of credit sensitive rates or spreads: First, that they lack the necessary volume of underlying transactions to be robustly determined. Second, that their robustness may be diminished in times in market stress. Third, that their robustness may not be sustainable over time due to changes in regulation or market structure. None of these issues apply to SOFR + AXI (See Table 9 for further details).

Table 9: Selected Regulatory Commentary

| Speech | Attribute | Applicability | Explanation |
|---|--|------------------------------|---|
| Descending safely: Life after Libor - speech by Andrew Bailey. Given at Alternative Reference Rates Committee – the SOFR symposium: The final year. May 11, 2021 ⁵ | Use of executable quotes | Does not apply to SOFR + AXI | SOFR + AXI does not use executable quotes as input data |
| | Use of Regression approaches | Does not apply to SOFR + AXI | SOFR + AXI does not use Regression approaches |
| | Concern over how stable these rates will be in the future as these underlying markets continue to evolve | Does not apply to SOFR + AXI | SOFR + AXI is not limited to the short-term unsecured markets that once underpinned LIBOR |

⁵ <https://www.newyorkfed.org/newsevents/speeches/2021/wil210511>

| | | | |
|---|---|------------------------------|--|
| | Concern over stability and representativeness against the backdrop of money market reform | Does not apply to SOFR + AXI | AXI automatically adapts to future changes in bank funding composition |
| Prepared Remarks Before the Financial Stability Oversight Council. Chair Gary Gensler June 11, 2021 ⁶ | “Term rate is underpinned primarily by trades of commercial paper and certificates of deposit” | Does not apply to SOFR + AXI | AXI is not limited to the short-term unsecured markets that once underpinned LIBOR |
| | “[trade volume behind three-month tenor] is single-digit billions of dollars per day” | Does not apply to SOFR + AXI | AXI is not limited to the short-term unsecured markets that once underpinned LIBOR |
| | “These markets underpinning a LIBOR-like rate not only are thin in good times; they virtually disappear in a crisis. Last spring, the primary commercial paper lending market evaporated for about five weeks during the initial stresses of the pandemic.” | Does not apply to SOFR + AXI | AXI is not limited to the short-term unsecured markets that once underpinned LIBOR |
| | | | |

Contact information

For additional information, questions, or to request a consultation, please visit SOFR.org/AXI, or call our New York office on +1 855 236 6106.

Prospective licensees should email: AXI@SOFR.org

AXI underlying issuers

It is anticipated that a list of approximately 100-200 distinct bank issuer names included in the AXI calculation will be made publicly available and will be updated at regular intervals, such as monthly or quarterly. These are the issuer names as listed in the bond prospectus. They can be aggregated to the level of parent company/equity issuing entity if needed.

⁶ https://www.sec.gov/news/public-statement/gensler-fsoc-libor-2021-06-11?utm_medium=email&utm_source=govdelivery

Banks are identified as firms listed as bank holding companies or commercial banks in the NY Fed RSSD file. As a robustness check, we also verify that their FISD industry code is between 20 and 26 (inclusive). The NY Fed updates RSSD codes every few years, and FISD updates annually, so the list of banks would update infrequently. Note that the additional check for FISD industry code could be removed.

About SOFR Academy

SOFR Academy, Inc. is a U.S. based digital education and data provider. SOFR Academy's panel of advisors includes academics from Harvard University, the MIT Sloan School of Management, the University of California Berkeley, New York University and Tsinghua University as well as experienced financial services professionals. The Firm provides services to corporations, financial institutions, governments, regulators, and individuals on important topics that impact the global economy. The Firm is also driving the operationalizing of AXI and FXI as credit spread add-ons for SOFR for use in lending and derivative markets. SOFR Academy is a member of the Loan Syndications and Trading Association (LSTA), the International Swaps and Derivatives Association (ISDA), the Asia Pacific Loan Market Association (APLMA) and the Bankers Association for Finance and Trade (BAFT) which is a wholly owned subsidiary of the American Bankers Association (ABA). SOFR Academy is backed by venture capital.

Fallback language

"Fallback language" refers to the legal provisions in a contract that apply if the underlying reference rate in the product (e.g., AXI) is discontinued, non-representative, or unavailable. The OSSG recommended that market participants both understand their contractual fallback arrangements and ensure that those arrangements are robust enough to prevent potentially serious market disruptions in an AXI cessation event ([ARRC, 2021](#)). Fallbacks for temporary and permanent cessation for AXI will generally follow existing market convention.

The following fallback language pertaining to AXI is an excerpt from a draft Term SOFR + AXI concept credit agreement document produced with permission from the Loans Syndication and Trading Association (LSTA) – for a copy of the full document please email AXI@SOFR.org. This excerpt fallback language is provided for illustrative purposes only, is not intended for usage, and is subject to change. It does not constitute legal advice. Fallback language has been drafted by legal counsel considering the recent letter⁷ from the UK Financial Conduct Authority and the letter⁸ from the U.S. Federal Reserve Board. Please consult your legal advisers before using.

* * *

"Benchmark Replacement Adjustment" means, with respect to replacing a then-current Benchmark with a Benchmark Replacement, the spread adjustment, or method for calculating or determining such spread adjustment, (which may be a positive or negative value or zero) that has been selected by the Administrative Agent and the Borrower giving due consideration to (a) any selection or recommendation of a spread adjustment, or method for calculating or determining such spread adjustment, for the replacement of such Benchmark with the applicable Unadjusted Benchmark Replacement for Dollar-denominated syndicated credit facilities made by, (i) in the case of a Benchmark Transition Event arising from AXI, the AXI Benchmark Administrator, or (ii) in the case of

⁷ <http://assets.isda.org/media/3aaf7995/9b13cedd-pdf/>

⁸ <http://assets.isda.org/media/f5bf13ae/5a1f3030-pdf/>

a Benchmark Transition Event arising from CME Term SOFR or any SOFR-based Benchmark Replacement, the SOFR Administrator or the Relevant Governmental Body, and (b) any evolving or then-prevailing market convention for determining a spread adjustment, or method for calculating or determining such spread adjustment, for the replacement of such Benchmark with the applicable Unadjusted Benchmark Replacement for Dollar-denominated syndicated credit facilities.

“Benchmark Replacement Conforming Changes” means, with respect to any Benchmark Replacement, any technical, administrative or operational changes (including changes to the definition of “ABR,” the definition of “Benchmark Transition Event,” the definition of “Business Day,” the definition of “U.S. Government Securities Business Day,” the definition of “Default Rate,” the definition of “Interest Period” or any similar or analogous definition (or the addition of a concept of “interest period”), timing and frequency of determining rates and making payments of interest, timing of borrowing requests or prepayment, conversion or continuation notices, length of lookback periods, the applicability of Section 2.14 and other technical, administrative or operational matters) that the Administrative Agent decides may be appropriate to reflect the adoption and implementation of such Benchmark Replacement and to permit the administration thereof by the Administrative Agent in a manner substantially consistent with any market practice (or, if the Administrative Agent decides that adoption of any portion of such market practice is not administratively feasible or if the Administrative Agent determines that no market practice for the administration of such Benchmark Replacement exists, in such other manner of administration as the Administrative Agent decides is reasonably necessary in connection with the administration of this Agreement and the other Loan Documents).

“Benchmark Replacement Date” means the earliest to occur of the following events with respect to the then-current Benchmark:

(a) in the case of clause (a) or (b) of the definition of “Benchmark Transition Event”, the later of (i) the date of the public statement or publication of information referenced therein and (ii) the date on which the administrator of the relevant component or Benchmark permanently or indefinitely ceases to provide all Available Tenors of such component or Benchmark; or

(b) in the case of clause (c) of the definition of “Benchmark Transition Event”, the later of (i) the first date on which the administrator of the relevant component or Benchmark or someone on its behalf, or any regulatory supervisor for the administrator of such component or Benchmark, publicly states that it has determined that such component or Benchmark is no longer representative or is not being administered, constructed, calculated or published in compliance with the International Organization of Securities Commissions (IOSCO) Principles for Financial Benchmarks (“IOSCO Principles”), or (ii) the date that such administrator or any such regulatory supervisor publicly specifies in such public statement as the future date that such relevant component or Benchmark will no longer be representative, or will no longer be administered, constructed, calculated or published in compliance with the IOSCO Principles; provided, that such non-representativeness or non-compliance will be determined by reference to the most recent statement or publication referenced in such clause (c).

For the avoidance of doubt, the “Benchmark Replacement Date” will be deemed to have occurred (A) in the case of clause (a) or (b) with respect to any Benchmark upon the occurrence of the applicable event or events set forth therein with respect to all then-current Available Tenors of such components from which the Benchmark is derived (or the Benchmark itself as the case may be), and (B) in the case of clause (c), regardless of whether any Available Tenor of the relevant component from which such Benchmark is derived (or the Benchmark itself as the case may be) continues to be provided after

the relevant statement or publication, or will continue to be provided after the date that such administrator or any such regulatory supervisor publicly specifies as the future date that such component or Benchmark will no longer be representative, or will no longer be administered, constructed, calculated or published in compliance with the IOSCO Principles.

“Benchmark Transition Event” means the occurrence of one or more of the following events with respect to the then-current Benchmark:

(a) a public statement or publication of information by or on behalf of either of the administrators for the components from which the Benchmark is derived (or the Benchmark itself as the case may be) announcing that such administrator has ceased or will cease to provide all Available Tenors of a component from which such Benchmark is derived (or the Benchmark itself as the case may be), permanently or indefinitely, provided that, at the time of such statement or publication, there is no successor administrator that will continue to provide any Available Tenor of such component or Benchmark;

(b) a public statement or publication of information by any regulatory supervisor for either of the administrators for the components from which the Benchmark is derived (or the Benchmark itself as the case may be), the Federal Reserve Board, the Federal Reserve Bank of New York (“FRBNY”), the Office of the Comptroller of the Currency (the “OCC”), the Federal Deposit Insurance Corporation (the “FDIC”), an insolvency official, resolution authority, court or entity with jurisdiction or similar insolvency or resolution authority over the administrator for the relevant published component of the Benchmark (or the Benchmark itself as the case may be), which states that the relevant administrator has ceased or will cease to provide all Available Tenors of a relevant component from which the Benchmark is derived (or the Benchmark itself as the case may be) permanently or indefinitely, provided that, at the time of such statement or publication, there is no successor administrator that will continue to provide any Available Tenor of such relevant component or Benchmark; or

(c) a public statement or publication of information by or on behalf of the administrator of a component from which the Benchmark is derived (or the Benchmark itself as the case may be), the Federal Reserve Board, the FRBNY, the OCC, the FDIC, or any regulatory supervisor for the administrator of a relevant component of the Benchmark (or the Benchmark itself as the case may be), announcing that all Available Tenors of such component or Benchmark are no longer, or as of a specified future date will no longer be, representative, or are not, or as of a specified future date will not be, administered, constructed, calculated or published in compliance with the IOSCO Principles.

For the avoidance of doubt, a “Benchmark Transition Event” will be deemed to have occurred with respect to any Benchmark if a public statement or publication of information set forth above has occurred with respect to each then-current Available Tenor of the relevant component of the Benchmark (or the Benchmark itself as the case may be). In the event that such a public statement or publication of information otherwise described in clause (c) of this definition implicates fewer than all of the then-current Available Tenors of the relevant component of the Benchmark (or the Benchmark itself as the case may be), then any affected tenors shall be treated in accordance with Section 2.20(d) entitled “Unavailability of Tenor of Benchmark”.

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