

Forum on Ongoing Innovation in Reference Rates for Commercial Lending
Meeting Attendees
November 18, 2020

Forum Attendees

Christopher Giancarlo (American Financial Exchange)	Derek Meyer (Huntington Bank)
Richard Sandor (American Financial Exchange)	Ed Chidsey (IHS Markit)
Tom Hunt (Association for Financial Professionals)	Tasha Gonska (IHS Markit)
Antje Berndt (Australian National University)	Dan Huscher (IHS Markit)
John Carpenter (Bank of America)	Julien Rey (IHS Markit)
Ashish Kumbhat (Bank of America)	Amanda Adams (ICE Benchmark Administration)
Sharon Hamilton (BBVA)	Tim Bowler (ICE Benchmark Administration)
Chris Marshall (BBVA)	Paul Rhodes (ICE Benchmark Administration)
Bruno Dupire (Bloomberg)	Tony Bulic (KeyBank)
Amine El Khanjar (Bloomberg)	Jay Luzar (KeyBank)
Umesh Gajria (Bloomberg)	John Marynowski (M&T Bank)
Harry Lipman (Bloomberg)	Scott Warman (M&T Bank)
David Mullen (Bloomberg)	Matt Engstrom (MUFG)
William Troost (Bloomberg)	Tom Deas (National Association of Corporate Treasurers)
James Nelson (Blue Cross Blue Shield of Minnesota)	Kieran Fallon (PNC Financial Services Group)
Tom Feil (Capital One)	Randall King (PNC Financial Services Group)
Jeff Kuzbel (Capital One)	Gagan Singh (PNC Financial Services Group)
Greg Yuhas (Capital One)	Tom Speir (Regions Financial Corporation)
Raleigh Noland (Caterpillar)	Tyler Zinder (Regions Financial Corporation)
Michael Soccio (Citizens Financial Group)	Peter Quinlan (Signature Bank)
Ana Volpi (Citizens Financial Group)	Brian Yono (Soave Enterprises)
Jillian Chuck (Comerica)	April Eaton (South State Bank)
Stasie Kostova (Comerica)	Darrell Duffie (Stanford University)
Riley Saunders (Fifth Third Bank)	Tom Baxter (Sullivan & Cromwell)
Hilary Gevondyan (First Republic Bank)	Rodgin Cohen (Sullivan & Cromwell)
Axel Petrov (First Republic Bank)	Cori Krebs (US Bank)
Jason Behnke (Ford Motor Company)	Joe Tessmer (US Bank)
Mark Brell (Frost Bank)	Spencer Langston (Wells Fargo)
Mike Abarca (Huntington Bank)	Akhil Salgia (Wells Fargo)

Ex-Officio Attendees

Darren Gersh (Board of Governors of the Federal Reserve System)	Jamie Pfeifer (Federal Reserve Bank of New York)
Evan Winerman (Board of Governors of the Federal Reserve System)	Will Riordan (Federal Reserve Bank of New York)
Sayee Srinivasan (Commodity Futures Trading Commission)	Monica Scheid (Federal Reserve Bank of New York)
Irina Leonova (Federal Deposit Insurance Corporation)	Nate Wuerffel (Federal Reserve Bank of New York)
Alex LePore (Federal Deposit Insurance Corporation)	Jay Gallagher (Office of the Comptroller of the Currency)
Pablo Azar (Federal Reserve Bank of New York)	Christopher McBride (Office of the Comptroller of the Currency)
Betsy Bourassa (Federal Reserve Bank of New York)	John McGrail (U.S. Department of the Treasury)
Ray Check (Federal Reserve Bank of New York)	Peter Phelan (U.S. Department of the Treasury)
Marco Cipriani (Federal Reserve Bank of New York)	David Metzman (U.S. Securities and Exchange Commission)
Cam Fuller (Federal Reserve Bank of New York)	Kay Smith (U.S. Securities and Exchange Commission)
Eric LeSueur (Federal Reserve Bank of New York)	

November 18, 2020

Forum on Ongoing Innovation in Reference Rates for Commercial Lending

The views here are of the presenter and do not necessarily represent those of the Federal Reserve Bank of New York or Federal Reserve System.

Introductions

Presenters

- American Financial Exchange
- Bloomberg
- ICE Benchmark Administration
- IHS Markit
- Professors Antje Berndt and Darrell Duffie

Banks

- Bank of America
- BBVA
- Capital One
- Citizens Financial Group
- Comerica
- Fifth Third Bank
- First Republic Bank
- Frost Bank
- Huntington Bank
- Key Bank
- M&T Bank
- MUFG
- PNC Financial Services Group
- Regions Financial Corporation
- Signature Bank
- South State Bank
- US Bank
- Wells Fargo
- Sullivan & Cromwell

Borrowers

- Association for Financial Professionals
- Blue Cross Blue Shield of Minnesota
- Caterpillar
- Ford Motor Company
- National Association of Corporate Treasurers
- Soave Enterprises

Official Sector

- Federal Reserve Bank of New York
- Board of Governors of the Federal Reserve System
- U.S. Department of the Treasury
- Office of the Comptroller of the Currency
- Federal Deposit Insurance Corporation
- U.S. Securities and Exchange Commission
- Commodity Futures Trading Commission

Agenda

- 1:00 – 1:15 pm: Welcome and Introductions; Purpose of Forum and Ground Rules
- 1:15 – 1:45 pm: IHS Markit
- 1:45 – 2:15 pm: Professors Antje Berndt and Darrell Duffie
- 2:15 – 2:45 pm: ICE Benchmark Administration
- 2:45 – 3:15 pm: Bloomberg
- 3:15 – 3:45 pm: American Financial Exchange
- 3:45 – 4:00 pm: Wrap Up and Closing Remarks

Purpose of the Forum

- The purpose of this Forum is to bring together a diverse set of banks and borrowers involved in prior Credit Sensitivity Group workshops, reference rate administrators, and other relevant parties to highlight areas of innovation underway in reference rates for commercial lending, particularly those with a credit-sensitive element.
- **This Forum is not intended to facilitate or result in a recommendation of any particular products, services, or approaches. Participation by the official sector participants does not constitute an endorsement or recommendation of any rate discussed.**
- **The materials presented today are solely the responsibility of the presenting organizations and the statements in those materials, including any data, have not been verified by the official sector participants in the Forum.**
- Opinions expressed or statements made by official sector staff during today's Forum are solely those of the individual and do not necessarily reflect the views of their agency.

Ground Rules for the Day

- A video recording of the entire event, including all presentation materials and a list of participants, will be made publicly available on the FRBNY website.
- Participants should not disclose any confidential or commercially sensitive information during today's Forum.
- The Forum is not intended, and should not be used, to facilitate any collective agreement or the adoption of any specific rate(s) or term(s) by participants.
- Participants should not make statements purporting to describe any conclusions of the Forum participants as a whole, or implying that the Forum constitutes an endorsement of any potential rate that may be discussed.

Antitrust Guidelines

- This Forum is intended to serve a public purpose and to be pro-competitive. However, participants must be mindful of their obligation to observe applicable antitrust laws.
- By participating, all participants are agreeing to observe the antitrust guidelines that have been provided in advance of the Forum.
- Those guidelines are intended to assist participants to ensure their conduct is consistent with law, but each participant is individually responsible for his or her own conduct.
- Participants should police themselves, and should raise questions about and report suspected violations of the Antitrust Guidelines to an FRBNY attorney or an attorney for their respective firms. Anonymous reporting is also available using the FRBNY's Integrity Hotline: (877) 52-FRBNY.



IHS Markit™

IHS Markit USD Credit Spread Adjustment

Forum on ongoing innovation in reference rates for commercial lending

November 2020

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Agenda

1. IHS Markit Overview and Relevant Capabilities
2. Product Overview
3. Methodology
4. Historical Performance
5. IOSCO Principles for Financial Benchmarks
6. Expected Use
7. Questions

About Us

IHS Markit is a world leader in critical information, analytics and expertise to forge solutions for the major industries and markets that drive economies worldwide.

We enable our clients to improve efficiency and make better decisions through next-generation information, analytics and solutions.



Relevant Expertise

Unique data, index and technology capabilities coupled with a robust compliance framework

Data and Pricing

- Market leading credit and loan franchises.
- Over 23 million market data points gathered, reviewed and processed daily.
- More than 11mm valuations produced for OTC and cash positions per month, and more than 35,000 private asset valuations per year.

Technology

- Advanced custom-built technologies across asset classes enable us to ingest, organize and model data to create the highest-quality datasets and products.
- Robust business continuity processes and platform redundancies to ensure consistency and timeliness of outputs.

Indices

- Our fixed income pricing powers important fixed income and credit indices that serve as key market benchmarks, including the iBoxx index franchise, across US, Europe, Asia and emerging markets.
- More than USD175 billion+ in ETFs linked to iBoxx indices, and USD1.5 trillion+ OTC derivative notional traded monthly.

Benchmark Administration

- FCA authorized Benchmark Administrator under the European Benchmark Regulation.
- Established governance and oversight structure.
- Significant experience and expertise in the administration of both proprietary and 3rd party benchmarks across all asset classes.

Product Overview

The IHS Markit Credit Spread Adjustment is designed to be a broad-based measure of average marginal funding spreads for banking institutions funding in U.S. Dollars, in institutional markets, on a senior unsecured basis.

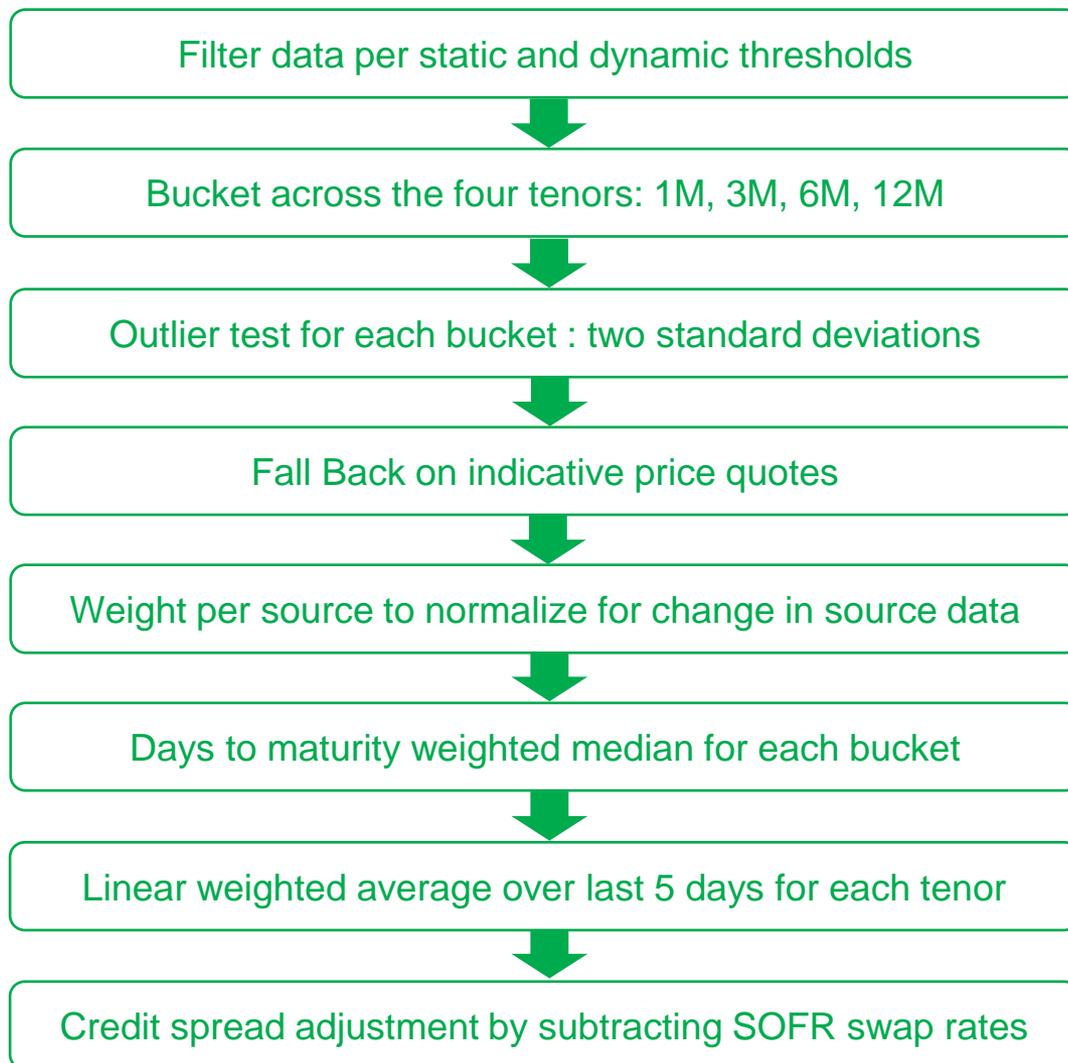
Thus, allowing for the adjustment of “secured” reference rates to include a credit risk component.

Inputs.....	Certificate of deposit, commercial paper, corporate bond transactions & indicative price quotes
Filtering.....	Institution type, transaction size, coupon range, issuance size, days to maturity and various bond types/characteristics
Methodology....	Bucketing and Median
Thresholds.....	Transaction count thresholds
Data cleaning....	Bucket level outlier testing
Fallback.....	Indicative price quotes
Limits.....	Issuer caps
Currency.....	U.S. Dollar
Tenors.....	1M, 3M, 6M, 12M
Frequency.....	Daily
Publish time....	8 a.m. Eastern

Process Overview

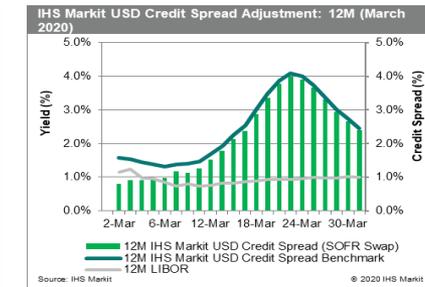
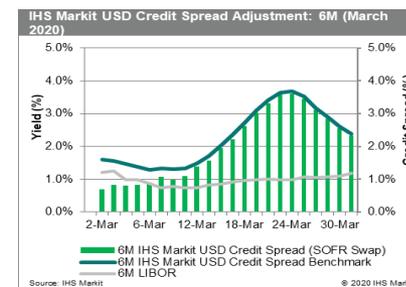
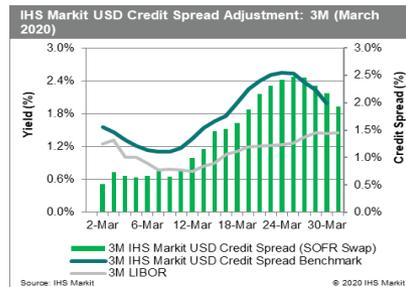
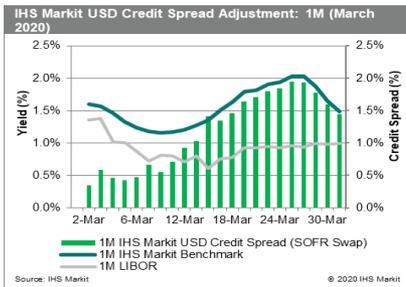
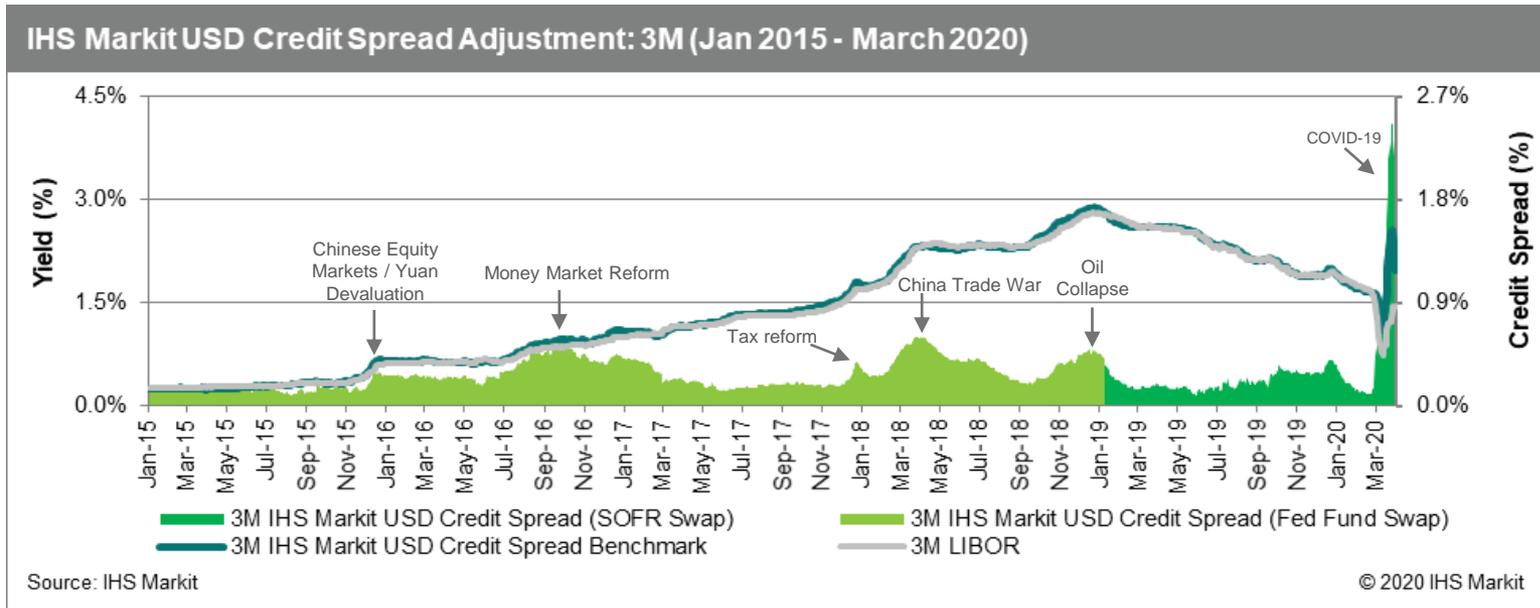
Data filtering thresholds have been chosen to ensure appropriate benchmarks during the entire 5-year test period including stressed market conditions in March 2020.

Multiple curve fitting algorithms have been tested, and after considering various aspects of a sound and stable methodology, particularly: simplicity, transparency, accuracy, and consistency we narrowed in on a median approach.



Historical Performance

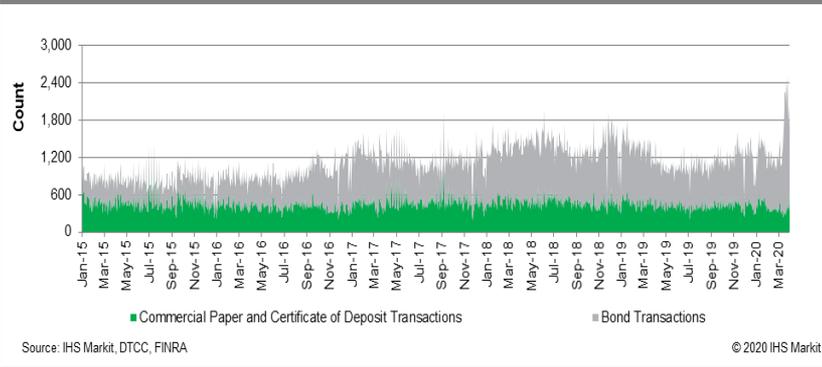
5 year historical performance



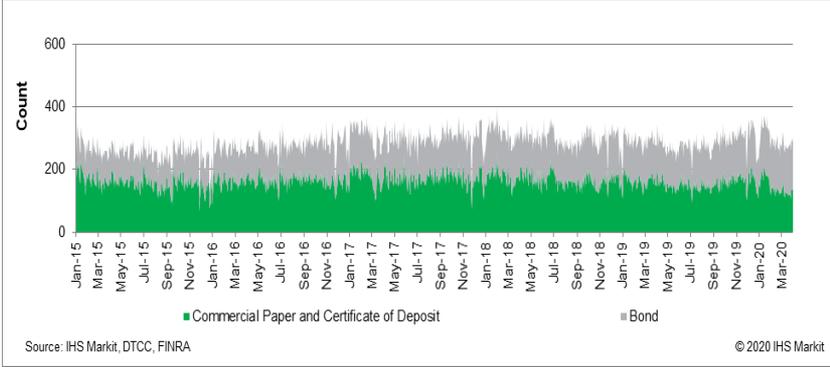
Historical Performance

5 year eligible transaction counts, indicative price counts and trade volume

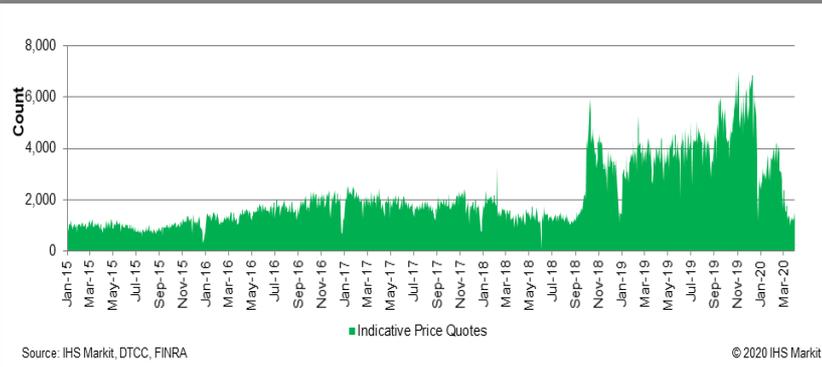
Eligible Transaction Count per Day (Jan 2015 - March 2020)



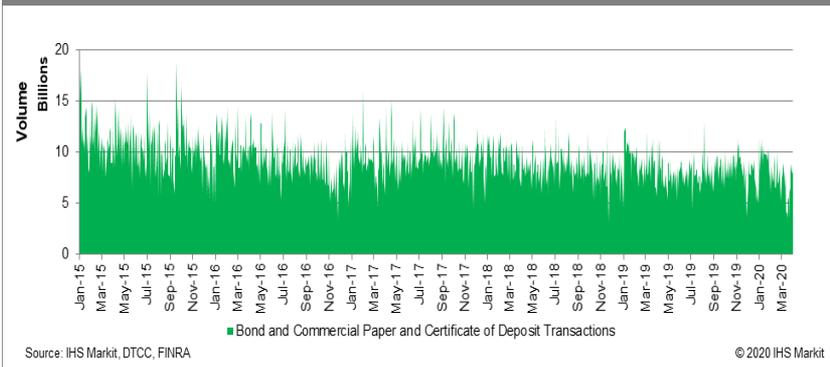
Eligible Bond Count per Day (Jan 2015 - March 2020)



Eligible Indicative Price Quote Count per Day (Jan 2015 - March 2020)



Total Trade Volume per Day (Jan 2015 - March 2020)



IOSCO Principles for Financial Benchmarks

All IHS Markit benchmarks are administered in accordance with IOSCO principles

IOSCO Principles Compliance

The Principles represent a set of practices that should be implemented by Benchmark Administrators and Submitters, including benchmark governance, quality, and accountability mechanisms.

IHS Markit operates in accordance with those principles across all indices administered. The USD Credit Spread Adjustment benchmark will be no exception.

In addition to IOSCO Principles, IHS Markit also complies with BMR rules to its index franchise.

EU Benchmark Regulation (BMR)

- IMBA UK (IHS Markit Benchmark Administration Ltd., FCA authorized since 07/2018).
- IMBA EU (Markit N.V., AFM authorized since 11/2019).
- Continuity in referencing iBoxx indices and other IHS Markit indices under BMR.
- IHS Markit is an early adopter committed to apply BMR protocols ahead of the transition period ending in 2020.
- IHS Markit is recorded on the ESMA Register of Benchmark Administrators.

Expected Use

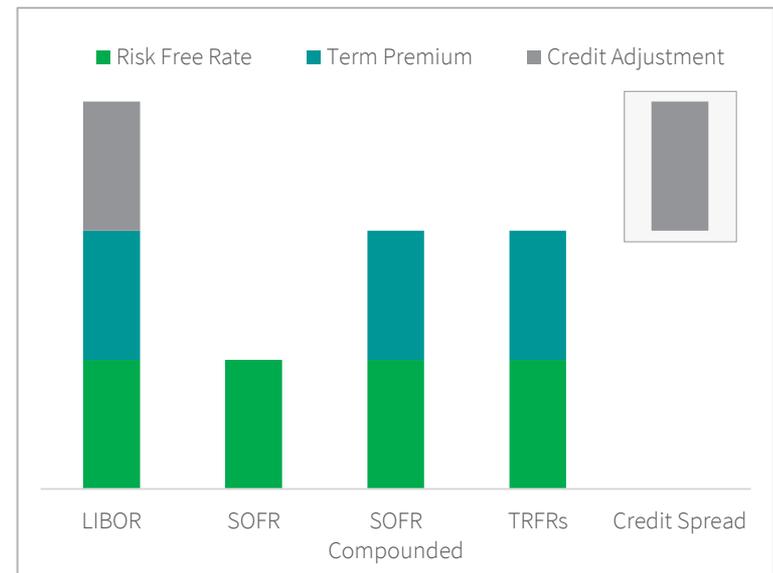
A dynamic credit sensitive benchmark for the institutional markets

A Dynamic Credit Sensitive Benchmark

- Provides exposure to funding spreads for banking institutions funding in U.S. Dollars, in institutional markets, on a senior unsecured basis.
- Ensures banks are compensated, via higher lending rates at times when bank costs of funding rise, to protect interest margins.
- Updated daily and reflective of market conditions for the standard 1M, 3M, 6M and 12M tenors.

Expected Use Cases

- Minimizing value transfer on legacy USD LIBOR positions at LIBOR cessation date, as an add-on to SOFR and an alternative to more static fallback rates.
- In new loan issuances, combined with SOFR compounded, averaged or term SOFR, as well as other benchmarks lacking a dynamic credit component.
- Does not impede the adoption of SOFR as the benchmark recommended by the ARRC Committee as a replacement for USD LIBOR.



Questions & Comments

Thank you for your time and input.



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IHS Markit™

Across-the-Curve Credit Spread Benchmarks

Antje Berndt Darrell Duffie Yichao Zhu
ANU Stanford ANU

Forum on Ongoing Innovation in Reference Rates for Commercial Lending
Federal Reserve Bank of New York

November 2020

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Credit spread benchmark: Across the curve

1. A credit spread benchmark should be robust, representative, and flexible to changes in bank funding patterns.
2. A successful credit spread benchmark is likely to underly substantial derivatives trade.
3. These criteria suggest combining a broad set of transactions from across the maturity curve.
4. Using TRACE and other data, we first estimate average wholesale unsecured funding spreads within each maturity bucket out to 5 years, and then average across maturity buckets by issuance.
5. The composition of unsecured issuance volumes across maturities changes substantially over time.

An average of short term and long term spreads

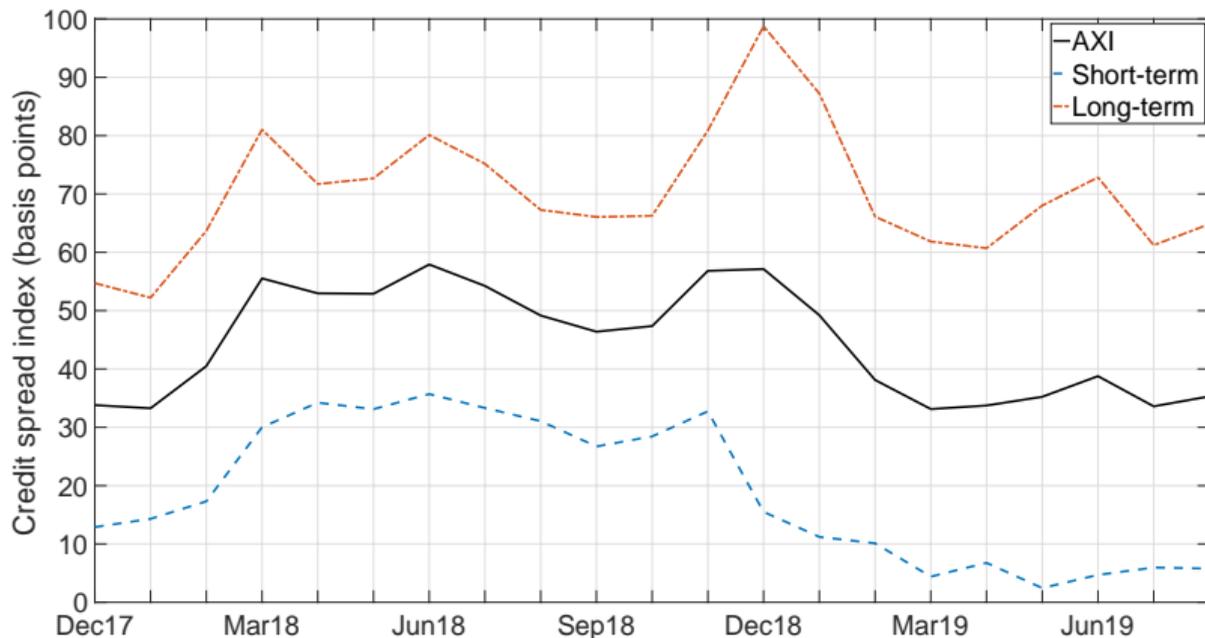


Figure: The black line is a roughly estimated across-the-curve credit spread index (AXI), constructed as the simple average of (a) weighted average long-term spreads (1-5 year bond spreads, TRACE data) and (b) weighted average short-term spreads, using data from ICE Benchmark Administration on wholesale deposits, CP, and CD primary issuances of a panel of 14 banks, restricted to issuances over \$10 million and maturities under 250 days. Short-term spreads are weighted by average issuance and a rough estimate of average maturity.

AXI, rescaled to average 3-month LIBOR-SOFR, 2014-2019

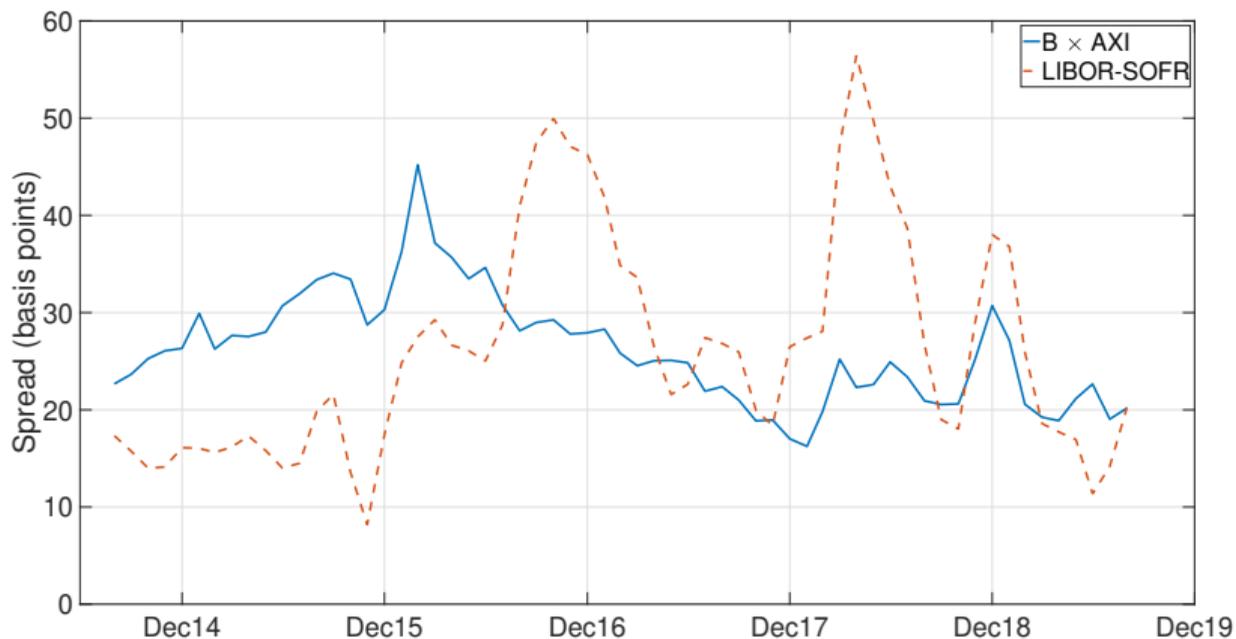


Figure: In red, the spread of 3-month LIBOR over 3-month SOFR, compounded in arrears. In blue, AXI scaled by $B_{3\text{mo}} = 26/84$, which is the ratio of the mean of LIBOR-SOFR over the indicated sample period (26 bps) to the mean of AXI over the same sample period (84 bps). Bank loans or floating-rate notes linked to AXI would have floating interest payments every n months of the contractual form

$$R = \text{SOFR}_n + B_n \times \text{AXI} + \text{borrower fixed spread}$$

Across-the-curve credit spread index (AXI) construction

- ▶ AXI is designed to measure the recent cost of U.S. dollar wholesale unsecured debt funding for publicly listed U.S. BHCs and commercial banks:

$$AXI = \sum_m q_m s_m,$$

where, for each maturity bucket m ,

- ▶ s_m : volume-wgtd median credit spread across secondary mkt trades in trailing month
 - ▶ q_m : fraction in maturity bucket m of the total issuance in the previous year
- ▶ For maturities of one year or longer, included instruments are senior unsecured corporate debentures, MTNs, or MTZs. To achieve a level of homogeneity, we exclude foreign currency, private placement, convertible, exchangeable, perpetual, unit deal, defaulted, Rule 144a, putable, Yankee, or Canadian bonds.
 - ▶ For money-market maturities, such as 1 day, 1 month, 3 months, and 6 months, include issues such as CP, wholesale CDs, Eurodollar deposits, and federal funds borrowings of U.S. banks and BHCs, with trailing issuance amounts replaced for weighting purposes with current outstanding amounts, scaled as desired.

Monthly transaction volumes (1-5 year maturities)

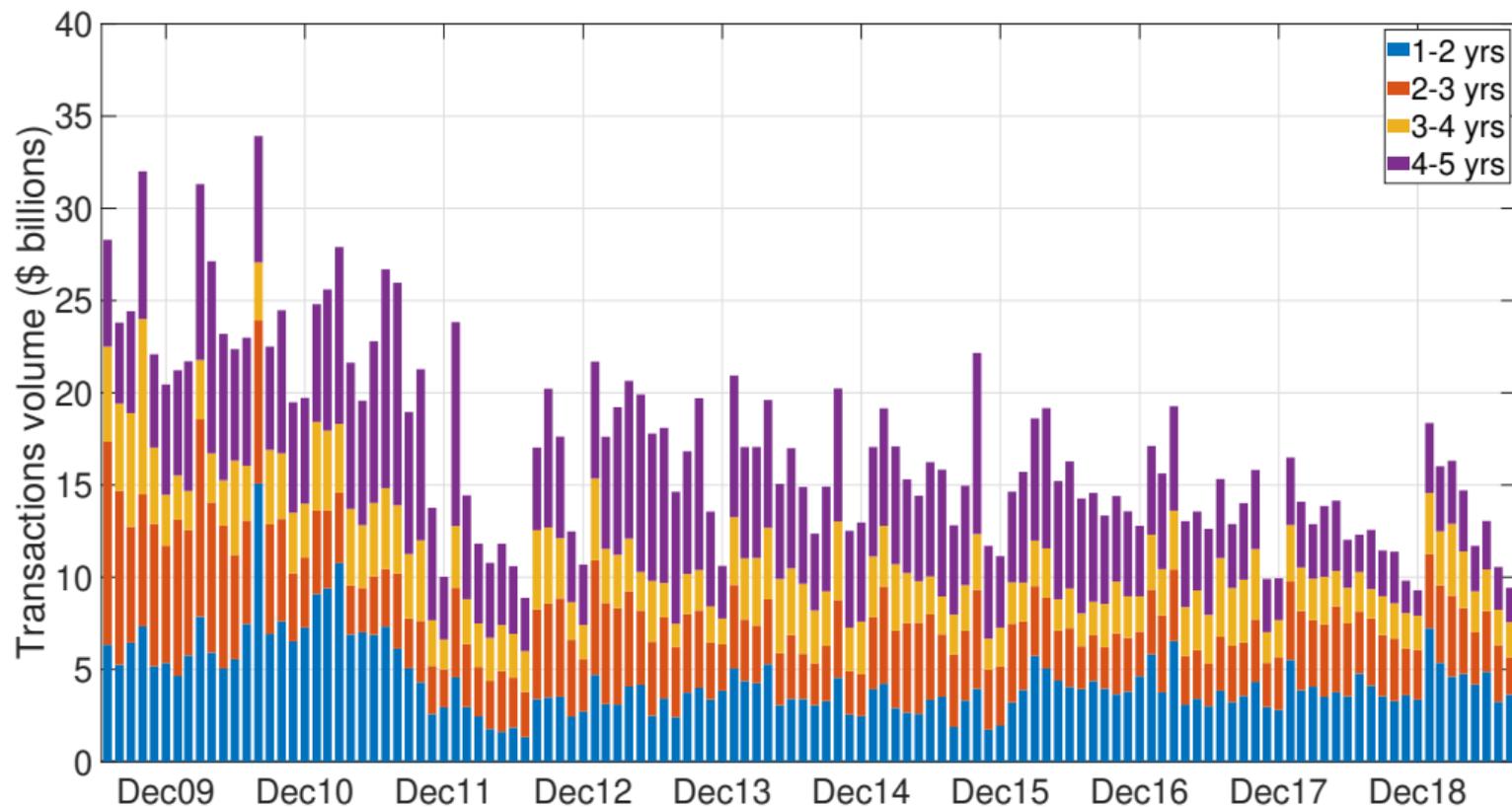


Figure: Transactions volumes by month and maturity range (TRACE, transactions above \$250K)

Spreads by maturity

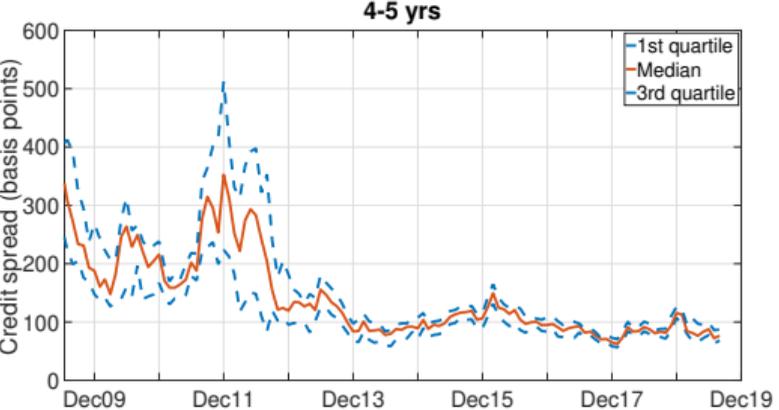
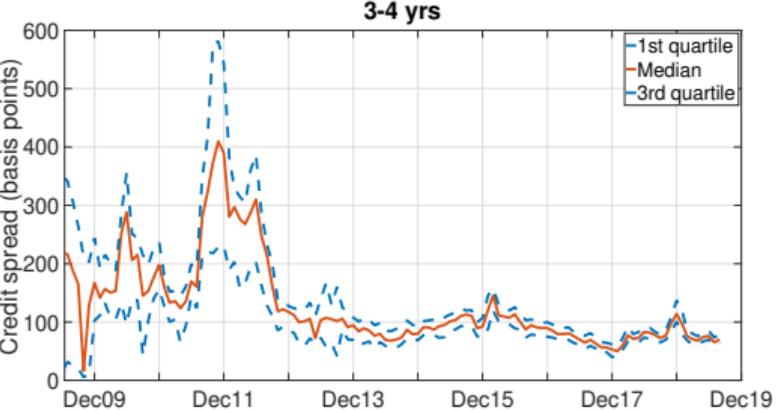
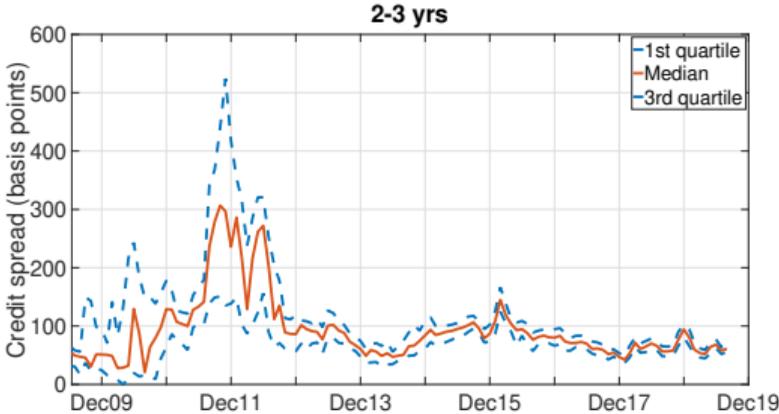
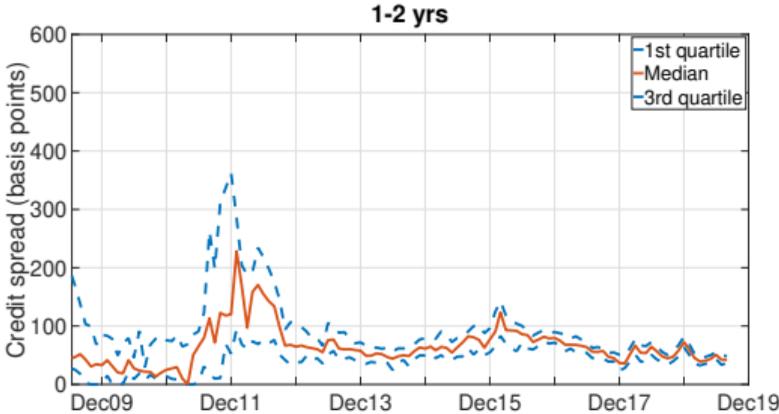


Figure: Transaction-volume-weighted credit spreads of U.S. banks and BHCs, by maturity range, and the associated interquartile range of spreads. Underlying data: TRACE, transactions above \$250K.

Trailing annual issuance

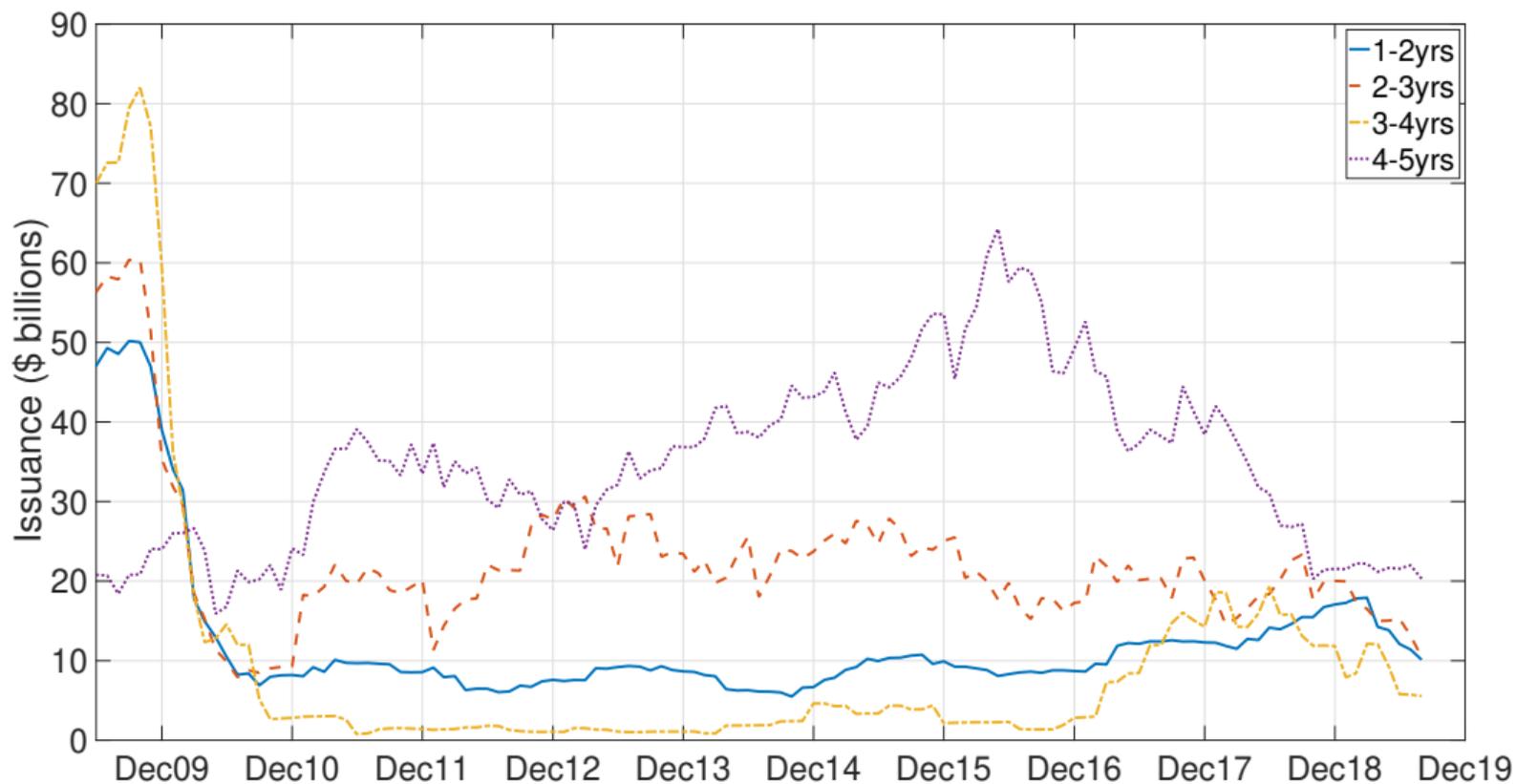


Figure: Trailing annual issuance (principal amt) in each maturity range. Underlying data: TRACE.

From AXI to FXI

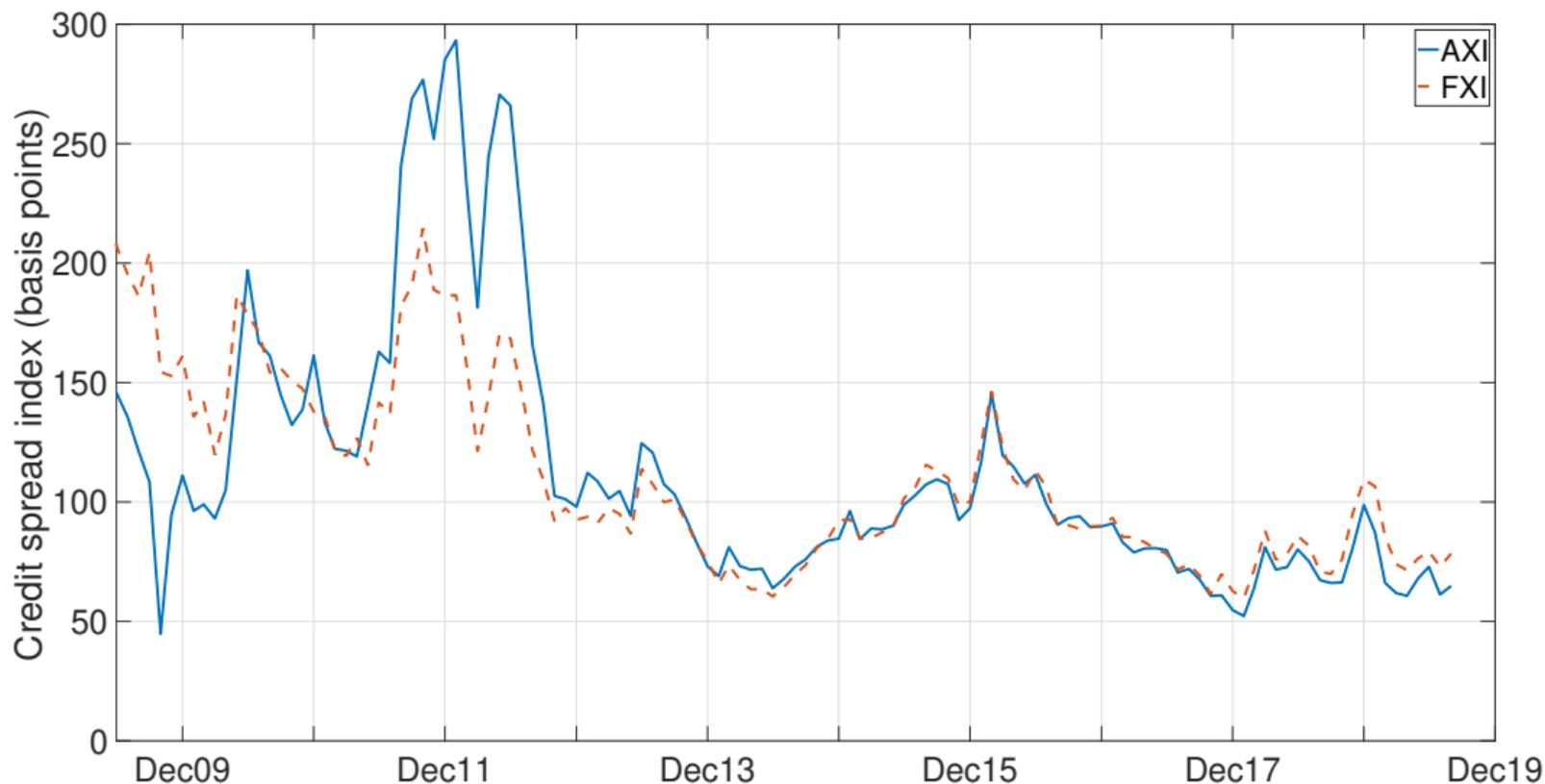


Figure: In addition to the long-term component of the AXI, the figure shows the analogous long-term component of the **Financial Conditions Credit Spread Index (FXI)** that includes all corporate bonds.

Monthly transaction volumes by issuer type

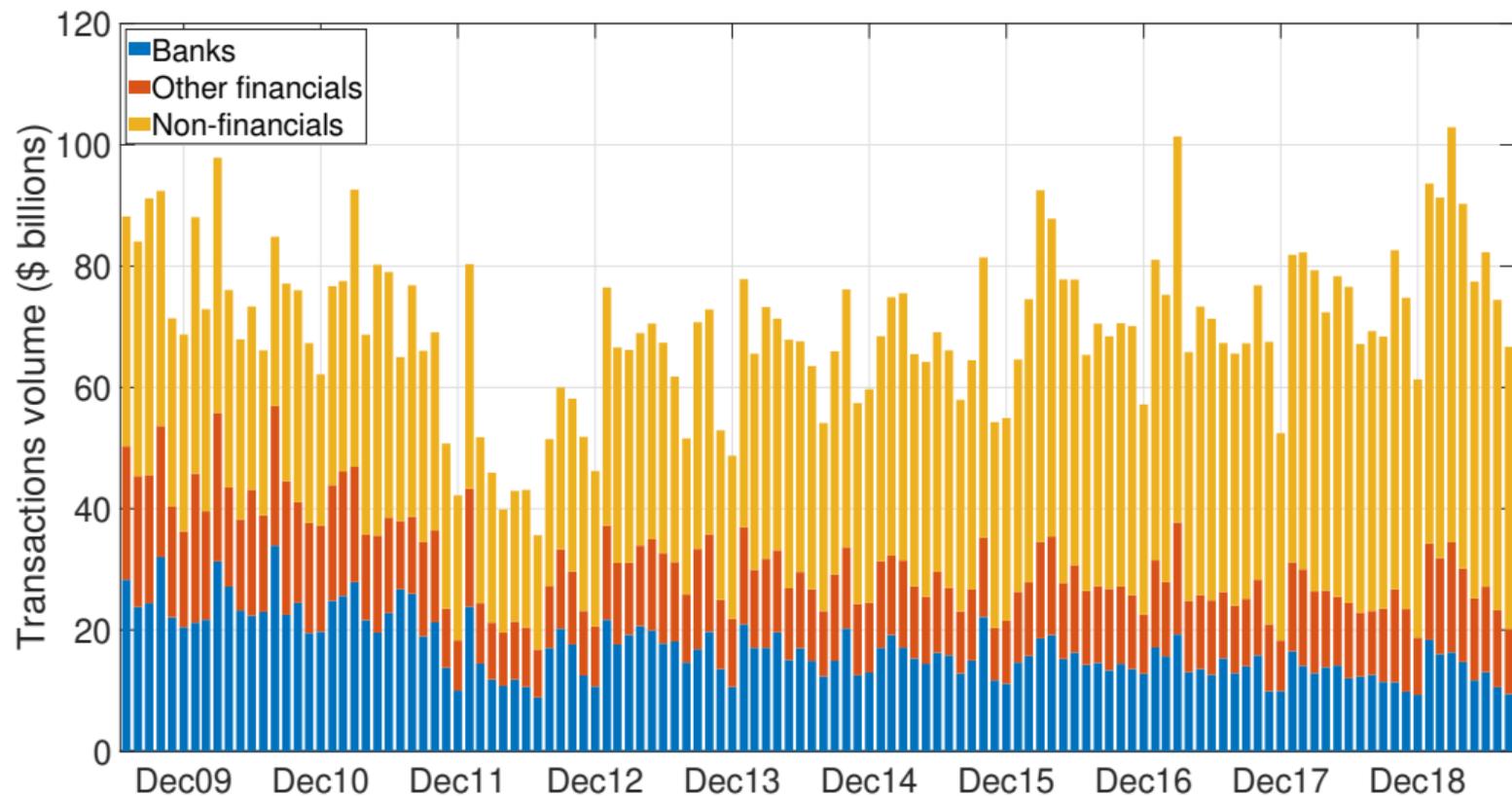


Figure: Transaction volumes by month for BHCs and commercial banks (Banks), other financials and non-financials. Underlying data: TRACE, transaction above \$250K.

Concluding remarks

- ▶ AXI is a measure of the recent cost of wholesale unsecured debt funding for publicly listed U.S. BHCs and their commercial 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
 - ▶ Secondary market transaction volumes, and
 - ▶ Primary market issuance volumes
- ▶ Data filters strike a balance between (i) basing spread index computations on a homogeneous set of bonds and (ii) retaining as many observations as possible.
- ▶ Incorporating transaction data for non-bank issuers scales up the dollar volume of covered transactions by a factor of nearly 5. The resulting FXI spreads are highly correlated with AXI spreads, especially over the past few years.



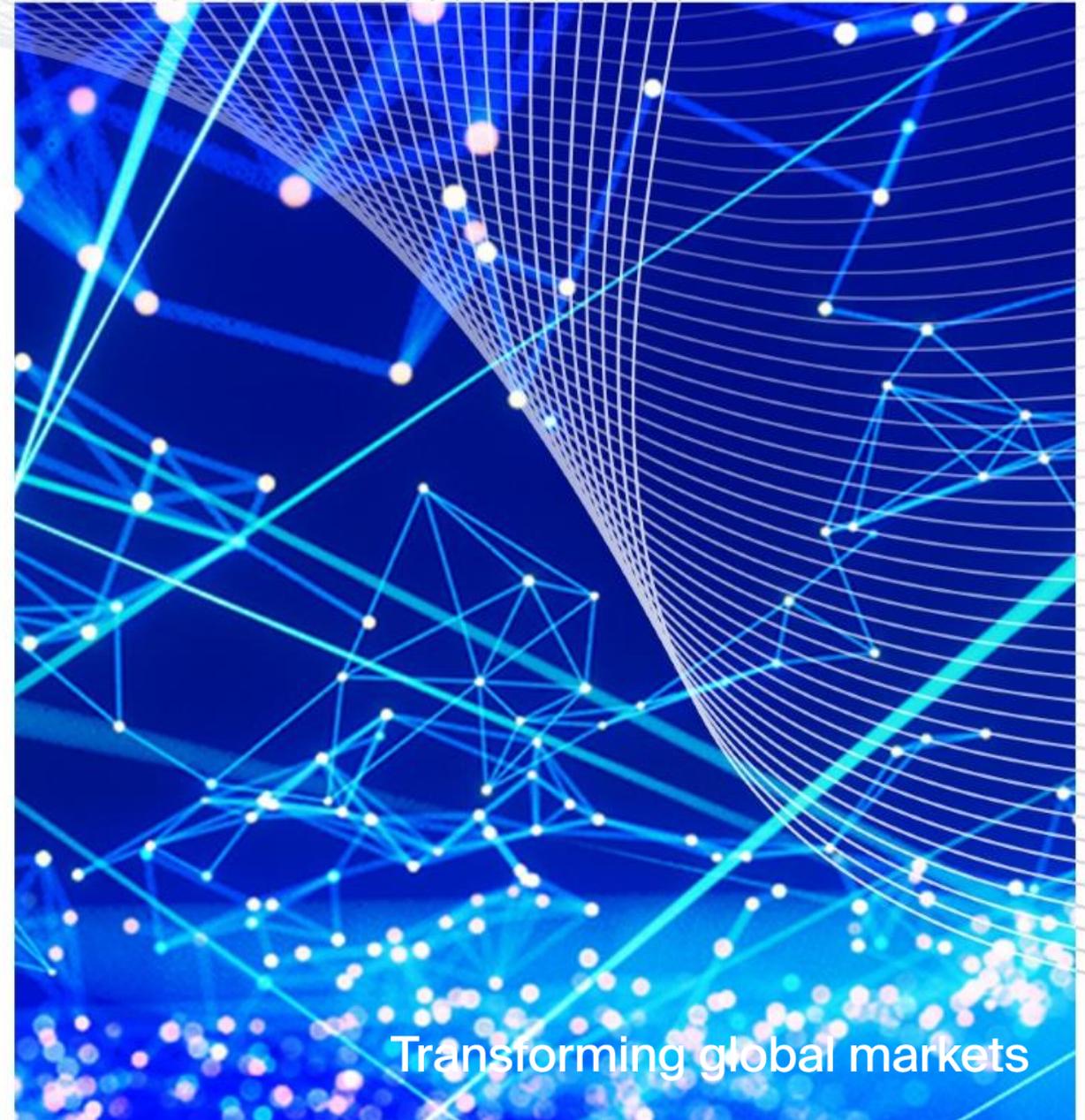
Constructing a Credit Sensitive Supplement to SOFR – The Bank Yield Index

ICE Benchmark Administration

Timothy J. Bowler, President

November 2020

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Transforming global markets

Agenda

- Background
- Transaction based data sets available to build a supplement to SOFR
- Data set IBA has used in developing a potential supplement to SOFR
- Producing a supplement to SOFR – Yield based
- Producing a supplement to SOFR – Spread based
- Meeting the IOSCO Principles
- Next steps for IBA

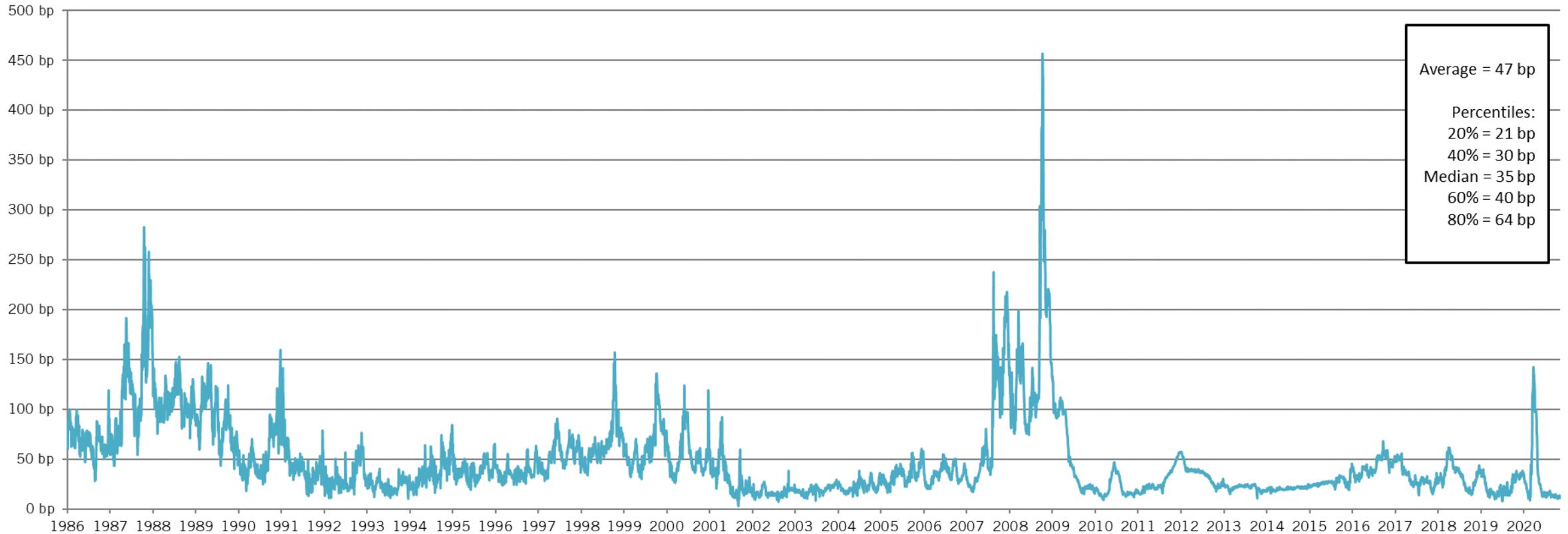
Background

- U.S. dollar LIBOR has been widely used in lending transactions over the past thirty years.
- Lenders and borrowers have generally expressed comfort in the economic premise behind U.S. dollar LIBOR, as the benchmark:
 - Allows lenders to extend credit based upon marginal unsecured bank funding cost; while
 - Facilitating competitive credit markets where the borrower does not need to take its specific lender's, or a small group of lenders', cost of funds risk.
- The transition to risk free rates has raised questions on the risks related to moving away from LIBOR to overnight rates and, in the case of U.S. dollars, a secured overnight rate for lending arrangements.
- For lenders these risks include a potential:
 - Divergence between realized marginal funding cost and the yields on overnight rates; and
 - Increased usage in undrawn liquidity facilities; particularly during a period of stress.
- For borrowers these risks include a potentially:
 - Less competitive lending market; and
 - Reduced access to undrawn lending facilities.

Rationale for a credit sensitive supplement to SOFR

Risk free rates (e.g. UST & SOFR) and marginal unsecured bank borrowing costs are different and can diverge

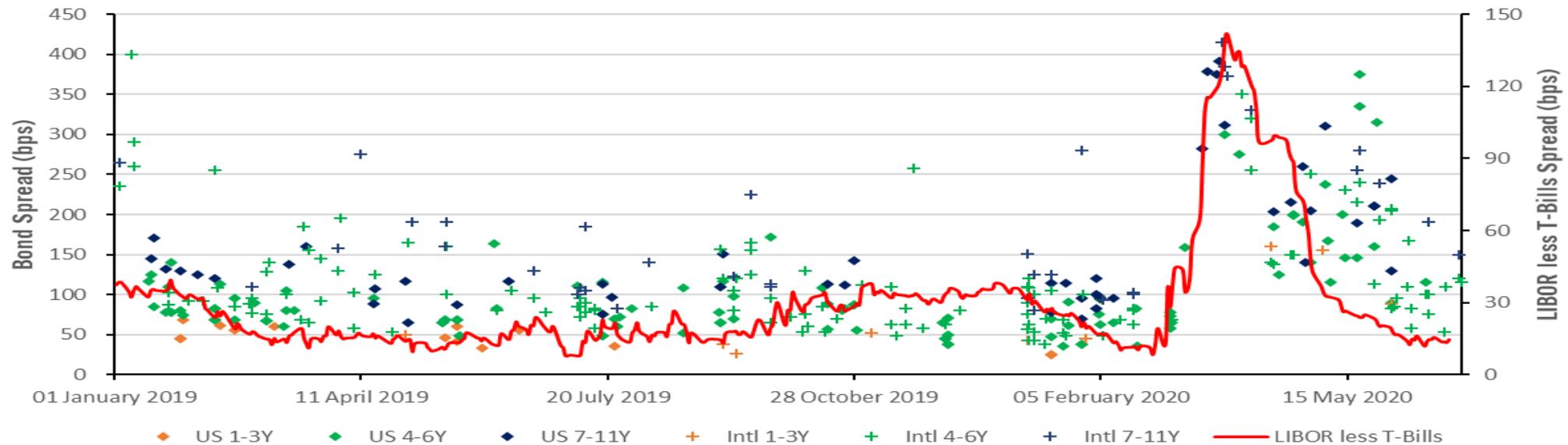
3 Month USD LIBOR - 3 Month Treasury Spread : Jan 02, 1986 to Nov 06, 2020



Rationale for a credit sensitive supplement to SOFR

Money market credit spreads are correlated with term debt spreads paid by banks for bond financing

Combined U.S. & International Banks New Issue Bond spreads to RFRs (UST & SOFR) compared to LIBOR less Treasury Bill Yields



- The chart above shows the new issue spreads to either U.S. Treasuries or SOFR paid by U.S. and International banks for new term unsecured U.S. dollar bonds (left hand axis) compared to the spread between 3M LIBOR and T-Bill yields (right hand axis)
- The chart demonstrates that these banks' marginal funding cost is correlated to risk premiums associated with LIBOR or other unsecured benchmarks that measure bank funding cost

Available transaction based data sets

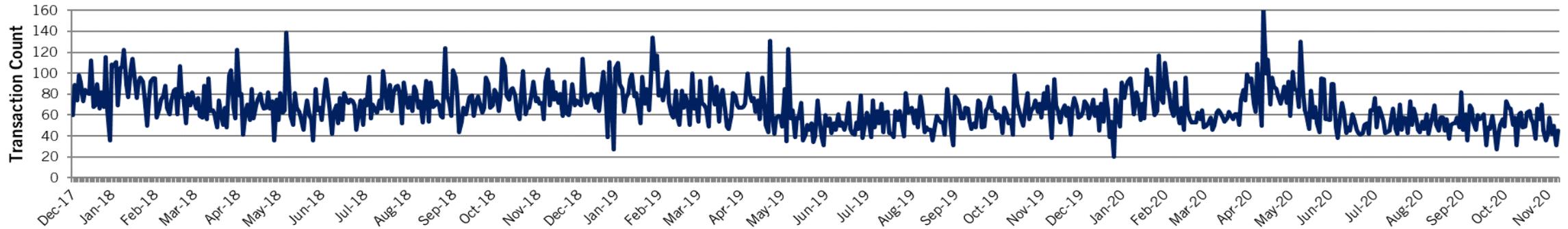
- Primary money market transactions in unsecured bank liabilities:
 - **Institutional Certificates of Deposit (CDs)**
 - **Commercial Paper (CP)**
 - **Wholesale unsecured deposits**
 - Short dated primary market issuance of unsecured bonds
- Secondary market transactions in unsecured bank liabilities:
 - **Unsecured bonds that have rolled down the yield curve**
 - Secondary transactions in CDs and CP
- Transactions in Credit Default Swaps (CDS)

*A subset of the data sets **in bold above** has been used by IBA to evaluate a potential supplement to SOFR through the creation of the Bank Yield Index*

Data set used by IBA to explore a potential supplement to SOFR

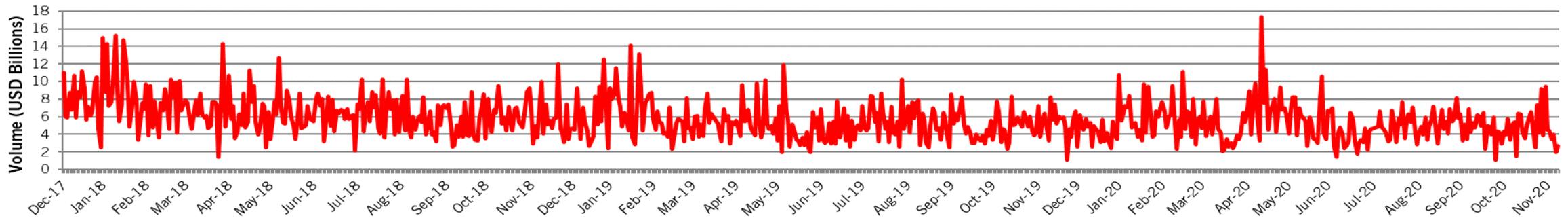
Review of daily data sourced to build the Bank Yield Index test rates since December 2017

USD Daily Count of Eligible Transactions : Funding and Bonds



Note – Funding transactions are primary unsecured money market borrowings \Rightarrow \$10MM in notional from fourteen global banks and the bond transactions are secondary money market trades in the unsecured debt of thirty internationally active banks that are \Rightarrow \$5MM in notional (block transactions)

USD Daily Volume of Eligible Funding Transactions : 14 Panel Banks



Data set used by IBA to explore a potential supplement to SOFR

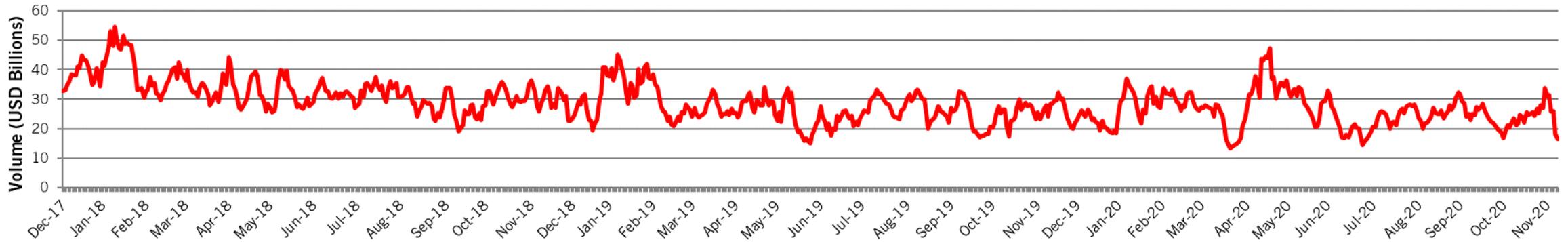
Rolling five day average of data sourced to build the Bank Yield Index test rates since December 2017

USD 5 Day Count of Eligible Transactions : Funding and Bonds



Note – Funding transactions are primary unsecured money market borrowings \Rightarrow \$10MM in notional from fourteen global banks and the bond transactions are secondary money market trades in the unsecured debt of thirty internationally active banks that are \Rightarrow \$5MM in notional (block transactions)

USD 5 Day Volume of Eligible Funding Transactions : 14 Panel Banks

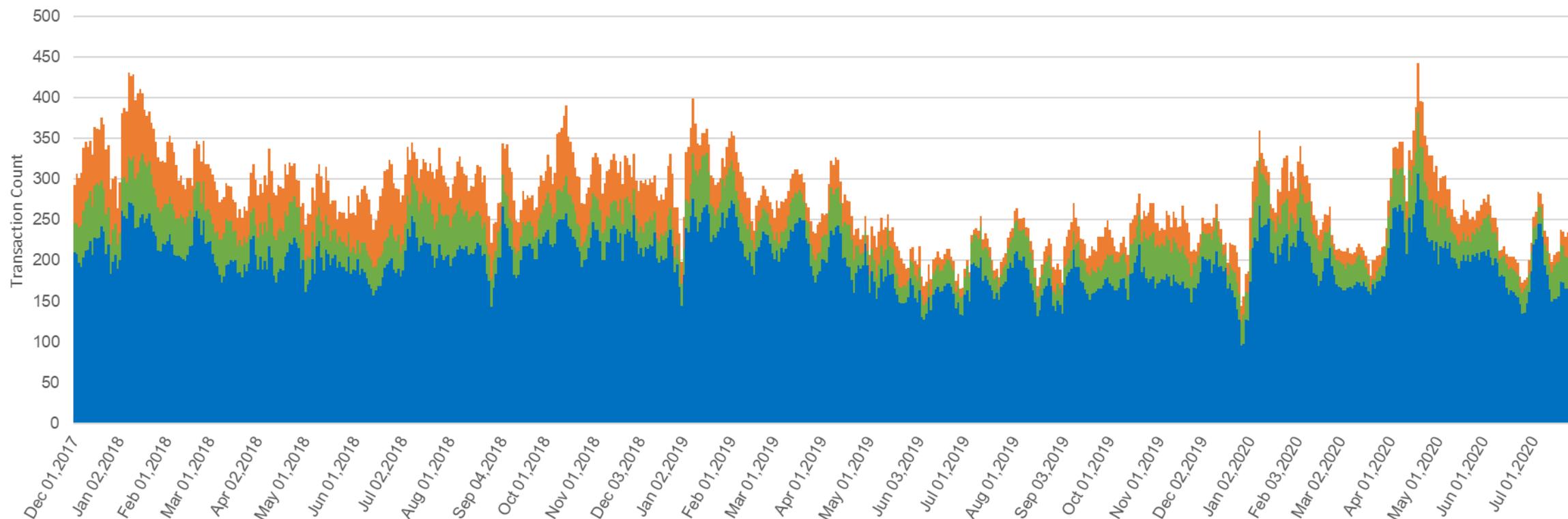


Data set used by IBA to explore a potential supplement to SOFR

Composition of funding data

USD 5-Day Count of Eligible Funding Transactions by Product : 14 Panel Banks

■ Unsecured deposits ■ Certificates of deposit (CD) ■ Commercial Paper (CP)



Building a supplement to SOFR – The Bank Yield Index

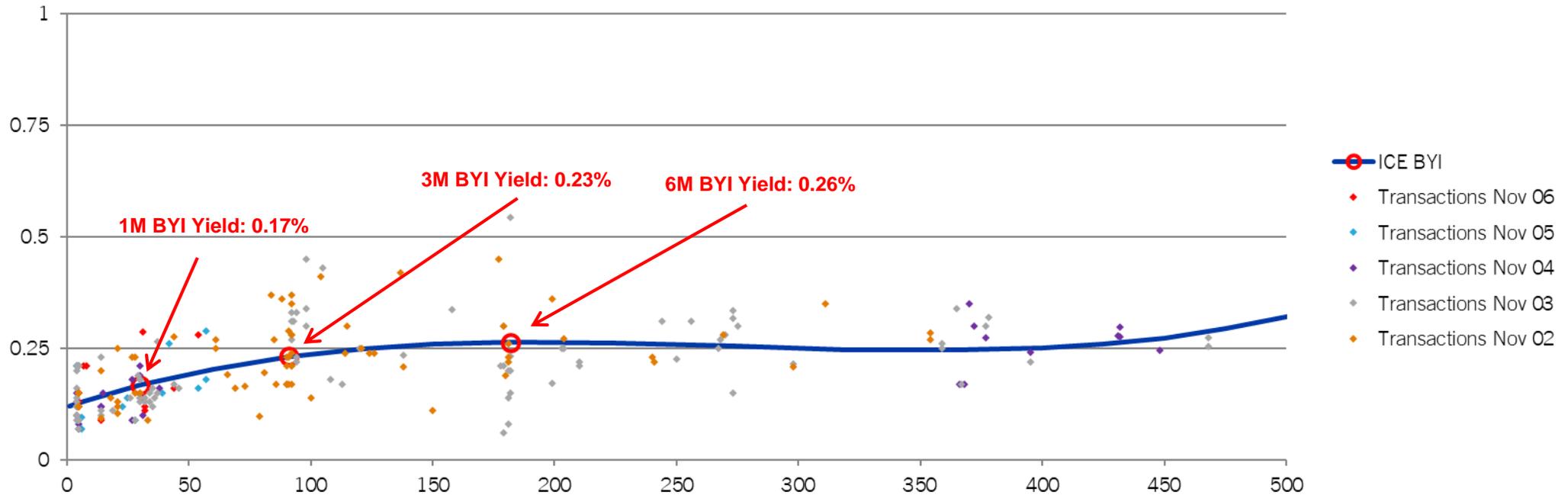
IBA collates bank funding transaction data (\$10MM or greater¹) and secondary market transaction data (\$5MM or greater¹), and calculates the Bank Yield Index. This involves:

1. Aggregation of eligible transactions over initial five day window; increasing the window if necessary to meet minimum aggregate trade count and volume thresholds (currently \$15B and 100 discrete transactions¹);
 - IBA chose a five day window to ensure a diverse and robust data set that reflects average bank yields
 - Minimum funding volumes and transaction counts are set to ensure a representative benchmark
2. Calculation of a fitted unsecured bank yield curve using a regression analysis across all eligible data points;
3. Review of transaction data points against fitted curve to identify extreme outliers for exclusion (currently any trades over 200bps above or below the curve are excluded), and the curve fitting is repeated using the remaining transactions; and
4. Determination of 1M, 3M and 6M Index rates from the fitted bank yield curve.

¹ IBA also uses minimum trade count thresholds for various maturity buckets across the yield curve. Further detail can be found on the IBA website here: https://www.theice.com/publicdocs/IBA_US_Dollar_ICE_Bank_Yield_Index_Fourth_Update.pdf

Bank Yield Index – Example calculation from Nov 6, 2020

USD ICE Bank Yield Index : Nov 06, 2020

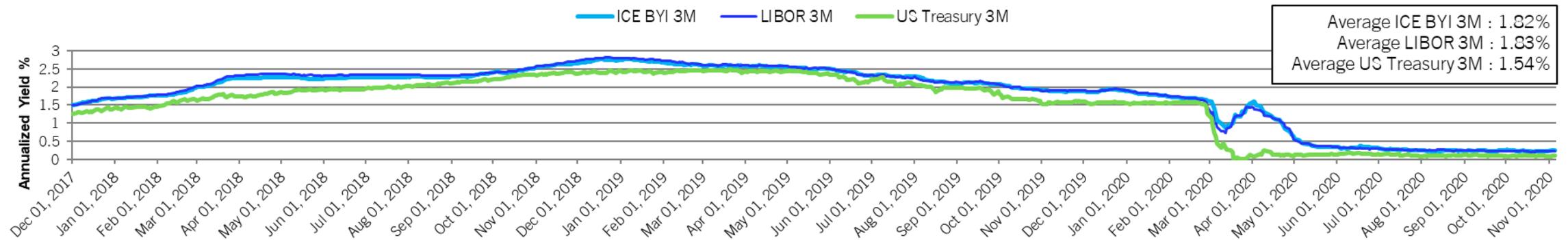


The dots in the chart are transaction data points sourced over 5 business days (Nov 2 to Nov 6) which are used to derive a best-fit bank yield curve. From this yield curve one-month, three-month and six-month points can be determined (red circles) and used as the Index settings.

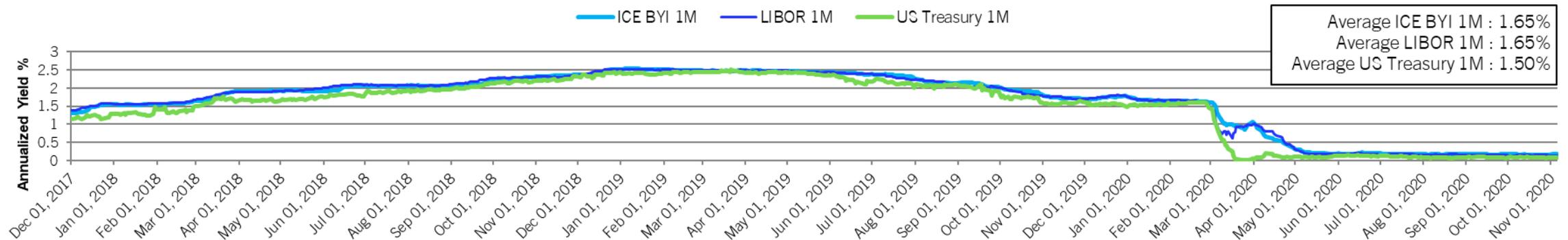
Bank Yield Index – Correlation with other indexes

Comparison of test results to U.S. dollar LIBOR and Treasury Yields

USD ICE Bank Yield Index comparisons : 3M



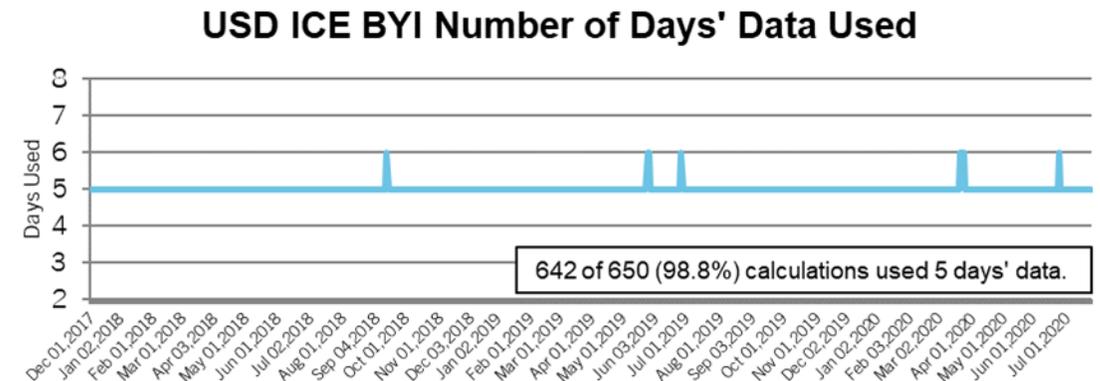
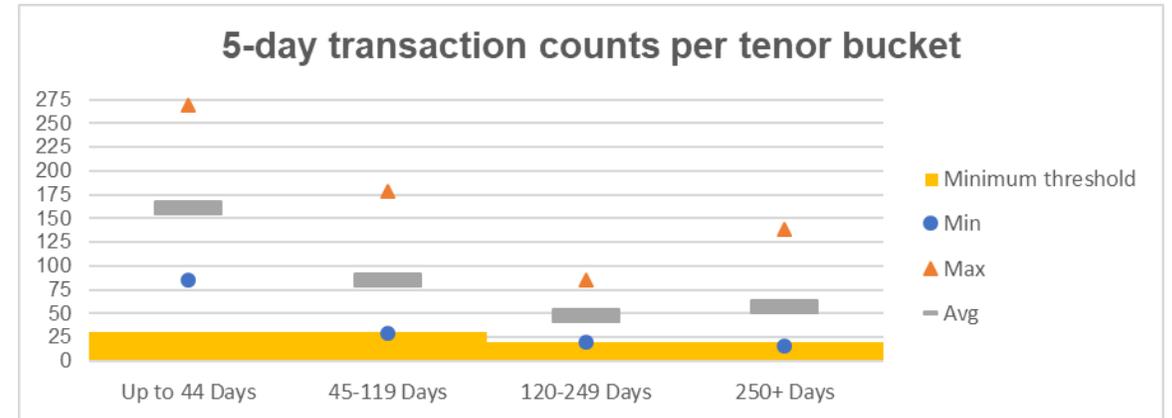
USD ICE Bank Yield Index comparisons : 1M



Test results are updated daily at <https://www.theice.com/iba/Bank-Yield-Index-Test-Rates>

Bank Yield Index – Calculation Contingencies

- The Bank Yield Index methodology leverages a rolling five days of input data in order to anchor the proposed benchmark in transactions.
- To ensure a representative and diverse set of transactional input is used, IBA sets minimum volume and transaction count thresholds:
 - Minimum total funding volume threshold: \$15B
 - Minimum transaction count across the money market curve: 100
 - Minimum transaction count by key tenor buckets:
 - 5 - 44 Days: 30
 - 45 – 119 Days: 30
 - 120 – 249 Days: 20
 - 250+ Days: 20
- If these thresholds are not met, IBA uses look back day(s) to add data (i.e. add one or more previous days' data) to meet the requirement.
- In three years of testing, 1.2% of calculations have extended to six days of input data. There has not been a need to add more than one day of “look-back” data.
- IBA is exploring an incremental contingency methodology that would incorporate third party valuations and associated yields on unsecured bank bonds in the event that transactional activity dries up for a prolonged period.

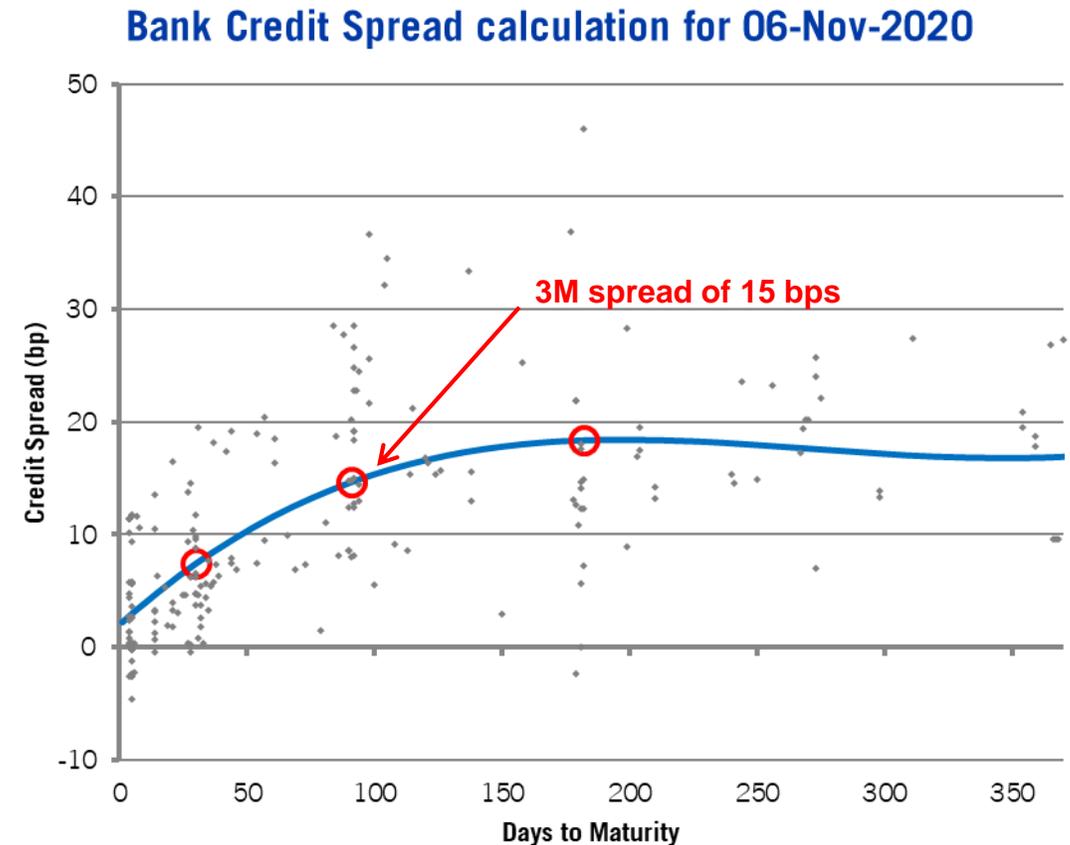


Bank Yield Index – Spread based supplement to SOFR

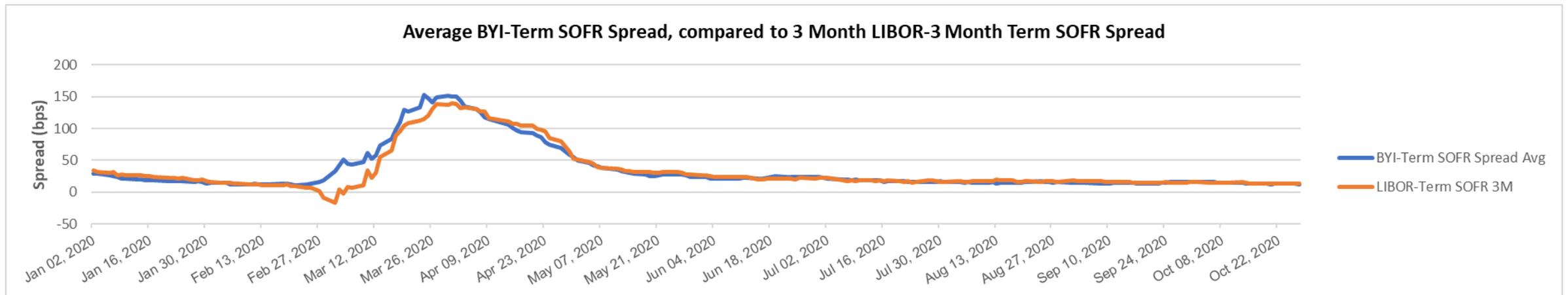
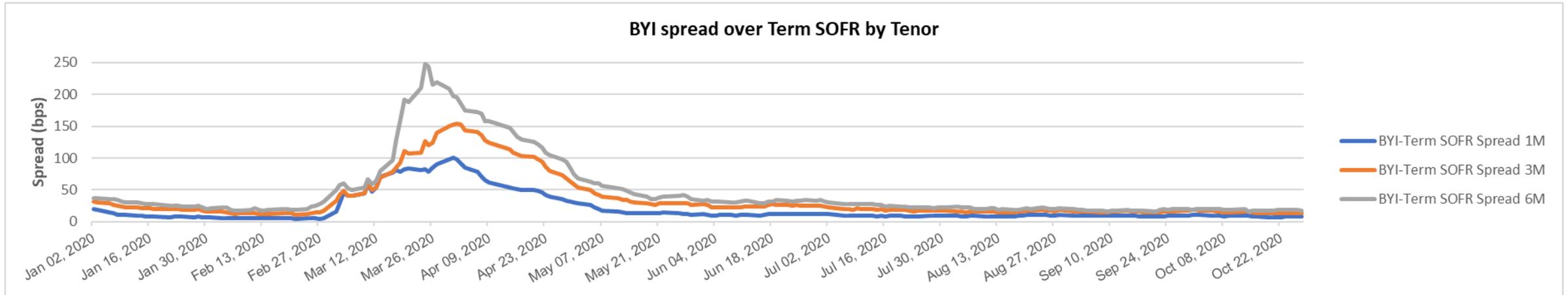
The Bank Yield Index can also be calculated as a spread to SOFR rates (SOFR+)

- Collate the transactions over a rolling collection window, as in the methodology.
- Determine a Transaction Credit Spread for each transaction by subtracting the contemporaneous risk free market rate (e.g. Term SOFR¹ for the same day) from the unsecured bank debt yields observed (i.e. determine the credit spread).
- Create a fitted credit spread curve to the data points. (Blue line on chart)
- Determine Bank Yield Credit Spreads from the fitted yield curve. (Red circles on the chart)
- Add the Credit Spreads to the current term risk free rate (e.g. Term SOFR today) to determine the Bank Yield Index.
- ***This realized spread to risk free rates can also be added to compounded and in arrears SOFR calculations.***

¹ Indicative implied forward-looking SOFR term rates produced by IBA for testing purposes



Bank Yield Index spreads to Term SOFR¹ Yields - 2020



¹ Indicative implied forward-looking SOFR term rates produced by IBA for testing purposes

Compliance with all 19 IOSCO Principles

The Index is designed to comply with all 19 of the IOSCO Principles for Financial Benchmarks across the 4 four broad categories

A. Governance

- Sole responsibility for all aspects of the benchmark determination by IBA
- Independent IBA Board
- Dedicated Oversight Committee to be established

B. Quality of the Benchmark

- Open and transparent methodology based on transactions; ***no exercise of expert judgement***
- Pre-publication verification and post-publication surveillance, and
- Operational contingency procedures are in place

IOSCO Principle categories:

A. Governance

B. Quality of the Benchmarks

C. Quality of the Methodologies

D. Accountability

Compliance with IOSCO Principles (continued)

The Index is designed to comply with all 19 of the IOSCO Principles for Financial Benchmarks across the 4 four broad categories

C. Quality of the Methodology

- Clear criteria for including and excluding unsecured bank transactional data
- Stringent arrangements to safeguard data integrity
- A Code of Conduct to be kept under review by the Oversight Committee, and
- Consultations will be used before any material changes to the methodology

D. Accountability

- Comprehensive control framework, policies and procedures
- Annual schedule of internal and external audits to assess the benchmark
- Open and co-operative liaison with market regulators and central banks

IOSCO Principle categories:

A. Governance

B. Quality of the Benchmarks

C. Quality of the Methodologies

D. Accountability

Bank Yield Index - Next Steps

1. Engage with stakeholders to seek advice on key aspects of the Bank Yield Index, including:
 - Input data used, including whether Bank Holding Company (BHC) level debt should be used and how to best create a nexus to SOFR rates;
 - Should both yield and spread settings be produced;
 - Should term settings be produced or just one average spread across the money market curve;
 - Time period used to calculate the rates (i.e. is the rolling 5-day window appropriate or should a shorter or longer window be used).
2. Update the Bank Yield Index methodology based upon feedback received from stakeholders.
3. Obtain commitments from banks (LIBOR Panel Banks and non LIBOR Panel banks over time) to provide their funding data to IBA on a daily basis to build the Index.
4. Once steps 1-3 are complete, establish a U.S. domicile from which the Bank Yield Index would be produced on an on-going basis.

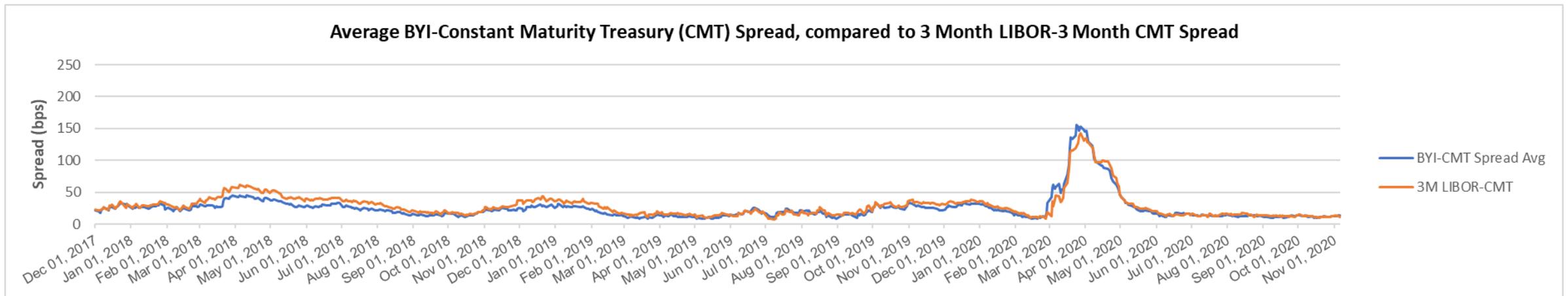
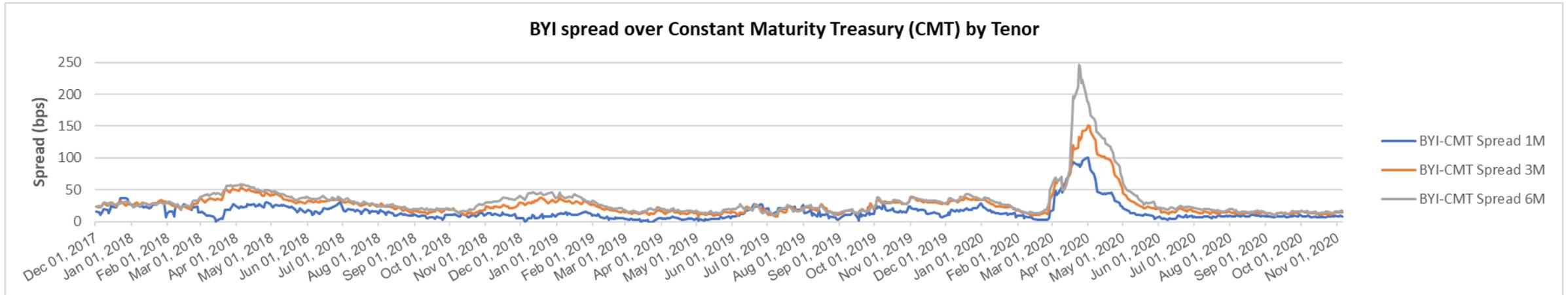
Bank Yield Index - Summary

- The transition to risk free rates from U.S. dollar LIBOR raises potential risks, including:
 - For lenders, a potential divergence between realized marginal funding cost and the yields on overnight rates, and of increased usage in undrawn liquidity facilities; and
 - For borrowers, potential for a less competitive lending market and reduced access to undrawn lending facilities.
- The Bank Yield Index is a forward-looking, credit and liquidity sensitive benchmark developed as a potential replacement for LIBOR for lending activity. It is compliant with the IOSCO Principles and the EU and UK BMR. It has been tested for three years.
- The Index settings (e.g. three months) are calculated using a fitted unsecured bank yield curve built on transaction based input data over a rolling five day window. The transaction based input data currently being used is:
 - Primary money market transactions of \$10MM or greater in unsecured bank liabilities; and
 - Secondary market transactions of \$5MM or greater in unsecured bank level bonds. (Note – IBA is asking for feedback from stakeholders if bank holding company (BHC) level debt should be used as well)
- The Index settings can be produced on a yield basis or a spread to implied term SOFR rates (SOFR+).
- IBA will launch the Index once it receives sufficient commitments from banks to provide their primary market funding data to IBA on an on-going basis.

Test results are updated daily at <https://www.theice.com/iba/Bank-Yield-Index-Test-Rates>

Appendix

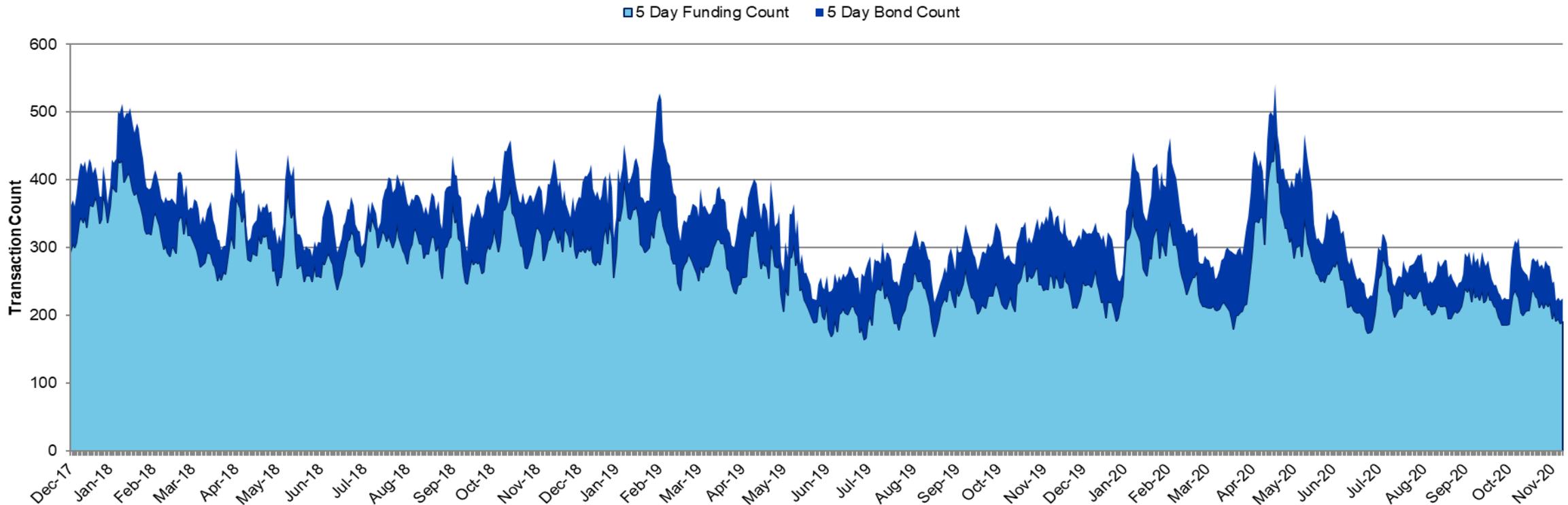
Bank Yield Index spreads to Treasury Yields



Data set used by IBA to explore a potential supplement to SOFR

Split between funding and bond data

USD 5 Day Count of Eligible Transactions : Funding and Bonds



Note – Funding transactions are primary unsecured money market borrowings \geq \$10MM in notional from fourteen global banks and the bond transactions are secondary money market trades in the unsecured debt of thirty internationally active banks that are \geq \$5MM in notional (block transactions)

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Introducing Bloomberg Short-Term Bank Yield Index (BSBY)

November 16, 2020

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The Bloomberg Short-Term Bank Yield Index (BSBY)

BSBY measures the average yields at which large, global banks access USD unsecured wholesale funding. It is dynamic, credit sensitive and reflects marginal funding cost at O/N, 1M, 3M, 6M and 12M tenors.

- BSBY is based on aggregated anonymized data anchored in transactions in CP, CD and bank deposits sourced from Bloomberg electronic trading solutions along with corporate bonds trade data from TRACE.
- The index is based on transaction related data and does not rely on subjective inputs in its calculation.
- BSBY is intended to provide the loan market with rates which can be used to supplement SOFR.
- The index is currently being published on an indicative basis for illustration and feedback purposes only. We will be ensuring compliance with the high standards of the EU benchmarks regulation and the best practices set forth in the IOSCO Principles for Financial Benchmarks.

The Four 'R's of BSBY

The essential building blocks of Bloomberg Short-term Bank Yield Index

Representative

- Can we build an index which represents the marginal funding cost of large global banks ?
- Can we accurately calculate representative rates across the term structure ?

Robust

- Is there sufficient transaction related activity in the money market across various tenors ?
- Can we construct an index that is not susceptible to data manipulations ?

Responsive

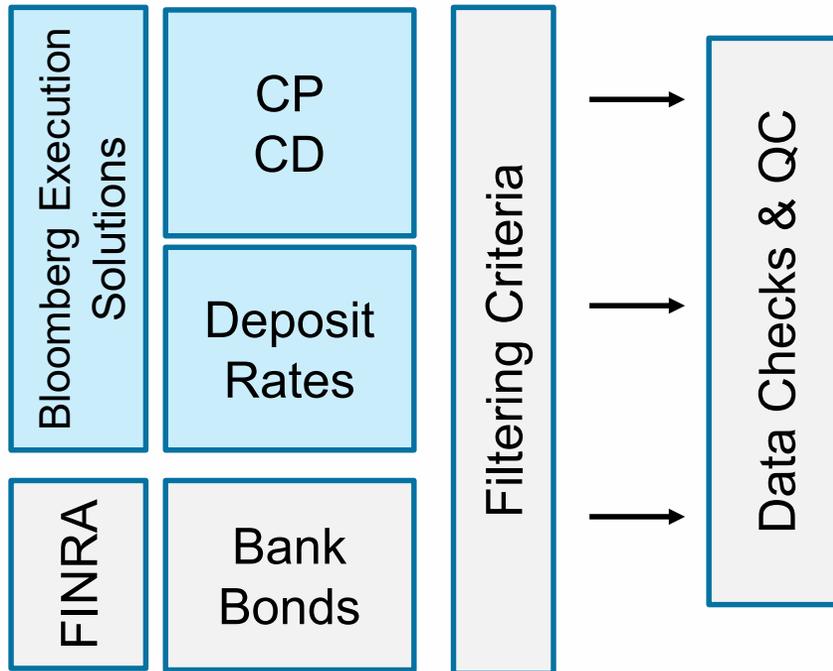
- Can the index be sensitive enough to reflect the day to day changes in wholesale funding market ?

Resilient

- Can we provide a methodology to ensure the index representativeness and accuracy in periods of market stress ?

Construction – The Ingredients

- BSBY sources transaction-related data from primary markets for USD bank deposits, commercial paper, and certificates of deposits and secondary market trades for bank bonds.

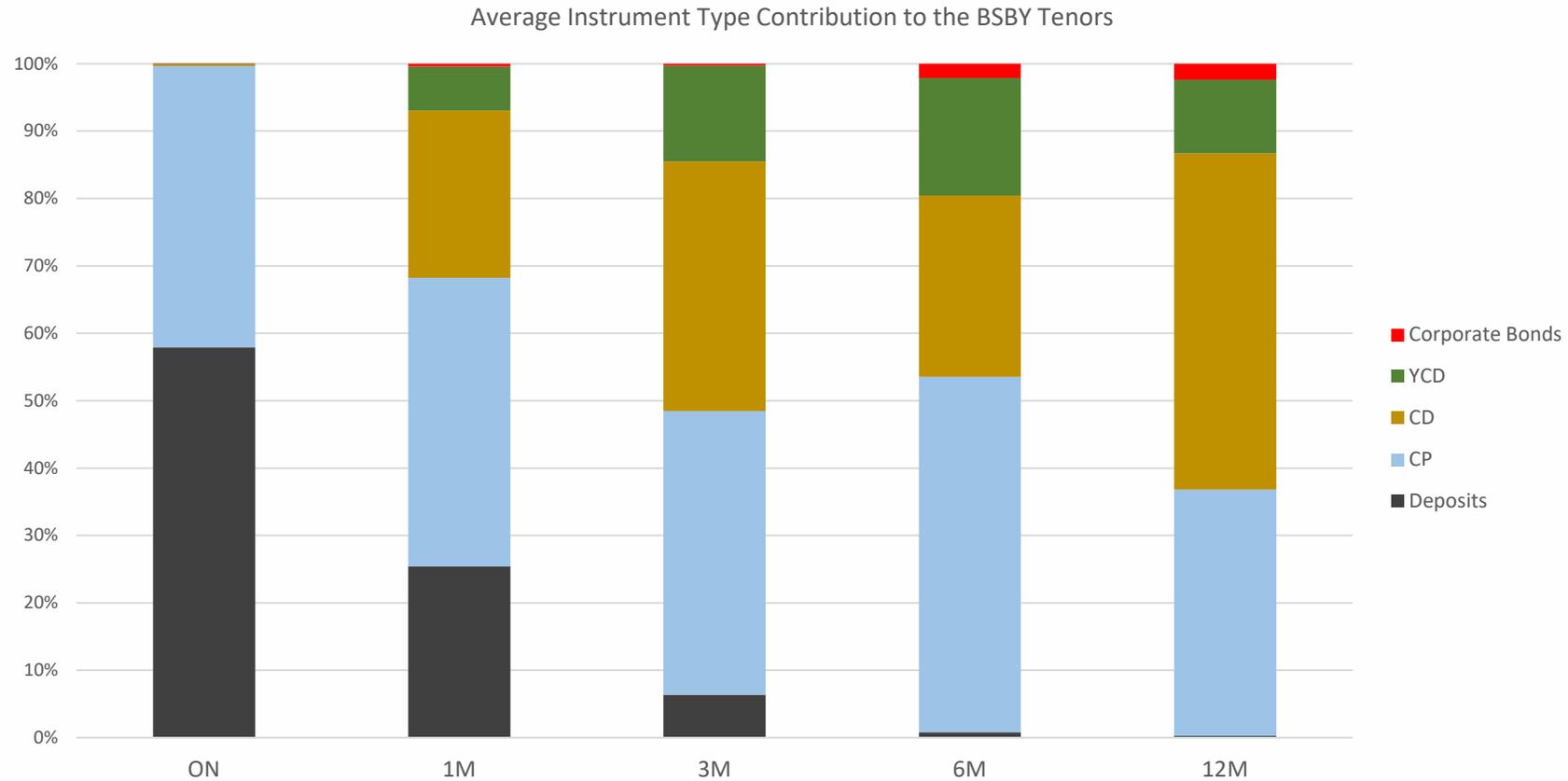


- BSBY uses CP, CD, ECP, ECD, YCD, bank deposits and short term bank bonds data.
- BSBY is constructed from a combination of transactions and firm executable offers.
- The aggregated anonymized resulting dataset will then go through a filtering criteria underpinned by a governance framework that will be reviewed on a periodic basis by BISL’s oversight committee.

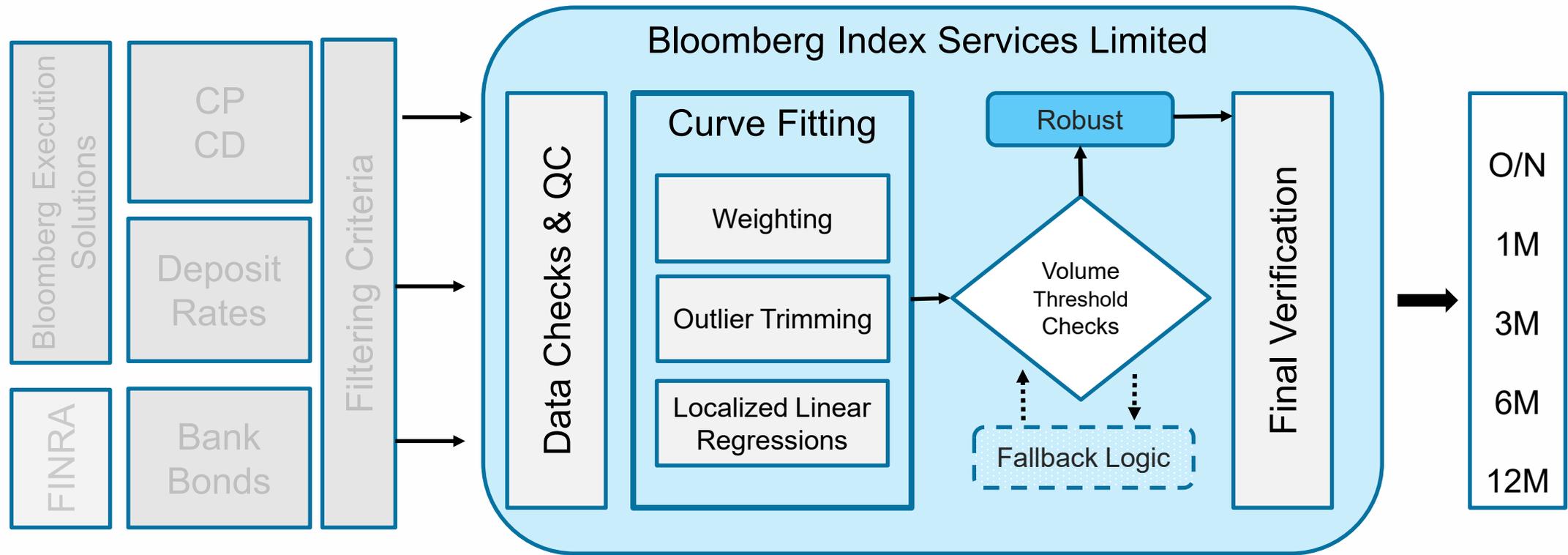
Source
Aggregate
Anonymize

Construction – The Ingredients

- Contribution by instrument type for each BSBY tenor (Dec 2017 – Oct 2020)



Construction - Recipe



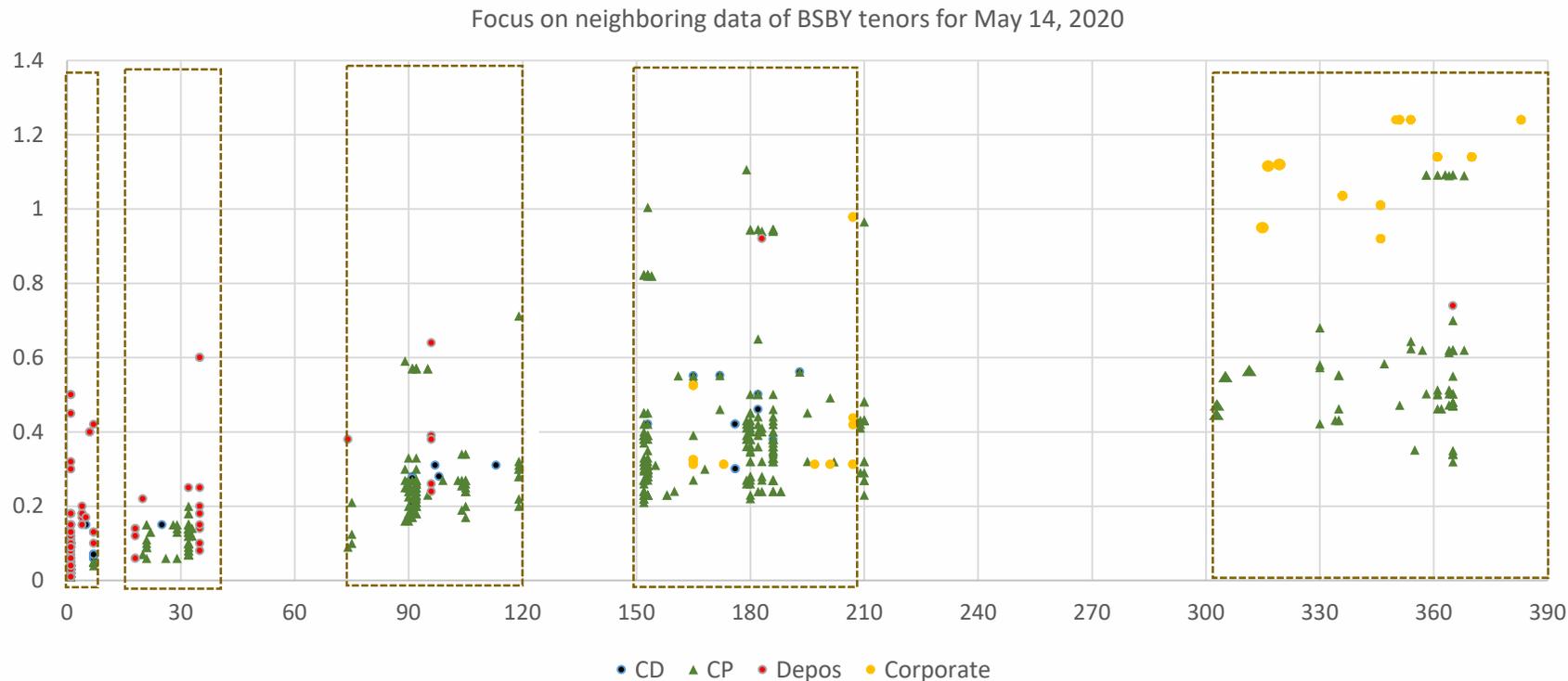
Source
Aggregate
Anonymize

Benchmark
Production

Publication

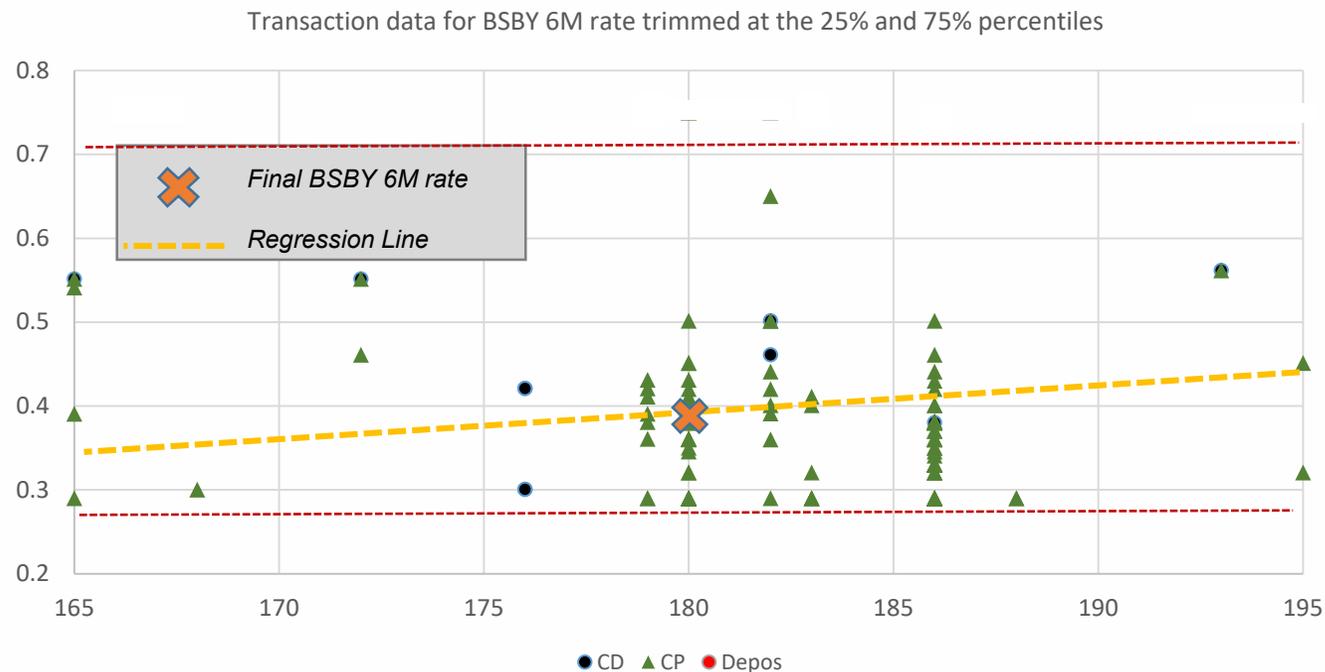
Construction - Recipe

- The BSBY rates are generated through a **localized trimmed methodology** where the algorithm seeks to fit a curve locally around each of the tenors.
- The issuer eligible dataset is **filtered** by days-to-maturity and only contributes to the calculation if their maturities fall within a defined date range.



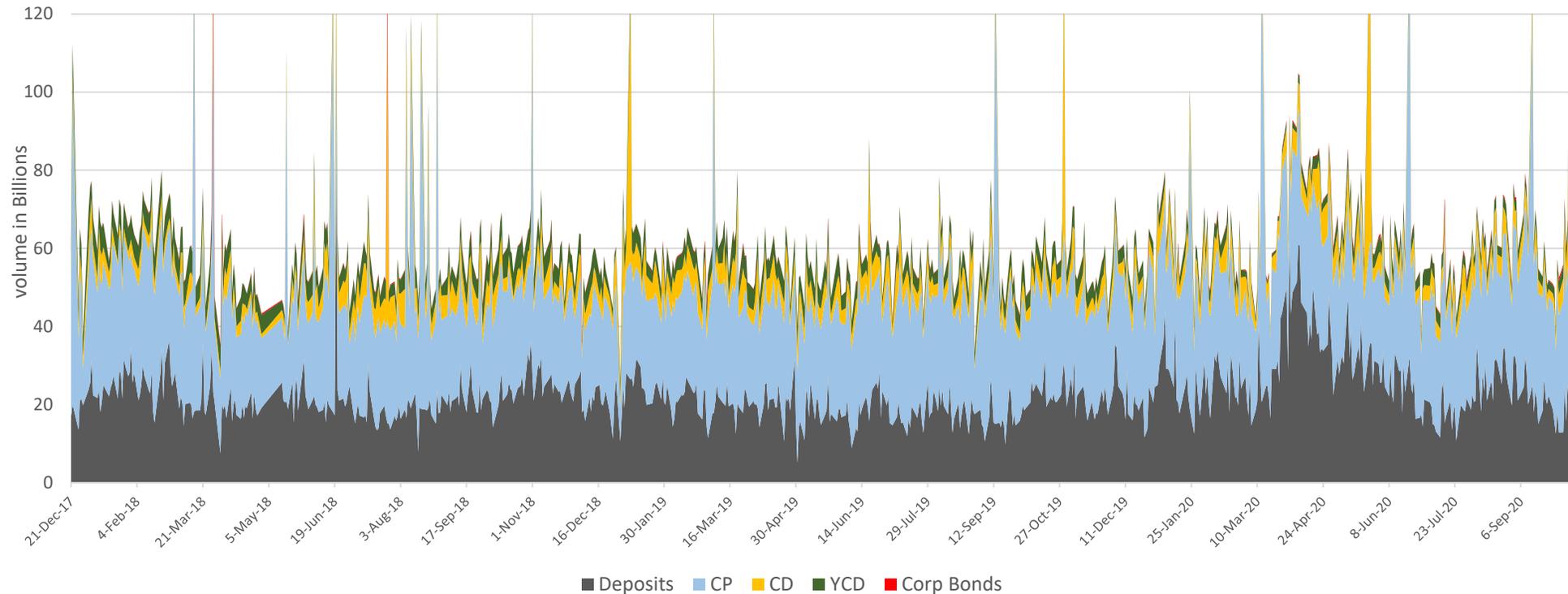
Construction - Recipe

- To ensure representativeness with a given tenor corridor :
 - Each transaction and executable quote volume is capped at **500MM**.
 - A given bank's contribution cannot exceed **20%**.
- Outlier yield data points are trimmed at **75%** and **25%** volume quantiles.
- The published BSBY rate is result of **volume weighted** linear regression to account for term structure.



Transaction Volumes

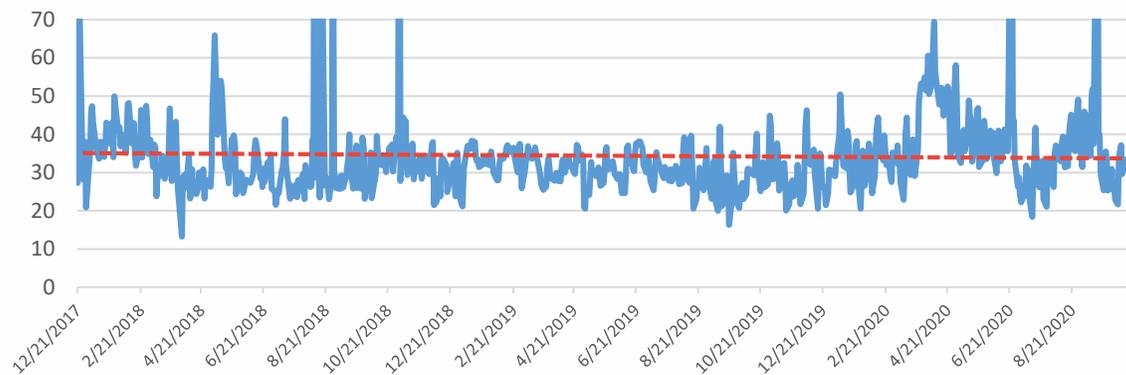
Breakdown of the daily volume in billions for the BSBY Index by instrument type



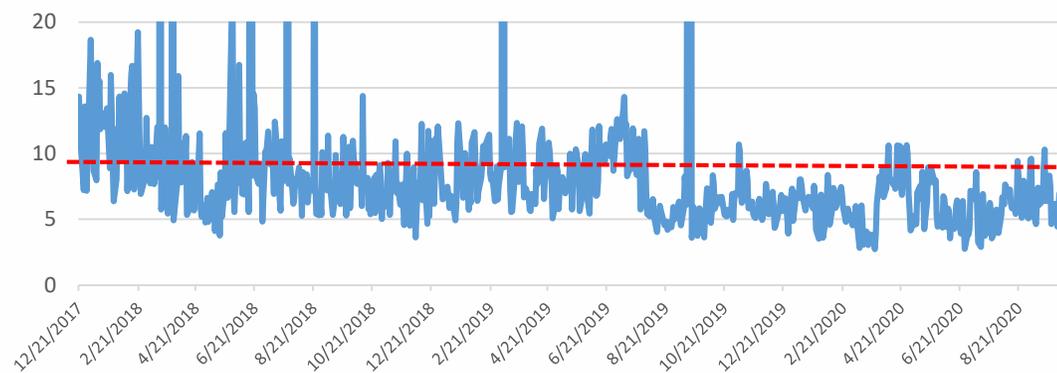
- The BSBY rates are based on instruments that have averaged more than \$55 billion in daily transactions over the past three years and \$70+ billion when executable quotes are included.
- BSBY ensures a minimum volume threshold per tenor.

BSBY Volume Per Tenor

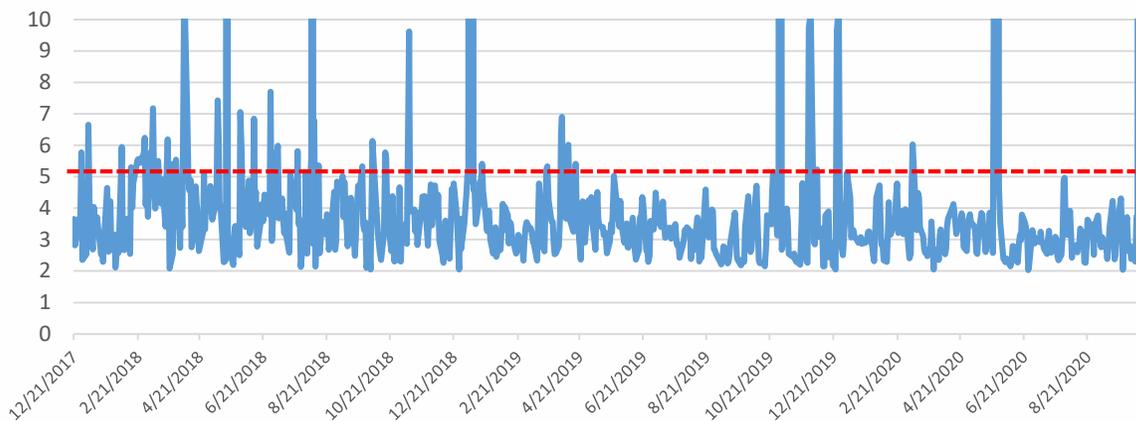
O/N Volume in Billions



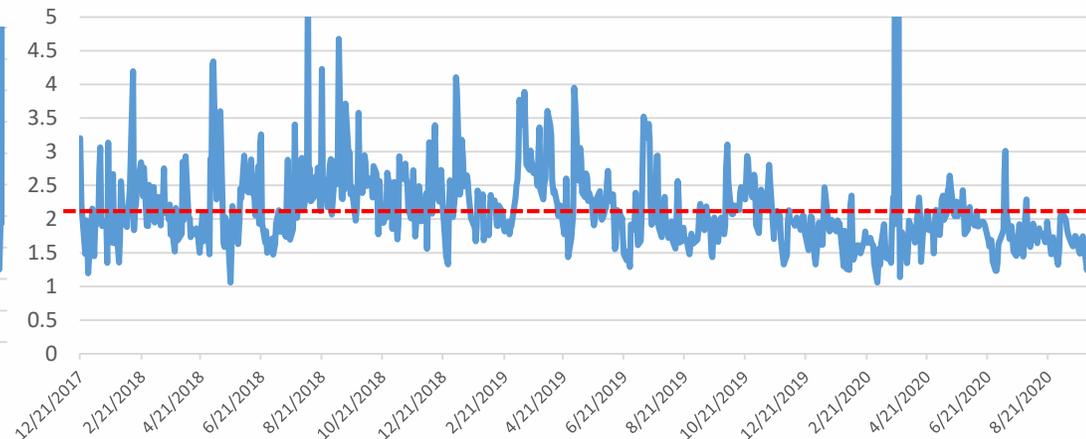
1M Volume in Billions



3M Volume in Billions

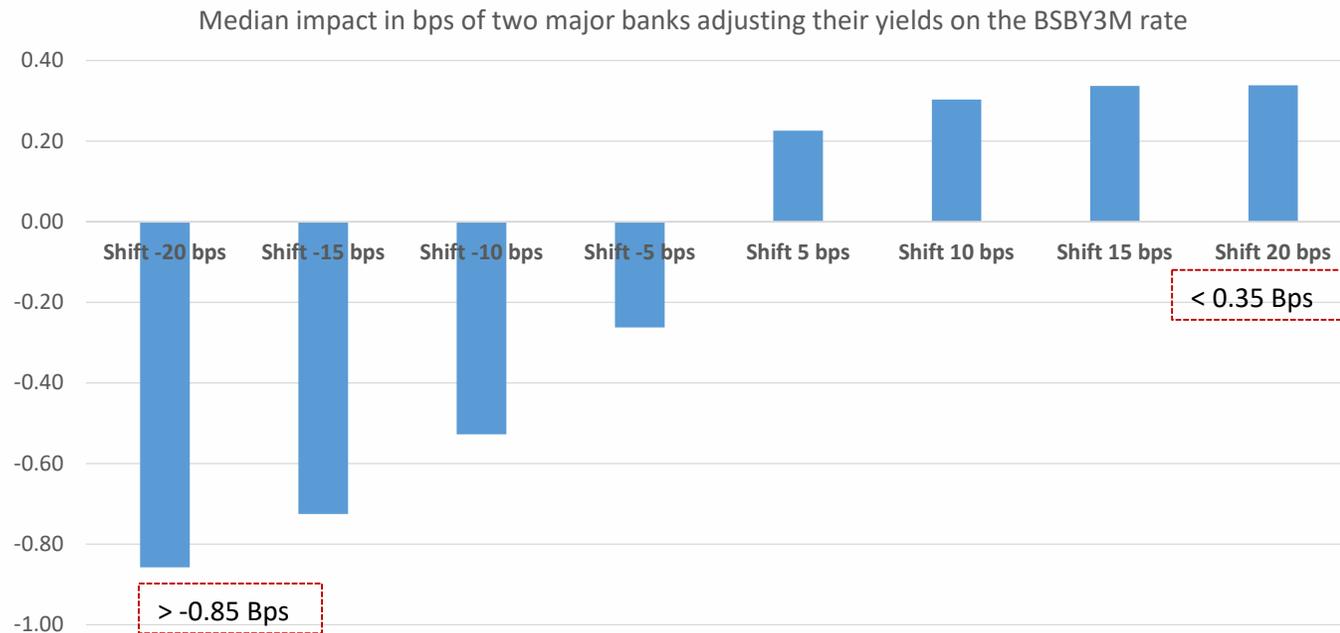


6M Volume in Billions



Benchmark Integrity and Validation

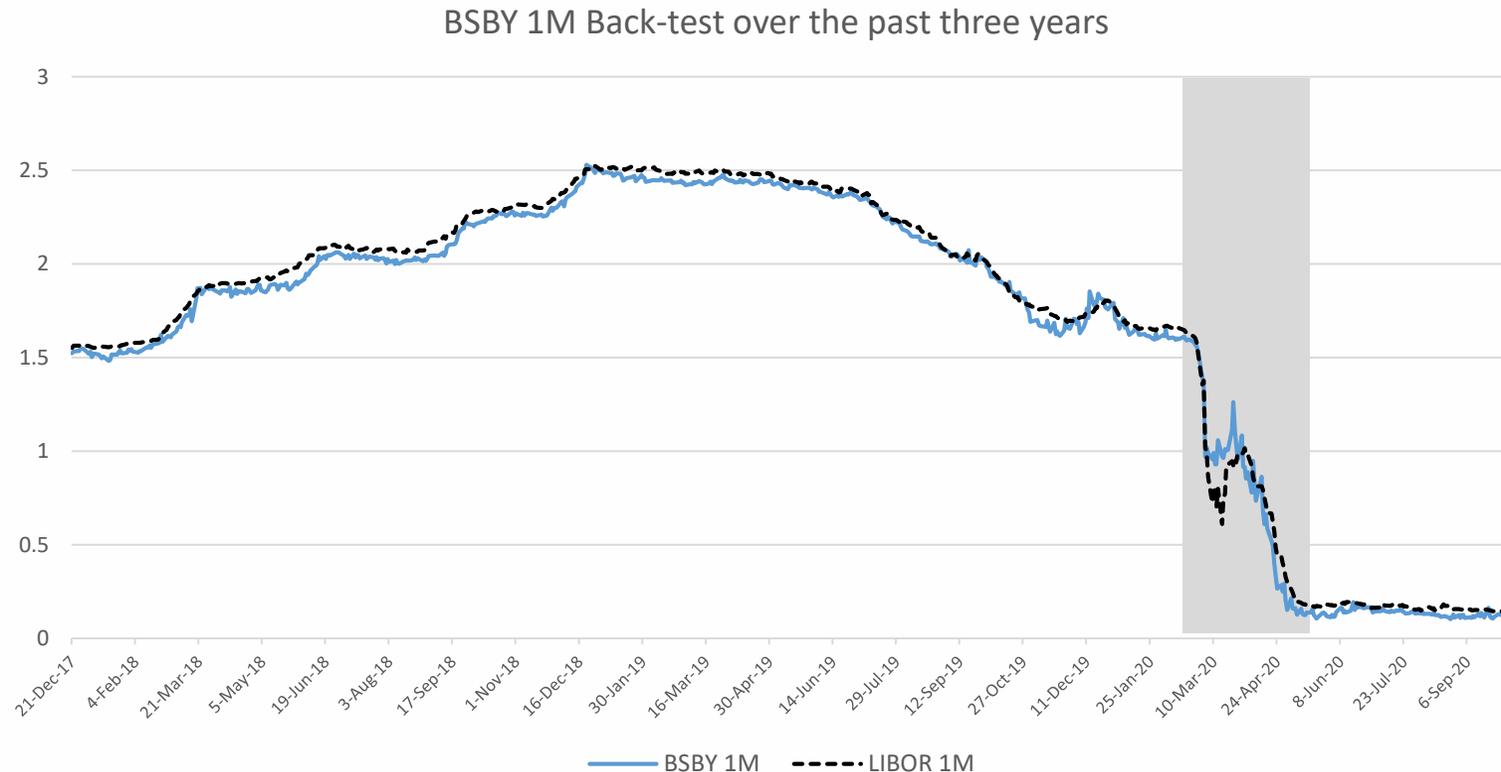
- In a hypothetical scenario, instruments from two of our top five contributing banks adjust, in unison, the yields of their instruments in an effort to impact the rates : (median impact of -0.85 bps for -20 bps shift and 0.35 bps for 20 bps shift).



- The Index governance framework ensures that the oversight committee will regularly review large idiosyncratic moves to further increase the index robustness.

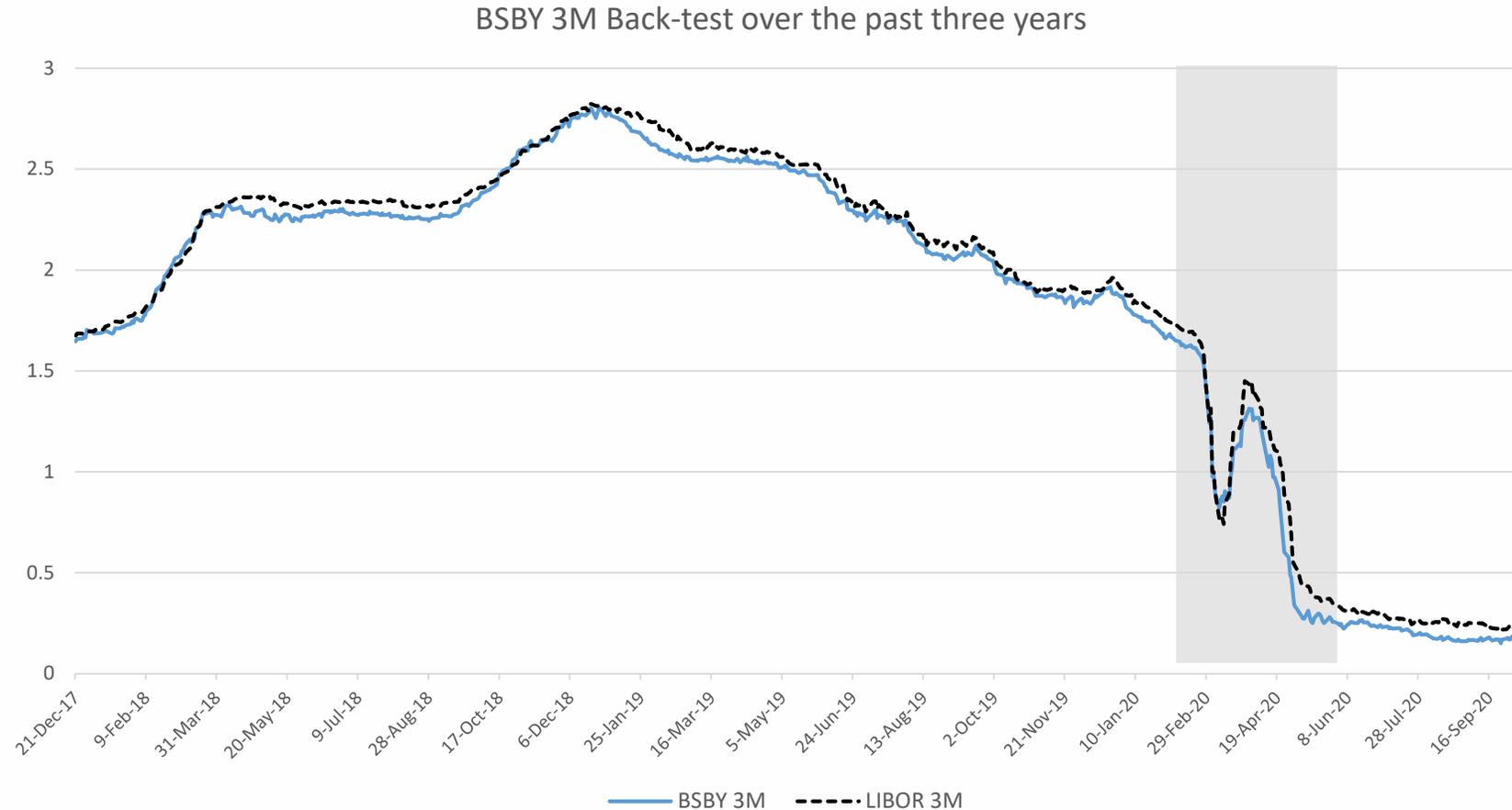
Back-test of BSBY 1M

- In a three year back-test, BSBY was reactive to day to day interest rate changes and funding costs and strongly correlated with 1M LIBOR.



Back-test of BSBY 3M

- In a three year back-test, BSBY 3M was dynamic and proved to be a leading indicator in periods of market stress.



Fallback Logic

- Each BSBY rate must be generated from robust transaction-based volumes.
- In the event that the minimum volume threshold per tenor is not met, BSBY construction algorithm relies on a fallback process by first expanding the corridor size around the tenor with low volume.

Ticker	Days to Maturity	Standard Window		Expanded Window	
		Start	End	Start	End
BSBYON	1	1	4	1	5
BSBY1M	30	14	45	6	45
BSBY3M	90	75	110	46	125
BSBY6M	180	166	195	126	240
BSBY12M	365	300	400	241	400

- If the minimum threshold is still not met, BSBY uses transactions from a supplemental list of banks with similar credit quality (A1/P1) to the original list.

Conclusion and Future Steps

BSBY aims to represent the average rates at which global banks access the USD wholesale, unsecured funding market at the O/N, 1M, 3M, 6M and 12M tenors.

Accessing BSBY

- BSBY is published at 8:00 am ET on non-holiday US business days.
- Available on the Bloomberg Terminal backfilled to 12/21/2017 for illustrative purposes only.
- Tickers are BSBYON, BSBY1M, BSBY3M, BSBY6M and BSBY12M.
- Displayed on the BTMM<GO>, USSW<GO>.
- BSOF<GO> function displays credit spread of BSBY to SOFR.

Next Steps

- Calculate BSBY as credit spread to term SOFR as it becomes available.
- Potential alternate formulations being researched:
 - Expanding the eligibility criteria to include non-financial corporations.
 - Using a rolling window to aggregate transaction volume to improve smoothness and resiliency.

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AMERIBOR®

November 18, 2020

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Financial Innovation

1. Dutch East India Company – 1605
2. Osaka Rice Exchange – 1697
3. Chicago Board of Trade Wheat – 1848
4. Ginnie Mae – 1970
5. Treasury Bond Futures – 1977
6. CO₂ Emissions Trading - Chicago Climate Exchange (CCX) – 2003
7. AMERIBOR[®] - 2011

AFX Timeline

- 2011 - CONCEIVED OF THE AMERICAN FINANCIAL EXCHANGE- A PEER TO PEER INTERBANK LENDING PLATFORM THAT WOULD PROVIDE THE BASIS FOR A TRANSACTION BASED INTEREST RATE BENCHMARK-AMERIBOR®
 - 3 years before Fed convened ARRC to begin exploring alternatives
 - 6 years before FCA moved to sunset LIBOR index by 2021
 - 7 years before the ARRC settled on SOFR as a potential alternative
- 2012 – filed for a patent and trademark for a market-based interest rate benchmark in August 2012 – AMERIBOR®; published first paper as clarion call for a transaction-based interest rate benchmark (published by World Federation of Exchanges in September 2012)
- 2013-2014 – visited over 125 banks all over the country
- Partnered with Cboe in 2015. Advised by Rodge Cohen of Sullivan & Cromwell
- 2015 – launched AFX on Dec. 11, 2015

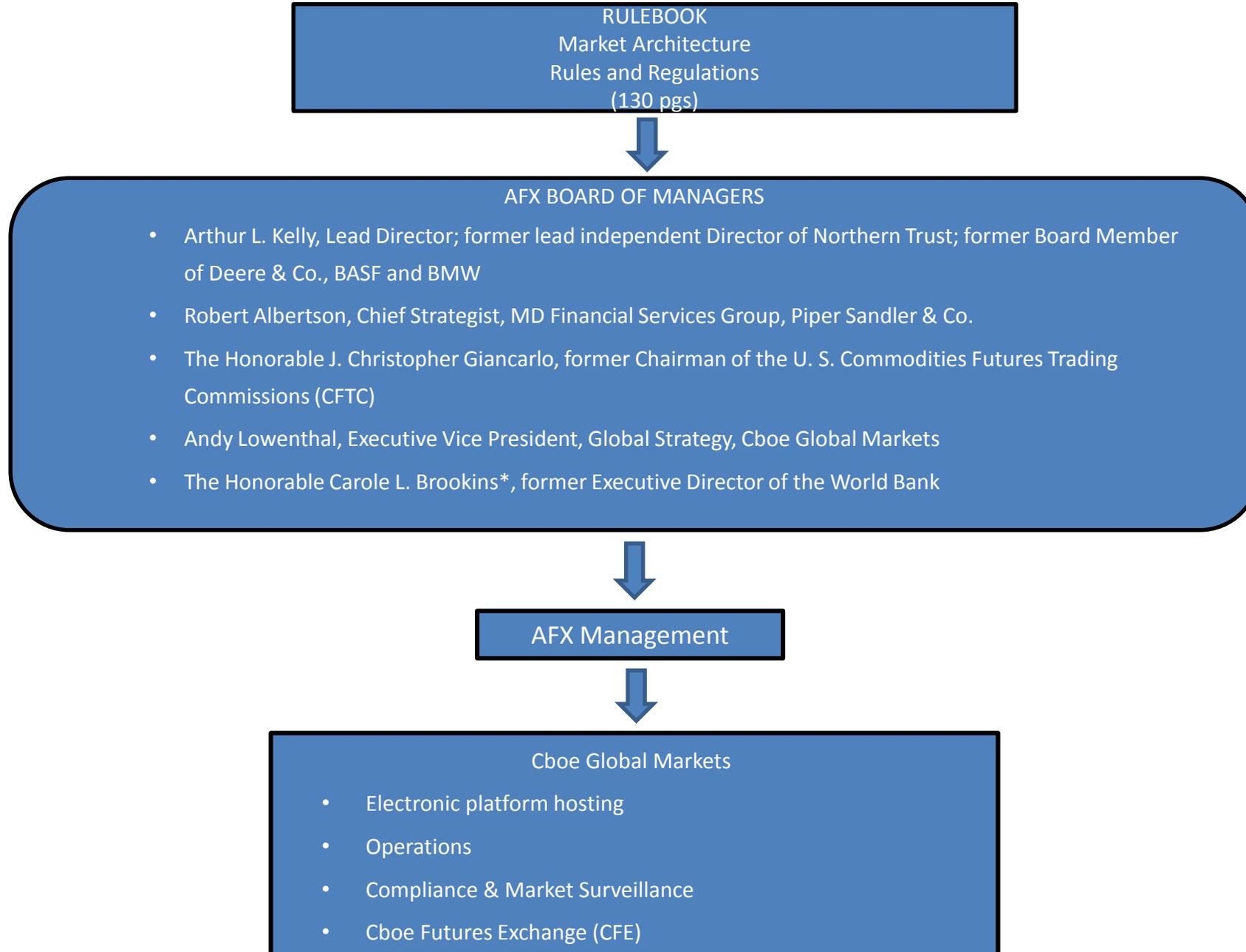
AMERIBOR[®]

AMERIBOR[®]
Only U.S. banks
Self-Regulated
Transparent
100% transaction-based
IOSCO compliant (confirmed by third party verification)

Need for a Truly U.S. National Benchmark

FHLB Rates	Overnight as of September 2020
Atlanta	0.36
Boston	0.45
Chicago	0.25
Cincinnati	0.16
Dallas	0.50
Des Moines	0.38
Indianapolis	0.28
New York	0.46
Pittsburgh	0.39
San Francisco	0.35
Topeka	0.35

Institutional Framework



Rules and Committee Structure

AFX RULEBOOK



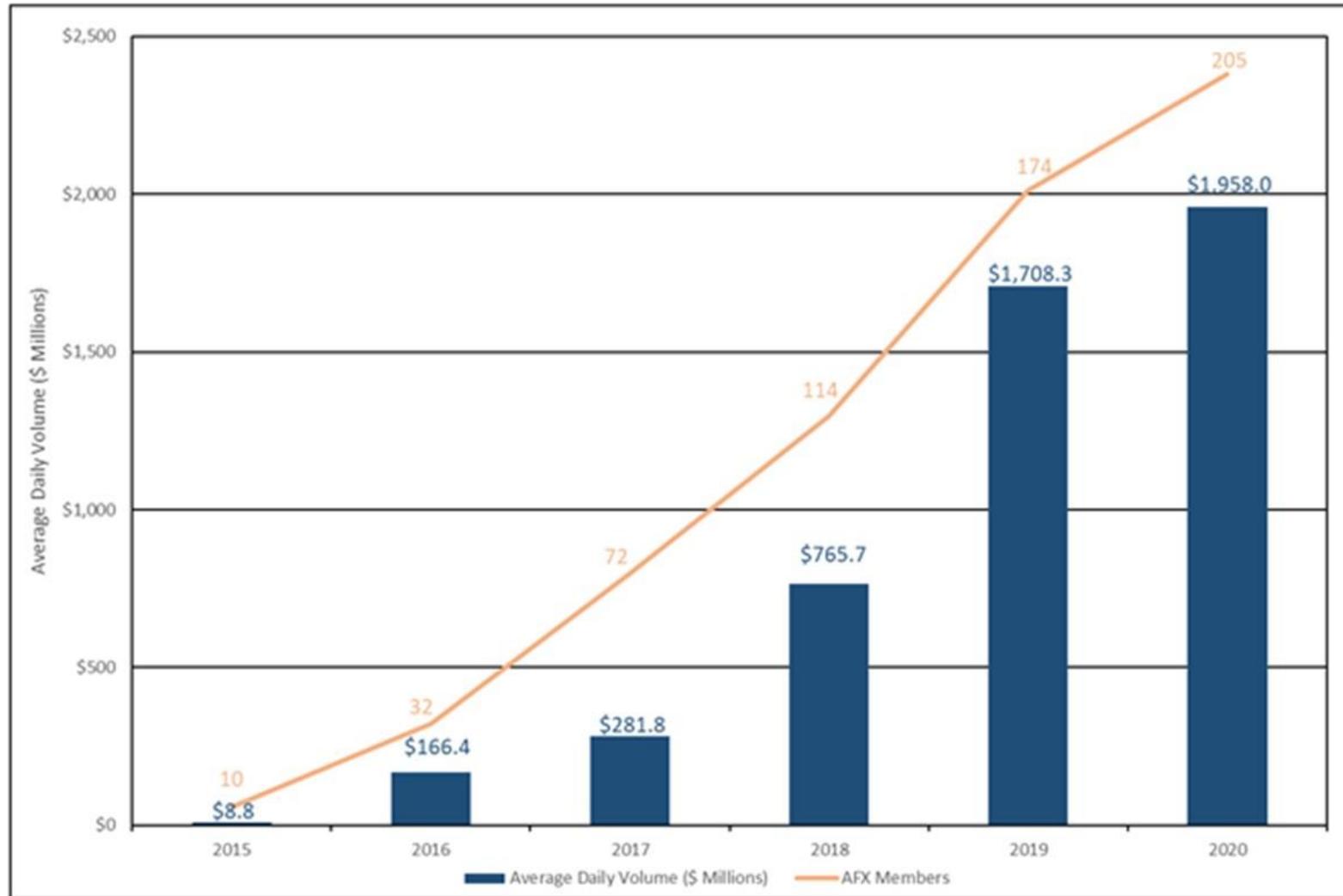
- Committee on Compliance and Dispute Resolution
- Committee on AMERIBOR® Benchmark Oversight
- Committee on Trading and Market Operations
- Committee on Participation (Membership)

Price Mechanism Design

- National in scope to take advantage of succession of rolling regional economies (e.g. southeast vs northeast regional economic characteristics which impact loan growth, etc.)
- Regional rates (secured) vary by as much as thirty basis points in a current zero interest rate environment
- Lender-driven with three bilateral filters: counterparty, rate and quantity optionality thereby making each trade credit-adjusted
- Transparent Central Order Book (multiple parties and bids and offers)
- AFX utilizes Cboe (a federally-regulated exchange) as a third party services provider to perform market surveillance, regulatory, and compliance services. In this role, Cboe conducts surveillance of the trading on AFX, submits surveillance reports to AFX, reports deviations and infractions to AFX for any necessary Compliance Committee action, and acts as a record keeper of daily AFX exchange data.

Average Daily Outstanding Volume and AFX Membership Growth

Total All Products
As of October 1st, 2020



* In addition to the 205 AFX Members, there are more than 1,200 downstream banks through AFX's correspondent bank lending program that have access to the AFX Platform, representing roughly a quarter of America's banks.

The American Financial Exchange opened on December 11, 2015

WHAT IS AMERIBOR®

- The AFX facilitates the calculation of AMERIBOR®, the volume-weighted average of real, daily transactions in the AFX's **overnight unsecured** loan market. Each individual trade is filtered by counterparty, quantity and rate.
- Stable reference benchmark interest rate; **99.74% correlation to LIBOR**
- AMERIBOR® independently determined to adhere to IOSCO's 19 principles for financial benchmarks
- Contains a credit spread component based on unsecured loans in contrast to SOFR which is based on secured (i.e., collateralized) loans
- **Represents the actual funding costs for approximately 25% of all US banks**
- **Optimizes asset-liability management; matches asset pricing & liability costs to a single common benchmark**
- Cboe Futures Exchange (CFE), a Designated Contract Market (DCM), lists one-week, 30-day and 90-day futures contracts on AMERIBOR®.
- Trading on AMERIBOR® futures began on August 16, 2019

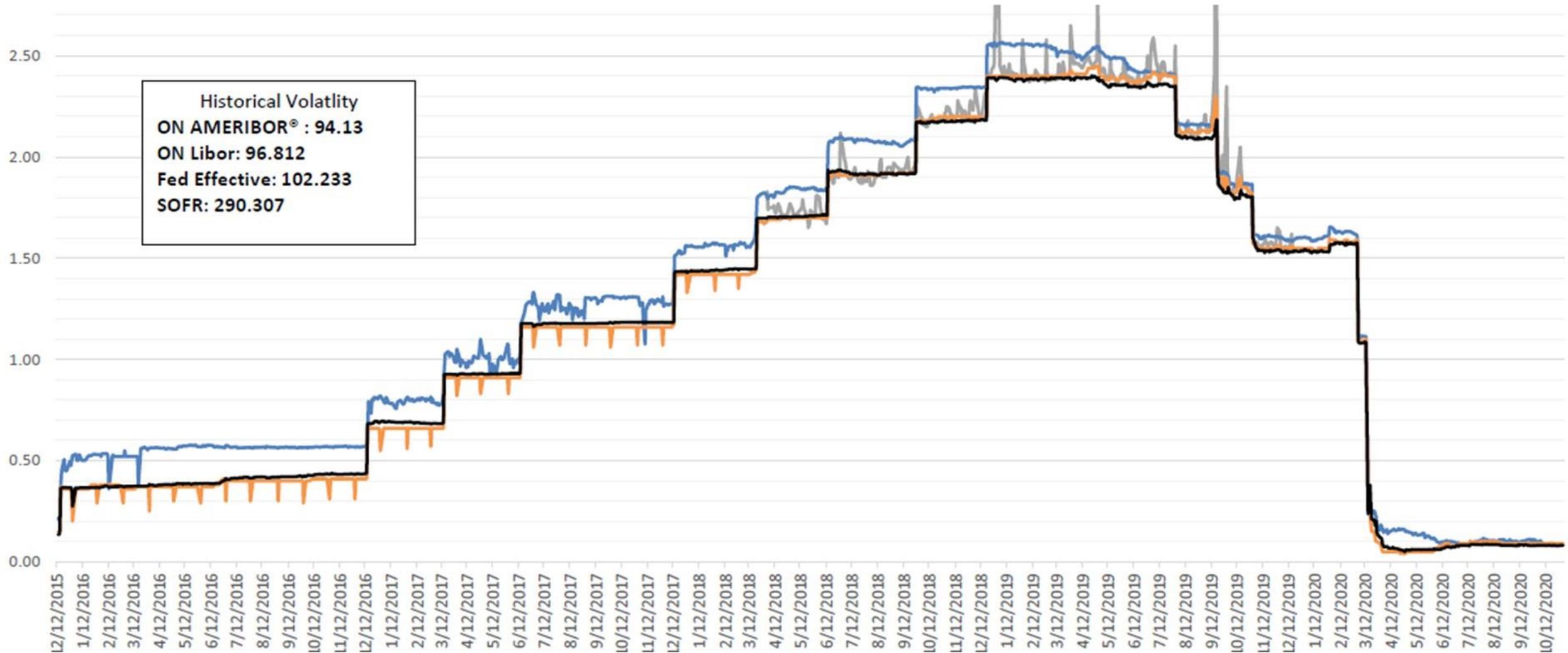
AMERIBOR[®] ADOPTIONS

- Non-banks (insurance companies; broker-dealers; asset managers; and corporations – e.g. John Deere)
- AMERIBOR[®] commercial loans (e.g. Frost Bank)
- AMERIBOR[®] floating rate deposits (e.g. Promontory)
- AMERIBOR[®] subordinated debt (e.g. Signature Bank)
- AMERIBOR[®] interest rate swaps (in process)

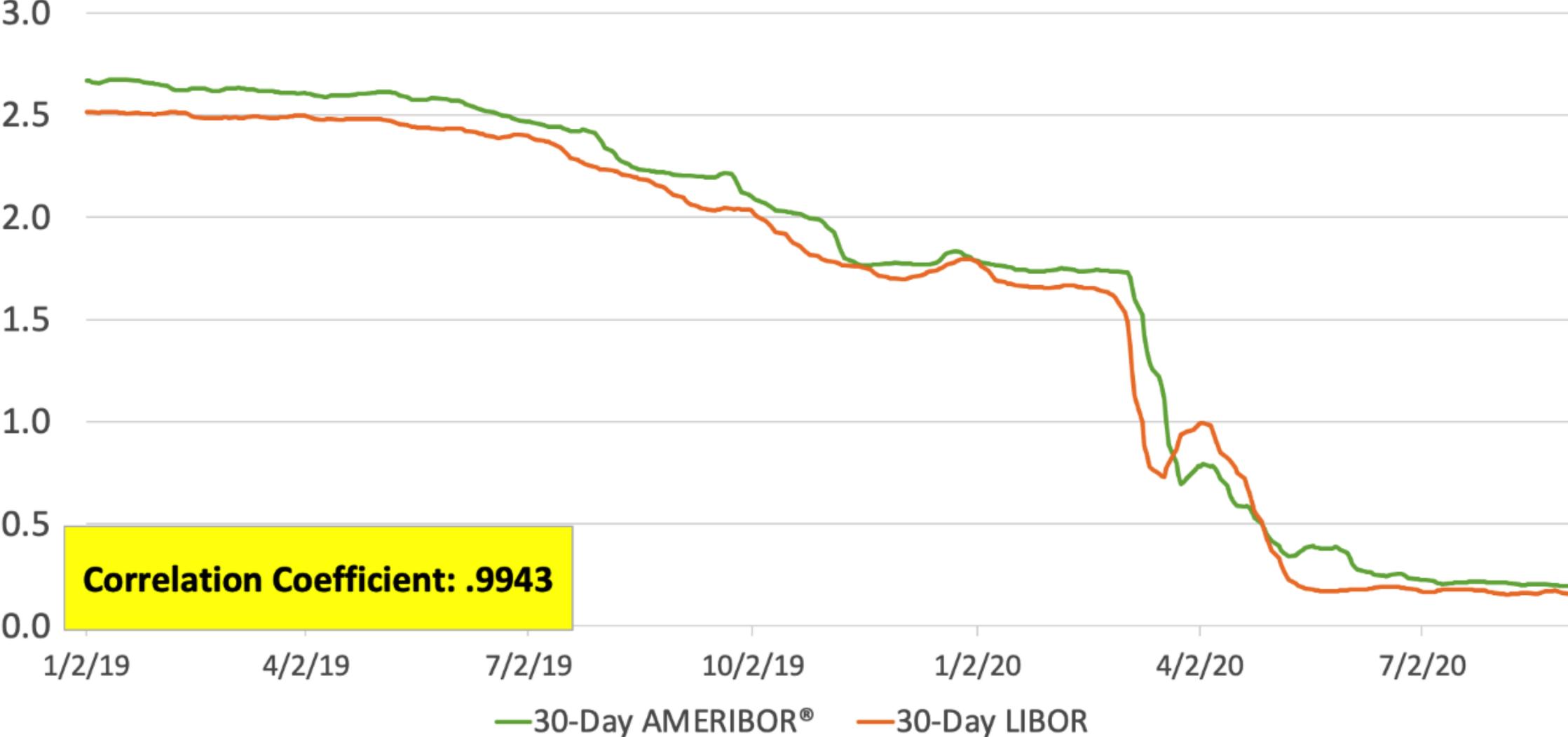
AMERIBOR® vs Other Benchmarks

December 11, 2015 - November 1, 2020

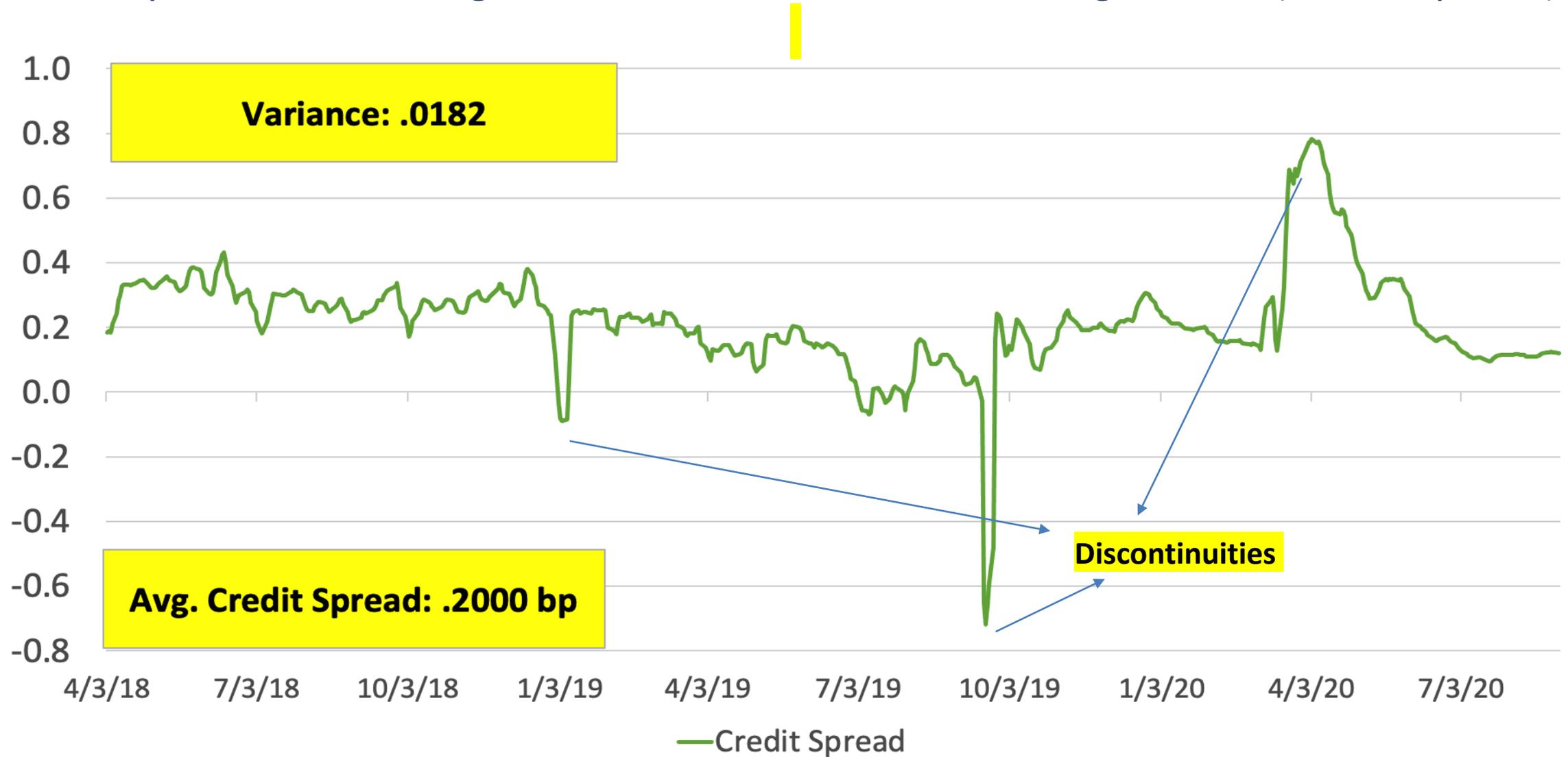
— O/N SOFR — O/N AMERIBOR® — Fed Funds Effective — O/N LIBOR



30-Day Term LIBOR vs 30-Day Forward Looking Term AMERIBOR[®]



30-Day Forward Looking Term AMERIBOR[®] minus Overnight SOFR (Credit Spread)



AMERIBOR DATA DISTRIBUTION (BLOOMBERG AND CNBC)

Bloomberg Terminal
Treasury and Money
Markets (BTMM) Page

United States of America		Browse	11:17:02	
Fed Funds FOMC »		Fed O/N Repo	US T-Bill	
DFD	0.0800 0.1000	SOFR	0.09	4W 0.07 -0.01 0.07 0.07
OBFR01	0.09	TGCR	0.07	2M 0.09 +0.00 0.09 0.09
Commercial Paper		RGCR	0.07	3M 0.10 +0.01 0.11 0.10
30D	0.110	AFX O/N Rate		6M 0.12 +0.01 0.12 0.12
90D	0.160	AMERIBOR	0.11	1Y 0.13 +0.00 0.14 0.13
Dow Jones		S&P 500 E-Mini Future		NASDAQ Composite I
DJIA	28105.71 +314.27	SPX Fut	3369.00 +16.25	CCMP 10964.0
US Bonds FIT »		SOFR Future		90
T 0 1/8 07/31/22	0.149	99-30+	99-30 ⁵ / ₈	- 01
		SFR1	99.910	SE

 **CNBC** SIGN IN

MARKETS BUSINESS INVESTING TECH POLITICS CNBC TV

Ameribor Unsecured Overnight Rate (.AMERIBOR:Exchange)

Real Time Quote | Exchange | USD

Last | 10:46:24 AM EDT

0.0848 UNCH (0)

Ameribor 0.0954 AMERIBOR 30-day 0.0992 AMERIBOR 90-Day 0.128

JET  JC PENNEY CFO JEFFREY DAVIS TO STEP DOWN  FDA API

AMERIBOR[®] DATA DISTRIBUTION

1. Bloomberg
2. CNBC
3. Thompson Reuters (Refinitiv)
4. Morningstar
5. MSCI
6. S&P
7. TraditionDATA
8. Quanthouse
9. QuoteMedia
10. SIX Financial
11. Savvis
12. Barchart
13. Ignite
14. Hanweck Associates
15. Devexperts
16. Activ Financial

Diverse and Growing List of AFX MDI Members

Institution	Location	Status
Abacus Federal Savings Bank	New York, NY	Asian-American
Bank of Hope	Los Angeles, CA	Asian-American
Citizens Trust Bank	Atlanta, Georgia	African-American
Unity National Bank	Houston, TX	African-American
East West Bank	Pasadena, CA	Asian-American
FirstBank of Puerto Rico	Santurce, PR	Hispanic-American
Lone Star National Bank	Pharr, TX	Hispanic-American
Pacific City Bank	Los Angeles, CA	Asian-American
People's Bank of Seneca	Seneca, MO	Native-American