Across-the-Curve Credit Spread Indices

PRELIMINARY

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Abstract

This note presents a preliminary approach to the design of an across-the-curve credit spread index (AXI). The index is a measure of the recent average cost of wholesale unsecured debt funding for publicly listed U.S. bank holding companies and their commercial banking subsidiaries. This may be a useful benchmark for bank lending and related derivatives risk management applications. The index is a weighted average of credit spreads for unsecured debt instruments with maturities ranging from overnight to five years, with weights that reflect both transactions volumes and issuance volumes. We provide preliminary illustrative output of the bond-based component of AXI using TRACE secondary-market price and volume data from 2002–2019. We have only extremely preliminary estimates of the short-maturity (money-market) spread component.

Keywords: LIBOR, SOFR, reference rate, benchmark, credit spreads, floating rates

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1 Introduction

This note presents a preliminary approach to the design of an across-the-curve credit spread index (AXI). The index is a measure of the recent average cost of U.S. dollar wholesale unsecured debt funding for publicly listed U.S. bank holding companies and their commercial banking subsidiaries. This may be a useful benchmark for bank lending and related derivatives risk management applications. The index would be a weighted average credit spread for maturities ranging from overnight to five years, with weights that reflect both transactions volumes and recent issuance volumes.

A useful credit-spead index should meet several basic criteria:

1. **Hedging effectiveness:** Highly correlated with U.S. bank cost of funds, as determined by recent market credit spreads for wholesale unsecured issues of U.S. banks and bank holding companies.

2. **Robustness:** Computed from a large enough pool of market transactions that the index can underly actively traded derivatives instruments used by banks and their borrowing customers to hedge their floating-rate exposures, without significant risk of statistical corruption or manipulation.

3. **Adaptable to changes in issuance patterns:** The index should, within reason, maintain the first two properties even as banks change the maturity and instrument composition of their issuances in response to changes in regulation and market conditions.

We provide an illustrative computation of the bond-based component of an across-the-curve credit spread index by exploiting TRACE secondary-market corporate bond price and volume data. The shorter-term money-market component of such an index could rely on transactions rates and volumes for commercial paper (CP), certificates of deposit (CDs), and interbank deposits. We have only extremely preliminary estimates of the short-maturity (money-market) spread component. Anderson, Du, and Schlusche (2019) estimate that U.S. banks had an aggregate outstanding amount of about $200 billion of short-term wholesale unsecured funding during 2016–2017. Foreign banks use wholesale unsecured U.S. dollar short-term funding much more intensively than U.S. banks.

2 Background

The U.K. Financial Conduct Authority (FCA) announced in 2017 that it will end its supervision of LIBOR at the end of 2021. The FCA provided an update in May 2020. Because LIBOR is expected to cease after 2021, market participants are now transitioning to new benchmark reference rates in each relevant currency. For U.S. dollar markets, the private-sector Alternative Reference Rates Committee is coordinating the transition from LIBOR to the new benchmark U.S. reference rate, SOFR, a broad measure of the cost of overnight financings secured by U.S. Treasury securities.

In September, 2019, a group of bank representatives wrote to banking regulators, stating:

"During times of economic stress, SOFR (unlike LIBOR) will likely decrease disproportionately relative to other market rates as investors seek the safe haven of U.S. Treasury securities. In that event, the return on banks' SOFR-linked loans would decline, while banks' unhedged cost of funds would increase, thus creating a significant mismatch between bank assets (loans) and liabilities (borrowings). Moreover, banks' SOFR-linked lending commitments to their commercial customers will likely exacerbate this mismatch. Specifically, borrowers may find the availability of low cost credit in the form of SOFR-linked credit lines committed prior to the market stress very attractive and borrowers may draw-down those lines to "hoard" liquidity. The natural consequence of these forces will either be a reduction in the willingness of lenders to provide credit in a SOFR-only environment, particularly during periods of economic stress, and/or an increase in credit pricing through the cycle. In a SOFR-only environment, lenders may reduce lending even in a stable economic environment, because of the inherent uncertainty regarding how to appropriately price lines of credit committed in stable times that might be drawn during times of economic stress. Moreover, in economically stressed times, these forces could increase pro-cyclicality, put pressure on lenders' liquidity, and generally exacerbate stress in the economy. We believe a sensible and practical way to address these risks is to create a SOFR-based lending framework that includes a credit risk premium."

The banking regulators responded that the official sector would convene a Credit Sensitivity Group to focus on this issue, and eventually to recommend a specific "credit sensitive rate/spread that could be added to SOFR." In this note, we explore one possible approach to such a credit sensitive spread index.

3 Approach

In future lending applications involving a credit sensitive index, one envisions that banks will provide loans to their customers at a fixed borrower-specific spread over the sum of SOFR and the credit spread index. In many cases, market participants will want to manage the risks of their floating-rate revenues and expenses with derivatives linked to SOFR and derivatives linked to the spread index. For example, a borrower may wish to swap a floating-rate borrowing expense to a fixed-rate expense. A special purpose vehicle that issues collateralized loan obligations may swap loan collateral interest payments so that the hedged collateral pool is floating only to SOFR. Banks may choose to hedge their balance sheet risk with derivatives that include swaps linked to the credit spread index.

Because a popular spread index will spawn the development of an active derivatives market, the spread index should be fixed in a deep pool of transactions so that the resulting index is statistically robust, flexible to changes over time in the composition of bank funding, and difficult to manipulate.

Traditional cost of funds indices for lending applications include wholesale short term market rate indices, such as LIBOR, and trailing average cost of fund indices, "COFIs," which are typically based on the ratio of the total interest expense of a set of banks to their total liabilities (Greenfield and Hall, 2019). A prominent example is the 11th District Cost of Funds. Traditional COFIs adjust only slowly to changes in market credit spreads.

LIBOR is no longer tenable as a benchmark index because regulations have induced banks to "term out" most of their unsecured funding to longer maturities. As a result, there is no longer a large enough volume of transactions to make LIBOR sufficiently robust as a benchmark. For the same reason, LIBOR is no longer close to being representative of banks' actual costs of funds, and will likely soon be discontinued.

The proposed ICE USD Bank Yield Index improves on the robustness of LIBOR by using short term and somewhat longer term wholesale transactions data to estimate 1-month, 3-month, and 6-month credit spreads. The underlying pool of transactions, while much broader than that used to fix LIBOR, is not sufficiently deep for heavy use in derivatives market applications. Moreover, the major source of risk to changes in bank funding costs no longer stems from fundings in the 1-month to 6-month maturity range because U.S. banks now obtain relatively little of their funding at these maturities. The data underlying the ICE USD Bank Yield Index could, however, complement transactions

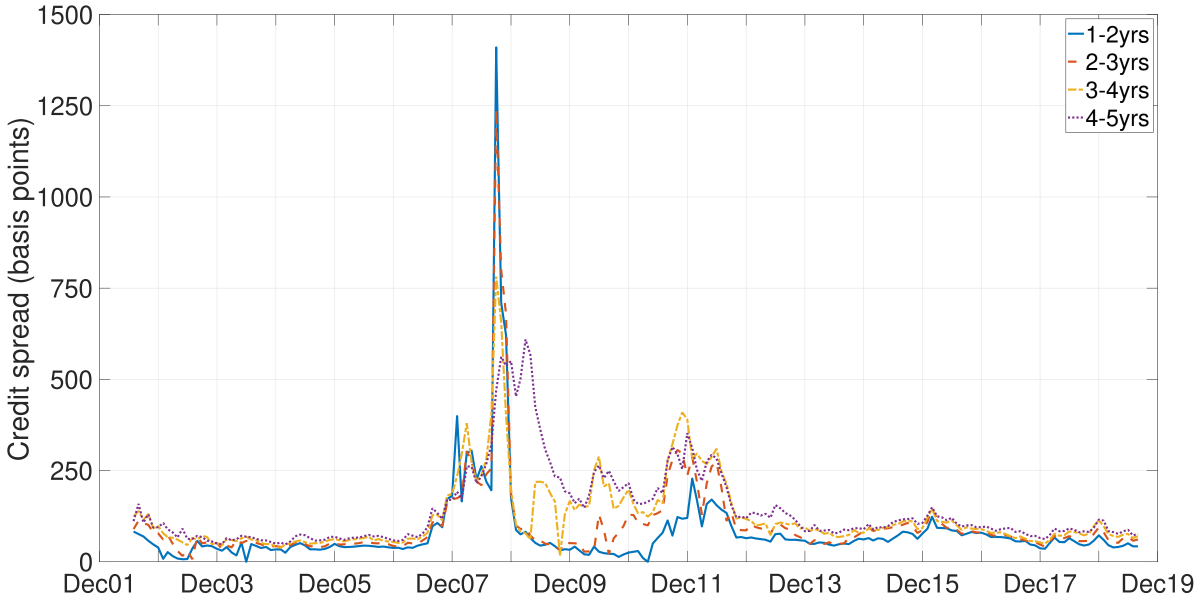

Figure 1: **Spreads by Maturity** Transaction-volume-weighted credit spreads of U.S. bank holding companies and commercial banks, for each of four maturity ranges, 2002–2019. Underlying data: Enhanced TRACE, uncapped transactions above $250,000 for fixed-rate and zero-coupon bonds.

data on longer term bond yield spreads so as to make a robust across-the-curve credit spread index, as we illustrate later in this note.

Ameribor, on the other hand, is an average of overnight unsecured borrowing rates of a collection of small banks, based on transactions conducted daily on the American Financial Exchange. In 2019, Ameribor ranged from 8 to 18 basis points above Federal Funds rate.

It has been reported that IHS Markit may develop a bank credit spread index from CDS transactions data. Current CDS trade volumes, however, would not make this a likely candidate for a robust index for heavy derivatives applications.

4 Illustrative construction of an index

This section provides an illustrative construction of an across-the-curve credit spread index. Figure 1 illustrates component credit spreads for each of four one-year maturity ranges, 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:

1. are senior unsecured corporate debentures, MTNs, or medium-term zeros.

2. are not foreign currency, private placement, convertible, exchangeable, perpetual, unit deal, defaulted, rule 144a, putable, Yankee, or Canadian.

3. can be linked to data provided by CRSP, FISD, and TRACE.

Figure 2 shows total monthly uncapped transactions volumes in each of the four maturity ranges. The underlying data, from Enhanced TRACE, are for all transactions in amounts above $250,000. Smaller transactions tend to be retail trades at prices that diverge significantly from those for wholesale-sized trades, as shown by Asquith, Covert, and Pathak (2019).

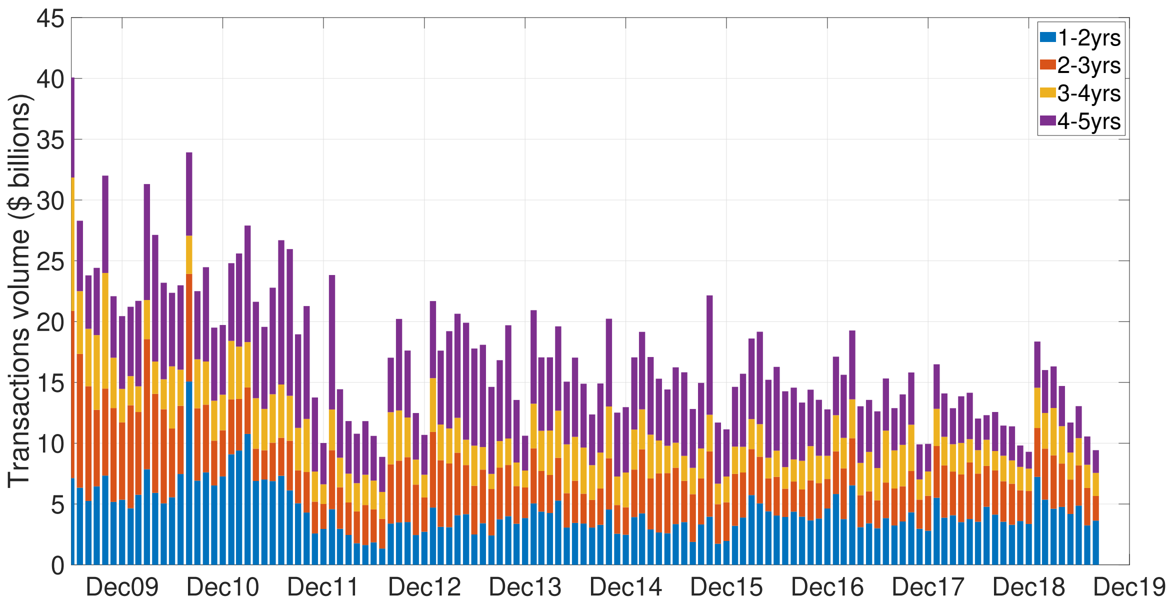

Figure 2: **Transactions volumes** Monthly transactions volumes in each of four maturity ranges. Underlying data: Enhanced TRACE, uncapped transactions above $250,000 for fixed-rate and zero-coupon bonds.

Our illustrative across-the-curve spread index is constructed as follows:

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 of included instruments types whose remaining maturities are in the indicated bucket.

2. The combined across-the-curve credit spread index is $S = \sum_m q_m s_m$, where q_m is the fraction in maturity bucket m of total issuance in the previous year, except for money-market maturities. Trailing issuances for the bond-market components are shown in Figure 3.

3. For money-market maturities, such as 1 day, 1 month, 3 months, and 6 months, issues of CP, wholesale CDs, and interbank deposits would be weighted based on current outstanding amounts, scaled as desired. We will illustrate with extremely preliminary estimates of the short-maturity (money-market) spread component.

The long term (1-year to 5-year) component of the credit spread index is shown in Figure 4.

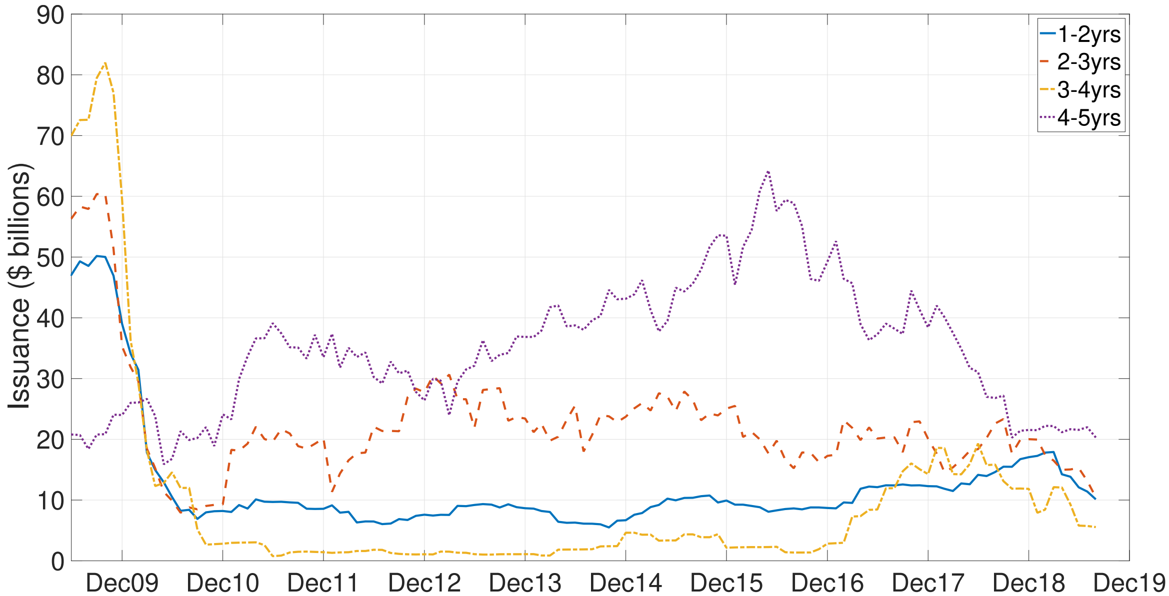

Figure 3: **Issuance** Trailing annual issuance (principal amount) in each of four maturity ranges. Underlying data: Enhanced TRACE.

FINRA publishes transactions data intraday, immediately after each transaction, via TRACE. The real-time public version of TRACE shows transaction sizes that are capped at $5 million for investment-grade bonds and $1 million for high-yield bonds. The uncapped transaction sizes are reported in the Enhanced TRACE dataset which is released to the public with several months of delay. For this reason, the illustrated sample period ends in the second half of 2019. A frequency plot of uncapped trade sizes is shown in Figure 5. For our data set, 12% of transactions were in excess of $5 million. In practice, an across-the-curve credit spread index would require access to uncapped contemporaneous transactions data (currently available only to regulators) or would be constructed using the capped size data. An advantage of the uncapped data is the increased representativeness of large trades and the increased difficulty of manipulating a volume-weighted index that is based on large transactions sizes (Duffie and Dworczak, 2019).

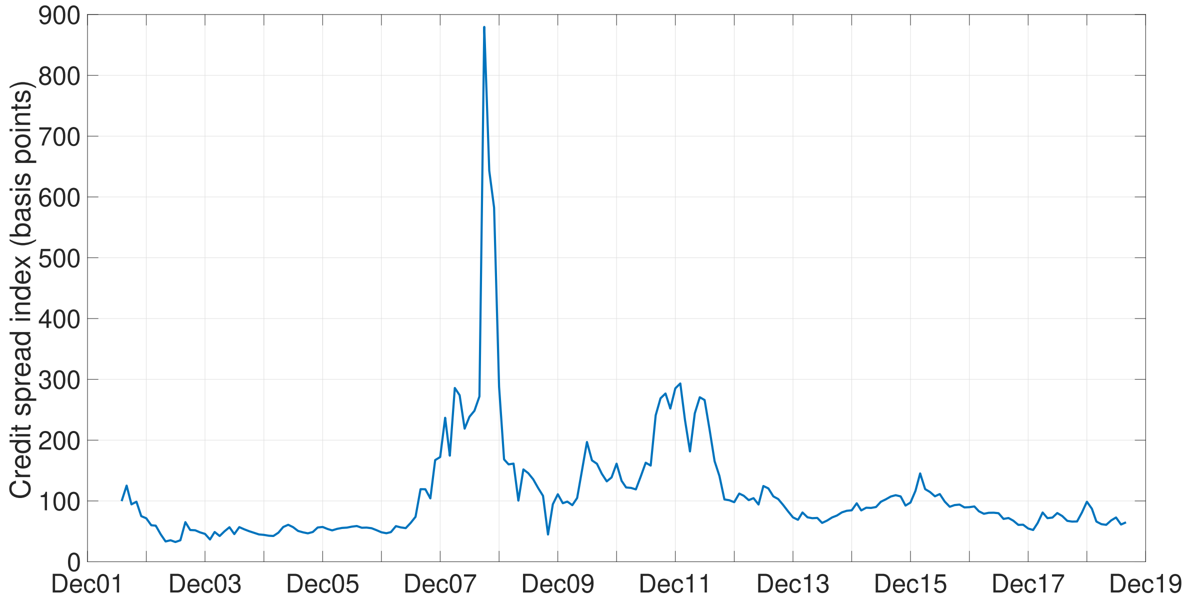

Figure 4: **Across-the-curve yield spread index** The long term (1-year to 5-year) component of an across-the-curve credit spread index. Underlying data: Enhanced TRACE, FISD.

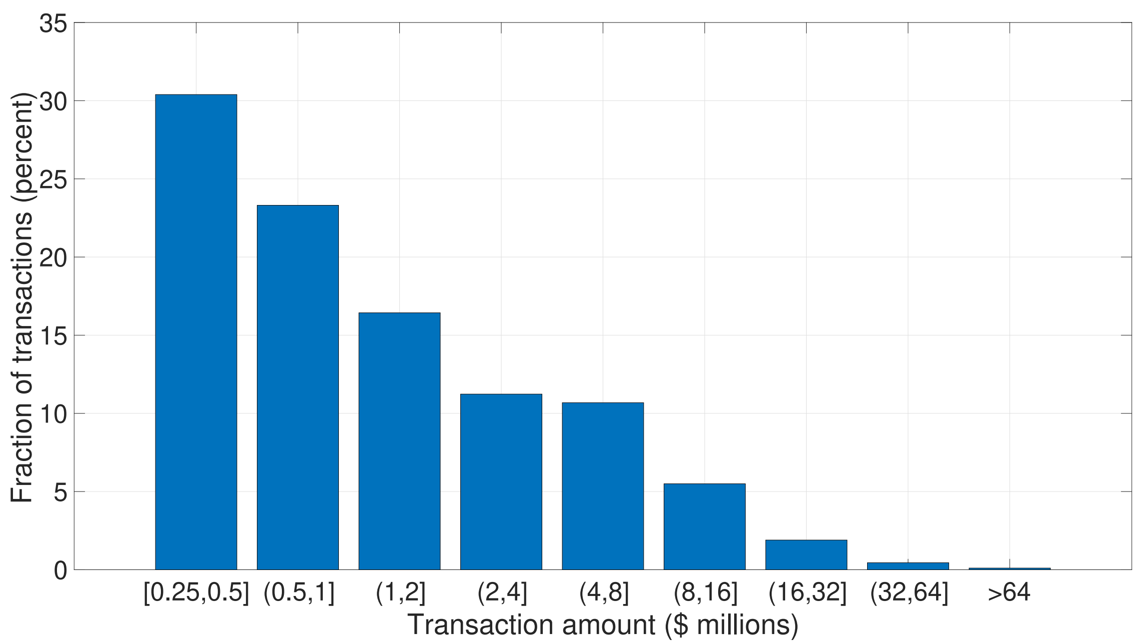

Figure 5: **Transaction sizes** The distribution of uncapped transaction size reports for the data underlying the construction of the spread index depicted in Figure 4. Underlying data: Enhanced TRACE, FISD.

Bond yield spreads tend to move in a wider range than money-market credit spreads such as LIBOR. It therefore 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

$$R(t) = \mathrm{SOFR}_n(t) + B_n X(t) + \text{borrower fixed spread}, \tag{1}$$

where B_n is a constant scaling factor specific to the n-month length of coupon periods and $\mathrm{SOFR}_n(t)$ 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 $\mathrm{SOFR}_n + B_n X$ can be swapped to a fixed rate by entering a SOFR payer swap with notional P and an X payer swap with notional $B_n P$.

Figure 6 illustrates the re-scaling of the spread index X shown in Figure 4 to 3-month coupon periods with the scaling factor $B_{3\text{mo}} = \overline{Y}/\overline{X}$, where $\overline{X}$ is the average of the yield spread index X over the illustrated sample period, 2014–2019, and $\overline{Y}$ is the average spread of LIBOR over SOFR during the same sample period.

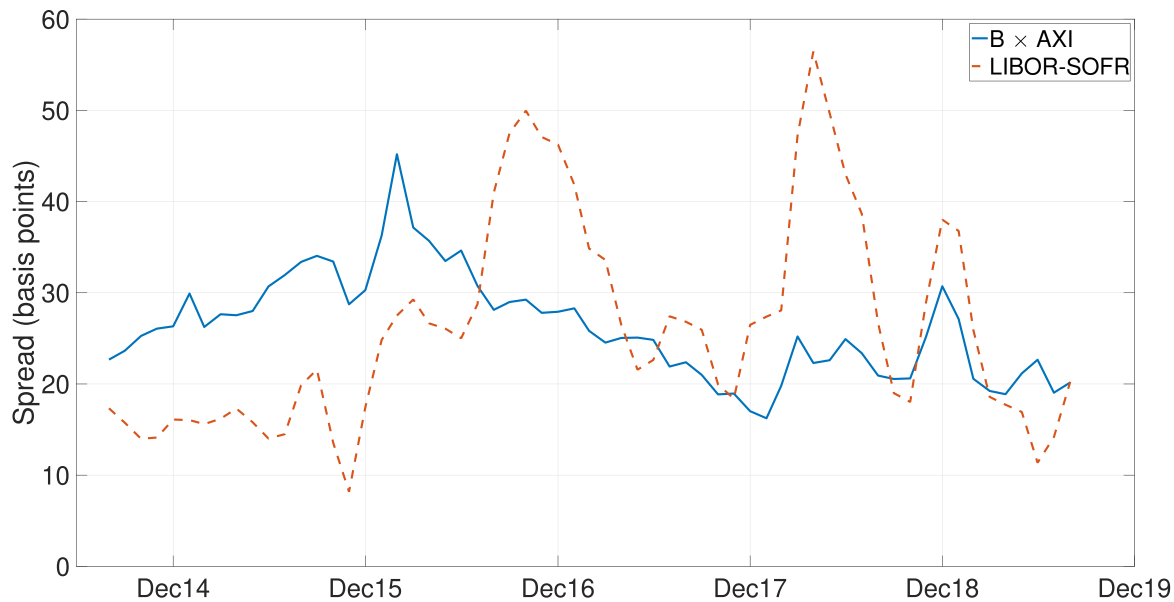

Figure 6: **Yield-spread index, rescaled to average 3-month LIBOR-SOFR, 2014–2019** In red, the spread of 3-month LIBOR over 3-month SOFR, compounded in arrears. In blue, AXI in Figure 4 scaled by $B_{3\text{mo}} = 26/84$, which is the ratio of the mean of LIBOR-SOFR over the indicated sample period (26 bps) to the mean of AXI over the same sample period (84 bps).

Figure 7 shows a preliminary illustrative construction of an across-the-curve index that combines the long-term component shown in Figure 4 with a rough estimate of the short-term money-market funding spread component. The black line shown in Figure 7 is the roughly estimated across-the-curve credit spread index (AXI) for the period 2017–2019, constructed as the simple average of (a) the weighted average long-term (1-5 year) credit spread shown in Figure 4, using Enhanced TRACE and FISD data, and (b) a weighted average of short-term spreads obtained from ICE Benchmark Administration (IBA).

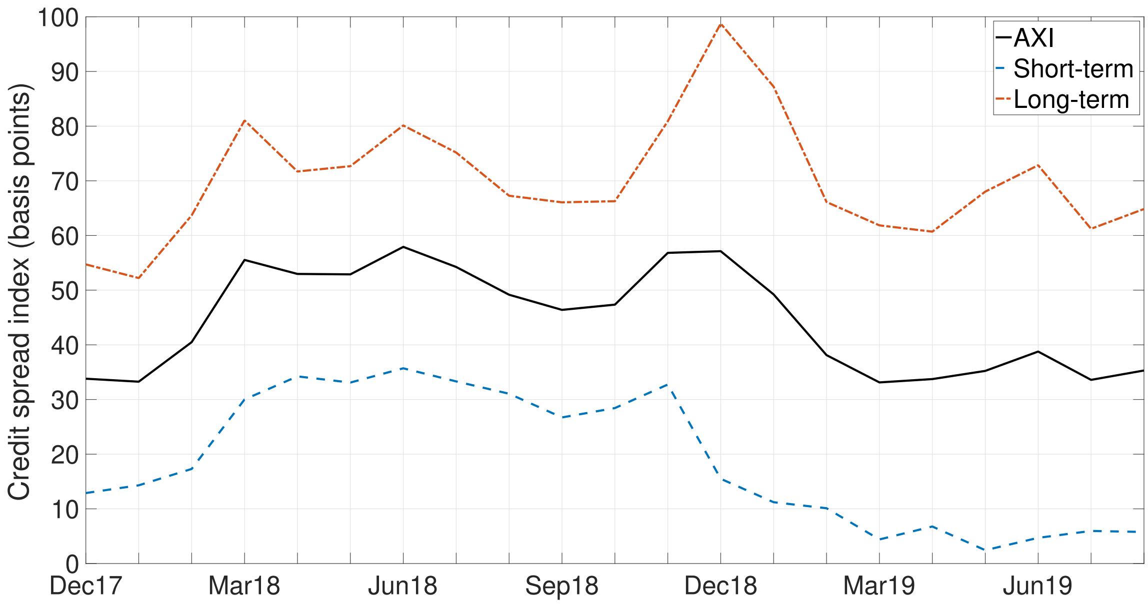

Figure 7: **Combining long-term and short-term spread components (illustrative only)** The black line is a roughly estimated across-the-curve credit spread index (AXI), constructed as the simple average of (a) weighted average long-term spreads (1-5 year bond spreads, Enhanced TRACE and FISD data) and (b) weighted average short-term spreads, using IBA data 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.

The IBA data, available to us from December 2017 onwards, cover wholesale deposits, CP, and CD primary issuances of a panel of 14 banks, restricted to issuances over $10 million. The IBA spread data are reported in four maturity buckets, 5 to 44 days, 45 to 119 days, 120 to 249 days, and 250 to 500 days. Because issuances in the 250-to-500 day bucket are low, and because this bucket intersects the 1-year to 2-year bucket of our long-term spread component, we drop the 250-to-500 day IBA bucket. We combine the credit spreads for the other three maturity buckets with weights based on average issuance and on a rough estimate of average maturity within each bucket (as we do not have the underlying maturity data). The intention is to capture the relative effect of outstanding amounts of funding obtained at each credit spread. Because of the extremely rough quality of these approximations, given our data limitations, the resulting short-term spread component, shown in blue in Figure 7, is only useful for illustrative purposes.

5 Questions and answers

The approach that we have outlined may raise questions such as the following, to which we offer some answers.

1. Are you proposing that banks should not provide loans based simply on SOFR?

   No, we are not. That's up to banks to decide based on business-strategy considerations. Issuing loans at a fixed spread to SOFR is significantly simpler, involves no delay or uncertainty associated with the development a credit spread index, and allows reliance on an extremely robust reference rate, SOFR. In the event, though, that banks choose to include a variable bank credit spread component to their floating-rate loan terms in order to hedge changes in their funding costs, we are suggesting criteria that point toward a representative and robustly determined credit spread index, which would therefore depend on a broad set of debt issuances with maturities ranging from short term to multiple years.

2. An across-the-curve weighted average credit spread does not correspond to the yield spread on any particular sort of issuance. Does that raise any concerns?

   We are not aware of any specific concern that this raises. If the objective is an index that, when added to a risk-free benchmark like SOFR, moves in high correlation with recent average market bank funding costs, then linking a reference credit spread index to a specific issuance maturity would not suffice.

3. Would the use of a credit spread index lower the incentive of market participants to transition from LIBOR?

   No. The existence of a credit spread index does not alleviate the need to stop referencing LIBOR.

4. Why should an across-the-curve index construction rely on weights that depend on both secondary market trade volumes and on primary-market issuance volumes?

   Weighting by transactions volumes in the secondary market is desirable for representativeness of recent market pricing within each maturity range. This also improves statistical robustness and reduces manipulability. Weighting across maturity segments by issuance volumes creates an average spread that reflects the recent composition of bank borrowings. When banks term out their borrowings to longer maturities, their average cost of funds becomes more correlated with longer term credit spreads, and vice versa.

5. Does the availability of a credit spread index reduce market reliance on SOFR, and thus lessen the "momentum" behind transition to SOFR?

   No. Whenever a loan is indexed to a credit spread index, it would also reference SOFR. So, use of a credit spread index does not imply less frequent reference to SOFR. It could be problematic, however, if the sum of SOFR and a spread index were to become a benchmark reference rate in its own right. Market participants and regulators should probably discourage that practice. The construction of floating-rate loan terms indicated in formula (1) *implies that the credit spread index would be used in different ways for different applications, including loans with different coupon periodicity and derivatives of different types. No single combined rate involving SOFR and the spread index seems likely to become dominant.*

6. Why do you emphasize the use of a credit spread index that is sufficiently robust to support a large derivatives market?

   With the emergence of an active loan market based on a credit spread index, there would be many potentially important useful applications for hedging and speculation based on that index, some of which we have outlined. It would tempt fate to choose a credit spread index that is not based on a large pool of transactions. Regulators and market participants can avoid painting themselves into that corner.

7. Your illustrative construction of a spread index includes transactions over the previous month, therefore lagging the most recent available prices. Does this not imply a staleness concern?

We chose a one-month observation period for illustrative purposes. Experimentation may suggest a shorter observation window. Reliance on an index that depends only on a much smaller available daily sample, however, would imply a much noisier index, having greater susceptibility to manipulation. Moreover, the intent is an index that, when added to a risk-free rate, is correlated with a bank's recent cost of funds. A bank's recent cost of funds is determined by the yields of its recently issued stack of liabilities, most of which are issued on a range of past dates. This explains the once-prevalent use of long-lag COFI reference rates, which move very slowly with changes in cost of funds. A credit spread index of the sort that we have illustrated is a compromise between using a very stale index, like 11th District COFI, and a current-market credit-sensitive rate such as LIBOR (which is no longer feasible). Finally, it bears mentioning that linking a loan interest payment to a lagging market spread index implies no sort of "arbitrage." The impact of any recent changes in market spreads can be embedded into the fixed spread (including the borrower-specific component) that is added to the variable rate components when setting the loan terms. Lenders would undoubtedly have in mind recent changes in market conditions when offering loan terms. Borrowers that are negotiating loan terms would benefit from staying up to date on changes in market credit spreads.

8. Your illustrative construction of a spread index is heavily slanted toward the funding costs of large banks, given that large banks are the largest issuers and their issues have the largest amounts of trade volumes in the secondary market. Aren't you concerned that this will be unattractive for use by smaller banks as a benchmark for their lending?

   Again, one wants an index that is based on a large pool of transactions. Studies can determine whether the funding costs of smaller banks are sufficiently correlated with the funding costs of larger banks that smaller banks would want to use this sort of credit spread index. Smaller and mid-size banks have been content to reference LIBOR, which is based exclusively on the funding costs of the largest banks, including non-U.S. global banks. Ameribor may be a useful alternative for some small banks, despite being an overnight rate.

9. The September 2019 letter from banks to regulators emphasized not only the desire of banks to hedge their funding costs, but also the desire to lower the incentive of their corporate borrowers to hoard cash in stress periods by drawing down credit lines. If a credit line is at a fixed spread to

SOFR, borrowers have, in effect, put options to exercise lines at a fixed spread to risk-free rates even with significant increases in their own credit spreads, which would be expected during stress periods. This may cause a surge of drawing on credit lines that is costly for banks to fund. Does this not imply that it could be valuable for a credit spread index to be correlated not only with bank funding spreads, but also with the credit spreads of corporate borrowers?

Yes, this is an important point. Moreover, by incorporating data based on transactions of both financial and non-financial corporate debt instruments, one can construct a more robust credit spread index. In order to provide a sense of the implications of including the transaction yield spreads of non-financial U.S. corporate bonds, we compare in Figure 8 the long-term yield spreads of bank and bank holding companies shown in Figure 4 and the analogous index constructed with the same methodology, except for including non-financial issuer bonds meeting the same criteria. As shown, these two bond yield-spread indices are highly correlated, especially over the past few years. An advantage of including non-financial issues is the much larger volume of transactions that can be exploited for robustness. We estimate that this scales up the dollar volume of covered transactions over the period 2014–2019 by factor of nearly 5.

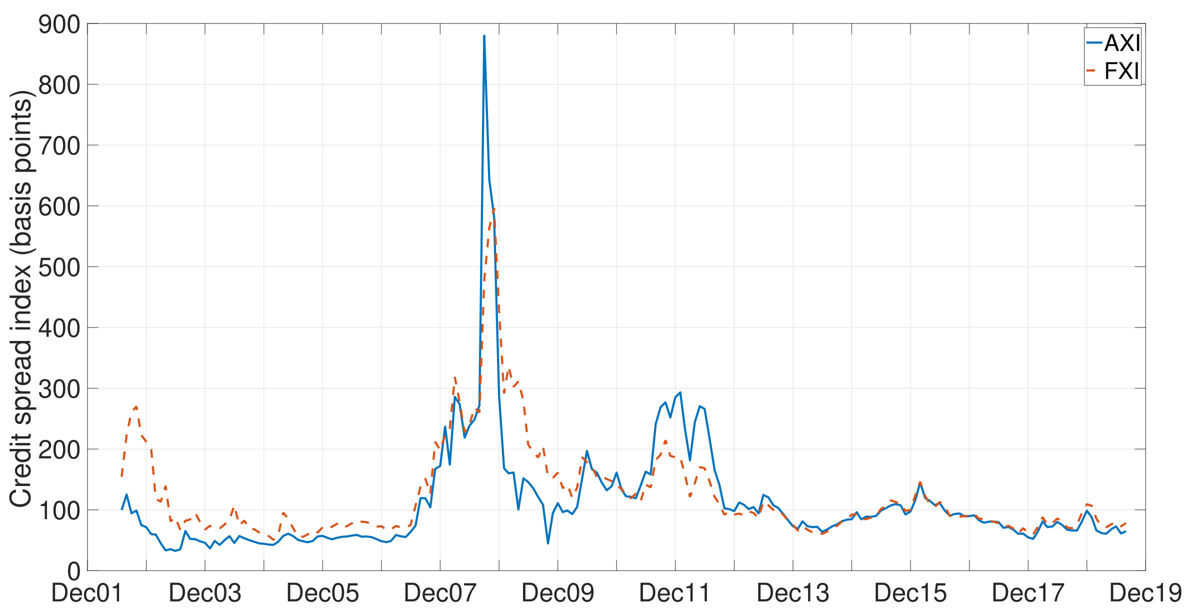

Figure 8: **Long-term yield spread indices** The figure shows the weighted average long-term yield spread index of bank and bank holding companies shown in Figure 4, shown as "AXI," and the analogous long-term yield spread index, "FXI," constructed using the same methodology and widening the coverage so as to include all corporate bonds. Underlying data: Enhanced TRACE, FISD.