On Credit Sensitive Reference Rates: AXI

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Background

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- During periods of economic stress, credit spreads on bank debt and other wholesale bank borrowings tend to increase, raising banks cost of funds. 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).

Credit Sensitivity Group

- In 2020, the Federal Reserve convened the Credit Sensitivity Group (CSG). The CSG held four workshops between June and August 2020. The CSG's initial plan was to recommend a specific credit sensitive rate/spread as a supplement to SOFR.

- In October and November 2020, the U.S. banking regulators stated that they would not endorse a specific replacement rate for LIBOR for loans: "A bank may use any reference rate for its loans that the bank determines to be appropriate for its funding model and customer needs. However, the bank should include fallback language in its lending contracts that provides the use of a robust fallback rate if the initial reference rate is discontinued."

Credit Spread Indices

A useful credit-spread index should meet the following basic criteria (Berndt, Duffie, and Zhu (2020)):

- Hedging effectiveness: Highly correlated with bank cost of funds, as determined by recent market credit spreads for wholesale unsecured issues of banks.
- 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, with minimum risk of statistical corruption or manipulation.
- Adaptable to changes in issuance patterns: The index should 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.

Large Bank Funding Structure

- Since the 2007-2008 financial crisis, advanced economy large banks have responded to market and regulatory pressures to increase stable funding by significantly changing their funding structures. Underlying the decline in many banks share of wholesale funding has been a cutback in the use of short-term funding and a contraction in interbank liabilities, (Committee on the Global Financial System (2018)).

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- U.S. and foreign banks differ significantly in terms of their reliance on unsecured short-term wholesale funding, particularly their reliance on unsecured funding from prime money market mutual funds, (Anderson, Du, and Schlusche (2021)).

Unsecured Short-Term Wholesale Funding

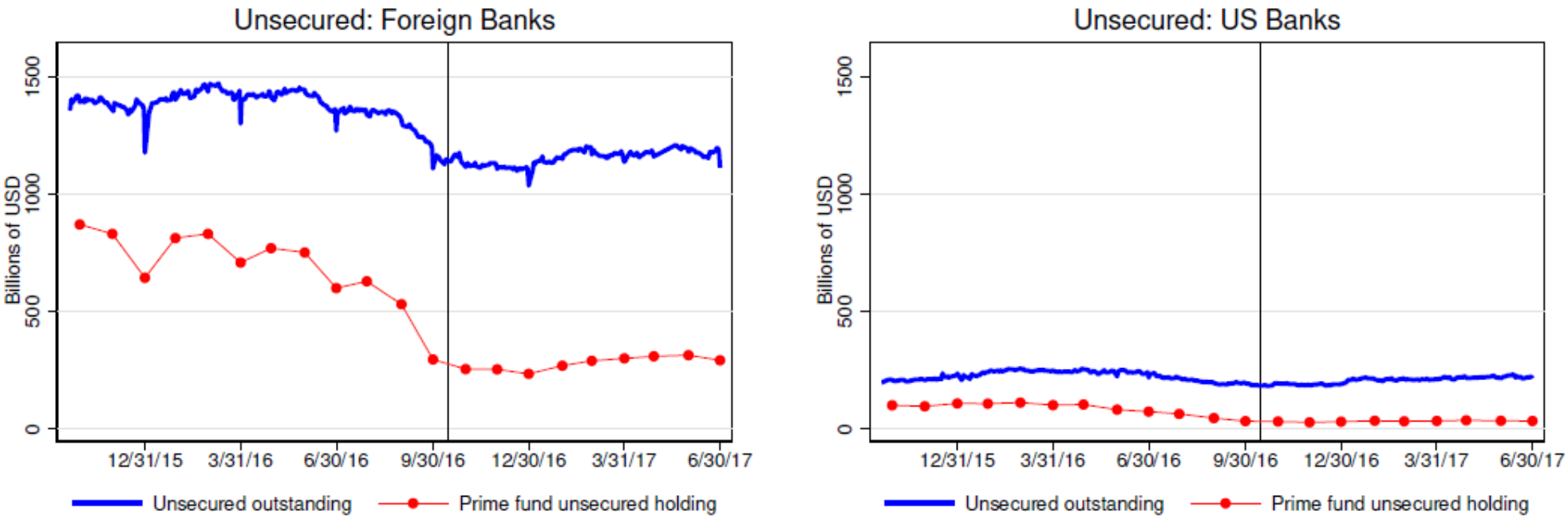

Figure: Total unsecured short-term wholesale funding outstanding (blue) and prime MMFs unsecured holdings (red), broken down by foreign (left column) and U.S. (right column) banks. Source: Anderson et al. (2021).

Across-the-Curve Credit Spread Index

- Darrell Duffie from Stanford University, and Antje Berndt and Yichao Zhu from the Australian National University outlined the design of the *across-the-curve credit spread index (AXI)* in July 2020.
- SOFR Academy (SFA) is finalizing the design and construction of AXI and will be releasing an AXI prototype shortly. SFA has introduced AXI to the U.S. official sector as well as to private sector financial institutions. We will be partnering with an administrator to ensure that AXI is aligned with the IOSCO principles and available for usage in Q4 2021.

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- *AXI 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.* 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 volume.

The Bond-based Component of AXI

Consider 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:

- 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.

Spreads by Maturity

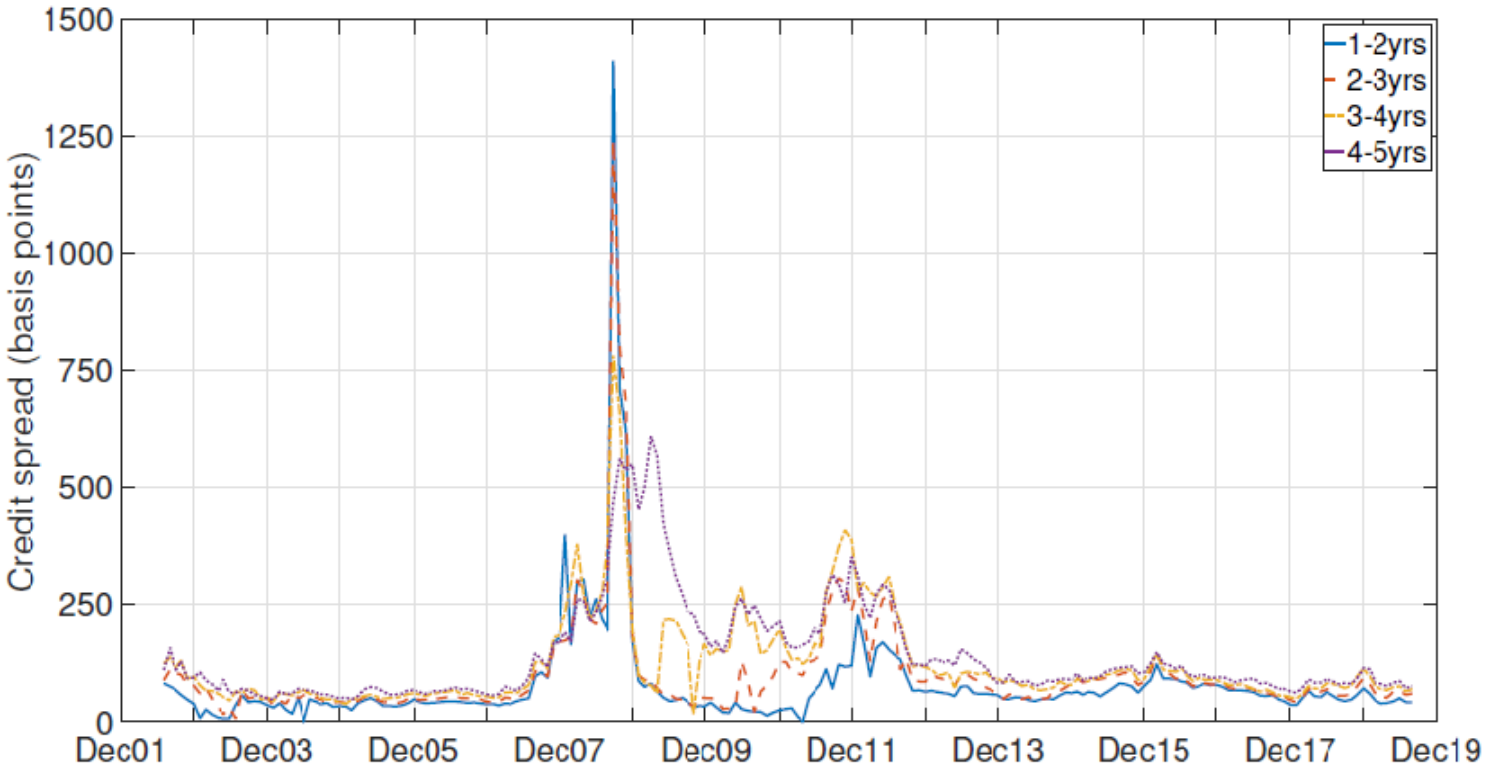

Figure: Transaction-volume-weighted credit spreads of U.S. bank holding companies and commercial banks, for each of four maturity ranges, 2002 - 2019. Underlying data: Enhanced TRACE, uncapped transactions above $\$250,000$ for fixed-rate and zero-coupon bonds. Source: Berndt et al. (2020).

Transaction Volumes

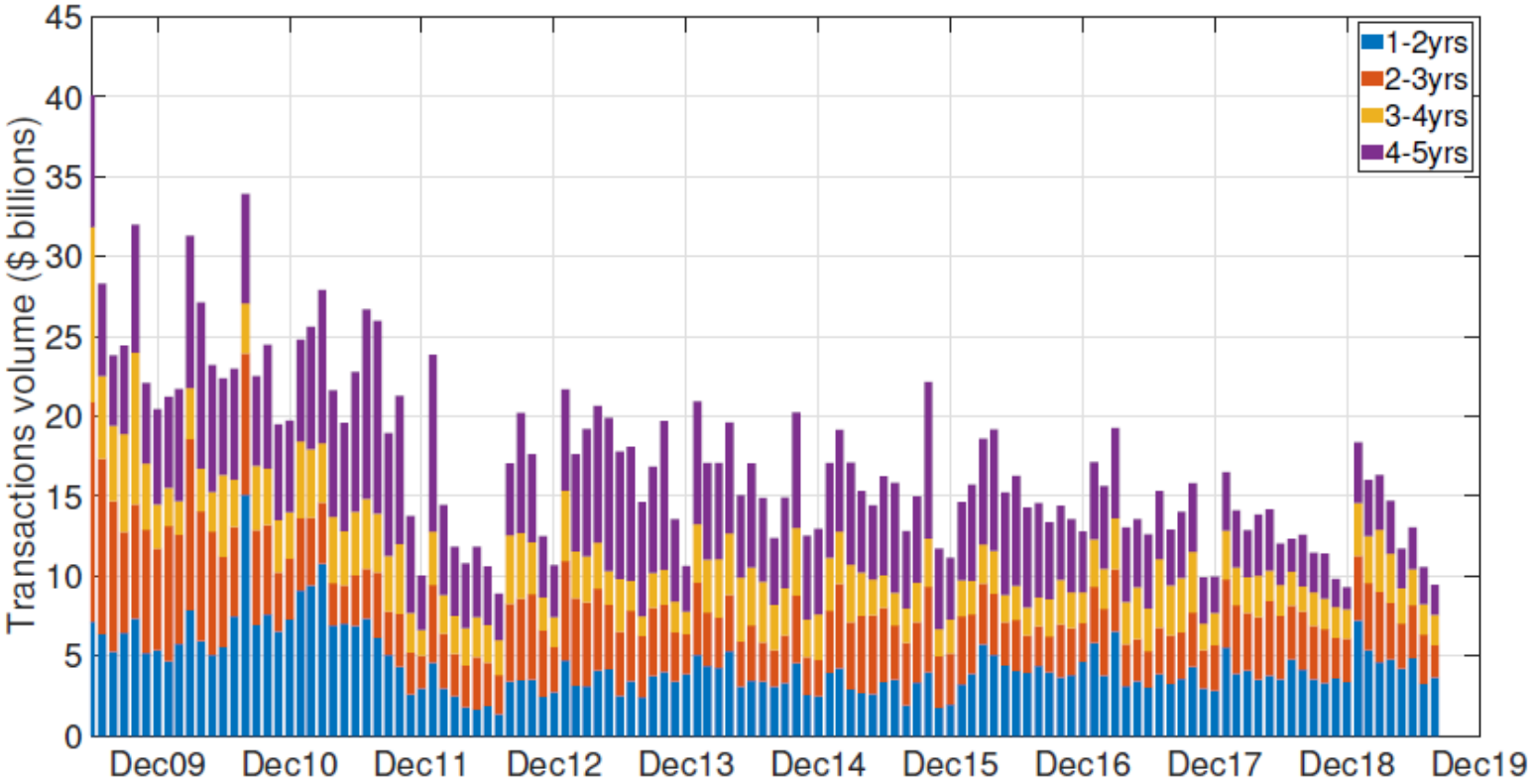

Figure: Monthly transactions volumes in each of four maturity ranges. Underlying data: Enhanced TRACE, uncapped transactions above $\$250,000$ for fixed-rate and zero-coupon bonds. Source: Berndt et al. (2020).

- For each maturity bucket m, 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.

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- For money-market maturities, such as 1 day, 1 month, 3 months, and 6 months, issues of commercial paper (CP), wholesale certificate of deposits (CDs), and interbank deposits would be weighted based on current outstanding amounts, scaled as desired.

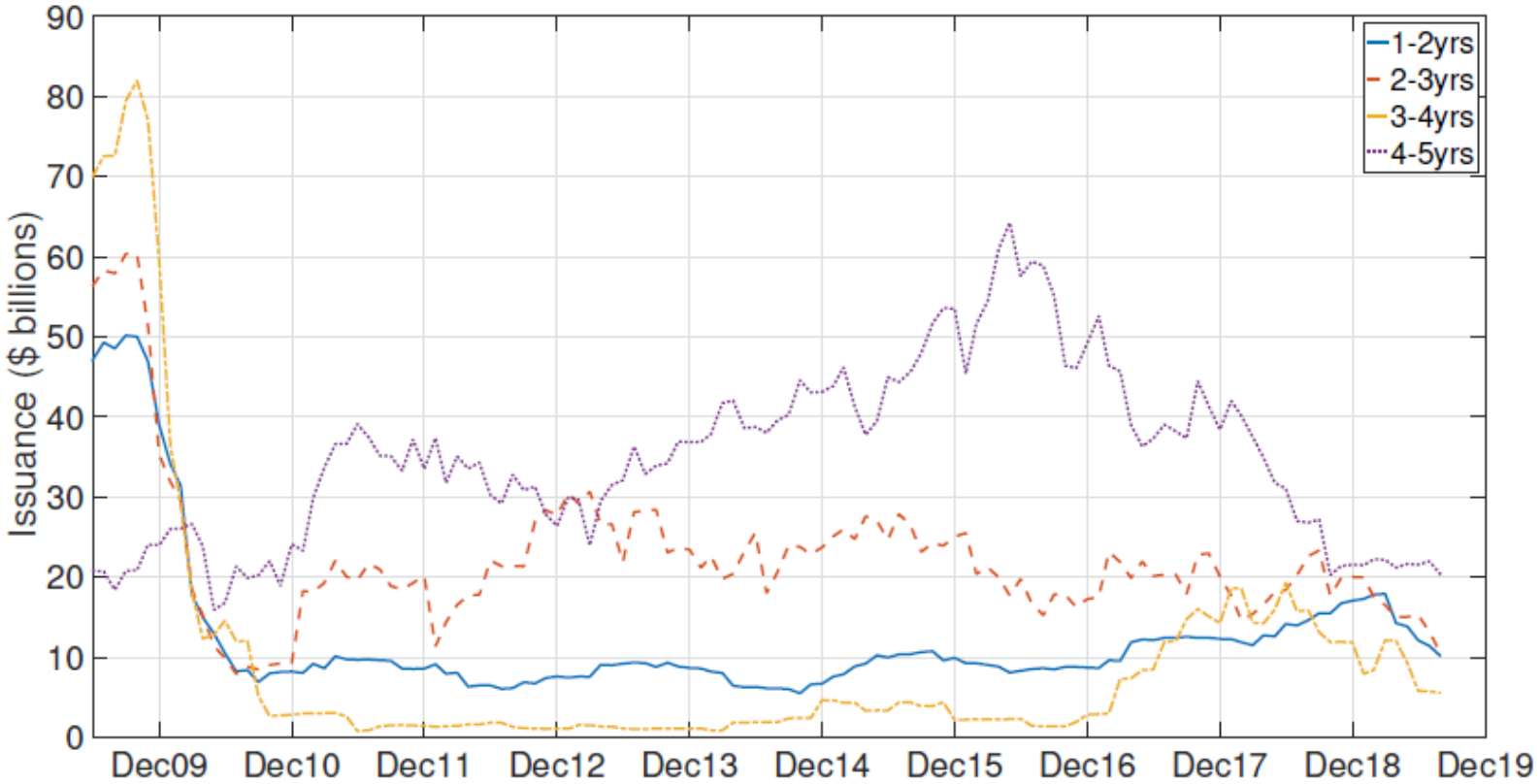

Figure: Trailing annual issuance (principal amount) in each of four maturity ranges. Underlying data: Enhanced TRACE. Source: Berndt et al. (2020).

A Preliminary Estimate of AXI

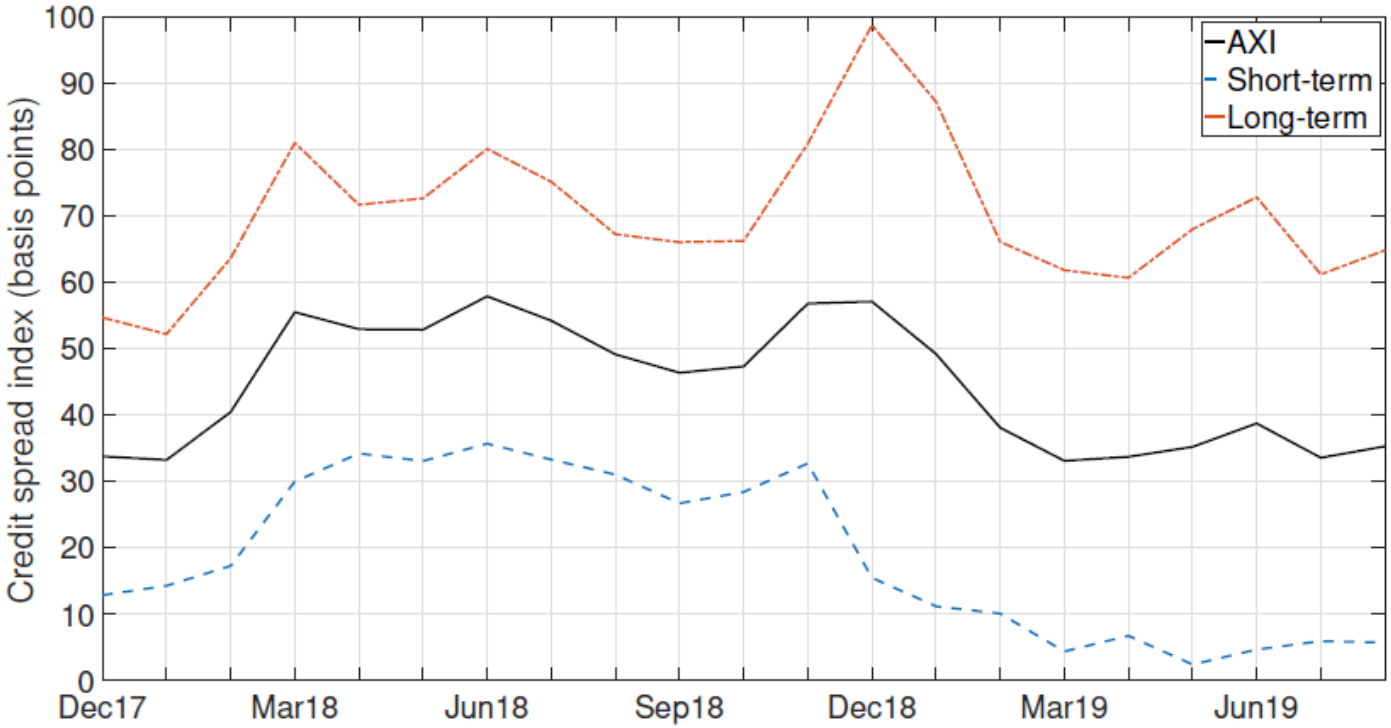

Figure: The black line is a rough estimate of AXI as the simple average of (a) weighted average long-term spreads (1-5 year bond spreads) and (b) weighted average short-term spreads, using IBA data on wholesale deposits, CP, and CD primary issuances of a panel of 14 banks, restricted to issuances over $\$10$ million and maturities under 250 days. Short-term spreads are weighted by average issuance and a rough estimate of average maturity. Source: Berndt et al. (2020).

Scaling AXI for Floating-rate Interest Payments

AXI should be scaled down when contracting monthly, quarterly, or semi-annual floating-rate interest payments. Example:

- A bank loan linked to AXI (X) would have a floating interest payment $R(t)$ on date t of the contractual form:

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

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- Floating-rate risk can be managed with combinations of SOFR derivatives and AXI derivatives, e.g., 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 AXI payer swap with notional $B_n P$.

Example: Re-scaling of AXI to 3-Month Coupon Periods

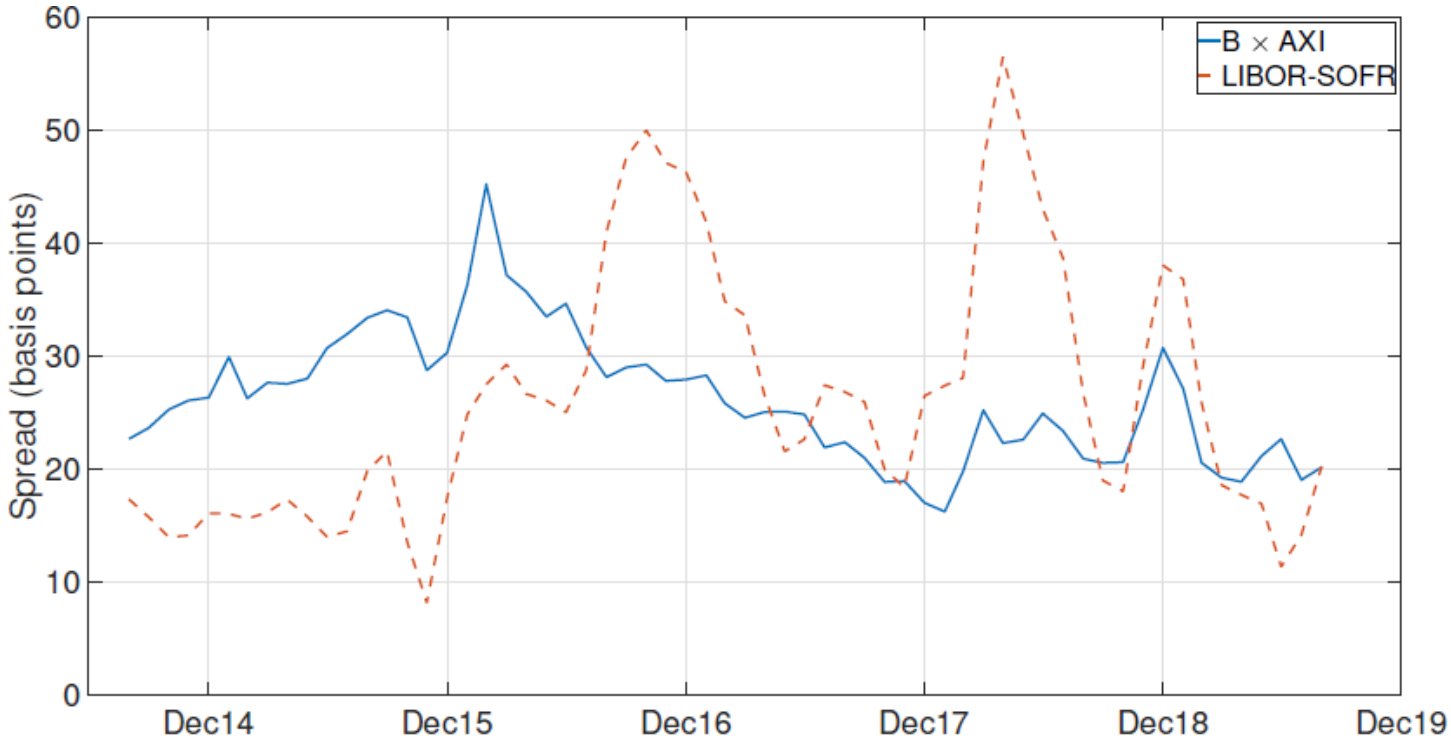

Figure: In red, the spread of 3-month LIBOR over 3-month SOFR, compounded in arrears. In blue, AXI scaled by $B_{3mo} = 26/84$, which is the ratio of the mean of LIBOR-SOFR over the indicated sample period (26 bps) to the mean of AXI over the same sample period (84 bps). Source: Berndt et al. (2020).

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- In May 2021, IHS Markit launched the USD Credit Inclusive Term Rate (CRITR) and USD Credit Inclusive Term Spread (CRITS), both a series of forward-looking term rates that measure the daily USD cost of funding in the banking system, (IHS Markit (2021)).

Concluding Remarks

- The funding structure of global banks has changed significantly after the 2007-2008 financial crisis. Large U.S. banks may continue to further reduce their reliance on less stable short-term wholesale funding. The finalized net stable funding ratio (NSFR) came into effect in the U.S. last month, (Quarles (2020)) – an indication of the continued shift toward more stable and longer term funding structures.

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- Unlike AXI, other existing credit sensitive indices appear to be more correlated with LIBOR as opposed to the overall bank funding costs.