

Credit Sensitivity Group Workshop 1
Meeting Minutes
June 4, 2020

Workshop Attendees

Alastair Borthwick (Bank of America)
Ashish Kumbhat (Bank of America)
Andrei Magasiner (Bank of America)
Sharon Hamilton (BBVA)
Chris Marshall (BBVA)
Tom Feil (Capital One)
Jeff Kuzbel (Capital One)
John Finley (CenterState Bank)
Stasie Kostova (Comerica)
Riley Saunders (Fifth Third Bank)
Brennen Willingham (Fifth Third Bank)
Hilary Gevondyan (First Republic Bank)
Mike Selfridge (First Republic Bank)
Mark Brell (Frost Bank)
Mike Abarca (Huntington Bank)
Derek Meyer (Huntington Bank)
Chris Cole (Independent Community Bankers of America)

Tony Bulic (KeyBank)
Jay Luzar (KeyBank)
Peter Olsen (M&T Bank)
Doug Sheline (M&T Bank)
Scott Warman (M&T Bank)
Matt Engstrom (MUFG)
John Trohan (MUFG)
Kieran Fallon (PNC Financial Services Group)
Randall King (PNC Financial Services Group)
Gagan Singh (PNC Financial Services Group)
Darrell Duffie (Stanford University)
Tom Baxter (Sullivan & Cromwell)
Rodgin Cohen (Sullivan & Cromwell)
Cori Krebs (US Bank)
Joe Tessmer (US Bank)
Brian Grabenstein (Wells Fargo)

Ex-Officio Attendees

Joe Carapiet (Board of Governors of the Federal Reserve System)
Darren Gersh (Board of Governors of the Federal Reserve System)
Evan Winerman (Board of Governors of the Federal Reserve System)
Irina Leonova (Federal Deposit Insurance Corporation)
Alex LePore (Federal Deposit Insurance Corporation)
Betsy Bourassa (Federal Reserve Bank of New York)
Ray Check (Federal Reserve Bank of New York)
Marco Cipriani (Federal Reserve Bank of New York)
Lindsay Collins (Federal Reserve Bank of New York)
Eric LeSueur (Federal Reserve Bank of New York)

Jamie Pfeifer (Federal Reserve Bank of New York)
Will Riordan (Federal Reserve Bank of New York)
Monica Scheid (Federal Reserve Bank of New York)
Nate Wuerffel (Federal Reserve Bank of New York)
Jay Gallagher (Office of the Comptroller of the Currency)
Christopher McBride (Office of the Comptroller of the Currency)
Chloe Cabot (U.S. Department of the Treasury)
Peter Phelan (U.S. Department of the Treasury)
David Metzman (U.S. Securities and Exchange Commission)
Jeff Dinwoodie (U.S. Securities and Exchange Commission)

- Due to the COVID-19 pandemic, the first Credit Sensitivity Group (CSG) workshop was held remotely via videoconference. Federal Reserve Bank of New York (FRBNY) staff, in their role providing secretariat services to the CSG workshops, opened the meeting by providing background on the CSG workshops. This background included a description of a [letter](#) to the official sector by some banks expressing a desire to explore ways to include a credit sensitive rate/spread that could be added to the Secured Overnight Financing Rate (SOFR) for loan products, as well as the official sector's [plan](#) in response. Under that plan, the official sector would initially convene a series of working sessions with banks of all sizes and borrowers of different types, with the goal of understanding the lending needs of these banks and their borrowers and how a robust credit sensitive rate/spread could be developed to address them. The workshops would cover the nature of the problem, the data that could be used to construct a rate/spread, and the design considerations in constructing robust reference rates. FRBNY staff emphasized that the workshops are administratively separate from, but supportive of, the work of the [Alternative Reference Rates Committee \(ARRC\)](#) and reiterated that overall the main priority is moving the financial system off of LIBOR and onto robust reference rates by the end of 2021, a timeline recently [reinforced](#) by the UK Financial Conduct Authority.
- FRBNY staff provided background on the LIBOR transition, highlighting that the Financial Stability Oversight Council (FSOC) noted that reliance on LIBOR creates vulnerabilities that could pose a threat to

market integrity, the safety and soundness of individual financial institutions, and to financial stability. FRBNY staff noted the FSOC recommended the International Organization of Securities Commissions' (IOSCO) [Principles for Financial Benchmarks](#) be considered in the assessment of financial benchmarks in the U.S., and in its [2013 annual report](#), the FSOC recommended the prompt identification of alternative interest rate benchmarks that are anchored in observable transactions and are supported by appropriate governance structures, and development of a plan to accomplish a transition to new benchmarks.

- In 2014, the Board of Governors of the Federal Reserve System and the Federal Reserve Bank of New York convened the ARRC. The ARRC evaluated a number of potential alternatives to USD LIBOR against criteria aligned with IOSCO's *Principles for Financial Benchmarks*, along with an assessment of the ease of implementing a transition. Following extensive deliberations, including seeking input from a wide range of stakeholders, the ARRC selected SOFR as its preferred alternative to USD LIBOR. Staff also noted that the ARRC's recommendations have always been voluntary and ARRC recognizes that market participants may choose other rates, but any solutions must be robust.
 - Staff reviewed transaction information and rates in money markets over recent months during the COVID-19-related volatility. Activity in the repo markets underlying SOFR remained high. Term unsecured wholesale funding market activity—an input to LIBOR—remained very limited, especially so in mid-March.
- FRBNY staff summarized responses to a pre-workshop questionnaire on the challenges associated with transitioning loan products to SOFR and available data to support a credit sensitive supplement to SOFR. The responses identified broad challenges in moving away from LIBOR, as well as challenges specific to transitioning loans to a risk free rate that does not feature a built-in credit sensitive component. The summary is included as an appendix to the minutes.
- The workshop proceeded to a presentation and panelist discussion on potential challenges transitioning loan products to SOFR.
- Representatives from The PNC Financial Services Group and M&T Bank opened the discussion with a presentation that articulated their views on the need for a rate with a credit sensitive component that could offset potential rising funding costs of banks in times of economic stress. The panel that followed included a range of banks of different sizes as well as Professor Darrell Duffie of Stanford University.
 - Presenters described that there could be a mismatch between banks' unhedged cost of funds and SOFR-based commercial loans during an economic downturn that could erode bank capital, and that a credit sensitive rate/spread would provide a natural hedge. Presenters noted that the spread between LIBOR and overnight Treasury repo rates widened during the 2008 financial crisis and the onset of the COVID-19 pandemic. They also reviewed their projections of the potential impact on bank net interest income during periods of economic stress if LIBOR-based commercial loans were instead benchmarked to SOFR.
 - Presenters noted that while SOFR was an appropriate benchmark for a range of types of transactions that currently reference LIBOR, there is a use case for a credit sensitive rate/spread to SOFR which would be focused on a subset of loans, including revolving lines of credit, commercial real estate loans, and commercial and industrial loans. For example, a number of banks noted concerns about the potential incentive for commercial customers to draw on SOFR-linked lines of credit versus otherwise comparable LIBOR-linked lines of credit during times of stress. Some participants noted alternative approaches to offset potential rising funding costs.
 - Participants also discussed issues related to applying a static spread adjustment to SOFR that could offset potential rising funding costs of banks in times of economic stress. Some noted it

would be difficult to prospectively determine such an adjustment that would accurately reflect differences between SOFR and bank cost of funds over different time periods.

- Participants discussed the nature of the credit sensitive rate/spread, and various types and tenors of credit and term risk it should reflect in order to represent the funding cost of different types and sizes of banking institutions. Participants recognized that an economic downturn could have different effects on different types of institutions, based on their funding models, among other factors.
- Participants also discussed the ability to create a credit sensitive supplement to SOFR. Some participants were optimistic that it could be done with relative ease, noting a variety of sources that might be useful in constructing a spread. Others were skeptical that it could be done before the end of 2021 and noted the limited number of underlying bank transactions in term unsecured money markets, particularly during periods of stress. The group discussed that the data available to create such a supplement would be discussed further in the second workshop.
- Participants also discussed the potential impact from the use of SOFR on pricing of corporate loans, both over the long-term and during periods of stress.
- Some participants noted that the use of SOFR plus a credit sensitive spread could lead to demand to hedge the credit sensitive spread in the derivatives market.
- Some participants highlighted the importance of being able to clearly communicate to their customers about the transition away from LIBOR. They noted some benefits of having choice in the rate used in their loans, and also acknowledged some costs, including potential market fragmentation. Some participants also mentioned challenges that borrowers might face in transitioning to SOFR-based loans. FRBNY staff noted that future sessions would involve borrowers of different types.
- There was also discussion on ways to mitigate the potential funding mismatch risk between banks' SOFR-based loans and unhedged cost of funds if the banks issued SOFR-based loans, with some noting the potential use of interest rate floors and other hedging activities to help reduce the risk. Some acknowledged potential challenges and limitations to such an approach.
- Finally, workshop participants noted the timeline heading into the end of 2021, after which the publication of LIBOR can no longer be guaranteed.

— FRBNY staff concluded the meeting by noting that the second workshop, which would be focused on data that could be used to construct a rate/spread, would be held in July.

Appendix: Credit Sensitivity Group (CSG) Workshop 1 Questionnaire Summary of Responses

Participants in the first CSG workshop were asked to complete a voluntary pre-workshop questionnaire aimed at identifying the challenges associated with transitioning loan products to SOFR and available data to support a credit sensitive rate/spread that could be added to SOFR. Twelve banks responded to the questionnaire. Feedback covered a range of issues associated with the transition away from LIBOR. Feedback highlighted below was summarized for the workshop participants.

- Respondents noted challenges associated with transitioning both commercial and consumer loan products to SOFR. Among the commercial loan types included were revolving lines of credit, commercial term loans, and commercial real estate loans. Among the consumer loan types included were floating rate consumer loans (adjustable rate mortgages), student loans, and home equity lines of credit. Note that while a full array of loan products were referenced in the survey responses, the scope of the CSG workshop is focused on a subset of loans, particularly commercial rather than consumer loans.
- Respondents noted challenges associated with transitioning loan products to SOFR, especially during periods of economic stress when SOFR is expected to decline due to correlation with other overnight money market rates. A few respondents also highlighted that transitioning could be difficult during periods when the LIBOR-SOFR basis diverges from its longer run average. In terms of reflections from the current COVID-19 period, respondents generally indicated that this period demonstrated the challenges in transitioning loan products to SOFR.
- In terms of the nature of potential stress associated with the transition, respondents highlighted challenges with asset-liability matching and effective hedging.
 - Respondents noted that their cost of funds tend to rise during periods of economic stress, while SOFR typically declines.
 - Respondents noted concern that a SOFR-based rate could incentivize incremental draw downs on revolving lines of credit during times of economic stress, and that this dynamic could lead to less availability of credit lines.
 - Respondents also noted that in the absence of a dynamic credit spread, accurately pricing a fixed credit risk premium to add to SOFR requires estimates of frequency and severity of stress events. Uncertainty related to these estimates could lead to a price premium, which is less efficient for borrowers.
 - Respondents highlighted that in the absence of a dynamic credit spread, it is difficult to hedge credit risk. Additionally, regional and community banks typically are not active participants in the repo market, which may make it more difficult for them to hedge exposure to SOFR.
- Respondents highlighted the following as among the potential data sources to inform a credit sensitive spread: FR 2420 Report of Selected Money Market Rates, DTCC Commercial Paper data, TRACE for corporate bonds, and CDS (Markit). Respondents also highlighted proposed or currently produced benchmark rates, including ICE Bank Yield Index and Ameribor. However, some noted that introducing a new component such as a credit sensitive spread in the middle of the LIBOR transition may be challenging and counterproductive. It was also noted that developing a credit sensitive spread may not be feasible, highlighting that Federal Reserve commercial paper data in some tenors was unavailable for several days in March.

June 4, 2020

Credit Sensitivity Workshop 1

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

Participants

- Bank of America
 - BBVA
 - Capital One
 - CenterState Bank
 - Comerica
 - Fifth Third
 - First Republic
 - Frost Bank
 - Huntington
 - Key Bank
 - M&T
 - MUFG
 - PNC
 - US Bank
 - Wells Fargo
- Independent Community Bankers of America
 - Darrell Duffie
 - Sullivan & Cromwell

Official Sector Representatives

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

Agenda

- Introduction of the Credit Sensitivity Group Workshops
- Overview of the Day and Administrative Matters
- Background on the LIBOR Transition
- Presentation and Panel on Potential Challenges Transitioning Loan Products from LIBOR
- Closing Remarks and Next Steps

Background on CSG Workshops

- In a letter to the official sector, some banks expressed a desire to explore ways to include a credit sensitive rate/spread that could be added to SOFR for loan products. Some views expressed by the banks included:
 - “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.”
 - “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).”
 - “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. That framework could consist of a dynamic spread that reflects changes in banks’ cost of funds over forward-looking term periods and is added on a periodic basis to SOFR-based rates.”

Purpose and Approach to CSG Workshops

- Following in person discussions, the official sector laid out a plan
- Official sector would initially convene a series of working sessions among banks of all sizes and borrowers of different types, with the goal of understanding the lending needs of these banks and their borrowers and how a robust credit sensitive rate/spread could be developed to address them.
- Workshops hosted by FRBNY. Secretariat will prepare minutes and summary outcomes of the discussions. This information will be made publically available on the FRBNY website.
- Workshops will cover:
 - Laying the Groundwork: What is the nature of the problem?
 - Reviewing the Data: What data could be used?
 - Constructing Robust Reference Rates: What are the design considerations?
 - Next Steps

CSG Workshops Support Transition from LIBOR

- The upcoming workshops aim to facilitate efforts to overcome transition challenges and move off of LIBOR to robust reference rates.
- The workshops are focused on a credit sensitive supplement to SOFR for lending products.
- The workshops are administratively separate but supportive of the work of the ARRC. The ARRC was convened to help ensure a successful transition from U.S. dollar (USD) LIBOR to a more robust reference rate, its recommended alternative, the Secured Overnight Financing Rate (SOFR).
- The main priority is moving the financial system off of LIBOR to robust reference rates in line with the timeline recently reinforced by the UK FCA.
- We don't want to do this again, so any solution needs to be robust.

Overview of the Day

- 8:45 – 9:45 am: Welcome and Introductions; Background on LIBOR transition and the CSG; Questionnaire Summary
- 9:45 – 10:45 am: Presentation by PNC, M&T
- 10:45 – 11:45 am: Panelist Discussion by Frost Bank, Wells Fargo, Darrell Duffie, Bank of America, First Republic
- 11:45 – 12:00 pm: Break
- 12:00 – 12:45 pm: Facilitated Discussion
- 12:45 – 1:00 pm: Closing Remarks and Next Steps

Ground Rules for the Day

- Participants are free to use and discuss the information received during the workshop sessions, but statements made by participants during workshop sessions may not be attributed to the participant or his or her firm.
- While a participant may share his or her own view on these topics, participants should not make statements purporting to describe the views of the CSG as a whole.
- Participants should not disclose any confidential or commercially sensitive information in workshop sessions.
- The public minutes for each workshop session will include a list of attendees and firms represented and all presentation materials used in the session.
- Opinions expressed or statements made by official sector staff during workshop sessions are solely those of the individual and do not necessarily reflect the views of their agency.

Antitrust Guidelines

- These workshops are being hosted by the official sector and are 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 this workshop.
- 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.

Background on the LIBOR Transition

Background on the LIBOR Scandal

- The Financial Stability Oversight Council (FSOC) noted that reliance on LIBOR creates vulnerabilities that could pose a threat to market integrity, the safety and soundness of individual financial institutions, and to financial stability.
- These vulnerabilities reflect three key issues:
 - LIBOR's widespread use, which creates incentives for manipulation
 - From LIBOR's origins supporting the syndicated loan market it grew into a reference rate for a wide range of products, from commercial and consumer loans to over-the-counter and exchange-traded derivatives.
 - The limited activity in the term unsecured wholesale funding markets.
 - The cases of attempted market manipulation and false reporting.

Overview of Reference Rate Reform's Beginning

- The official sector's LIBOR reform efforts started in 2012 with the Wheatley Review, which focused on the governance and oversight of LIBOR.
- In 2013, the Financial Stability Board (FSB) initiated work to develop reform proposals for major interest rate benchmarks, including LIBOR.
- In 2013, the International Organization of Securities Commissions (IOSCO) released its Principles for Financial Benchmarks.
 - The FSB endorsed the adoption of the IOSCO Principles.
 - The FSOC recommended that US agencies consider the Principles when assessing financial benchmarks in the US.
- In 2014, the FSB released its reform proposal; recommended a "multiple-rate approach"
 - Strengthen LIBOR (and other LIBOR-like rates) by underpinning them to the greatest extent possible with transactions data.
 - Developing alternative, nearly risk-free reference rates.
- In its 2013 Annual Report the FSOC recommended prompt identification of alternative interest rate benchmarks that are anchored in observable transactions and are supported by appropriate governance structures, and development of a plan to accomplish a transition to new benchmarks.

Efforts to Strengthen LIBOR

- In line with the recommendations of the Wheatley Review, steps were taken to strengthen governance and oversight of LIBOR. Notably:
 - In April 2013, the production of LIBOR became formally regulated by the UK Financial Conduct Authority (FCA).
 - In February 2014, ICE Benchmark Administration (IBA) took over as the administrator of LIBOR and has strengthened the governance and oversight of LIBOR.

- Lack of term unsecured wholesale borrowing by banks remains a fundamental challenge for LIBOR.
 - Activity in the markets LIBOR is intended to reflect remains limited, and LIBOR remains reliant on the expert judgment of panel banks.
 - In July 2017, Andrew Bailey, then head of the FCA noted that the lack of an active underlying market raised a “serious question about the sustainability of [LIBOR]”, and the FCA could not guarantee that LIBOR will continue past the end of 2021.

Establishment of the ARRC

- In 2014, the Federal Reserve convened the Alternative Reference Rates Committee (ARRC) to identify robust alternatives to USD LIBOR and identify an adoption plan to facilitate the voluntary acceptance and use of these alternative reference rates.
 - Tasked with identifying a set of alternative USD reference rates that are firmly based on transactions from robust underlying markets and that comply with standards such as IOSCO's *Principles for Financial Benchmarks*.
 - ARRC's five criteria for potential alternative reference rates:
 - Benchmark quality
 - Methodological quality
 - Accountability
 - Governance
 - Ease of implementation

Evaluation of Alternative Rates 1 of 2

- The ARRC considered a number of rates:
 - Overnight general collateral (GC repo) rates
 - Overnight unsecured lending rates
 - Policy rates
 - Treasury bill or bond rates
 - Term overnight index swap (OIS) rates
 - Term GC repo rates
 - Term unsecured lending rates

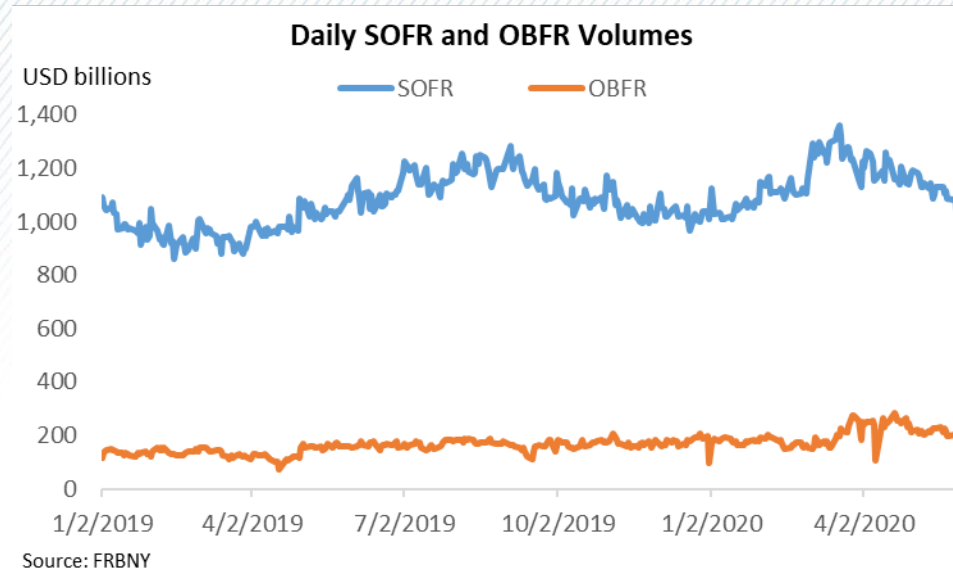
- The ARRC assessed term unsecured wholesale markets did not offer a basis for a robust reference rate anchored in a deep, active market given the lack of borrowing by banks in term unsecured wholesale markets.

Evaluation of Alternative Rates 2 of 2

- The ARRC narrowed its selection of potential alternatives to two rates:
 - An overnight Treasury repo rate—the Secured Overnight Financing Rate (SOFR)
 - A rate reflecting bank borrowing in overnight wholesale unsecured markets—the Overnight Bank Funding Rate (OBFR)

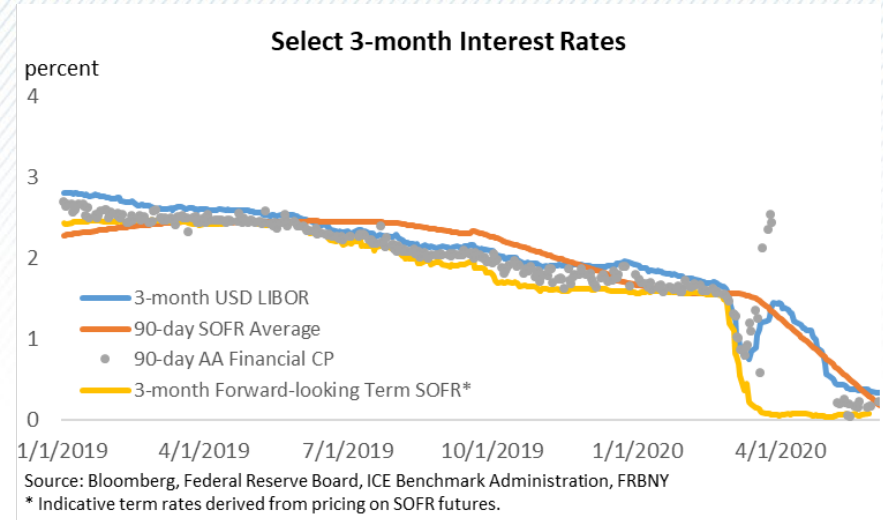
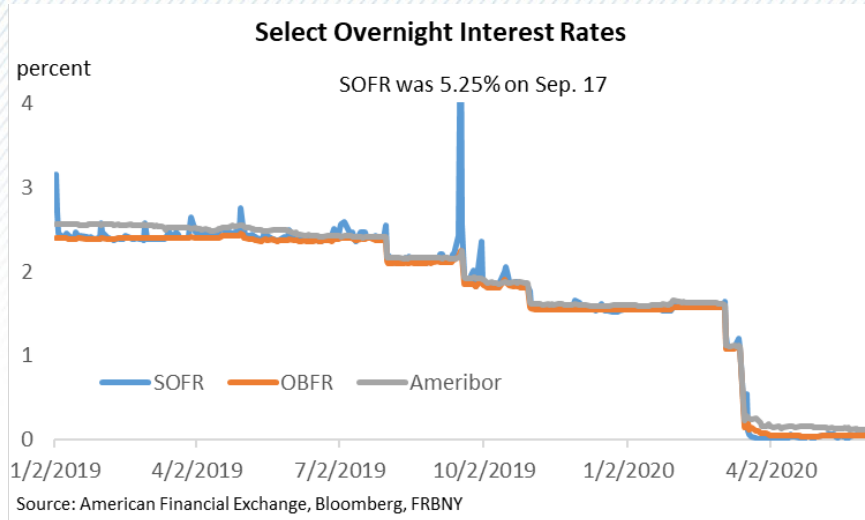
- In July 2017, the ARRC selected the SOFR as its preferred alternative to USD LIBOR.
 - The ARRC considered a variety of factors in selecting SOFR, including
 - The depth of the underlying market and its likely robustness over time;
 - The rate’s usefulness to market participants; and
 - Whether the rate’s construction, governance, and accountability would be consistent with IOSCO’s *Principles for Financial Benchmarks*.
 - In making its selection, the ARRC also considered the input of a wide range of market participants, including feedback from an advisory group of end-users.

Activity Across Overnight Money Markets



- Volumes underlying SOFR consistently above \$1 trillion in 2020.
- Volumes underlying OBFR averaged \$200 billion in 2020.

Secured and Unsecured Rates



- Both secured and unsecured overnight rates generally moved together in 2020.
- Federal Reserve was unable to publish 90-day AA Financial CP rates from late March to early May as trade data were insufficient to support calculation of the rate.
- Data from IBA show that less than $\frac{1}{4}$ of daily USD LIBOR panel bank submissions typically are transaction based (Level 1) in 2020.

Questionnaire Summary

Presentation & Panelists

Facilitated Discussion

Key Questions

- To what extent are there challenges in transitioning loan products to SOFR from a credit sensitive perspective? For which lending products and borrower types?
- How might a credit sensitive supplement to SOFR address the challenge? What could the credit sensitive component reflect?
- Other reflections?

Next Steps

Why the banking system needs a credit sensitive lending benchmark

Presentation for the Federal Reserve Bank of New York CSG workshop
A commercial bank perspective from PNC Bank and M&T Bank
June 4, 2020

The views expressed in this presentation are solely those of the authors and do not necessarily represent those of the sponsors or any other participants in the Credit Sensitivity Group workshops for which it was prepared.

Agenda

- Why a lending benchmark needs to be aligned with bank cost of funds
- Challenges with stand-alone SOFR as a lending benchmark
- Approaches to mitigating these challenges: developing a credit sensitive benchmark for commercial lending
- Conclusions and recommendations

Executive Summary

➤ Overview:

- We are very supportive of the efforts around the development of SOFR as a benchmark for a risk-free reference rate, and the transition away from LIBOR in an expedited manner
- We believe SOFR is a good reference rate for use in a wide variety of liquid capital market derivative and debt instruments
- However, SOFR alone is not likely to be a good benchmark for commercial lending and raises significant macroeconomic, safety and soundness, and financial stability considerations
- We believe that a benchmark with a credit sensitive component that aligns with bank funding costs is the best approach for the commercial lending markets, and the healthy functioning of credit markets to support U.S. businesses and consumers
- **Products in scope for discussion: commercial loans and lines of credit**

Why a lending benchmark needs to be aligned with bank cost of funds

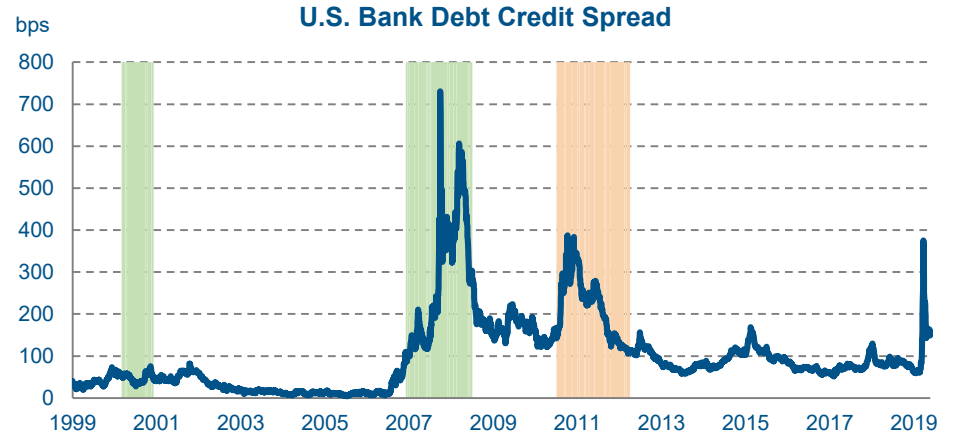
Banks lending rates, cost of funds, and profitability drivers

- A bank's net interest income (NII) depends upon the bank's overall level of balances and is driven by the difference between a bank's cost of funds (borrowing costs) and asset yields
 - NII comprises a large portion of bank revenues and directly impacts bank capital
 - Bank balance sheets are levered and hence, small mismatches in asset and liability yields can get amplified into large changes in banks' income and capital
- Typically, in periods of economic stress, interest rates decline sharply. If yields on bank assets decline in an outsized manner relative to its cost of funds, NII can drop sharply and this can negatively impact bank capital
- Floating rate loan yields are directly linked to lending benchmark yields and hence, a close correlation between lending benchmark yields and bank cost of funds results in alignment between changes in asset yields and borrowing costs
- This alignment helps provide stability for NII and bank capital, especially in periods of economic stress
- The predominant sources of funding for U.S. banks are deposits and bank debt and as such, deposit rates and debt spreads are the key drivers of cost of funds
 - Various factors impact the cost of funds including the level of risk-free rates, yield curve shape, credit spreads, and deposit dynamics
 - Cost of funds are also impacted by the mix of deposits, including by the share of non-interest bearing deposits
 - Run-off in existing debt and deposits, and replacement yields on the same also have an impact on the cost of funds through time

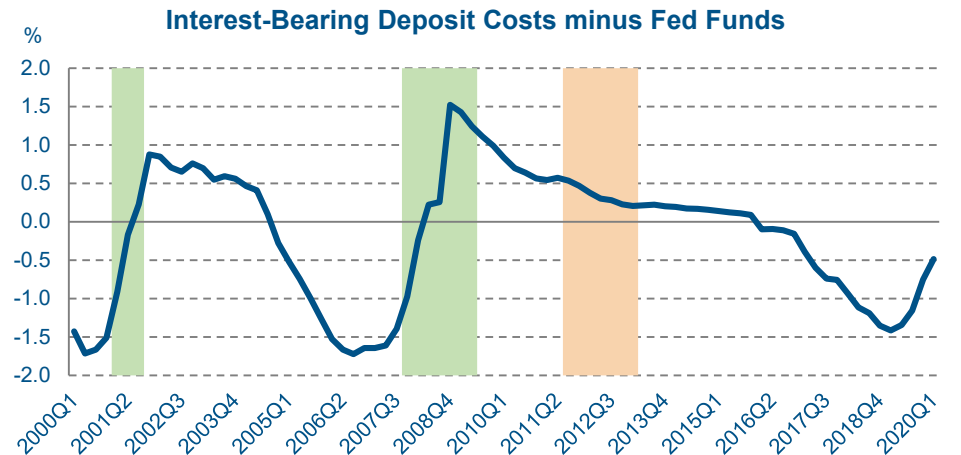
Challenges with stand-alone SOFR as a lending benchmark

Banks' cost of funds: some observations

- Borrowing and lending costs should be evaluated as a spread to the level of risk-free interest rates
- The cost of funds for banks tends to increase relative to risk-free rates in periods of economic and credit stress
 - The two most important sources of funding are bank debt and deposits
- Bank debt spreads widen versus risk-free rates as credit risk increases and overall debt spreads widen
- Deposit costs increase relative to the level of risk-free rates in recessions and periods of economic stress as short-term rates decline faster than deposit rates
- An increase in bank cost of funds tends to put downward pressure on bank profitability in periods of economic stress



U.S. Recession (NBER) Euro Area-Only Recession (CEPR) U.S. Bank Debt Spread

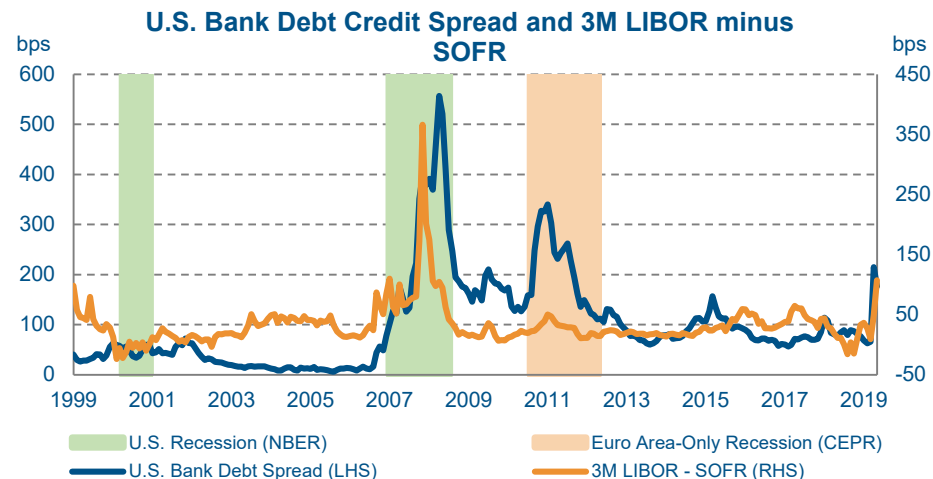


U.S. Recession (NBER) Euro Area-Only Recession (CEPR) Int-bearing Deposit Cost - FFs

Sources: Top Right - JP Morgan DataQuery (JULI U.S. Bank 3 to 5yr z-spread to LIBOR), NBER, and CEPR. Bottom Right - Bloomberg (Fed Funds), SNL/Bloomberg/10-Qs/10-Ks/Earnings Releases (Int-bearing Deposit Costs), NBER and CEPR. See the Appendix for the commercial banks used for interest-bearing deposit cost calculations

Impact of lending benchmark on asset yields and cost of funds: a historical perspective

- In economic downturns, banks' profitability comes under stress as net interest margins typically decline as banks' cost of funds increase relative to risk-free rates
- Furthermore, in these environments, credit losses tend to increase and fee income tends to decline with overall economic activity
- LIBOR rates are based on unsecured inter-bank borrowing costs, and as such, embed a credit risk component
- **The spread between LIBOR and short-term, risk-free rates has historically been highly correlated with credit spreads on term bank debt (see chart)**
- **Because a significant portion of commercial loans have historically been benchmarked to LIBOR, yields on bank loans in economic downturns have declined in a manner consistent with changes in cost of funds, mitigating pressure on NII (see table)**
- During the 2007-2009 period, the LIBOR/SOFR spread widened and cushioned the decline in loan yields, keeping them aligned with the changes in the cost of funds
- In 2001, bank debt costs remained stable, and changes in LIBOR rates, cost of funds, and loan yields remained well aligned with each other



	Early 2000s Recession			Great Recession			Current		
	2000 Q4	2001 Q4	Chng	2007 Q2	2008 Q4	Chng	2019 Q2	2020 Q1	Chng
bps									
Loan Yields	976	789	-187	762	612	-150	542	490	-52
Earning Assets Yield	914	725	-189	697	559	-137	449	403	-46
Deposit Yields	409	249	-160	290	168	-122	78	56	-22
Debt Yields	665	384	-281	519	307	-212	313	230	-83
Cost of Funds	497	292	-205	354	216	-139	118	83	-35
Net Interest Spread*	416	432	16	342	343	1	331	319	-12
SOFR	644	215	-429	511	25	-487	243	123	-120
1M LIBOR	665	220	-445	532	223	-309	244	140	-104
1M LIBOR - SOFR	21	6	-15	21	198	178	1	17	16
U.S. Bank Debt Credit Spread	52	54	2	13	389	376	84	118	34

Sources: JP Morgan DataQuery (JULI U.S. Bank 3 to 5yr z-spread to LIBOR), Bloomberg, NY Federal Reserve, SNL/10-Qs/10-Ks/Earnings Releases, NBER and CEPR

* Net Interest Spread = Earning Assets Yield – Cost of Funds. See the Appendix for the commercial banks used for yield and cost calculations

Potential SOFR impact on bank income and profitability

- SOFR, unlike LIBOR, is a credit risk-free benchmark rate, reflecting rates on overnight borrowings secured by U.S. Treasury securities. During times of economic stress, SOFR (unlike LIBOR) tends to decrease disproportionately relative to other market rates as investors seek the safe haven of U.S. Treasury securities
- This would imply that in periods of economic stress, yields on SOFR-linked loans would decline faster than banks' cost of funds, putting additional downward pressure on bank profitability
- This mismatch will exacerbate stress on bank income and capital, and result in reduced willingness to lend at artificially low rates
- Furthermore, draws on banks' SOFR-linked lending commitments will also 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 drawdown those lines to “hoard” liquidity
 - This will lead to new loans being made at uneconomic spread levels that were determined prior to the onset of economic stress, but still need to be funded at crisis funding costs
- During the 2007-2009 period, given the wide divergence in SOFR versus LIBOR rate behavior, our projections show that if loan yields were linked to SOFR, bank margins would have come under severe stress and NII would have sharply declined (see table)

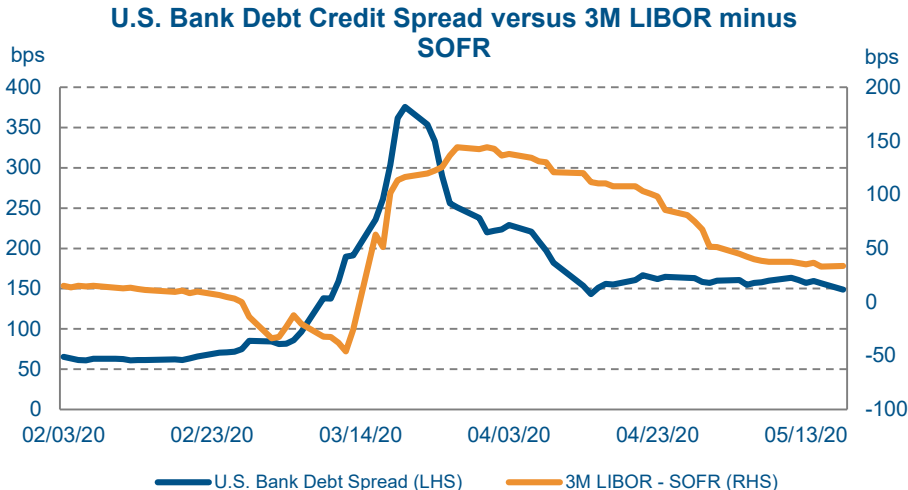
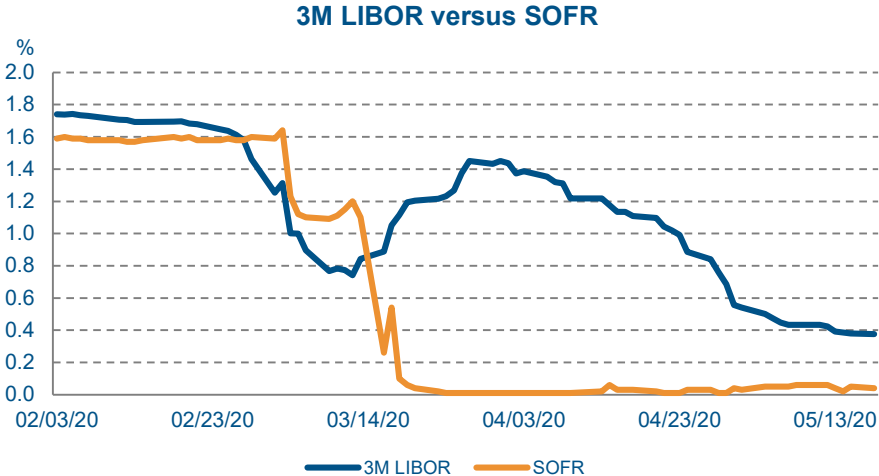
	Early 2000s Recession			Great Recession			Current		
bps	2000 Q4	2001 Q4	Chng	2007 Q2	2008 Q4	Chng	2019 Q2	2020 Q1	Chng
Projected SOFR-Linked Loan Yield	966	787	-179	751	512	-239	541	481	-60
Projected SOFR-Linked Earning Assets Yield	906	723	-184	689	490	-200	449	397	-52
Cost of Funds	497	292	-205	354	216	-139	118	83	-35
Projected SOFR-Linked Net Interest Spread*	409	430	22	335	274	-61	331	313	-17
LIBOR Net Interest Spread	416	432	16	342	343	1	331	319	-12
SOFR	644	215	-429	511	25	-487	243	123	-120
LIBOR	665	220	-445	532	223	-309	244	140	-104

Sources: Bloomberg, NY Federal Reserve, SNL/10-Qs/10-Ks/Earnings Releases, NBER and CEPR

* Net Interest Spread = Earning Assets Yield – Cost of Funds. Projected SOFR-linked loan yields assumes 50% of loans are floating rate. Projected SOFR-linked earning assets yields assumes 70% of earning assets are loans. See the Appendix for the commercial banks used for yield and cost calculations, and explanation of SOFR-Link Yield calculations

LIBOR versus SOFR: recent behavior

- Post-COVID 19 market behavior has provided a good recent test case for many of the aforementioned points and observations
- SOFR and LIBOR diverged sharply starting in early March 2020 as credit concerns spiked and funding stresses developed in credit markets
- Subsequent to forceful policy action by the Fed and Congress, the LIBOR/SOFR spread stopped widening and in recent weeks, has started to compress as credit risk has begun to subside, following the improvement in bank debt spreads
- Needless to say, ex-ante, it would have been difficult to forecast the magnitude and duration of the stress we have witnessed
- The past few months have highlighted the value of a real-time credit risk premium adjustment instead of having a long-term, average add-on spread to SOFR



Sources: All tables – Bloomberg, NY Federal Reserve, and JP Morgan DataQuery (JULI U.S. Bank 3 to 5yr z-spread to LIBOR)

Hypothetical example of SOFR versus LIBOR line of credit

- In a LIBOR environment, a line draw, funded wholesale, produces a net interest spread of 125 bps in 4Q 2019
 - The spread narrows to zero in 1Q 2020
 - In a SOFR environment, the spread becomes negative at -84 bps in 1Q 2020
- Banks cannot renegotiate lending margins during times of stress for committed facilities
 - As a result, committed lines may become uneconomical in stressed economic environments
- This may lead to a significant decline in bank appetite to provide lines of credit

LIBOR Example

Assumptions	4Q19	1Q20
1M LIBOR	0.60%	0.95%
Lending Margin (LIBOR)	2.00%	2.00%
Loan Coupon (LIBOR)	2.60%	2.95%
Wholesale Funding Spread (LIBOR)	0.75%	2.00%
Net Interest Spread	1.25%	0.00%

SOFR Example

Assumptions	4Q19	1Q20
1M SOFR	0.50%	0.01%
Lending Margin (SOFR)	2.10%	2.10%
Loan Coupon (SOFR)	2.60%	2.11%
Wholesale Funding Spread (SOFR)	0.85%	2.94%
Net Interest Spread	1.25%	(0.84)%

SOFR from a borrower's perspective: benefits and challenges

SOFR Benefits

- SOFR rates tend to decline sharply in economic downturns, causing monetary policy easing to be transmitted swiftly and fully to borrowers
- SOFR reference rates are widely available and transaction based, giving borrowers both transparency and confidence
- SOFR derivatives will allow for borrowers to easily manage their interest rate risk profile in a seamless manner
- SOFR overnight reference rates are easy to calculate and do not need to depend on forward looking indicators

SOFR Challenges

- Liquidity and credit availability in a SOFR-only environment might decline as banks are fearful of large drawdowns of credit lines in an environment where SOFR declines disproportionately
- On average, liquidity and credit availability might become more expensive and less available because of mismatches between lending and borrowing costs of banks
- In a SOFR-only environment, it could be perceived as prudent to draw down on credit lines during an economic stress and “hoard” liquidity which can create a run on bank liquidity
- Liquidity hoarding by larger and stronger borrowers could crowd out both smaller borrowers and less mature industries that started with fewer options
- Backward-looking overnight SOFR creates timing mismatches and uncertainty in borrowing costs, especially in periods when short-term rates are volatile

Borrower impact: client feedback

- Banks anticipate that a transition from forward looking LIBOR to SOFR will present significant challenges, especially for smaller, less sophisticated commercial clients
- The great majority of regional bank LIBOR exposures (by contract count) are with these smaller clients. The majority of our contractual exposures are less than \$10mm, with an average contract of approximately \$5mm
- Generally, small clients have limited financial and legal resources internally, typically with a handful of team members responsible for accounting and financial matters, often relying on external vendors for financial/accounting systems and outside firms for legal counsel
- Clients are accustomed to a forward looking rate that allows them to definitively calculate accruals in advance of loan payments, and an index that is easy to find and explain inside their companies. Currently, available SOFR rates do not meet this need
- In addition, our clients will be challenged to make system and contract changes to migrate to an index dissimilar to LIBOR, either in terms of spread level, rate reset frequency, and calculation/accrual methodology. These changes, and related costs, will come with limited ostensible benefits to our clients

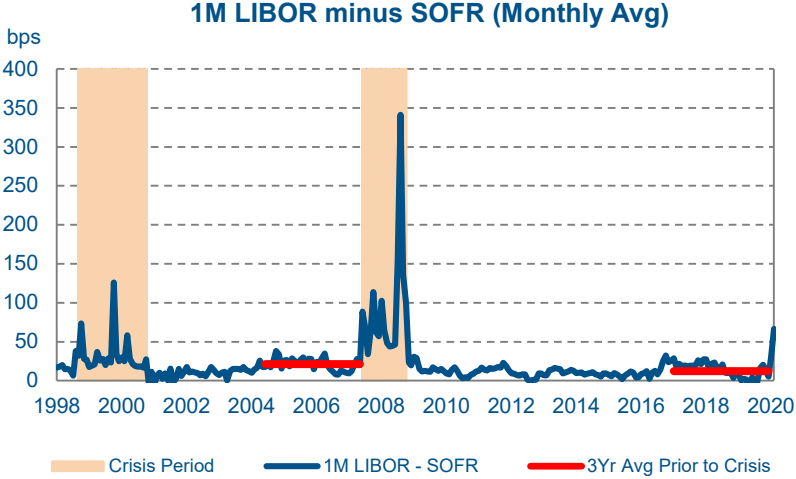
**Approaches to mitigating these challenges:
developing a credit sensitive benchmark for
commercial lending**

Our view of key attributes of a good lending benchmark

- It should be transparent, reliable, and easily and widely available on a timely basis
- The benchmark should reflect changes in the cost of credit in a real-time manner, and adjust with changes in interest rates and credit risk premium in a timely manner
 - Credit risk premium reflects compensation for systemic (as opposed to idiosyncratic, borrower-specific risk) credit risk for certain types of high-quality borrowers
- It should adjust with changes in bank borrowing costs in a timely manner
- The benchmark should be forward looking, which gives certainty to both lenders and borrowers, and better allows for managing funding and lending costs
- Many lending benchmarks have co-existed for decades, including MTA, COFI, and Prime, and market participants don't have an expectation of a SOFR-only environment

Static spread add-on to SOFR: issues and challenges

- Banks can use expected funding costs over a cycle to create an average risk premium add-on to SOFR
- Conceptually, this solution should work, but practically, there are likely to be many challenges
- The risk-premium add-on is backward-looking and hard to forecast accurately as every crisis differs in duration and magnitude. In addition, the impact on bank funding costs is also heavily dependent on policy response and the behavior of capital markets
- Banking tends to be highly pro-cyclical and it is reasonable to expect that banks will compete down/away the spread add-on in good times
- Historical experience illustrates that there is a significant discrepancy between the average spread during economic expansions relative to realized levels of credit risk premiums during stressed economic environments (see chart and table)
- Hence, a SOFR based lending benchmark (with a static spread adjustment) is likely to lead to increased risk of a mismatch between loan yields and cost of funds during stressed economic environments and exacerbate pro-cyclicality



Daily 1M LIBOR minus SOFR Spread (bps)

bps	5Y Prior Avg	3Y Prior Avg	Crisis Avg	Crisis Peak
Early 2000s Recession	na	na	32	316
Great Recession	18	21	94	451
Current	12	12	72	101

Sources: All charts – Bloomberg and NY Federal Reserve.; Crisis periods is defined as: November 19, 1998 to December 31, 2000 (Early 2000s Recession), August 13, 2007 to December 31, 2008 (Great Recession), and March 16, 2020 to April 30, 2020 (Current Period)

Credit sensitive lending benchmark with a dynamic credit risk premium adjustment

- We believe a sensible and practical way to address the risks surrounding a stand-alone SOFR (or one with a static risk premium) is to create a commercial lending framework that includes a credit sensitive benchmark
- An approach to creating a credit sensitive benchmark might be to add a time-varying dynamic credit spread add-on to SOFR-based reference rates; this dynamic spread add-on should reflect changes in banks' cost of funds
- This approach will allow for hedging of benchmark interest rates using SOFR-based derivatives, and lenders and borrowers alike could transform their borrowings into fixed or floating rate
- Furthermore, by closely aligning borrowing and lending rates, banks will be more willing and able to extend credit during both good and stressed times
- This approach does not require banks to use complex hedging strategies for managing changes in funding costs related to systemic credit changes
- A new lending benchmark would co-exist alongside SOFR and other existing indices like Prime, MTA, and COFI
 - Market participants do not have an expectation that interest rate frameworks will be monolithic (e.g., participants do not expect a SOFR-only environment)
- The availability of a credit sensitive rate element would facilitate, and likely accelerate, the orderly transition from LIBOR

Conclusions and recommendations

- We support the efforts of the official sector and the ARRC to facilitate an orderly transition away from LIBOR to SOFR for most products
 - SOFR can and should be the “liquid markets” reference rate for the significant majority of derivatives and debt products that currently reference LIBOR
- However, we believe that SOFR, on a stand-alone basis, is not well suited to be a benchmark for commercial lending products, and have concerns that use of SOFR alone for lending products will adversely affect the availability and/or price of credit and could exacerbate pro-cyclicality in bank lending
- A sensible and practical way to address these risks is to create a new credit sensitive lending benchmark that is SOFR-based, but also includes a dynamic credit component
- We believe inclusion of a credit risk premium is essential to addressing the previously outlined concerns and will make the banking system and, in turn, the U.S. economy, more resilient during times of economic stress and facilitate the transition of lending markets from LIBOR

Appendix

Total loan yields (SOFR-linked) calculations and data

- Total loan yield (SOFR-linked) calculation is estimated using the following formula:

$$\text{Total Loan Yields} - 50\% \times (1\text{M LIBOR} - \text{SOFR})$$

- Total earning assets yield (SOFR-link) calculation is estimated using the following formula:

$$\text{Total Earning Assets Yields} - (70\% \times [50\% \times (1\text{M LIBOR} - \text{SOFR})])$$

- 50% represents the estimate of the percentage of loans linked to LIBOR on bank balance sheets (per Citi Research)
 - 70% represents the estimate of the ratio of average loans to average earning assets
 - Calculations apply to the table found on slide 9
- The following U.S. commercial banks were used for bank yield and liability cost calculations:
 - Bank of America, Capital One, Citigroup, Citizens, Comerica, Fifth Third, Huntington, JP Morgan, Keycorp, M&T, PNC, Regions, Truist, U.S. Bank, and Wells Fargo
 - The data was obtained from 10-Qs/10-Ks/earnings releases and supplemented with data from Bloomberg, NY Federal Reserve, and SNL Financial
 - Data was used in the bottom chart on slide 7, table on slide 8, and table on slide 9

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Credit-Sensitive Loan Benchmarks

Darrell Duffie

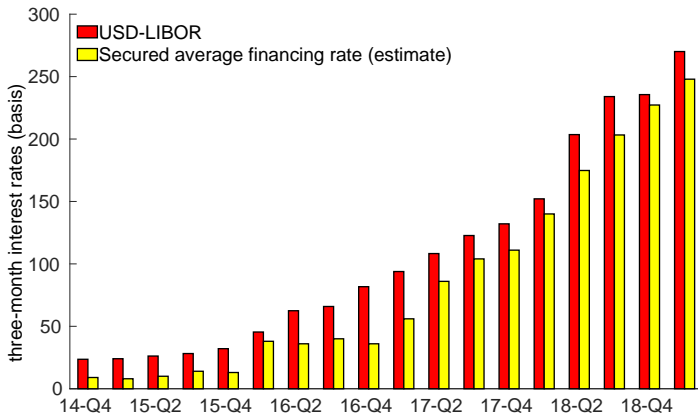
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Credit Sensitivity Group Workshop
Federal Reserve Bank of New York

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3mo LIBOR and compounded SOFR (estimated)



Data: FRBNY and Bloomberg.

Perspectives

- 1 SOFR is a robust benchmark for the huge rates market. (Repo rate spikes can be cured with abundant reserves.)
- 2 Bank funding credit spreads vary unpredictably.
- 3 With floating-rate loans indexed to a credit-sensitive benchmark, borrowers can absorb some bank funding-cost risks.
- 4 This credit-spread insurance would lower (a bit) all-in average market borrowing costs.
- 5 A reasonable credit-sensitive index is feasible for bank lending applications, but
 - a. would not likely become “LIBOR,” absent legislation.
 - b. would be orphaned from the derivatives market – credit-sensitive floating-rate loans could not be swapped to fixed. Is that OK?
- 6 Banks should in any case achieve the operational capability of transitioning from LIBOR-based lending in a timely manner, whether to new credit-sensitive benchmarks, SOFR, or both.
- 7 Banks are naturally placed to choose their lending benchmarks.

Transition timing

