WELLS FARGO

NCSHA Fall Conference

LIBOR Transition…SOFR, So Good

An update on the transition from LIBOR to the Secured Overnight Financing Rate

October 21, 2019

Important Disclosures

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In the event that you have provided us with your written representation in form and substance acceptable to WFBNA that you are represented by a "qualified independent representative" as defined in the Commodity Exchange Act ("CEA") with respect to any municipal derivative or trading strategy involving municipal derivatives described in the Materials, we have provided you with our written disclosure that we are not acting as an advisor to you with respect to the municipal derivative or trading strategy pursuant to Section 4s(h)(4) of the CEA and the rules and regulations thereunder, and have taken certain other steps to establish the "Swap Dealer exemption" under the Muni Advisor Rules.

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4Q19

LIBOR is huge...and it's going away

- **LIBOR** = the London Interbank Offered Rate
- Interbank offered rates (collectively, LIBOR) underpin **more than $350 trillion** of financial products
- However, **LIBOR is no longer derived from a widely traded market** and panel **banks are reluctant to submit estimates** of activity in which they do not engage

- **2013 –** Financial Stability Board directs national regulators to evaluate alternatives to LIBOR
- **2014** – Federal Reserve brings together market participants to form the Alternative Reference Rates Committee (ARRC)
- **2017** – UK Financial Conduct Authority announces that it will not compel banks to provide LIBOR submissions beyond 2021
- **2017** – ARRC endorses the Secured Overnight Financing Rate (SOFR) as the replacement for U.S. dollar LIBOR

The USD LIBOR Footprint

~$200 trillion in exposures

OTC **$145T**
- Swaps, options
- Forwards, cross-currency

Exchange **$45T**
- Options
- Forwards

Loans **$5T**
- Syndicated, CRE
- Residential, Consumer

Bonds **$4T**
- FRNs
- Securitizations

Source: Second Report of the Alternative Reference Rates Committee
https://www.newyorkfed.org/medialibrary/Microsites/arrc/files/2018/ARRC-Second-report

Regulatory Call to Action

In 2014, regulators initiated a global workstream to transition away from LIBOR. Working through the Financial Stability Board, these regulators include the Federal Reserve, Commodity Futures Trading Commission, Bank of England, and European Central Bank.

The Official Sector is increasingly stressing the need to transition now.

"Some say only two things in life are **guaranteed:** death and taxes. But I say there are actually three: **death, taxes, and the end of LIBOR.**

- John C. Williams, *President and CEO Federal Reserve Bank of New York*[1]"

"**Don't wait for term rates** to get your house in order…This is a problem you have the opportunity to get ahead of now.

- John Williams, *President and CEO Federal Reserve Bank of New York*[2]"

"We do **expect panel bank departures from the LIBOR panels at end-2021**. That is why we keep stressing that the base case assumption for firms' planning should be LIBOR publication after end-2021.

- Andrew Bailey, *CEO Financial Conduct Authority*[3]"

"I believe that the ARRC has chosen the most viable path forward and that most will benefit from following it, but regardless of how you choose to transition, **beginning that transition now** would be consistent with **prudent risk management** and the duty that you owe to your shareholders and clients.."

– Randal K. Quarles, *Vice Chair for Supervision Federal Reserve Board of Governors*[4]"

[1] Source: https://www.newyorkfed.org/newsevents/speeches/2019/wil190923
[2] Source: https://www.newyorkfed.org/newsevents/speeches/2019/wil190715
[3] Source: https://www.fca.org.uk/news/speeches/libor-preparing-end
[4] Source: https://www.federalreserve.gov/newsevents/speech/quarles20190603a.htm

The ARRC Mandate

In 2014, the Federal Reserve Board convened the Alternative Reference Rates Committee to explore alternatives for replacing USD LIBOR

The ARRC was convened to address the following:

Objectives
1 Identify best practices for alternative reference rates
2 Identify best practices for contract robustness to ensure contracts are resilient to the possible cessation of USD LIBOR
3 Develop an adoption plan that identifies factors that would either facilitate or impede the adoption of alternative reference rates
4 Create an implementation plan with metrics of success and a timeline

In March 2018, the ARRC was reconstituted to: [1, 2]

- Include a **broader** representation of the financial market and establish **working groups** to address regulatory, legal, tax and accounting issues
- Ensure successful implementation of the paced transition plan
- Coordinate planning across cash/derivatives products

ARRC Members	
Banks / Dealers	10
Exchanges	3
Industry Associations	9
GSE / SSA	4
Asset Managers / Insurance	5
Official Sector (ex officio)	10

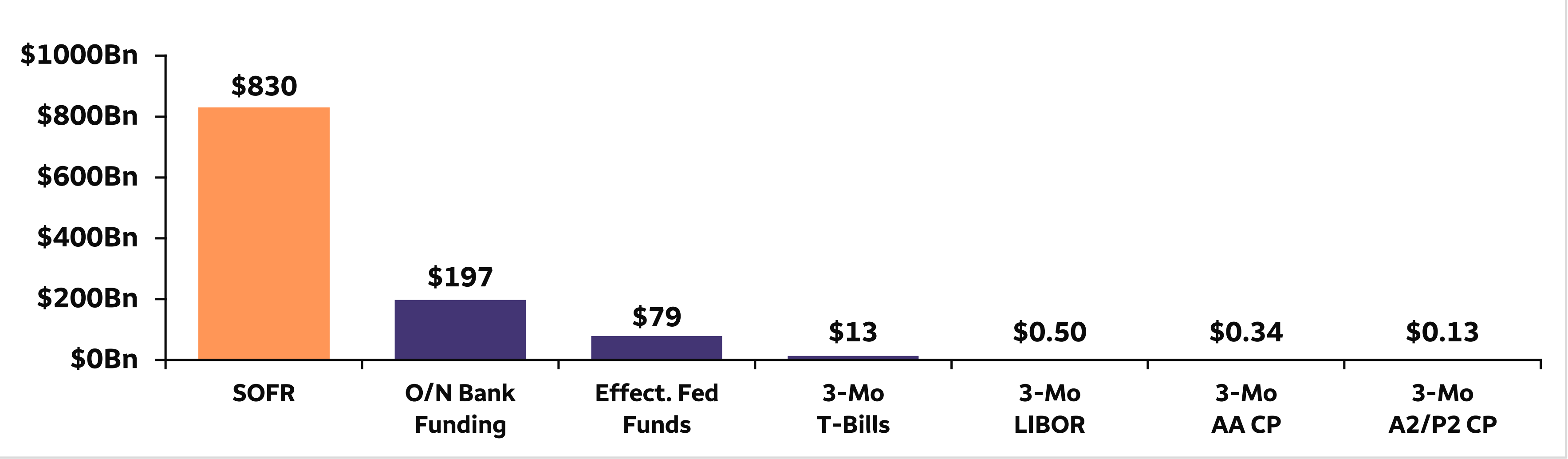
Ex Officio Members	
CFPB	CFTC
FDIC	SEC
FRB New York	FHFA
U.S. Treasury	OCC
Fed Reserve	OFR

[1] Source: https://www.newyorkfed.org/arrc/index.html

Goodbye LIBOR, Hello SOFR

- In June 2017, the ARRC identified the Secured Overnight Financing Rate (SOFR) as its preferred alternative for USD LIBOR
  - **Secured:** Based on trades in the triparty, cleared bilateral, and certain other U.S. Treasury repo markets
  - **Overnight:** The repo rates used are overnight and reflect borrowing for one business day
  - **Financing Rate:** Represents secured funding costs for financial institutions pledging U.S. Treasuries

Average Daily Volumes in U.S. Money Markets ($bn)[1]



1) Average volumes over 2017H1, with the exception of 3-month T-bills, which are preliminary estimates from available FINRA Trade Reporting and Compliance Engine (TRACE) data over August and September 2017. 3-month volumes are based on all transactions with remaining maturities between 80 and 100 calendar days or 41-80 business days. SOFR average from inception to 2/1/19.

USD LIBOR vs. SOFR

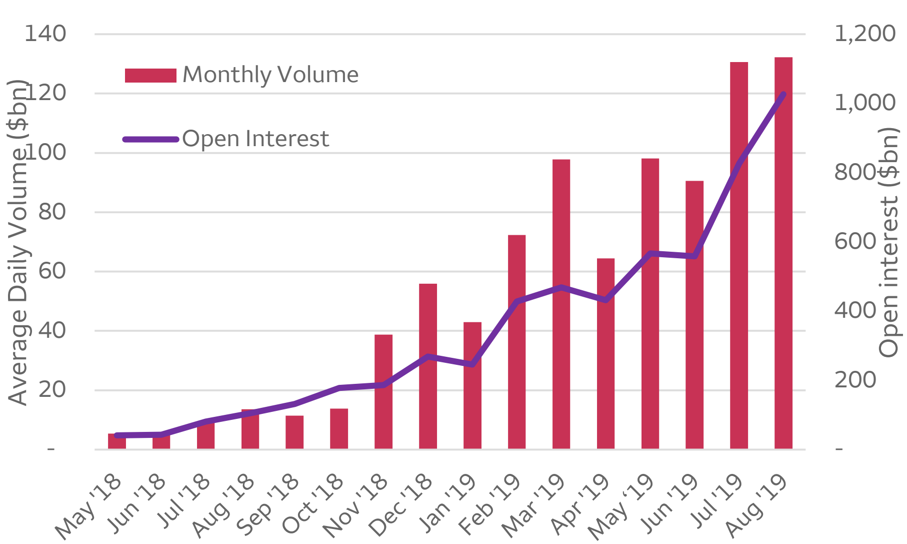
	USD LIBOR	SOFR
Definition	**Unsecured** wholesale interbank lending rate	**Secured** overnight repo rate
Maturity/Term	Various tenors, all forward-looking	Currently only overnight (in arrears)
Bank Credit Premium	Yes	No
Methodology	**Subjective** trimmed mean of panel bank submission rates based on Waterfall Methodology	**Objective** volume-weighted median for various US Treasury repo datasets
Administrator	ICE Benchmark Administration	Federal Reserve Bank of New York
Underlying Daily Transaction Volume	~$500 million	More than $1 Trillion

Sources: ICE Benchmark Administration at https://www.theice.com/iba/libor and Federal Reserve Bank of New York at https://apps.newyorkfed.org/markets/autorates/SOFR

SOFR Market Adoption

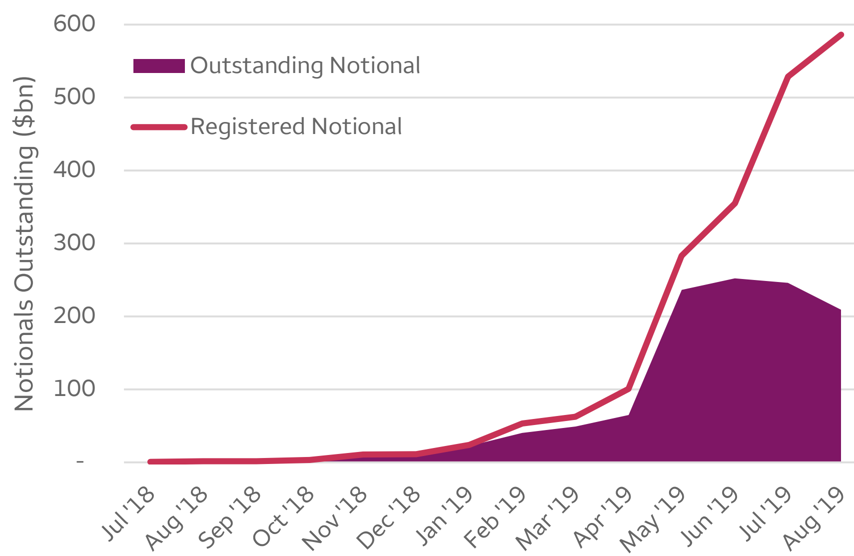
- Market adoption has increased significantly over the past year, with over 130 global participants currently trading in SOFR
- SOFR futures and swap markets were launched in 2018
  - SOFR futures volumes have exceeded expectations; in aggregate, more than $1 trillion outstanding
  - SOFR swaps have also experienced dramatic growth, as more market participants have begun to use the rate for a variety of purposes, including as a repo hedge. $210 billion notional outstanding
- Since the inception of SOFR in April 2018, total notional has reached more than **$15 trillion** in the market

SOFR Futures Traded on CME and ICE



Sources: CME, ICE As of August 2019.

SOFR Swap Notional



Sources: CME, LCH As of August 2019.

The List of Early Adopters is Growing for SOFR-based Debt Issuance

Over $300B in SOFR-based transactions from 42 issuers

Notable Issuers ($B)

Issuer Name	Total
FHLB	146.9
Freddie Mac	67.8
Fannie Mae	21.5
Credit Suisse	17.3
JPMorgan Chase	6.3
MetLife	6
Federal Farm Credit Banks	5.2
Goldman	4
Bank of Montreal	3.5
Citi	2.5
Bank of Nova Scotia	1.7
World Bank	1.5
Wells Fargo	1.1
Various Other Issuers	18.7
Total	$301

Volume by Tenor ($B)

Source: Bloomberg As of October 10, 2019.

Increasing Contractual Robustness

What is LIBOR Fallback Language?

- The contractual language that specifies the rate that will be used if LIBOR is unavailable
- Fallback language was originally intended to address the temporary unavailability of LIBOR instead of a permanent cessation
- As a result, fallback language in many contracts may not produce a commercially reasonable result

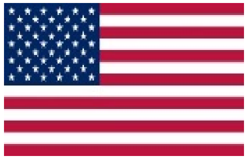
Development of More Robust Fallback Language

- The ARRC and ISDA have been developing new fallback language to address a permanent cessation of LIBOR
  - Floating Rate Notes and Syndicated Loan language published in April 2019
  - Bilateral Loans and Securitizations published in May 2019
- The intention of the fallback language is to:
  - Ensure contracts continue to function as closely as possible to what was initially intended by the parties
  - Minimize any potential transfer of value between the parties when the fallback takes effect

Components of Fallback Language

- **Trigger events**: Define the circumstances under which references to LIBOR in a contract will be replaced with an alternative reference rate
- **Replacement benchmark:** Identify the rate, or waterfall of rates, that would replace LIBOR following a trigger event
- **Spread adjustment:** An adjustment added to the replacement rate to account for differences between LIBOR and the replacement benchmark

Global Overview of Reform Initiatives

					
Working Group	Alternative Reference Rates Committee	Working Group on Sterling Risk-Free Reference Rates	Working Group on Euro Risk-Free Rates	National Working Group on Swiss Franc Reference Rates	Cross-Industry Committee on Japanese Yen Interest Rate Benchmarks
Alternative Reference Rate	**SOFR** (Secured Overnight Financing Rate)	Reformed **SONIA** (Sterling Overnight Interbank Average Rate)	**€STR** (Euro-Short term rate)	**SARON** (Swiss Average Rate Overnight)	**TONA** (Tokyo Overnight Average Rate)
Underlying Market	Secured overnight funds	Unsecured overnight funds	Unsecured overnight funds	Secured overnight funds	Unsecured overnight funds
Publication date	Published since 3 April 2018	Reformed since 23 April 2018	Published since 2 October 2019	Published since 2009	Published since 1992
Administrator	Federal Reserve Bank of New York	Bank of England	European Central Bank	SIX Swiss Exchange	Bank of Japan
Tenor	Overnight	Overnight	Overnight	Overnight	Overnight

Source: https://www.isda.org/2019/09/10/supplement-to-the-plain-english-disclosures-for-derivatives-referencing-libor-and-other-ibors/

Important Disclosures

Disclosures (Continued):

Important Information

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LIBOR Discontinuation Risk

On July 27, 2017, the Chief Executive of the United Kingdom Financial Conduct Authority, which regulates the London Interbank Offered Rate ("LIBOR"), announced that it intends to stop persuading or compelling banks to submit rates for the calculation of LIBOR to the administrator of LIBOR after 2021. The announcement indicates that the continuation of LIBOR on the current basis cannot and will not be guaranteed after 2021. It is impossible to predict whether and to what extent banks will continue to provide LIBOR submissions to the administrator of LIBOR or whether any additional reforms to LIBOR may be enacted in the United Kingdom or elsewhere. While global regulators and financial services industry market participants, including the Alternative Reference Rates Committee in the United States, have been working on developing alternative reference rates ("ARR") for LIBOR and other interbank offered rates, there is no guarantee that ARRs will be developed or widely used by market participants by the end of 2021, that any ARRs developed will be suitable for each transaction as a substitute or successor for LIBOR, that the composition or characteristics of ARRs will be similar to those of LIBOR, or that ARRs will be the economic equivalent of the rate used in your LIBOR-based swap or financing transactions. Therefore, if LIBOR is discontinued during the term of your swap, your payments would be calculated differently and could be higher or more volatile than expected. These risks and others are discussed in greater detail at the IBOR Alternative Reference Rates disclosure at: www.wellsfargo.com/swapdisclosures.

Risks to Consider

While certain transactions described in the Materials may be used for hedging purposes to reduce or eliminate certain risks associated with your assets or liabilities, the effectiveness of hedging may depend upon holding these transactions to maturity and not reducing or disposing of all or any portion of the asset or liability during the term of the hedge. If a swap transaction is terminated early, or if you reduce or dispose of all or a portion of the underlying asset or liability before the transaction matures (such as prepaying a floating rate loan you hedge with a swap), then depending on the nature of the transaction, its characteristics and your position in it (e.g., buyer, seller, counterparty, etc.), you may incur a substantial loss or you may receive little or no hedging benefit from any upfront or periodic payments or exchanges or any other costs incurred in purchasing, selling, acquiring, maintaining or disposing of the transaction. You may also incur a substantial loss if you enter into a swap transaction in anticipation of hedging an asset or liability that does not materialize. You should understand that significant potential amounts could become payable by you for modifying a swap transaction, terminating it early or transferring your position in the transaction to another person or entity, or in connection with the exercise of any option or other rights under the transaction or governing documents, depending upon then existing market conditions. You should also consider that prepaying your loan or disposing of an asset or other liability does not relieve you of your obligations under a swap transaction, which may be terminated early only in accordance with the terms of the swap trading relationship documentation (such as an ISDA Master Agreement) or other transaction documents, or otherwise by mutual agreement. Such termination may require payment by you of an early termination amount, which amount may be substantial. Whether you use a swap transaction for hedging or another purpose, you should satisfy yourself that you understand these and other risks relative to the benefits you are seeking to achieve and that the transaction and risks are suitable for you. These risks are discussed in greater detail in disclosures provided to you through the following website: **www.wellsfargo.com/swapdisclosures**

Independent Obligation

To the extent any swap transaction described in the Materials may be used to hedge against increases in the interest expense of a loan or other financing, the swap transaction would be a separate and independent obligation and would not be contingent on whether or not any loan or other financing closes, is outstanding, or is repaid, in whole or in part, at any time, subject to any contractual requirement to terminate and settle the transaction early upon prepayment of the loan or financing or for other financing-related events. In addition, if you provide any existing or future collateral or other credit support to secure the transaction and any loan or other financing, then you would be entitled to the release of such collateral or credit support only if certain conditions contained in the related collateral agreement or credit support document are completely satisfied for both the transaction and any such loan or financing, or we otherwise reach agreement with you on alternative collateral, credit support or other arrangements.

Unmatched Terms & Conventions

If the principal amount or duration of a loan or financing differs from that of a transaction used to hedge such loan or financing, you may be exposed to risk of loss from such over-hedging or under-hedging. If any other economic terms or characteristics of a loan or financing differ from those of the related hedge, then in addition to any losses that you could incur from such differences, the hedge may create unanticipated accounting exposure or tax liability for you. To the extent fair value accounting applies to the hedge, you may have to reflect unrealized gains and losses (i.e., the so-called "mark-to-market" value of the hedge) over the life of the hedge on your balance sheet and/or income statement. If hedge accounting applies, any ineffectiveness in the hedge resulting from such differences may likewise need to be taken into account and reflected in your financial results. These swap valuation considerations may also be important to you for tax purposes, including any tax laws that may require unrealized gains or losses on swaps to be taken into account in determining your income tax liability.

Conventions used in the loan or other financing and swap markets may differ, and we are under no obligation to ensure that any swap we offer is a perfect hedge for your financing even if we provide you with both products. For example, if the method for determining a loan's floating rate differs from that for a swap's floating rate, the loan floating rate payments could diverge from those of the swap. Such divergence may occur by convention or as the result of contractual differences, such as in the definition of or the reset timing (e.g., 1-month or 3-month) for the London Interbank Offered Rate (LIBOR), the dates or times at which LIBOR is set, the number of days in the payment periods, any applicable fallback floating rate, or the floating rate rounding convention.

Important Disclosures

Negative Interest Rates

Express wording in swap transactions is required to place a 0% floor on LIBOR or other floating benchmark rate of the swap transaction, and no such 0% floor is included in an interest rate swap or other swap transaction unless mutually agreed between the parties as reflected in the swap confirmation. Absent such floor, if a Floating Amount is negative under an interest rate swap, the Floating Rate Payer does not make such payment. Instead, the Fixed Rate Payer pays the absolute value of the negative Floating Amount in addition to the Fixed Amount. See §6.4 of the 2006 ISDA Definitions, as amended. If you wish to acquire a swap with a 0% floor, this may increase the price of your swap as reflected in a higher Fixed Rate. For further information on negative interest rates, including their effect on swaps and the loans they are hedging, see Negative Interest Rates at: www.wellsfargo.com/swapdisclosures.

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