

LIBOR transition: SOFR, so good

Implications of a new reference rate
for your business • 2021



Contents

What is LIBOR?	2	What fallback language is currently in place?	16
Why does LIBOR have to go?	4	How will derivative contracts be impacted?	17
Who is driving the process?	5	How will loans and bonds be impacted?	19
How can LIBOR be replaced?	7	How is Wells Fargo contributing?	21
What should I know about SOFR?	9	Where can I get further information?	22
Why are repo transactions so important?	10	Contacts	22
How can SOFR fill LIBOR's big shoes?	11		

What is LIBOR?

A brief history of the London Interbank Offered Rate

The London Interbank Offered Rate (LIBOR) emerged in the 1980s as the fast-growing and increasingly international financial markets demanded a **consistent rate to serve as a common reference rate for financial contracts**. A Greek banker is credited with arranging the first transaction to be based on the borrowing rates derived from a “set of reference banks” in 1969.¹

The adoption of LIBOR spread quickly as many market participants saw the value in a common base rate that could underpin and standardize private transactions. At first, the rate was self-regulated, but in 1986, the British Bankers’ Association (BBA), a trade group representing the London banks, stepped in to provide some oversight. With the blessing of the Bank of England, they formalized the process of surveying a group of banks to answer the following question each day at 11:00 a.m.: ***“At what rate could you borrow funds, were you to do so by asking for and then accepting interbank offers in a reasonable market size just prior to 11:00 a.m.?”*** The data set originally included submissions from 20 banks and the BBA would drop the top and bottom submissions before publishing a trimmed mean rate.

From that point forward, LIBOR grew to be one of the most dominant and recognizable rates in the world. **It serves as a reference rate for tens of millions of contracts worth more than \$200 trillion USD.**² LIBOR is calculated and published daily across five currencies and seven maturities.

LIBOR is a critical component of the financial system, hardwired into not only global derivatives but also business loans, securitizations, floating rate notes, adjustable mortgages, and student loans.

How is LIBOR set?

- 11 – 16 contributor banks submit rates based on theoretical borrowing costs
- The top 25% and bottom 25% of submissions are thrown out
- Remaining rates are averaged together



35 LIBOR rates published at 11:00 a.m. London Time
5 currencies (USD, EUR, GBP, JPY, CHF) with
7 different maturities each (overnight, 1wk, 1m, 2m, 3m, 6m, 12m)



- **Derivatives**
LIBOR is used to price swap transactions and futures contracts. 3-month LIBOR is most common.
- **Loans**
Many loans are priced off of LIBOR + credit spread. As LIBOR rises, the cost of borrowing rises. Common index in both adjustable rate mortgages and student loans.

1. Bloomberg, “The Man Who Invented the World’s Most Important Number,” November 2016.


2. “ARRC,” “The Alternative Reference Rates Committee — Second Report,” March 2018.


Overall exposure per currency

 **USD LIBOR:** > \$200 trillion

 **GBP LIBOR:** > \$30 trillion

 **EURIBOR:** > \$150 trillion
Euro-LIBOR: > \$2 trillion

 **CHF LIBOR:** > \$6.5 trillion

 **JPY LIBOR:** > \$30 trillion
TIBOR: > \$5 trillion

USD LIBOR and EURIBOR

- USD LIBOR and EURIBOR together represent approximately 80% of the total IBOR market exposure.

Derivatives

- Over-the-counter (OTC) derivatives and exchange-traded derivatives (ETD) represent more than \$300 trillion (80%) of products referencing IBORs.

Syndicated loans³

- \$1.5 trillion of syndicated loans in the U.S. market reference USD LIBOR.
- 90% of the \$535 billion of syndicated loans in the euro market reference EURIBOR.

Floating rate notes

- \$1.8 trillion of FRNs in the U.S. market reference USD LIBOR.
- 70% of the \$2.6 trillion of FRNs in the euro market reference EURIBOR.

Bilateral corporate loans³

- \$0.8 trillion of bilateral corporate loans in the U.S. market reference USD LIBOR.
- \$4.3 trillion of bilateral corporate loans in the euro market reference EURIBOR.

Tenor

- 3-month LIBOR is the most widely referenced tenor of USD LIBOR. The 3-month tenor by volume is the most widely referenced across the majority of currencies, followed by 6-month and 1-month.

Efforts to “fix” LIBOR post-financial crisis

The financial crisis, which began in 2007, prompted the first major concerns over LIBOR’s credibility as the whole world watched these key rates behave in unpredictable and volatile ways that were inconsistent with other market rates and prices. A very public series of investigations by regulators into rate-fixing, rigging, and other market manipulation led to large fines, high-profile settlements, and, in a few cases, prison sentences. As the volume of direct borrowing underpinning LIBOR submissions decreased, LIBOR panel banks relied on hypothetical transactions and expert judgment.

George Wheatley, the U.K.’s Chancellor of the Exchequer, commissioned an independent review of LIBOR. The Wheatley Review of LIBOR yielded a number of constructive reforms that were implemented during 2013. The International Organization of Securities Commissions (IOSCO) also released its Principles for Financial Benchmarks in 2013, to articulate “best practices” on policy guidance, principles, and transparency for benchmarks used in financial markets. In early 2014, the ICE Benchmark Administration (IBA) took over the administration of LIBOR from the BBA and began publishing ICE LIBOR with more robust oversight and transparent guidelines as prescribed in the regulatory review. Despite these improvements, the fundamental challenge with LIBOR is that the volume of transactions that form the basis for the rate is no longer derived from a widely traded market, inconsistent with a key IOSCO principle that a benchmark should be anchored by an active market of observable, arm’s-length transactions.

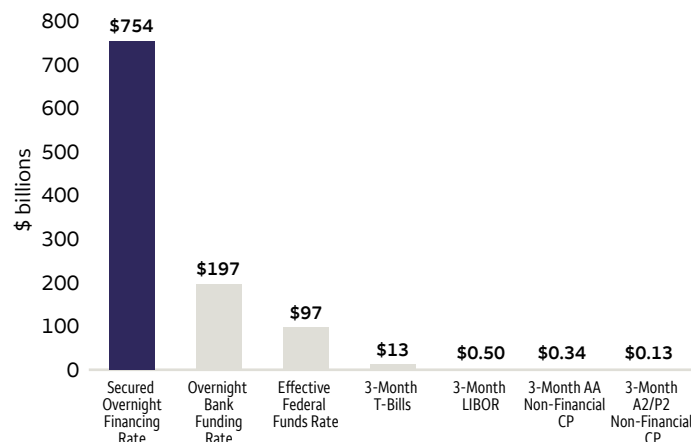
Why does LIBOR have to go?

“World’s Most Important Rate” lacks market-driven inputs

Despite improvements made post-financial crisis, the volume of inputs that support LIBOR has continued to shrink for a variety of reasons:

- **Basel III:**⁴ Pushes banks away from short-term unsecured funding markets. Money center banks no longer rely on unsecured interbank lending to finance their daily operations. Median daily volume of 3-month LIBOR is less than \$1 billion.
- **Financial crisis:** Banks stopped lending to each other, which meant LIBOR did not always reflect actual extensions of short-term interbank credit.
- **Manipulation:** LIBOR has been found susceptible to market manipulation by: 1) traders looking to bolster profits by skewing the average LIBOR fixing in their favor on a given day; and 2) banks submitting artificially low rates during periods of disruption so as not to trigger loss of confidence from investors, market participants, or regulators.
- **Reference banks:** Concerns about willingness of contributors to continue voluntarily submitting judgment-based quotes.

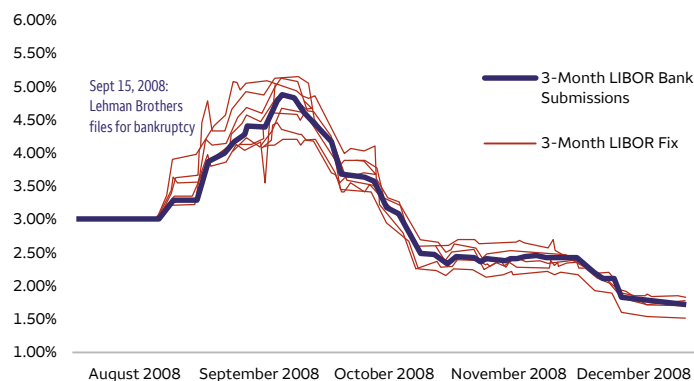
SOFR is based on actual market transactions



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.

Source: Federal Reserve Bank of New York; Financial Industry Regulatory Authority; DTCC Solutions LLC, an affiliate of the Depository Trust & Clearing Corporation; and the Board of Governors of the Federal Reserve System.

LIBOR submissions varied dramatically post-Lehman collapse



Source: Thomson Reuters.

4. Basel III is a regulatory framework designed to strengthen the world banking system by ensuring banks are properly funded.

Who is driving the process?

Replacing the “IBORs” is an international effort

The massive undertaking to replace interbank offered rates (IBORs) is not simply a U.S. or U.K. effort, but a coordinated, global initiative. The path forward is being paved in multiple jurisdictions advancing on different timelines. International working groups have identified alternative reference rates, as shown in the table to the right, and are developing a transition strategy for each currency IBOR.

In some jurisdictions, the new alternative reference rate will coexist alongside other IBORs, such as EURIBOR or TIBOR.

The U.K. Financial Conduct Authority (FCA) called for banks to make SONIA the market convention in the U.K. at the end of Q1 2020 by making it standard to quote and offer swaps based on SONIA instead of GBP LIBOR unless a particular reason for preferring LIBOR to SONIA exists. The FCA further called for an end to new GBP LIBOR contracts by end of Q1 2021.

On March 5, 2021, the administrator and regulator of LIBOR announced the final cessation/non-representative dates for all LIBOR settings as follows:

- December 31, 2021 for all tenors of GBP, EUR, CHF, and JPY LIBOR
- December 31, 2021 for 1-week and 2-month USD LIBOR
- June 30, 2023 for all remaining tenors of USD LIBOR (overnight, 1-month, 3-month, 6-month, and 12-month)

The publication of the final cessation/non-representative dates for each LIBOR currency provides important clarity to the market in effecting a timely transition.

IBOR	Successor rates
USD LIBOR	Secured Overnight Financing Rate (SOFR)
GBP LIBOR	Reformed Sterling Overnight Index Average (SONIA)
EURIBOR	Not expected to be discontinued
Euro LIBOR	Euro Short-Term Rate (€STR) or EURIBOR
EONIA ⁵	The date on which the option privilege expires
Euro Short-Term Rate (€STR)	To execute the purchase or sale permitted by the option
CHF LIBOR	Swiss Average Rate Overnight (SARON)
JPY LIBOR	Tokyo Overnight Average Rate (TONAR) or TIBOR
TIBOR	Not expected to be discontinued

5. EONIA was recalibrated on October 2, 2019, to be €STR + 8.5bps. It will be published in this manner until January 3, 2022, at which point it will be discontinued.

The foundation for global transition oversight was laid in 2013 – 2017

G20 finance ministers and central bank governors commissioned the Financial Stability Board (FSB) to review and reform major interest rate benchmarks. It is comprised of major regulatory bodies across the globe, including the Fed, the Securities and Exchange Commission (SEC), and the U.S. Treasury.

The FSB established the Official Sector Steering Group (OSSG) to coordinate reviews of widely used benchmarks. This is co-chaired by the Fed Chairman and Financial Conduct Authority (FCA).

International Organization of Securities Commissions (IOSCO) published principles for benchmark reform. These principles are followed by global regulators, including U.S. regulators. IOSCO principles govern work of FSB, OSSG, and MPG.

The OSSG engaged the International Swaps and Derivatives Association (ISDA) to implement more robust fallbacks for benchmarks in the ISDA Definitions.

2013

2014

2015

2014 – 2017: Working groups have been established in the U.S., U.K., Eurozone, Switzerland, and Japan to identify and transition IBORs to alternative reference rates.

2016

2017

The FCA initially announced that it would no longer compel panel banks to submit LIBOR after 2021.

How can LIBOR be replaced?

The important mission of the Alternative Reference Rates Committee (ARRC)

In November 2014, the Federal Reserve convened the ARRC, a public/private sector working group, to explore alternatives for replacing USD LIBOR as a benchmark rate in the U.S. The ARRC's mission is to identify best practices for alternative reference rates, develop an adoption plan, and create an implementation plan with metrics of success and a timeline.⁶ In June 2017, the ARRC officially endorsed the Secured Overnight Financing Rate (SOFR) as its preferred alternative reference rate. For many, this news and the subsequent speech by the head of the FCA, stating

that the FCA would no longer compel banks to submit quotes for LIBOR after 2021, served as a call to action. As traction has increased on this historic undertaking, so has participation in the overall transition process. Membership of the ARRC was expanded in March 2018 to include a number of asset managers, insurance companies, and trade associations. In total, there are 31 firms (including Wells Fargo), 11 U.S. government agencies as ex officio members, and five observers on the Committee.⁷



6. Alternative Reference Rates Committee.

7. As of December 31, 2019. Members: American Bankers Association, AXA, Bank of America, BlackRock, Citigroup, CME Group, CRE Financial Council, Deutsche Bank, Federal National Mortgage Association, Federal Home Loan Mortgage Corporation, GE Capital, Goldman Sachs, Government Finance Officers Association, HSBC, Intercontinental Exchange, International Swaps and Derivatives Association, JP Morgan Chase & Co., LCH, MetLife, Morgan Stanley, National Association of Corporate Treasurers, Pacific Investment Management Company, Prudential Financial, Structured Finance Association, TD Bank, The Federal Home Loan Banks through FHLBNY, The Independent Community Bankers of America, The Loan Syndications and Trading Association, The Securities Industry and Financial Markets Association, Wells Fargo, World Bank Group.

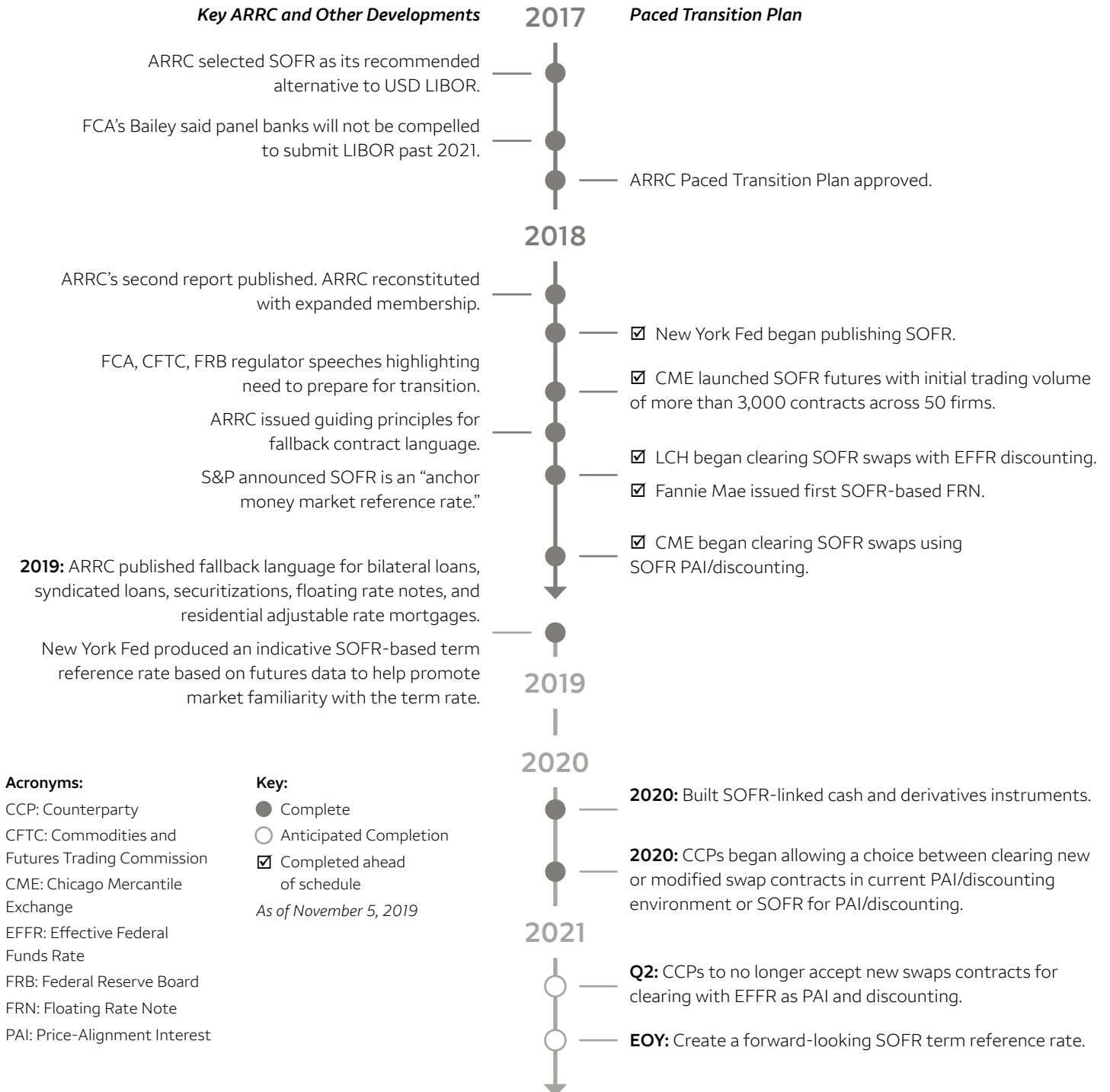
Ex Officio Members: U.S. Commodity Futures Trading Commission, Consumer Financial Protection Bureau, Federal Deposit Insurance Corporation, Federal Housing Finance Agency, Federal Reserve Bank of New York, Federal Reserve Board, Office of Financial Research, Office of the Comptroller of the Currency, U.S. Department of Housing and Urban Development, U.S. Securities and Exchange Commission, U.S. Treasury Department.

Observers: Bank of Canada, BNP Paribas, Cadwalader, Morgan Lewis, Venerable

LIBOR transition background | ARRC 2.0 Paced Transition Plan

The ARRC announced a Paced Transition Plan (PTP) in October 2017, which established a process and timeline for building market structure and liquidity in derivatives and cash products that reference SOFR. The plan entails generally building market acceptance around SOFR. The final step will be developing a term structure. The timeline below includes some key milestones in the transition.

ARRC 2.0 Paced Transition Plan



What should I know about SOFR?

Overview of SOFR

Officially launched in April 2018, SOFR is a broad measure of the cost of borrowing cash overnight secured by Treasury securities. The Federal Reserve Bank of New York (FRBNY) publishes daily rates and volumes on its website: <https://apps.newyorkfed.org/markets/autorates/SOFR>.

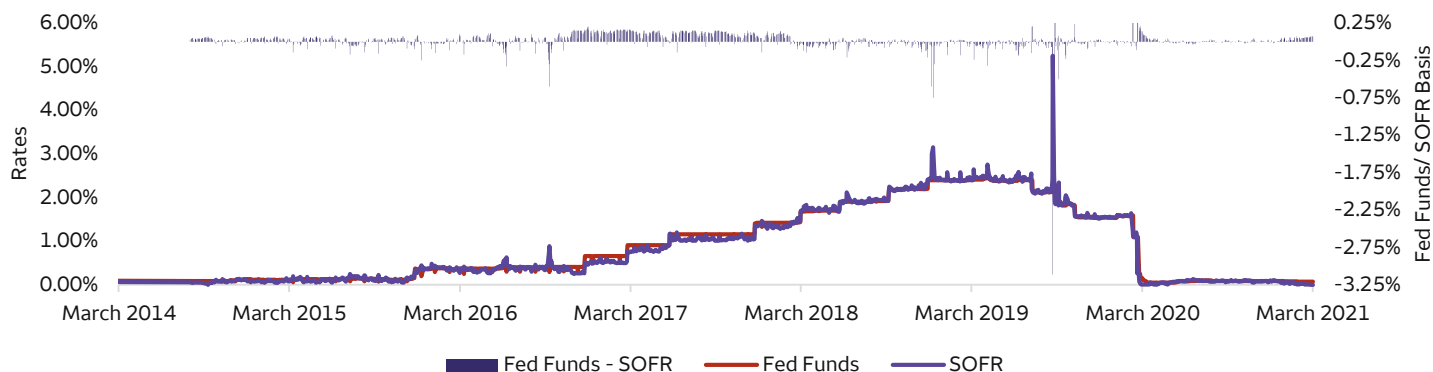
The actual inputs for the Secured Overnight Financing Rate incorporate three data sets illustrated in the charts below:

- Tri-party treasury repo data collected by BNY Mellon

- General collateral repo data collected by The Depository Trust & Clearing Corporation (DTCC)
- Bilateral treasury repo data collected by Fixed Income Clearing Corporation (FICC)⁸

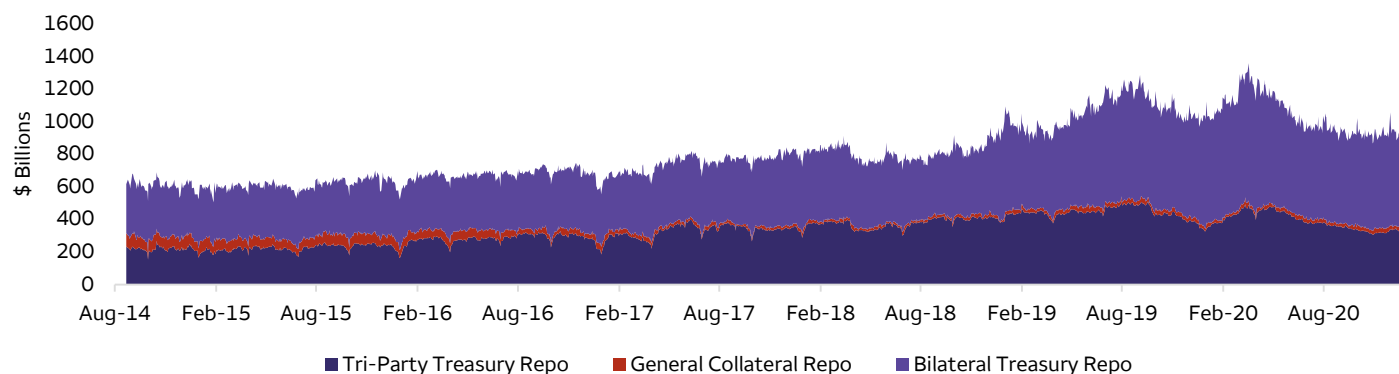
The market underlying SOFR has a daily trading volume of roughly \$750+ billion and has demonstrated consistent volume for several years. In December 2019, daily volumes exceeded \$1 trillion.⁹

Repo rates closely mirror Fed Funds



Source: New York Fed <https://apps.newyorkfed.org/markets/autorates/sofr>

Transaction volumes underlying SOFR



Source: New York Fed <https://apps.newyorkfed.org/markets/autorates/sofr>

8. Excludes "specials" which are repos for specific-issue collateral, which take place at cash-lending rates below those for general collateral repos because cash providers are willing to accept a lesser return on their cash in order to obtain a particular security.

9. Daily volume of SOFR averaged in excess of \$1 trillion in December 2019. <https://apps.newyorkfed.org/markets/autorates/sofr>

Why are repo transactions so important?

Repo serves as a proxy for a “risk-free” rate

The IOSCO Principles for Financial Benchmarks are a set of guidelines and best practices established by global regulatory bodies to ensure transparency and confidence in global benchmarks. A key principle provides for benchmarks based on “overnight risk-free, or nearly risk-free, rates (RFRs) that are sufficiently robust for such extensive use.”¹⁰ To align with these objectives, the ARRC selected a benchmark based on the secured Treasury repo market as its alternative reference rate due to the depth, resilience, and transparency of the market. Money market mutual funds, asset managers, securities lenders, and securities dealers, among others, are key participants in this short-term lending market.

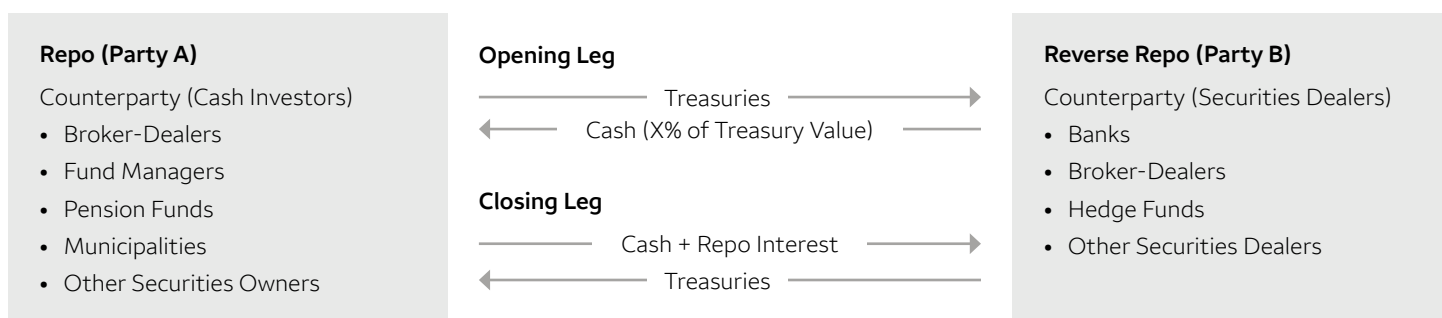
A repurchase agreement (repo) is a form of short-term financing where one party (Party A) sells securities (e.g., Treasury bonds) to another party (Party B), usually on an overnight basis, and then buys them back the following day at a pre-set price. Essentially, repos are fully collateralized

sale and repurchase transactions whereby the securities secure Party B’s cash and the cash secures Party A’s securities with the economic intention that the market risk and reward of the underlying securities remain with Party A. The buyer (Party B) acts as a short-term lender and the seller (Party A) as a short-term borrower, fully collateralized by the securities in the trade. The difference between the price paid at the beginning of the contract and price received at the end equals the return to the original seller (Party A).

A reverse repurchase agreement (reverse repo) describes the position of the counterparty on the other side of the repo transaction (e.g., from the buyer’s point of view as a purchase and resale transaction). The buyer has an agreement to purchase a security today (opening leg) and then sell it back at a higher price on the future date (closing leg).

Repo agreements are critical to the efficient working of the financial markets.”

Overview of repo transactions



Tri-Party Repo	General Collateral Financing (GCF)	Bilateral/Delivery vs. Payment
Cash and collateral are exchanged via a third-party custodial bank who facilitates settlement and other operational processes	<ul style="list-style-type: none"> Tri-Party Repo which is executed without designation of specific securities until the end of the trading day Dealers and Investors interact through intermediaries 	There are two parties to the transaction, under one agreement and cash and collateral are exchanged simultaneously via an agreed settlement system

Source: Wells Fargo Securities.

10. Financial Stability Board “Interest rate benchmark reform – overnight risk-free rates and term rates,” July 12, 2018. <https://www.fsb.org/wp-content/uploads/P120718.pdf>

11. Repos perform four basic functions: 1) safe investment vehicles, 2) liquid asset financing facilities, 3) yield enhancement opportunities, and 4) liquidity facilities to cover variation margin.

How can SOFR fill LIBOR's big shoes?

Key qualitative differences between SOFR and LIBOR

- SOFR is an overnight rate and therefore does not have a term structure (e.g., 1-, 3-, or 6-month rates; although, it is contemplated that there may be a SOFR term structure in the future).
- SOFR is a secured borrowing rate and therefore does not reflect the interbank unsecured credit component inherent in LIBOR.
- SOFR is supported by more than a trillion dollars in daily transaction volumes and is administered by FRBNY, whereas LIBOR has few actual trades underpinning the rate itself, which is administered by ICE Benchmark Administration.¹²

Key quantitative differences between SOFR and LIBOR

While the FRBNY formally began publishing SOFR in 2018, it has published historical data from 2014 to provide additional context for the market. The Fed also polled various repo dealers to gather data going back to 1998 to develop a longer-term proxy for SOFR performance over various economic cycles.

LIBOR vs. SOFR: Quick summary of the historic differential

Data period analyzed	1-month LIBOR - SOFR	3-month LIBOR - SOFR	6-month LIBOR - SOFR	Fed Funds - SOFR
Median daily differential, 5 years (Spread adjustments set)	0.114%	0.262%	0.428%	N/A
Avg daily differential since August 22, 2014 (when FRBNY started publishing SOFR)	0.136%	0.302%	0.446%	0.028%
Avg daily differential since February 1, 1998 (furthest back that the Fed could collect General Collateral Data which would have been a good proxy for SOFR)	0.208%	0.331%	0.460%	0.054%
Avg daily differential during 2008 – 2009 (focus on performance during financial crisis)	0.884%	1.329%	1.610%	0.108%
95th percentile differential point (based on full data set available since February 1, 1998)	0.562%	0.904%	1.082%	0.190%
5th percentile differential point (based on full data set available since February 1, 1998)	-0.002%	0.003%	-0.044%	-0.070%

Source: Wells Fargo Securities, FRBNY, Bloomberg, as of 3/5/2021

- SOFR simulations since August 2014 show that SOFR averaged 13.6 bps, 30.2 bps, 44.6 bps, and 2.8 bps less than 1-month LIBOR, 3-month LIBOR, 6-month LIBOR, and Fed Funds, respectively.
- Based on this data, a loan priced at 3-month LIBOR + 150 bps would hypothetically equate to SOFR + 180.2 bps (credit spread of 150 bps and 30.2 bps basis adjustment).
- The positive differential for most of the values in the table shows that term LIBORs are typically higher than

SOFR (as would be expected). The data points from the 5th and 95th percentile show that there have been times where SOFR was higher than a term LIBOR, but that has not been the norm.

- The distribution of the data also shows that LIBOR has more upside variability. For example, the differential between 3-month LIBOR and SOFR at the 5th percentile and 95th percentile range from 0.3 bps to 90.4 bps, but the average is 33.1 bps.

12. Daily volume of SOFR averaged in excess of \$1 trillion in December 2019. <https://apps.newyorkfed.org/markets/autorates/sofr>

Daily volume of LIBOR tenors 1Y-4Y averaged 270 trades in December 2019. 1-month LIBOR volume is not published. <https://www.theice.com/marketdata/reports/212>; SOFR

Understanding repo volatility and the Federal Reserve Board open market operations

Daily observed SOFR is more volatile than LIBOR on any given day due to SOFR's greater sensitivity to real-time market dynamics. Trading activity around month and quarter-ends, when companies adjust balance sheets for reporting requirements, typically causes repo rates, including SOFR, to rise. Other activity in the secured funding markets can similarly cause repo rates to rise, such as bank reserve volumes, liquidity, Treasury settlements, and auctions.

On September 17, 2019, the repo market experienced a significant spike in rates, with general collateralized repos increasing over 800 basis points overnight to 10% from about 2% and SOFR increasing about 300 basis points to 5.25% from 2.2%. This substantial spike resulted from a confluence of technical aspects of the Treasury market, notably the lack of liquidity due to the need for corporations to make tax payments, which is estimated to have drained approximately \$100 billion from the system and \$54 billion in net supply of mid-month Treasury settlements.¹³ The combination of a reduction in cash reserves plus an increase in collateral in the system likely

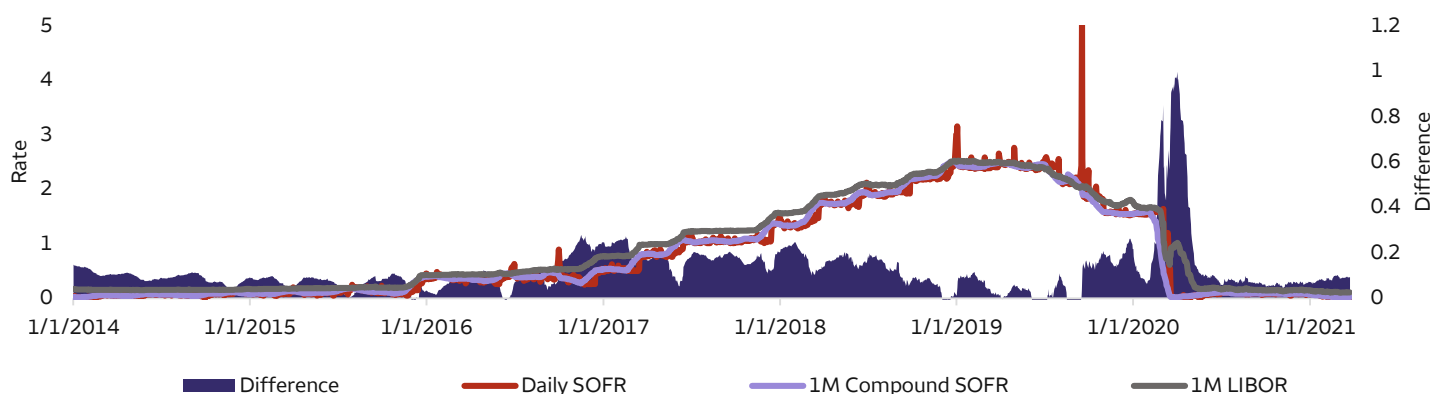
exacerbated the funding squeeze, resulting in a spike in repo rates. In response, the Federal Reserve stepped in to purchase several billion in Treasuries, infusing the market with needed liquidity and became an active lender of cash in the repo market on both an overnight and term basis. The Fed's actions resulted in a return to repo rates, including SOFR, closer to the Fed's target federal funds rate.¹⁴

Despite greater overnight variability, average daily SOFR has been less volatile than 3-month LIBOR. Although SOFR rose sharply over a few days in mid-September 2019, the three-month average rose only two basis points. By comparison, the three-month average LIBOR rose four basis points over the same period.¹⁵

Since the September 2019 spike in repo rates, the Fed has continued to inject liquidity into the market, which has muted much of the overnight volatility. Notably, the typical year-end repo spike did not manifest going into 2020 or 2021 as a result of Fed intervention.

The following figure shows SOFR's daily fluctuations and its September 2019 spike.

Comparison of SOFR and LIBOR since January 2014



Source: Wells Fargo Securities, FRBNY, Bloomberg, as of January 15, 2020.

13. Wells Fargo Securities "Economics and Rate Strategy: Repo Running Wild," September 17, 2019.
<https://www08.wellsfargomedia.com/assets/pdf/commercial/insights/economics/special-reports/funding-pressures-20190917.pdf>

14. Ibid.

15. Tom Wipf, ARRC Chair. "Wave Goodbye to Libor. Welcome Its Successor, SOFR," December 6, 2019.
<https://www.bloomberg.com/opinion/articles/2019-12-06/wave-goodbye-to-libor-welcome-its-successor-sofr>

Tackling SOFR implementation

Choosing SOFR as the go-forward benchmark rate is the easiest part of the process. Actually replacing LIBOR is a highly complex undertaking for numerous reasons, including, but not limited to:

- Tens of millions of contracts, totaling more than \$200 trillion, reference USD LIBOR.
- LIBOR is the benchmark for a very wide spectrum of products ranging from residential mortgages to corporate bonds to derivatives (and everything in between).
- SOFR is a liquid, risk-free rate, which lacks the interbank credit component inherent in LIBOR.

Three of the most critical transition questions for cash products and derivatives are:

- How to create a term structure from the overnight SOFR rate?
- How to coordinate the conversion of contractual documentation?
- How to address the differences between LIBOR and SOFR from an economic standpoint, specifically value transfer?

Currently, regulators, swap dealers, financial institutions, asset managers, and other market participants are considering a variety of alternatives to address these items in the derivative and cash markets.

Term structure. While the ARRC's best practices project a SOFR term rate by June 2021, it is not likely to be developed by that time due to the limited SOFR derivative activity. SOFR term rates are not guaranteed and may not be available until after the prohibition on use of USD LIBOR in new contracts after December 31, 2021. Therefore, a transition strategy with a heavy reliance on a term SOFR carries increased risk.

Contractual documentation. Many types of financial contracts do not include provisions (known as "fallback language") that adequately address a permanent end to LIBOR, while others have ambiguous language. ISDA has developed fallback language that sets forth the steps to be taken, or the interest rate to be applied should LIBOR be discontinued during the term of a contract for use in derivatives (See page 17) and the ARRC published fallback recommendations for non-derivatives (See page 19).

Value transfer. Many existing contracts either do not address a permanent end to LIBOR or have ambiguous fallback language that could alter the economics of LIBOR-linked contracts. This uncertainty could create complex problems for parties and create instability in financial markets. In recognition of this challenge, industry working groups have developed and recommended the use of fallback language that specifies an alternative rate (hardwired fallback language) in LIBOR contracts that seeks to account for the differences between LIBORs and ARRs through the use of a credit spread adjustment. The credit spread was fixed on March 5, 2021. Please see the section, Fallback Rate and Spread Adjustment, for more information.

"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, AND THE CHAIR OF THE
FINANCIAL STABILITY BOARD**

Source: <https://www.federalreserve.gov/newsevents/speech/quarles20190603a.htm>

SOFR interest accruals and the SOFR index

Like many other overnight rates such as effective federal funds rate (EFFR) used in overnight index swaps (OIS), financial products will likely use some kind of average of SOFR for determining the floating rate payments.

Issuers and lenders will face a technical choice between using a simple or a compound average of SOFR as well as whether the averages will use in-arrears or forward calculations. The ARRC published “A User’s Guide to SOFR” to help market participants understand how they can use an overnight rate.

The Guide contains the following key concepts for users to consider:

- Use of a simple or compound average of SOFR;
- The period of time over which the daily SOFRs are observed and averaged. An in advance structure would reference an average of SOFR observed before the current interest period begins, while an **in arrears** structure would reference an average of SOFR over the current interest period;
- Calculation conventions in order to allow for advance notice of payment within the in arrears framework: payment delay, lockout or suspension period, or lookback.

Those who are able to use SOFR should not wait for forward-looking term rates in order to transition from LIBOR.

Both the ARRC and the Financial Stability Board have made compound calculations available to promote clear and consistent use of overnight rates. Compounded averages of SOFR have been increasingly adopted by issuance in the floating rate note market and will be included in ISDA’s amended Definitions for LIBOR fallback rates (see page 17). Market participants can apply payment notification adjustments as needed, particularly a lookback period or payment delay.

The Official Sector advises market participants to act now to effect an orderly transition

The LIBOR transition is being led by the working groups in each IBOR currency jurisdiction, and in the U.S. market, the ARRC represents a public-private partnership under the guidance of the Fed. While regulators are generally looking to the market to facilitate the transition away from LIBOR and into new alternative reference rates such as SOFR, they have strongly emphasized the importance of prioritizing transition work ahead of the 2022 timeline.

In December 2019, the Fed announced that the LIBOR transition is one of its top supervisory priorities for 2020. Similarly, the OCC stated that it is increasing oversight of the LIBOR transition through 2020 and 2021.

Both agencies, as well as the Chairman of the Commodity Futures Trading Commission and SEC staff, noted that LIBOR’s discontinuation and the movement to a new reference rate may increase operational, compliance, and reputational risks to market participants and the financial system, and that these risks will be exacerbated unless the work to transition is accomplished in a timely manner.

Practical considerations

To facilitate the work required to change from LIBOR to SOFR, the ARRC published a practical implementation checklist that outlines steps to consider to mitigate risks and ensure a smooth transition. The checklist contains a list of practical considerations for the following 10 categories:

- **Establish program governance:** Implement a robust governance framework with accountable senior executives to oversee the delivery and coordination of the firm’s enterprise-wide LIBOR transition program.
- **Develop transition management program:** Establish an enterprise-wide program across functions and businesses to evaluate and mitigate the risks associated with transition with specific considerations for unique product and client exposures.

- **Implement communication strategy:** Develop and implement an enterprise-wide strategy with clear objectives to proactively engage, consistently communicate, and increase levels of education with impacted internal and external stakeholders.
- **Identify and validate exposure:** Quantify and develop a flexible approach to monitor LIBOR-linked exposures through the transition period. Obtain or develop capabilities to value SOFR-based products as part of transition to using those products.
- **Develop product strategy:** Develop strategy for redesigning or transitioning the existing portfolio of LIBOR products, including creating or using new products based on SOFR.
- **Risk management:** Identify, measure, monitor, and control financial and non-financial risks of transition, establishing processes and oversight routines for ongoing management.
- **Assess contractual remediation impact and design plan:** Understand the financial, customer, and legal impacts resulting from transitioning from LIBOR to SOFR via fallbacks, and plan mechanisms for implementing.
- **Develop operational and technology readiness plan:** Develop a plan to address the large-scale operating model, data, and technology implications required for LIBOR transition.
- **Accounting and reporting:** Determine accounting considerations along with related reporting considerations.
- **Taxation and regulation:** Determine the tax and regulatory reporting considerations.

While not exhaustive, the ARRC's checklist provides a practical guide to organizing and managing LIBOR transition for individual market participants.



What fallback language is currently in place?

Addressing legacy contracts: Fallback provisions of various asset classes

Contracts in both the derivative and cash markets contain fallback language in the event a LIBOR rate is not available. However, existing language was drafted assuming a temporary discontinuation of LIBOR, not a permanent cessation.

The ARRC released four guiding principles in regards to developing new LIBOR fallback language:

Guiding principle 1: Market participants should not wait too long to begin implementing new language. Since there are still many unknowns, language should be flexible.

Guiding principle 2: Fallback language should be consistent across and within asset classes.

Guiding principle 3: Fallback language should be based on observable facts, have feasible implementation, and should minimize value transfer.

Guiding principle 4: Replacement language should provide triggers for when successor rate and spread adjustments should occur.

While recommended fallbacks are designed to mitigate value transfer, fallbacks will invariably lead to some degree of value transfer. The best way to transition is through amendment of the reference rate prior to a permanent cessation.

Overview of general legacy fallback provisions of various asset classes

Derivatives	<ul style="list-style-type: none">Under the 2006 ISDA Definitions (as amended by Supplement 70, effective January 25th, 2021), there are three trigger events, covering both permanent cessation and pre-cessation events, that establish a credit spread adjustment to specified new ARRs. The amended Definitions are effective for new transactions; however, the language will not retroactively apply to legacy transactions unless both parties incorporate the updated Definitions (e.g., through a bilateral amendment or where both parties have adhered to ISDA 2020 IBOR Fallbacks Protocol)
Corporate loans	<ul style="list-style-type: none">Fallback language in credit agreements vary, but typically reference a “base rate” which is often Prime.Changes to fallback language will need to be negotiated between borrower and lender and in the case of syndicated loans, all or most of the lenders would need to agree to the change.
Floating rate notes (FRN) and securitizations	<ul style="list-style-type: none">Similar to derivatives, fallback language for FRNs and securitizations typically rely on receiving quotes from reference banks. In the event no reference rates are available, the security will convert to fixed at the most recent LIBOR period fix.FRNs and securitizations are anticipated to be one of the most challenging to amend. For securities with a large number of investors, any amendment usually requires a significant majority, and in some cases 100%, of holders to agree to a change.
Mortgages and consumer loans	<ul style="list-style-type: none">Both mortgages and consumer loans provide more flexibility to the lender than the borrower.

Source: Wells Fargo Securities.

How will derivative contracts be impacted?

Proposed approach for replacing LIBOR in the derivatives markets

Following several market-wide consultations to determine fallback rates and adjustments for multiple currency IBORs, ISDA amended its standard definitions to implement alternative reference rates (ARRs) for certain key IBORs, including LIBOR, to protect against the risk that those IBORs could cease at some point in the future. The amendment (known as Supplement 70 to the 2006 ISDA Definitions) was published on October 23, 2020 and took effect on January 25, 2021.

Derivative market LIBOR footprint by product

Market	Product	Volume (\$T)	End 2021	End 2025
Over-the-counter derivatives	Interest Rate Swaps	81	66%	88%
	Forward Rate Agreements	34	100%	100%
	Interest Rate Options	12	65%	68%
Exchange-traded derivatives	Cross Currency Swaps	18	88%	93%
	Interest Rate Options	34	99%	100%
	Interest Rate Futures	11	99%	100%

Source: Federal Reserve staff calculations, BIS, Bloomberg, CME, DTCC, Federal Reserve Financial Accounts of the United States, G.19. Shared National Credit, Y-14 data and JPMorgan Chase; Data are gross notional exposures as of year-end 2016

One key advantage for the derivatives market is that documentation is relatively standard. Most outstanding derivatives reference the 2006 ISDA Definitions, which ISDA amends from time to time. ISDA can facilitate amendment of legacy trades by publishing a multilateral protocol that counterparties can voluntarily choose to adopt. By adhering to the protocol, market participants agree that transactions that are in scope for the protocol will be amended to provide for fallbacks for relevant IBOR. Supplement 70 to the 2006 ISDA Definitions (which became effective on January 25, 2021) provides that all new transactions that incorporate those Definitions will include the relevant IBOR fallbacks.

Main challenges

- Value transfer at the time LIBOR is discontinued. LIBOR and ARRs are different rates. The spread adjustments are designed to mitigate value transfer and address the differences between the IBORs and the ARRs
- The use of overnight rates in derivatives is a change from the current practice of using forward-looking term LIBOR rates
- Parties that do not adhere to or bilaterally incorporate the ISDA 2020 IBOR Fallbacks Protocols may have contractual language that provides for rates different than typically used in ARR convention

Derivatives that hedge loans or other debt. Relying on fallbacks may result in a mismatch between products.

Fallback rate and spread adjustment

After several market-wide consultations, ISDA has selected a fallback rate and spread adjustment that has been incorporated into the 2006 ISDA Definitions via a supplement that were published on October 23, 2020 and became effective on January 25, 2021. Upon the March 5, 2021 Trigger Event, those spreads have been fixed.¹⁶

Fallback rate for USD LIBOR: Compounded average SOFR calculated in arrears. SOFR compounding period will correspond to the length of transaction's calculation period with two-banking day backward-shifted observation period so that payments are known before they become due (e.g., 30-day average for 1-month LIBOR or 90-day average for 3-month LIBOR).

Spread adjustment for USD LIBOR: Spread adjustment based on the historical median between LIBOR and compounded SOFR calculated over a 5-year lookback period.

Next steps

Amended ISDA definitions include three triggers (i.e., the events that precede the transition from LIBOR to the new reference rate) relating to the permanent unavailability of LIBOR:¹⁷

1. The Administrator of LIBOR (ICE Benchmark Administration (IBA)) issues a public statement announcing that it has ceased or will cease to provide LIBOR permanently or indefinitely, and there is no successor administrator. This Trigger Event occurred on March 5, 2021 when IBA issued an announcement detailing the final publication dates on a representative basis for each LIBOR tenor.
2. The regulator of the administrator of LIBOR (the U.K. FCA), the central bank for the LIBOR currency, or an entity with insolvency or resolution authority over the administrator of LIBOR states that LIBOR has ceased or will cease to be provided, and there is no successor administrator. This Trigger Event occurred on March 5, 2021 when the FCA issued an announcement acknowledging the final publication dates on a representative basis for each LIBOR tenor as announced by IBA.
3. The regulatory supervisor for an administrator has determined that the applicable rate is no longer, or as of a specified future date will no longer be, representative of the underlying market and will not be restored and the statement is being made in awareness that the statement will trigger fallbacks activated by a pre-cessation announcement.

Central clearing party “Big Bang”

On October 16, 2020, central clearing houses took major steps in transitioning from LIBOR: (i) transitioned to use SOFR for price aligned interest (PAI) and discounting of new U.S. dollar swap contracts going forward (in place of EFFR); and (ii) modified outstanding swap contracts to replace EFFR with SOFR for PAI and discounting. A similar transition occurred with respect to a transition of PAI and discounting from EONIA to €STR on July 27, 2020.

16. <https://www.isda.org/category/legal/benchmarks/>

17. <https://www.isda.org/a/n6tME/Supplemental-Consultation-on-USD-LIBOR-CDOR-HIBOR-and-SOR.pdf>

How will loans and bonds be impacted?

Replacing LIBOR in the cash markets

Cash market participants are actively working to create fallback language for new LIBOR-based cash products.

Current LIBOR fallback language in loan documents was often designed without the permanent discontinuation of LIBOR in mind and is either unworkable (e.g., polling reference banks) or allows lender/agent discretion to select a new rate, as described on page 16.

The ARRC has worked to develop more robust fallback language to address a permanent cessation of LIBOR. In 2019, the ARRC published recommended fallback language for floating rate notes, business loans, securitizations, syndicated loans and closed-end, residential adjustable rate mortgages (ARMs). The recommended fallback provisions define the trigger events and provide for the selection of a new reference rate to replace LIBOR as well as a spread adjustment to account for the differences between LIBOR and the replacement rate.

For ARMs, the recommended language provides for an adjusted index comprised of SOFR plus a spread.

To support the use of SOFR in new contracts, the Loan Syndications and Trading Association (LSTA) released a SOFR credit agreement in September 2020 to familiarize market participants with replacement benchmark alternatives. The agreement references a compounded average of daily SOFRs calculated in arrears.

The first SOFR-based instruments were issued in the Investment Grade Floating Rate Note market in July 2018 and subsequent issuances continue to be well-received by investors. The notes have been issued with a variety of coupon conventions (daily resets as well as simple and compounded averaging), different pay frequencies (monthly and quarterly), and lockout periods (the number of days where SOFR is frozen at the end of each pay period to provide for interest calculation). Some SOFR notes have been left unhedged and others hedged with a LIBOR basis swap.

Cash market LIBOR footprint by product

Market	Product	Volume (\$T)	End 2021	End 2025
Business loans	Syndicated Loans	1.5	83%	97%
	Nonsyndicated Business Loans	0.8	86%	97%
	Nonsyndicated CRE/Com. Mortgage	1.1	83%	94%
Consumer loans	Retail Mortgages	1.2	57%	82%
Bonds	Floating/Variable Rate Notes	1.8	84%	93%
Securitizations	Mortgage-backed Securities	1	57%	81%
	Collateralized Loan Obligations	0.4	26%	72%
	Asset-Backed Securities	0.2	55%	78%
	Collateralized Debt Obligations	0.2	48%	73%

Source: Federal Reserve staff calculations, BIS, Bloomberg, CME, DTCC, Federal Reserve Financial Accounts of the United States, G.19, Shared National Credit, Y-14 data and JPMorgan Chase. The figures are syndicated and corporate loans do not include undrawn lines. Nonsyndicated business loans exclude CRE/commercial mortgage loans. Estimated maturities for retail mortgages based on historical pre-payment rates.

Market participants have done significant work to identify and standardize conventions for SOFR products. To facilitate the awareness of conventions used to date, the ARRC released a floating rate note conventions matrix that illustrates look-backs, lockouts, and payment delays that have been included in debt market issuances. The matrix is intended to supplement to the ARRC's "User's Guide to SOFR". An appendix to the matrix includes (1) term sheets with key provisions to provide additional explanation on how to issue compounded SOFR-based floating rate notes and (2) recommended fallback language for SOFR-based floating rate notes.

Select SOFR issuances

Issuer name	Total
FHLB	164.1
Freddie Mac	67.8
Fannie Mae	21.5
Credit Suisse	19.3
Federal Farm Credit Banks	7.9
MetLife	6
Citi	5.3
Goldman	4.1
Bank of Montreal	3.5
Bank of Nova Scotia	1.7
World Bank	1.5
JPMorgan	1.5
Wells Fargo	1.1
Various Other Issuers	29
Total	\$334

Source: Bloomberg as of January 3, 2020.



How is Wells Fargo contributing?

Wells Fargo is a leader in the LIBOR transition process

Wells Fargo is one of the world's largest banks by market capitalization; a top five U.S. bank by total assets; and the second-largest bank in home lending. **In recognition of the scope and importance of the LIBOR transition work**, as well as the significant LIBOR exposure across multiple product types, risk categories, and customer segments, **Wells Fargo created a LIBOR Transition Office (LTO) in January 2018.**

Its top priority is to manage the impacts and risks inherent in the transition and support our customers with information and resources. Wells Fargo is an active member of key industry groups, providing a platform for the firm to relay feedback on concerns related to the transition that impact our customers and the broader industry. Notable membership includes:

- Representation on every ARRC working group, chair of the ARRC's Floating Rate Notes working group, and co-chair of certain Communications and Consumer Products sub-working groups
- CFTC's Market Risk Advisory Committee
- ISDA
- Euro RFR Working Group

This transition work is still underway and it is critical that all market participants understand what is happening and why, specifically with respect to the potential impacts on new and legacy contracts.

Wells Fargo is a leading presence at the ARRC

- Chair of Floating Rate Notes working group
- One of two banking institutions participating in all working groups
- Assumed leadership role in the drafting of key industry papers (Title VII relief letter,¹⁸ ARRC FAQ documents, and ARRC fallback language consultations)

Wells Fargo has regular dialogue with LIBOR transition leadership at ISDA, Loan Syndications & Trading Association (LSTA), and American Bankers Association (ABA), among other organizations.

Wells Fargo frequently speaks at industry conferences, including ARRC roundtables, Securities Industry and Financial Markets Association (SIFMA), ISDA, and Structured Finance Association (SFA).

As part of Wells Fargo's commitment to the SOFR transition, Wells Fargo was the first globally systemically important bank to issue SOFR-linked notes.

18. Title VII relief letter: ARRC letter requesting regulatory relief for derivatives in connection with the LIBOR transition.

Where can I get further information?

New information is continuously being published regarding the transition

ARRC

<https://www.newyorkfed.org/arrc/publications>

CME

<https://www.cmegroup.com/education/browse-all.html#search=sofr#pageNum=1>

Financial Stability Board

<http://www.fsb.org/wp-content/uploads/P120718.pdf>
http://www.fsb.org/wp-content/uploads/r_140722.pdf
<http://www.fsb.org/wp-content/uploads/P141118-1.pdf>

FRBNY

<https://apps.newyorkfed.org/markets/autorates/sofr>

International Organization of Securities Commissions

<http://www.iosco.org/library/pubdocs/pdf/IOSCOPD415.pdf>

ISDA

<https://www.isda.org/2018/07/12/interbank-offered-rate-ibor-fallbacks-for-2006-isda-definitions/>
<https://www.isda.org/a/g2hEE/IBOR-Global-Transition-Roadmap-2018.pdf>
<https://www.isda.org/a/OqrEE/IBOR-Transition-Report.pdf>

Oliver Wyman

<https://www.fca.org.uk/news/speeches/interest-rate-benchmark-reform-transition-world-without-libor>

Speech transcripts

<https://www.federalreserve.gov/newsevents/speech/quarles20180719a.htm>
<https://www.fca.org.uk/news/speeches/the-future-of-libor>
<https://www.fca.org.uk/news/speeches/interest-rate-benchmark-reform-transition-world-without-libor>

Contacts

For more information, please email our LIBOR Transition Office at libortransitionoffice@wellsfargo.com.

Authors

Readie Callahan
Spencer Langston

Special thanks

Jessica Murphy
Holly Richer
Alexis Pederson

Disclaimer

This communication is for informational purposes only, is not an offer, solicitation, recommendation or commitment for any transaction or to buy or sell any security or other financial product (unless expressly stated otherwise and/or this communication is subject to 17 C.F.R. §§ 1.71 and 23.605), and is not intended as investment advice or as a confirmation of any transaction (except for any transaction confirmation transmitted herewith). This communication does not take into account your particular investment objectives, financial conditions, or needs and is not intended to serve as a basis for entering into any transaction or to suggest, through opinion, recommendation, or otherwise, you should enter into a particular transaction or trading strategy.

For the purposes of, and to the extent subject to, Commodity Futures Trading Commission ("CFTC") Regulations at 17 C.F.R. §§ 1.71 and 23.605 promulgated pursuant to the Commodity Exchange Act ("CEA"), if this communication relates to one or more derivatives transactions regulated by the CFTC, this is a "solicitation" and is not a "research report" as defined in 17 C.F.R. §§ 1.71 and 23.605. This communication should not be construed as a recommendation or opinion with respect to any derivative or trading strategy involving a derivative for purposes of CFTC Regulations Part 23 or the CEA.

If you are a "Special Entity" within the meaning of 17 C.F.R. §23.401(c), you are hereby notified that this communication does not, is not intended to and should not be interpreted as an expression of an opinion within the meaning of 17 C.F.R. §23.440 by any person on behalf of Wells Fargo & Company and its subsidiaries as to whether you should enter into any swap or trading strategy involving a swap.

Neither the sender, WFBNA nor Wells Fargo Securities, LLC is acting as a municipal advisor and this communication is not intended to be, and does not constitute, advice within the meaning of Section 15B of the SEA.

Any market price, indicative value, estimate, view, opinion, data or other information in this communication is not warranted as to completeness or accuracy, is subject to change without notice, and Wells Fargo Corporate and Investment Banking, CIB accepts no liability for its use or to update or keep it current.

Any views or opinions expressed in this communication are not necessarily those of CIB. CIB or its affiliates may provide views or opinions that differ from those expressed in this communication and also may from time to time acquire, hold or sell a position in the securities or financial products mentioned herein. Expressions of opinion, including any attachments, contained herein are given in good faith, but are subject to change without notice.

You should consult your own advisors for opinions on whether to enter into any transaction or trading strategy. Not all financial products offered under this trade name are securities, and unless otherwise expressly stated, financial products are not bank deposits or FDIC insured.

Important Information

"Wells Fargo" means Wells Fargo Bank, N.A. Wells Fargo CIB is the trade name for the corporate banking, capital markets and investment banking services of Wells Fargo & Company and its subsidiaries, including but not limited to Wells Fargo Securities, LLC, a U.S. broker-dealer registered with the U.S. SEC and a member of NYSE, FINRA, NFA and SIPC, Wells Fargo Prime Services, LLC, a member of FINRA, NFA and SIPC, Wells Fargo Securities Canada, Ltd., Member – Canadian Investor Protection Fund, Wells Fargo Securities International Limited and Wells Fargo Bank N.A., London Branch (both of which are authorized and regulated by the U.K. FCA), and Wells Fargo Bank, N.A., a member of NFA. Wells Fargo Securities, LLC, Wells Fargo Prime Services, LLC, Wells Fargo Securities Canada, Ltd. and Wells Fargo Securities International Limited are distinct entities from affiliated banks and thrifts. Derivatives products (including "swaps" as defined in the Commodity Exchange Act ("CEA") and Commodity Futures Trading Commission ("CFTC") regulations) are transacted through Wells Fargo Bank, N.A., a CFTC registered swap dealer, member of the National Futures Association and physical commodities are transacted through Wells Fargo Commodities, LLC., a wholly-owned subsidiary of Wells Fargo & Company.

Informational Purposes Only

This document and any other materials accompanying this document (collectively, the "Materials") are for general information only. Although we believe that market data and other information contained in the Materials is reliable, it is not warranted as to completeness or accuracy, is subject to change without notice, and we accept no responsibility for its use or to update or keep it current. The Materials are not an offer or commitment for any products or transactions. Historical data, past trends and past performance do not reflect or guarantee future results. Financial projections and economic forecasts are based on hypothetical assumptions about uncertain future market conditions and events and therefore should not be relied upon in connection with any asset, liability, transaction or otherwise, including any decision whether or when to invest or hedge or to acquire or dispose of any asset, liability or transaction.

Some of the information or opinions stated in this message may have been obtained or developed by Wells Fargo from sources outside Wells Fargo. In such cases, Wells Fargo believes the information or opinions to be reliable. However, Wells Fargo will not have independently confirmed the reliability of such information or opinions and does not guarantee their accuracy or completeness or the reliability of their sources.

The information and opinions in these Materials, whether or not they were obtained or developed from outside sources, may not be appropriate for, or applicable to, some or any of your activities or circumstances.

In our written and oral communications with you, we are not giving you any economic, tax, accounting, legal, or regulatory advice or recommendations, and are not acting in a fiduciary relationship with you. You should conduct a thorough and independent review of the economic, tax, accounting, legal, and regulatory characteristics, consequences, and risks of any transaction in light of your particular circumstances, consulting with such advisors as you consider appropriate. This information does not constitute trading or investment advice or research, and has not been prepared in accordance with any laws or regulations designed to promote the independence of research.

Updating the Materials

We reserve the right to amend, supplement, or replace these Materials at any time, and your use of the Materials constitutes your agreement to update the Materials with any such amendments, supplements, or replacements we furnish you.

Limitation of Liability

In no event shall Wells Fargo Bank, N.A. be liable to you or any third party for any direct or indirect, special, incidental, or consequential damages, losses, liabilities, costs, or expenses arising directly or indirectly out of or in connection with the Materials.

LIBOR Transition Risks

This information is not intended to override, and should be considered in conjunction with, any disclosures, or other statements identifying potential risks provided to you by Wells Fargo. The events described in these Materials could have unpredictable and material consequences for transactions, products, and services that require payments or calculations to be made by reference to LIBOR. These consequences include, but are not limited to, the following:

- (a) changes to the way in which LIBOR is calculated, or differences between the way a replacement rate and LIBOR are calculated, could significantly affect the value, price, cost and/or performance of affected contracts;
- (b) replacement rates for LIBOR may differ across affected contracts, and those differences may create material economic mismatches with any affected contracts used for hedging or similar purposes;
- (c) some existing affected contracts may not provide for any replacement rate; as such, there could be disputes about what replacement rate applies when LIBOR is unavailable or is no longer representative or whether contracts are enforceable in the absence of any replacement rate;
- (d) new alternative rates are likely to be developed over time and these new rates may be significantly different from both LIBOR and replacement rates that are currently being considered;
- (e) existing or new regulations may limit the ability of market participants to enter into new transactions, products, or services linked to LIBOR if a determination or announcement is made that LIBOR is no longer representative of the relevant market;
- (f) Wells Fargo may have rights to determine a replacement rate for LIBOR for affected contracts, including any price or other adjustments to account for differences between the replacement rate and LIBOR, and the replacement rate and any adjustments we select may be inconsistent with, or contrary to, your interests or positions; and
- (g) moving from LIBOR to a replacement rate may raise a variety of tax, accounting, and regulatory risks.

Derivatives-related risks of the LIBOR transition are discussed in greater detail at the IBOR Alternative Reference Rates disclosure at: wellsfargo.com/swapdisclosures.

Wells Fargo cannot provide any assurances as to the consequences, or likely costs or expenses associated with any of the changes arising from the LIBOR transition, though they may be important to you. The above is provided for informational purposes only and is not intended to apply to any specific customer or transaction.