NATIONAL BANK OF CANADA
FINANCIAL MARKETS

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Benchmark Reform Update – Tracking the transition

This document is intended to give a comprehensive picture of the past, present and future issues surrounding the LIBOR transition and broader benchmark reform underway across international financial markets. It is our hope that this is able to strike the right balance between being concise and detailed, while including a full account of the timeline that brought us to this point. We've organized the document as follows: The first section provides a brief summary on LIBOR. The second section provides a timeline of the early stages of the transition process. The following sections discuss more recent timelines associated with the Canadian and U.S. transitions. Subsequent sections provide a more technical, detailed look at some of the issues associated with global benchmark reform and adoption. The final page includes a (non-exhaustive) list of relevant resources from central banks and benchmark rate reform working groups.

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Benchmark Reform Summary – Canada versus U.S.

	Canada		United States	
	IBOR	**Alternative Reference Rate**	**IBOR**	**Alternative Reference Rate**
Reference Rate	Canadian Dollar Offered Rate (CDOR)	Canadian Overnight Repo Rate Average (CORRA)	USD LIBOR	Secured Overnight Financing Rate (SOFR)
Description	Committed rate that Canadian banks are willing to lend to clients with existing credit agreements via banker's acceptances	Cost of overnight funding via repo transactions secured by Government of Canada debt	Submitted rate at which banks can borrow from each other unsecured for a specified term	Cost of borrowing cash on an overnight basis in the US Treasury repo markets
Type of Rate	Unsecured	Secured	Unsecured	Secured
Calculation type	Trimmed Arithmetic Mean (excluding highest and lowest submission)	Volume-weighted trimmed median (excludes the lower 25th percentile)	Trimmed Arithmetic Mean (excluding the highest and lowest 25% of submissions)	Volume-weighted Median
Term(s)	1, 2, 3, 6, 12 months+	Overnight	Overnight/Spot Next, 1 week, 1, 2, 3, 6, 12 months	Overnight
Publication Time	10:15 EST	09:00 EST (next day*)	11:55am BST	8:00am EST (next day*)
Administrator	Refinitiv	Bank of Canada	Intercontinental Exchange	New York Federal Reserve

*Source: NBF, Bank of Canada, Federal Reserve | * Note: Alternative reference rates are published based on the previous day's transactions. +6- and 12-month CDOR tenors will cease publication in May 2021*

A Brief History on LIBOR

The London Interbank Offered Rate (LIBOR) is the reference rate at which banks indicate that they can borrow short-term wholesale funds from one another on an unsecured basis. Its origins date back to 1969 when a syndicated loan was based on the reported funding costs of a set of reference banks. As the LIBOR loan market developed in the decades that followed, banks increasingly borrowed using LIBOR-based contracts. At its peak, LIBOR was reported for ten currencies across fifteen maturities.

To obtain LIBOR submissions, the following question is posed to submitting institutions: "*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 11am?*" The official LIBOR setting is then calculated by taking the simple mean of all LIBOR submissions after the highest and lowest 25% of submitted rates have been discarded. One of the fundamental issues with the survey question is its subjectivity and lack of corroborating evidence required to support a given submission.

LIBOR's current usage is predominantly two-fold. Firstly, it acts as a reference rate for which hundreds of trillions of dollars in financial contracts, instruments and derivates are pegged to. These include swaps, futures, bonds and variable rate loans, including mortgages and student loans. Secondly, it is used as a benchmark rate in which investment performance or financial market wellbeing and stability can be measured by. The LIBOR-OIS spread, for example, is generally seen as a barometer for the general health of financial markets.

What's the Issue?

LIBOR scrutiny has existed for years, particularly since 2008, but came to the forefront in 2012 due to investigations into the manipulation of LIBOR submissions from panel banks during the financial crisis. It was alleged that banks submitted artificially low borrowing costs to: (a) project financial strength and soundness while the financial crisis created tremendous uncertainty and/or; (b) to realize gains on LIBOR-linked derivative products sometimes via coordinated manipulation with other submitting banks. As a result, many banks agreed to pay multi-billion-dollar fines to financial regulators.

In addition to the mistrust the scandal generated, fewer panel banks began reporting borrowing costs to the LIBOR administrator and those that did increasingly relied on "market and transaction-based expert judgement". Moreover, five of the ten currencies that had once been reported have since been discontinued (NZD, DKK, CAD, SEK, AUD) and several maturities have been dropped. The number of currency-maturity pairs have declined from 150 to 35. Additionally, regulation imposed in the aftermath of the global financial crisis disincentivized interbank unsecured funding. This led to significantly reduced volumes, meaning submissions have become less reliant on tangible market transactions and thus, more reliant on 'expert judgement'. Also, the central clearing of derivatives mandated by the Global OTC Derivatives Reform reduced the relevance of rates with counterparty credit risk. Meanwhile, liquidity in longer maturity settings worsened as banks generally moved towards shorter-term funding sources. All of the above factors support moving away from LIBOR and IBOR-style interest rates.

Table: LIBOR's significant footprint

Estimated U.S.D LIBOR market footprint[1] by asset class as of year-end 2016

Type	Instrument	Volume (US$tln)	Share maturing by: End 2021	End 2025	After 2030	After 2040
OTC Derivatives	Interest rate swaps	81	66%	88%	7%	5%
	Forward rate agreements	34	100%	100%	0%	0%
	Interest rate options	12	65%	68%	5%	5%
	Cross currency swaps	18	88%	93%	2%	0%
Exchange-traded derivatives	Interest rate options	34	99%	100%	0%	0%
	Interest rate futures	11	99%	100%	0%	0%
Business loans[2]	Syndicated loans	1.5	83%	100%	0%	0%
	Non-syndicated business loans	0.8	86%	97%	1%	0%
	Non-syndicated CRE/Commercial mortgages	1.1	83%	94%	4%	2%
Consumer Loans	Retail mortgages[3]	1.2	57%	82%	7%	1%
	Consumer loans	0.1	---	---	---	---
Bonds	FRNs/VRNs	1.8	84%	93%	6%	3%
Securitiz-ations	MBS (incl. CMOs)	1.0	57%	81%	7%	1%
	CLOs	0.4	26%	72%	5%	0%
	ABS	0.2	55%	78%	10%	2%
	CDOs	0.2	48%	73%	10%	2%
Total USD LIBOR Exposure:		***199***	***82%***	***92%***	***4%***	***2%***

[1]Source: Federal Reserve staff calculations, BIS, Bloomberg, CME, DTCC, Federal Reserve Financial Accounts of the Unites States, G.19, Shared National Credit, and Y-14 data, and JPMorgan Chase. Data are gross notional exposures as of year-end 2016. [2]The figures for syndicated and corporate business loans do not include undrawn lines. Non-syndicated business loans exclude CRE/commercial mortgage loans. [3]Estimated maturities based on historical pre-payment rates

The Early Days of Transition

In September 2012, the UK Financial Services Authority's (FSA) *Wheatley Review of LIBOR* was published which was triggered by the LIBOR-manipulation scandal that had been brought to the forefront earlier in the year. While alternatives to LIBOR were a component of the report, the ultimate recommendation was that LIBOR should be retained as a benchmark but with a comprehensive reform. Recommended changes included a transfer of administration from the British Bankers' Association to an independent party, stricter submission standards, using a more transactions-based approach, ceasing the publication of some currencies and maturities where underlying trade data was deemed insufficient and the continued consideration into the long-term future and appropriateness of LIBOR as a benchmark rate.

In the wake of the Wheatley Review, two main initiatives were undertaken to further investigate the future of financial benchmark interest rates: the International Organization of Securities Commissions (IOSCO) created the IOSCO Principles for Financial

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Benchmarks and the Financial Stability Board (FSB) launched the Official Sector Steering Group (OSSG).

In July 2013, IOSCO's *Principles for Financial Benchmarks* final report was released, garnering approval from the G-20 and the FSB. A link to the principles can be found in the appendix to this document but for the sake of brevity we will briefly outline the core tenets here. The IOSCO principles call for a financial benchmark with strong governance arrangements devoid of conflicts of interest, a transparent and transactions-based design, an unambiguous methodology and an accountability framework that allows for a straightforward auditing procedure.

In July 2014, the FSB presented *Reforming Major Interest Rate Benchmarks*, describing the findings of the OSSG's research on the three largest IBOR's (LIBOR, EURIBOR and TIBOR). The FSB's report endorsed the adoption of the IOSCO Principles for Financial Benchmarks and found that, while progress had been made by IBOR administrators in improving each of the benchmark rate's quality, there was more to be done to ensure the principles would be adequately implemented. The report ultimately recommended a multiple-rate approach, whereby existing IBOR's would be strengthened to meet IOSCO Principles and an additional, risk-free rate would be developed that would be better-suited for many derivative transactions. Importantly, an earlier report conducted by the Market Participants Group (an FSB subgroup) found that fallback language (i.e. contractual language outlining alternative rates in the event of LIBOR discontinuation) was in some cases lacking, particularly for a number of derivatives contracts. The report highlighted that this could pose problems in the case of a transition away from LIBOR.

Table: The Global benchmark reform effort

Major jurisdictions, prior rate, new rate and working group

Jurisdiction	IBOR	New RFR	Working Group
U.S.	USD LIBOR	SOFR (Secured Overnight Funding Rate)	ARRC (Alternative Reference Rate Committee)
Canada	CDOR	Enhanced CORRA (Canadian Overnight Repo Rate Average)	CARR (Canadian Alternative Reference Rate Working Group)
Europe	EURIBOR, EONIA	€STR (Euro Short Term Rate)	Working Group on Euro RFR
United Kingdom	GBP LIBOR	Reformed SONIA (Sterling Overnight Index Average)	Working Group on Sterling Risk-Free Rates
Switzerland	CHF LIBOR	SARON (Swiss Average Rate Overnight)	NWG (National Working Group on Swiss Franc reference rates)
Japan	JPY LIBOR	TONAR (Tokyo Overnight Average Rate)	Cross-Industry Committee on JPY Interest Rate Benchmarks

Source: NBF, each jurisdiction's working group

For the following three years, the focus shifted from a broader, global analysis to each individual jurisdiction. Benchmark administrators focused on reforming existing IBORs, generally to make them more transactions-based. Meanwhile, central banks initiated working groups to establish alternative reference rates compliant with the IOSCO Principles. Industry groups also focused on developing more robust fallback language for derivative and cash products, in case of discontinued rate publication. During these years, the conventional wisdom was that most nations would operate under a multiple-rate system consisting of both an IBOR-style rate and a new or already existing (but refined) risk-free rate.

This was upended in July 2017, when Andrew Bailey of the UK's Financial Conduct Authority (FCA) announced that it would not compel panel banks to provide LIBOR quotes beyond the end of 2021. While the Intercontinental Exchange (ICE) said it intended to continue publishing LIBOR (assuming banks continue to provide submissions on an entirely voluntary basis), the now-BoE governor's speech generated a greater sense of urgency among policymakers, industry groups and financial market participants to ensure a replacement rate would be ready by 2022. More recent developments suggest that an official announcement to end LIBOR could come even sooner than many had been expecting, potentially as early as year-end 2020.

The U.S. Transition

November 2014: As part of the U.S. transition from LIBOR, the Alternative Reference Rate Committee (ARRC) was established in December of 2014 by the Federal Reserve Board and the New York Fed in cooperation with the U.S. Department of the U.S. Treasury, the Commodity Futures Trading Commission (CFTC), and the U.S. Office of Financial Research. Its membership originally included representation from fifteen large global dealers in USD interest rate derivatives. ARRC's original purpose was to primarily identify an IOSCO Principles-compliant, transactions-based alternative reference rate for use in derivatives contracts. In addition, the group was tasked with promoting the adoption of the selected rate and ensuring fallback language in financial contracts were more resilient to changing conditions.

May 2016: As part of the ARRC's Interim Report and Consultation, the committee announced it had narrowed the list of potential rates to two: The Overnight Bank Funding Rate (OBFR) and some form of overnight Treasury general collateral repo rate.

June 2017: ARRC recommended the Secured Overnight Financing Rate (SOFR) as the preferred U.S. dollar overnight risk-free rate.

July 2017: Andrew Bailey announces the FCA will no longer compel panel banks to submit LIBOR quotes beyond 2021.

October 2017: ARRC formally adopts the "Paced Transition Plan" as part of the move to SOFR (see table on following page).

March 2018: Membership to ARRC was broadened to help facilitate a successful LIBOR transition between a wider array of financial instruments. New members included financial institutions, government agencies and financial regulators.

April 2018: The New York Fed begins publishing SOFR as well as the Tri-Party General Collateral Rate (TGCR), the Broad General

Collateral Rate (BGCR) and the related trading volumes underlying each rate.

Table: Transition to SOFR making good progress

Steps of ARRC's Paced Transition Plan (October 2017, since revised)

ARRC Paced Transition Plan (October 2017, since revised)		
Step	Original Timeline	Status/revised timeline
1. Put in place infrastructure for futures and/or OIS trading	H2:2018	**Complete**
2. Begin trading in SOFR futures and/or SOFR-referenced bilateral/uncleared OIS	End 2018	**Complete** (CME, May-18)
3. Begin trading in SOFR-referenced, cleared OIS (using current PAI and discounting)	Q1:2019	**Complete** (LCH July 2018; CME Oct 2018)
4. CME and LCH convert discounting and PAI from EFFR to SOFR on all outstanding cleared USD swaps.	Q1:2020/ Q2:2021*	**Complete** (Oct 16, 2020)
5. Creation of a term reference rate based on SOFR derivatives market	End 2021	**Complete** (CME, Jul-21)

*Source: New York Fed | * In the original Paced Transition Plan, there were six steps. The fourth involved CCPs providing a choice between SOFR and EFFR PAI for new trades by Q1:2020. The fifth involved CCPs moving to offer only a SOFR PAI for new trades by Q2:2021. Both CME and LCH subsequently determined moving to the model in step 4 above was appropriate.*

What is SOFR?

[1]The Secured Overnight Financing Rate (SOFR) is a broad measure of the cost of borrowing cash overnight in the repo market collateralized by U.S. Treasury securities. Produced daily by the New York Fed, SOFR is robust, is based on a deep, active market with a diverse set of borrowers and lenders, is not at risk of being discontinued due to a scarcity of underlying transactions, and meets international best practices.

Unlike USD LIBOR, which is an unsecured interest rate, SOFR has no credit component as borrowing is secured by U.S. Treasury securities. Moreover, the daily rate setting requires no expert judgement as it is fully transactions—based. The transactions underlying SOFR average $1 trillion on a daily basis compared to the ~$500 million that underlie 3-month USD LIBOR submissions. Given that SOFR reflects lending and borrowing activity for a broad-based range of market participants (i.e. banks, broker-dealers, asset managers, insurance companies, securities lenders, pension funds, etc.), it was deemed to be the most resilient option of those considered by the ARRC.

[1]*Source: New York Fed*

May 2018: CME launches 1-month and 3-month SOFR futures.

July 2018: LCH begins clearing USD swaps referencing SOFR.

July 2018: Fannie Mae issued the first ever SOFR FRN.

July 2018: ARRC releases "Guiding Principles for More Robust LIBOR Fallback Contract Language in Cash Products". The principles recommended include more specific contract language, better consistency between asset classes, liabilities and derivatives, fairness of implementation, the inclusion of successor rates and the allowance of a spread adjustment.

September 2018: ARRC releases consultations on fallback contract language for floating rate notes and syndicated business loans for public feedback.

October 2018: CME begins clearing OTC SOFR swaps.

October 2018: FASB approves SOFR OIS as benchmark for hedge accounting.

December 2018: ARRC releases consultations on fallback contract language for bilateral business loans and securitizations for public feedback.

April 2019: The ARRC releases "A User's Guide to SOFR", intended to help explain how market participants can use SOFR in cash products and to explain the forward-looking term rates the ARRC seeks to see published in the future and where the ARRC believes those rates can be most productively used.

April 2019: ARRC releases "Recommended Fallback Language for Floating Rate Notes and Syndicated Loans".

May 2019: ARRC releases "Recommended Fallback Language for Bilateral Business Loans and Securitizations", encouraging the use of this language in new contracts.

July 2019: ARRC publishes a whitepaper titled, "Options for Using SOFR in Adjustable Rate Mortgages", intended to help illustrate a model of how market participants could use SOFR in consumer closed-end, residential adjustable rate mortgages.

July 2019: ISDA releases preliminary results of supplemental consultations on LIBOR fallbacks. The overwhelming majority of respondents preferred the "compounded setting in arrears rate" for the adjusted risk-free rate and the "historical mean/median approach" for the spread adjustment.

September 2019: ARRC publishes a "Practical Implementation Checklist for SOFR Adoption", providing important considerations for firms impacted by the transition to SOFR.

September 2019: CME announces the launch of SOFR options in January 2020.

October 2019: The IRS issues proposed regulations that would ensure that no taxable event was triggered on transition from an IBOR reference rate to a replacement rate.

November 2019: ISDA publishes the results of its consultation on the final parameters for benchmark fallback adjustments. Responses to the consultation show that a majority of participants preferred a historical median approach over a five-year lookback period. A majority also preferred not to include a transitional period in the spread adjustment calculation, not to exclude outliers, and not to exclude any negative spreads. For the compounded setting in arrears rate, a clear majority favoured a two-banking-day backward shift adjustment for operational and payment purposes.

November 2019: ARRC releases "Recommended Fallback Language for Residential Adjustable-Rate Mortgages"

January 2020: CME launches 3-month SOFR options.

January 2020: ARRC releases recommendations for inter-dealer cross-currency swap market conventions.

February 2020: ISDA announces a new consultation on implementing pre-cessation fallbacks.

March 2020: The New York Fed begins publishing SOFR Index and SOFR Averages data.

April 2020: The Federal Reserve's announces its Main Street Lending Facility. Eligible loans must be linked to SOFR. (*Note: The Fed subsequently changes the benchmark for this program from SOFR to LIBOR after market pushback*).

April 2020: ARRC announces its recommendation of a Spread Adjustment Methodology for Cash Products. It recommends using a five-year mean spread adjustment (consistent with ISDA's recommendation for derivatives). Also recommended was a one-year transition period for consumer products.

May 2020: ARRC announces Best Practices for Completing Transition From LIBOR, setting forth recommended timelines and intermediate steps market participants can take to achieve a successful transition.

Table: ARRC's recommended transition milestones

Product	Hardwired fallbacks incorporated by:	Tech/ops vendor readiness by:	Target for cessation of new use of USD LIBOR by:	Anticipated fallback rates to be identified by:
FRNs	30-Jun-20	30-Jun-20	31-Dec-20	6 months prior to reset after LIBOR's end
Business Loans	30-Sep-20 (syndicated) 31-Oct-20 (bilateral)	30-Sep-20	30-Jun-20	6 months prior to reset after LIBOR's end
Consumer Loans	30-Jun-20 (mortgages) 30-Sep-20 (student loans)	20-Sep-20 (mortgages)	30-Sep-20[1] (mortgages)	In accordance with relevant consumer regulations
Securitiz-ations	30-Jun-20	31-Dec-20	30-Sep-20 (CLOs) 30-Jun-20 (Other)	6 months prior to reset after LIBOR's end
Derivatives	Not later than 3-4 months after amendments to 2006 ISDA Definitions are published	Dealers to take steps to provide liquid SOFR derivatives markets to clients	30-Jun-21	-

Source: New York Fed | [1]The September 30, 2020 date for consumer loans refers to new applications for closed-end residential mortgages using USD LIBOR and maturing after 2021.

May 2020: The Department of the Treasury requests comments on the possibility of issuing an FRN indexed to SOFR.

June 2020: ARRC releases Recommended Fallback Language for Private Student Loans.

June 2020: Edwin Schooling Latter, head of Markets Policy at the Financial Conduct Authority, stated that "announcements about the discontinuation from the end of 2021 of LIBOR settings could come as early as November or December this year." While he suggested it was possible that LIBOR continues after 2021, he also noted that "once the ISDA protocol is out there and has been signed up, and market participants have therefore had plenty of chance to prepare for announcements on the future, there is quite a good case for making those announcements earlier rather than later."

June 2020: The UK Financial Conduct Authority (FCA) is given legislative authority to implement changes in LIBOR's methodology, if it is deemed to be no longer representative, in order to allow a 'synthetic LIBOR' to continue to be used for legacy LIBOR contracts that are effectively impossible to amend or renegotiate.

June 2020: ARRC announces further details regarding its recommendation of spread adjustments for cash products. The results of its supplemental consultation indicated a clear majority for using the same spread adjustment value as ISDA and unanimous support for the timing of ARRC's spread adjustment recommendation to align with ISDA's.

July 2020: Bloomberg launches its Fallback Page (FBAK <GO>), publishing ISDA fallback rates and historical spreads across a number of IBORs.

August 2020: ARRC publishes its SOFR Starter Kit, a set of factsheets to inform the public about the transition away from LIBOR to SOFR.

August 2020: The Commodity Futures Trading Commission issued revised no-action letters providing additional relief to swap dealers and other market participants.

September 2020: ARRC publishes a request for proposal seeking to identify a recommended administrator who will be responsible for the calculation and publication of forward-looking SOFR term rates.

September 2020: ISDA CEO Scott O'Malia announced the delay of the publishing of the supplement to the 2006 ISDA Definitions and a related protocol to mid-to-late-January 2021.

October 2020: The Justice Department issues a favorable business review letter To ISDA for its proposed amendments to its standardized documentation for derivatives.

October 2020: ISDA launches the IBOR Fallbacks Supplement and the IBOR Fallbacks Protocol, which both become effective on January 25, 2021. Guidance for adhering to the protocol and the list of adhering parties to the protocol are available on the ISDA website.

October 2020: Legislation is introduced in New York state senate to address legal issues associated with the discontinuance of USD LIBOR.

November 2020: IBA announced that it will consult on its intention to cease publication of GBP, EUR, CHF and JPY LIBOR settings after December 31, 2021.

November 2020: The IBA (the LIBOR administrator), announced that it will conduct consultations in early December on its intention to cease USD LIBOR. IBA intends, assuming confirmation in its consultations, that one-week and two-month LIBOR settings will cease at the end of 2021 while all other setting will cease after June 2023. While the FCA had previously said it wouldn't compel banks to submit after 2021, it and other regulators/agencies supported the IBA's timeline given yet-to-be resolved legacy issues. The consultation period concludes on January 25, 2021.

March 2021: The FCA announced the future cessation and loss of representativeness of LIBOR benchmarks. They will no longer require any panel banks to continue to submit to LIBOR beyond the dates from which they have notified their departure, or to require IBA to continue to publish LIBOR on the basis of panel bank submissions beyond such dates. Publication for the following LIBOR settings will cease immediately after December 31st, 2021:

- All 7 euro LIBOR settings;
- All 7 Swiss franc LIBOR settings;
- Spot Next, 1-week, 2-month and 12-month Japanese yen LIBOR settings;
- Overnight, 1-week, 2-month and 12-month sterling LIBOR settings;
- and the 1-week and 2-month US dollar LIBOR settings.

Publication of overnight and 12-month USD LIBOR will cease immediately after June 30th, 2023. The FCA will consult on requiring the IBA to continue publishing the remaining non-USD LIBOR settings (1M, 3M, 6M GBP and JPY LIBOR), **on a synthetic basis**, beyond the end of 2021. For 1-month, 3-month and 6-month USD LIBOR, it will consult on whether publishing **on a synthetic basis** should be required beyond mid-year 2023. While these rates may be *published* beyond this end date, they will **not** be based on bank submissions. Instead, it would simply be the risk-free rate plus the relevant spread adjustment which was locked in as of March 5. Importantly, the FCA also concluded that any LIBOR settings published on a synthetic basis beyond the dates outlined above "will no longer be representative of the underlying market and economic reality that such setting is intended to measure and that representativeness will not be restored".

ISDA then announced that the FCA statement "constitutes an index cessation event" for all 35 euro, sterling, Swiss franc, US dollar and yen LIBOR settings. This means the fallback spread adjustment published by Bloomberg is fixed as of the date of the announcement (March 5). "The fallbacks will automatically occur for outstanding derivatives contracts that incorporate the IBOR Fallbacks Supplement or are subject to adherence of the ISDA 2020 IBOR Fallbacks Protocol on the following dates:"

- After December 31, 2021 for outstanding derivatives referenced to all euro, sterling, Swiss franc and yen LIBOR settings.
- After June 30, 2023 for outstanding derivatives referenced to all US dollar LIBOR settings. Under the fallbacks methodology, the rate for the one-week and two-month US dollar LIBOR settings will be computed by each calculation agent using linear interpolation between end-2021 and June 30, 2023, before falling back to the adjusted risk-free rate plus spread after June 30, 2023.

April 2021: The Governor of New York signs legislation enacting provisions relating to the discontinuance of LIBOR. The bill prohibits parties from refusing to perform contractual obligations or declaring a breach of contract as a result of the discontinuance of LIBOR or the use of a replacement; establishes that the replacement is a commercially reasonable substitute for and a commercially substantial equivalent to LIBOR; provides a safe harbor from litigation for the use of the recommended benchmark replacement.

May 2021: The ARRC announced that it selected CME Group as the administrator that it plans to recommend for a forward-looking SOFR term rate, once market indicators for the term rate are met.

July 2021: The ARRC announced conventions and use cases for how best to employ the SOFR Term Rates to accelerate the transition away from LIBOR. Shortly thereafter, it announced that it is formally recommending CME Group's forward-looking SOFR Term Rates, following the completion of a key change in interdealer trading conventions. The ARRC continues to recommend the use of overnight SOFR and SOFR averages given their robustness but supports the use of SOFR term rates where use of overnight and averages have proven challenging. Moreover, the ARRC does not support the use of SOFR term rates for the vast majority of derivative markets.

November 2021: Refinitiv announced that USD IBOR Institutional Cash Fallbacks are now production benchmarks, and it will launch USD IBOR Consumer Cash Fallbacks 1-week and 2-month settings on January 3, 2022

December 2021: The ARRC released a year-end progress report outlining key developments made in the transition and the work still needed to be done. At the end of the month, 1-week and 2-month LIBOR settings were published for the last time. Also, trading in new IBOR contracts (all terms) must cease at this time.

March 2022: President Biden signed into law legislation that provides a targeted solution for financial contracts that mature after the cessation of LIBOR and have no effective means to replace LIBOR upon its cessation. As per ARRC's subsequent statement: "The legislation will minimize legal and operational risks and adverse economic impacts associated with the transition—providing greater certainty to a diverse array of corporate borrowers and lenders, as well as to retail bondholders and consumers, whose student loans, mortgages, and investment accounts it will protect from disruption".

The Canadian Transition

March 2018: The Bank of Canada announces the creation of the Canadian Alternative Reference Rate Working Group (CARR), sponsored by the Canadian Fixed-Income Forum to identity and seek to develop a new term risk-free rate Canadian dollar interest rate benchmark. The rate identified would operate alongside, rather than replace, the existing Canadian Dollar Offered Rate (CDOR).

June 2018: After review, the Alternative Rates subgroup of CARR recommends that an enhanced version of the existing Canadian Overnight Repo Rate Average (CORRA) be adopted as the Canadian benchmark risk-free rate. While CDOR will continue to

exist as a benchmark rate, the new enhanced CORRA was thought to evolve into the main financial reference rate in Canada at some point in the future.

February 2019: The Bank of Canada on behalf of CARR publishes its consultation on proposed enhancements to CORRA. The proposed enhancements would expand the range of transactions used in the daily CORRA calculation to include overnight repos between all counterparty types that are collateralized using either Government of Canada treasury bills or bonds. The proposal also introduces a new methodology for calculating CORRA. CARR also launched two new working subgroups: (i) The Transition Subgroup – which will focus on the transition toward the widespread use of CORRA as a reference rate in Canadian dollar financial products, and (ii) The Term Rate Subgroup – which will focus on the need for and the construction of a term risk-free rate benchmark.

June 2019: The Canadian Fixed Income Forum unanimously approves CARR's proposed methodology for enhancing CORRA.

What is (enhanced) CORRA?

CORRA is Canada's overnight risk-free rate that represents the cost of overnight lending via general collateral repo transactions secured by Government of Canada treasury bills and bonds. All transactions on which CORRA is set are for an overnight term and for same-day settlement. CORRA will track closely to, but not exactly match, the Bank of Canada's overnight rate.

Under the "old" CORRA, the rate was calculated as the volume-weighted average of overnight repo transactions collateralized by general Government of Canada securities, as reported by designated inter-dealer brokers. This methodology was based on a small number of repo transactions conducted through a limited set of counterparties which often resulted in an insufficient transactions volume to be compliant with the IOSCO Principles.

CARR made a number of recommendations to enhance CORRA in order to make it more robust and reliable. Firstly, it recommended expanding the counterparty types to include any GoC repo transaction between unaffiliated parties. To prevent 'special' securities from unduly influencing the rate, CARR recommended using a volume-weighted trimmed median whereby the lowest 25th percentile of trades (by repo rate), would be removed from the calculation. Ultimately, these enhancements were approved by the Canadian Fixed-Income Forum and were implemented starting in June 2020.

July 2019: The Bank of Canada announces its intention to become the administrator of CORRA, taking over from Refinitiv. The official change in publishing responsibility became effective in June 2020. The Bank also published its methodology for calculating CORRA, consistent with the recommendations made by CARR.

April 2020: The Montreal Exchange announces that it will launch new three-month CORRA futures for trading on June 12, 2020.

June 2020: The Bank of Canada officially becomes administrator CORRA and posted the first rate calculated using the improved methodology.

October 2020: CARR's mandate is expanded to include the analysis of CDOR.

November 2020: Refinitiv announced that as of May 17, 2021, the 6-month and 12-month CDOR tenors would no longer be published. Shortly thereafter, ISDA released guidance on how IBOR fallback protocols will apply in this case. Bloomberg also put out an announcement that the Spread Adjustment Fixing Date for the affected tenors will be November 12, 2020.

November 2020: The CARR published a consultation paper on a proposed methodology for calculating CORRA-in-arrears as well as draft fallback language for FRNs that reference CDOR. The CORRA-in-arrears methodology would be used to create and publish three daily compounded average (1M, 2M, 3M) to facilitate the use of CORRA in Canadian financial products. A daily CORRA index is also proposed that would allow the calculation of compounded average rates over custom time periods.

April 2021: The Bank of Canada announced it will begin publishing the CORRA Compounded Index effective April 6, 2021. The index is a measure of the cumulative impact of CORRA daily compounding over time and can be used to calculate CORRA compounded rate between any two dates

July 2021: The CARR working group published the results of its consultation on its proposed methodology for calculating CORRA-in-arrears and CDOR fallback language for FRNs. Alongside these results, it published its final recommended fallback language for FRNs that reference CDOR. The language is in line with ISDA recommendations and would be applicable if CDOR was discontinued as a reference rate, though CARR notes that there is no immediate expectation that this will happen.

November 2021: The CARR published a set of recommendations aimed at facilitating the widespread use of the CORRA the Canadian financial system. These recommendations include conventions for FRNs, loans that reference CORRA and inter-bank interest rate swaps that involve either CORRA or CDOR and the U.S. risk-free benchmark, SOFR. In addition, the CARR published recommended legal fallback language for FRNs referencing CORRA.

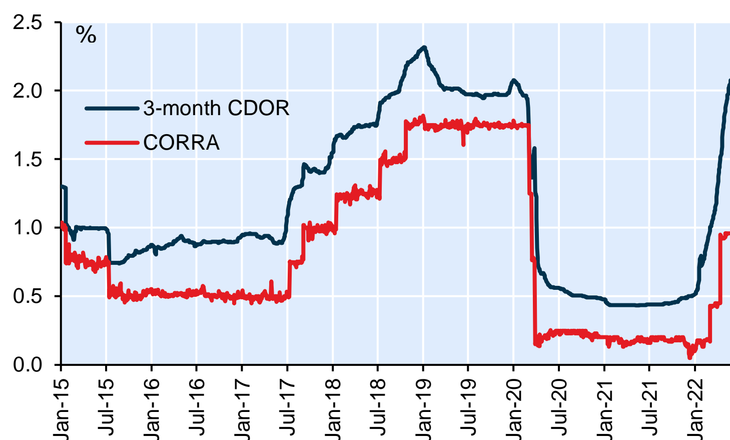
December 2021: The CARR working group published a white paper recommending Refinitiv Benchmark Services, CDOR's administrator, cease publication of CDOR after June 2024. The working group proposed a two-stage transition with the first stage to be completed by June 30, 2023. This first stage would include transitioning all new derivative contracts and securities to CORRA (with few exceptions). The second stage of the transition (June 2023 to June 2024) would give firms more time to transition, address issues related to 'legacy' securities (i.e., those in which there is no adequate 'fallback' language written into contract language) and allow more CDOR-based securities to mature. The recommendation was unanimously endorsed by CARR and Canadian Fixed Income Forum members.

May 2022: Refinitiv Benchmark Services, CDOR's administrator, announced the cessation of the publication of CDOR after June

28, 2024. The cessation, which had been widely anticipated, was met with the Bank of Canada's support. In addition, the Ontario Securities Commission and the Autorité des marchés financiers published notices authorizing the publications cessation. Meanwhile, ISDA confirmed that the Refinitiv's statement constitutes an index cessation event, triggering fallback spread adjustments. The OSFI published supervisory expectations for federally regulated financial institutions and pension plans to transition from CDOR. Finally, CARR launched a consultation for a potential forward-looking term CORRA that could replace CDOR. This consultation will remain open until June 13, 2022.

Chart: A longer-term perspective on CDOR/CORRA basis

3-month CDOR vs. CORRA since 2015



Source: NBF, Bloomberg

Table: Official credit spread adjustments

Official spread adjustments between reference rates & IBOR rates (bps)

Term	LIBOR/SOFR	CDOR/CORRA
Overnight	0.644	-
1-week	3.839	-
1-month	11.448	29.547
2-month	18.456	30.190
3-month	26.161	32.138
6-month	42.826	49.375
1-year	71.513	54.820

Source: NBF, Bloomberg

Key Issues

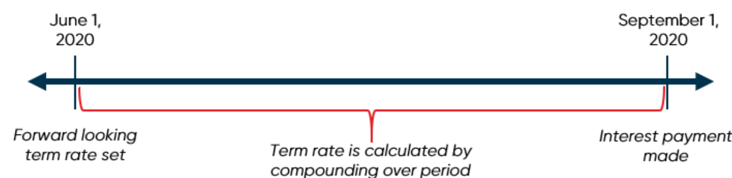
Is LIBOR's deadline being extended?

One of the key developments in recent months was the IBA's announcement that it will conduct consultations in early December on its plans to cease the publication of USD LIBOR. Importantly, IBA intends, assuming confirmation in its consultations, for one-week and two-month USD LIBOR settings to cease at the end of 2021 (as previously expected) while **all other settings will cease publication after June 2023** (it had earlier been expected that these too would cease after December 2021). The IBA's consultation period will end on January 25th, 2021, after which time it "intends to share the results of the consultation with the FCA and to publish a feedback statement summarizing responses from the consultation shortly thereafter". The IBA's announcement was met with widespread support from the FCA, the Fed, federal agencies, the ARRC and ISDA, among others. So will the proposed extension affect SOFR adoption? And will the transition off of LIBOR see widespread delays going forward? In our estimation, not really.

While it is likely that key USD LIBOR settings will continue to be published for longer than had been previously been telegraphed, it's important to note that the sole purpose of the extension is to address the ongoing issues with tough legacy contracts, ensuring a more orderly transition (see our section below on Fallback Language). Regulators continue to urge market participants to stop the use of new USD LIBOR contracts by the end of 2021. While there is currently nothing in place to prevent this from legally happening, the FCA has said that it will coordinate with relevant authorities to consider whether and, if so, how to most appropriately limit new use of USD LIBOR by supervised entities in the UK. Additionally, the Fed noted that new USD LIBOR issuance after December 2021 "would create safety and soundness risks." In other words, while regulators will permit USD LIBOR to continue to be published for usage in legacy contracts, they have no intention to otherwise allow for a derailment of the December 2021 LIBOR transition timeline for new contracts.

Payment Uncertainty

One of the key concerns relating to transition is the difference in the payment certainty between IBORs and risk-free rates. Whereas LIBOR (and CDOR) are forward-looking term rates, SOFR (and CORRA) are overnight rates. In other words, for IBORs, the interest payment will be known with certainty at the start of the interest period. For bonds, loans, futures, etc. that reference SOFR, however, the rate of interest paid will only be known towards the end of the interest period (as determined by appropriate payment convention). This means participants will not know the exact interest rate they'll be paying or receiving until the final day of the compounding period. While this may sound like a serious drawback of the new benchmark interest rates, in practice, this issue isn't a major concern.



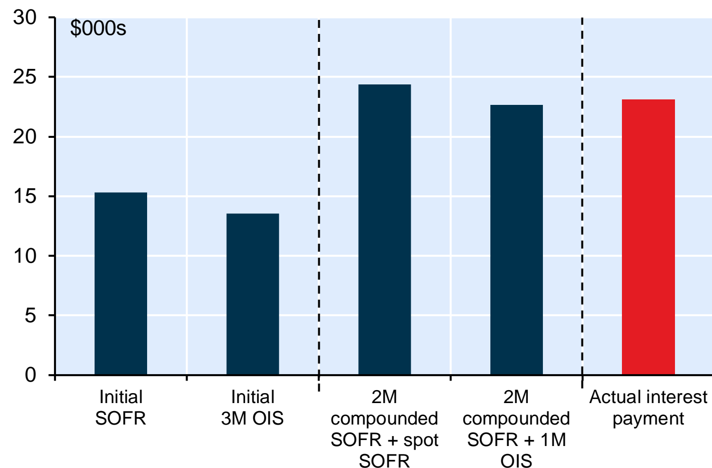
To demonstrate, let's consider an example using a $100 million dollar loan, initiating on June 1, 2020 and making an interest payment on September 1, 2020 of 3-months (92 days) of compounded daily SOFR. At the start of this period, we can make estimate what our interest payment will be by simply looking at the June 1st SOFR setting (0.06% in this example). In a stable interest rate environment, this will often lead to a fairly accurate result. Moreover, we can use an existing forward-looking term rate as a proxy—3-month OIS, for example.

Under these scenarios, our naïve estimates end up doing a decent job at giving us an idea of what the interest payment will be. Using the June first SOFR setting of 0.06% and the three-month OIS of 0.053%, we end up within a handful of basis points of the actual 3-month compounded SOFR of 0.09034%. On a notional amount of $100 million, the difference in the end interest payment represent a

modest $7,751 and $9,541 for initial SOFR and 3-month OIS, respectively.

Chart: Accurate interest payment estimates

Actual/estimated interest payments based on theoretical $100 mln loan



Source: NBF, Bloomberg | Note: Each estimate uses the compounded rate to date and either spot SOFR or OIS to compound for the remaining duration of the interest period. Interest period runs from June 1st, 2020 to August 31st, 2020.

Better yet, thanks to the power of compounding, by the two-month mark of the interest period, the accuracy of our estimate of the final rate becomes even greater. By taking the two months of compounded SOFR that we now know and compounding either the current reading of SOFR for the final month or using 1-month OIS, our estimates are now 0.0953% and 0.0887%, differences of just $1,278 and $411 when translated to the actual interest payment that will be made.

Of course, there is the issue of an interest rate shock occurring during our payment period as we saw when central banks were rapidly cutting policy rates at the onset of the COVID-19 pandemic. Under this scenario, of course, our initial naïve estimates will be insufficient. However, once we have two months of compounded rates, we're able to once again arrive at a reasonably close estimate of the final interest rate setting.

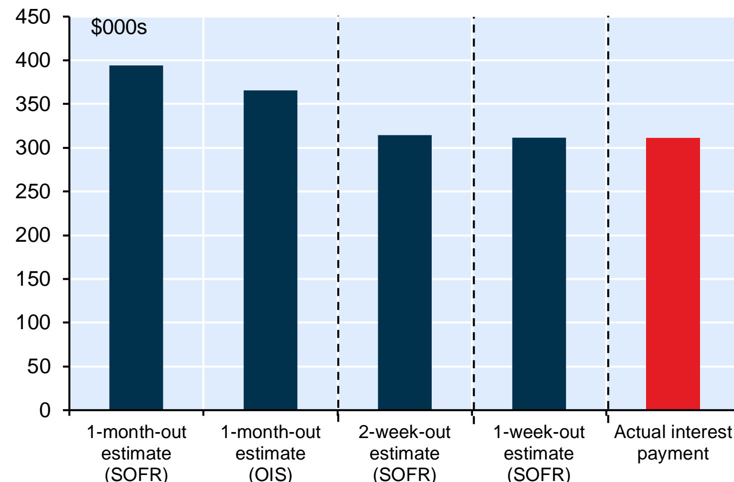
Let's again consider an example of a $100 million loan initiated on January 2, 2020, paying 3-month compounded daily SOFR on April 1st. By the time we get two months in, on March 1st, we have two months of compounded SOFR already known. This means that even significant deviations won't have a *tremendous* effect, despite the ~160 basis point drop in SOFR that actually materialized over the month of March.

Using the SOFR reading on March 2nd and compounding it forward for a month brings us to an estimate of 1.577%. Using the forward-looking, one-month OIS rate as a proxy (1.237% on March 2nd), we arrive at an end-of period 3-month SOFR estimate of 1.459%. While over the course of March, there were 150 basis point of Fed rate cuts, by April 1st, the actual 3-month compounded SOFR set at 1.245%. All told, the discrepancies between our one-month-out estimate and the actual compounded SOFR setting differ by ~$83,000 and ~$54,000 using the current SOFR and OIS method, respectively. Compared to the notional amount of $100 million, these deviations represent 0.08%-pts and 0.05%-pts respectively.

Finally, in our example, using the SOFR setting from two weeks out, we can estimate our interest payment within $3,000 of the realized amount. A week out, our estimate ends up correct to the dollar. In other words, in what may turn out to be the biggest interest rate shock in a generation, compounding in arrears still doesn't provide an unmanageable degree of uncertainty. Thanks to the power of compounding, the accuracy of our estimates of end-of-period compounded SOFR will increase significantly as the payment date approaches.

Chart: Estimating interest during rate shock

Actual/estimated interest payments based on theoretical $100 mln loan



Source: NBF, Bloomberg | Note: Each estimate uses the compounded rate to date and either spot SOFR or OIS to compound for the remaining duration of the interest period. Interest period runs from Jan 2nd, 2020 to April 1st, 2020.

Fallback Language

One of the concerns market participants have had to contend with is what will happen to IBOR-based products if and when LIBOR is no longer available. While most contracts have fallback language that dictates what occurs in the event that LIBOR is unavailable, for many financial products there may be either no fallback language or fallback language that is inadequate or inconsistent with the current environment or industry best practices.

In the swaps and derivatives markets, most contracts have specific fallback rates that are set out in the 2006 ISDA Definitions. However, these typically require the counterparty that is the calculation agent to obtain quotes from banks and dealers. If and when an interbank offered rate is permanently discontinued, it may be impossible to obtain such quotes if these parties are unable or unwilling to provide one. Moreover, these quotes would likely be less reliable than those provided in the already shallow IBOR markets. For floating rate notes, for example, if quotes from dealers are not obtained then the security is converted to a fixed-rate note. Amendments to the terms of the note are theoretically possible but often require **unanimous** consent from all noteholders. Similar fallback-related issues exist in the loan, CLO, CMO and ARM markets.

As a result, the International Swaps and Derivatives Association (ISDA) and ARCC have taken steps to address these issues, with ARRC handling cash products and ISDA addressing the derivatives and swap markets.

Addressing these issues is much easier in the swap and derivatives markets. ISDA has updated its 2006 ISDA Definitions to provide fallbacks for certain interest rate benchmarks that use IBORs as an input, so that contracts referencing those benchmarks have robust fallbacks in the event of a permanent cessation of these rates. Once the supplement to the 2006 ISDA definitions becomes effective on January 25, 2021, the fallbacks will automatically apply to derivatives that reference the 2006 ISDA Definitions. A protocol (a multilateral contractual amendment mechanism) has also been published that will enable market participants to incorporate revisions into their legacy non-cleared derivative trades (i.e. transactions entered into before January 25, 2021). Moreover, parties can also proactively bilaterally agree to amend their legacy contracts to incorporate negotiated fallbacks. Clearing houses have signaled they will implement ISDA fallbacks in all of their legacy cleared derivative transactions.

Importantly, the fallback language won't simply be amended to have new risk-free rates take the place of IBORs in the event of discontinuation. Rather, there are also fallback adjustments that will have to be made. This is due to the structural differences between the rates. While 3-month LIBOR has both term premium and credit risk, SOFR is an overnight risk-free rate. Adjustments are therefore needed to ensure contracts negotiated to reference an IBOR continue to meet their originally intended objectives as closely as possible. After industry consultation, ISDA determined that IBORs will be compounded over the appropriate period and a spread adjustment will be added to that rate. The spread adjustment will be based on the median, over a five-year period, of the historical differences between the IBOR in the relevant tenor and the relevant RFR compounded over each corresponding period.

For cash products, the transition should prove to be more challenging. While ARRC has published recommended fallback language for new loans, FRNs and securitizations, there remains the issue of legacy products. For many of these products, inadequate fallback language currently exists and amending contracts is not realistically possible. To deal with this, there are a few suggested solutions. Firstly, the FCA has been granted the authority to publish a "synthetic LIBOR" in order to ensure that difficult-to-amend cash products will still have a rate to utilize. Importantly, the FCA has the authority to ensure that no new financial products are originated that reference this "zombie" rate. Additionally, there is legislation being proposed in New York (where many of these contracts are enforceable), that would: prohibit parties from refusing to perform contractual obligations as a result of LIBOR discontinuation, establish that the benchmark replacement is a reasonable substitute and provide a safe habour from litigation for using the recommended benchmark replacement. There are many questions still left to answer for the cash market and while progress has been made, more clarity is still to come here.

Additionally, the lending industry is still lagging in its adoption, essentially hoping for term rates involving a credit sensitivity component to arise. The uncertainty associated with that becoming available in a timely fashion is of particular concern. Furthermore, the fact that the lending industry doesn't seem to be regarding the ISDA fallback methodology as appropriate for loans, makes it challenging to address the transition of swaps that are used by customers to hedge their loan interest rate (or other LIBOR exposures). In other words, if the lending rate of their loan falls back to something other than adjusted SOFR upon LIBOR discontinuation, it won't make sense to transition the floating rate of their swap to adjusted SOFR (as it would create basis risk). For now, these are still very much up in the air and remain unresolved.

Another issue that participants have had to contend with is a scenario in which an IBOR would be deemed 'non-representative' by a regulatory supervisor, central bank or other authority but would continue to be published. This is known as a pre-cessation trigger. Originally, ISDA had only planned to incorporate 'permanent cessation triggers' in its amended 2006 ISDA Definitions. However, after further consultations and consistent with ARRC's recommendations for cash products, it included a non-representativeness trigger, locking in the fallback spread adjustment should an IBOR be deemed non-representative while still being published.

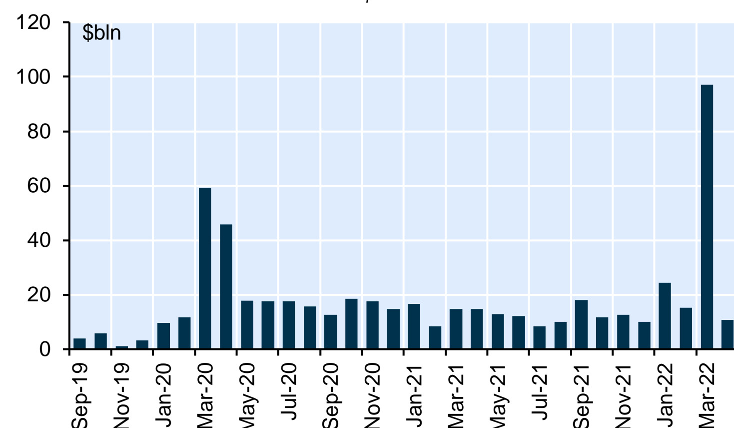
Bloomberg has been assigned the responsibility of publishing the fallback rates, spread adjustments and all-in rates. It has begun publishing these rates as of July 2020 on the <FBAK GO> page for eleven different IBORs.

Adoption

In fixed income markets, SOFR adoption has gotten off to a strong start with $459 billion in SOFR-linked securities issued since the rate began publication in April of 2018. Average SOFR issuance in 2020 has totaled $36 billion per month, with March and April bringing $79 billion and $72 billion respectively. We saw SOFR-linked issuance spearheaded by Fannie May back in July 2018 with total of $6 billion issued in 6-month, 12-month and 18-month tenors. Since then, we've seen the likes of EIB, IBRD, EBRD and a number of global financial institutions issue SOFR-linked notes and bonds. Meanwhile, Shell signed the first SOFR-linked corporate line of credit in December 2019.

Chart: SOFR issuance market growing

Total SOFR-linked issuance since September 2019



Source: NBF, Bloomberg (FN001ZT1 LEAG) | Notes: Includes globally issued bonds which reference SOFR. Excludes bonds with warrants, convertible securities, credit-linked securities, and structured notes. There is a minimum threshold of 18 months for maturities, call or put periods, and USD $50 mln minimum amount for self-led bonds

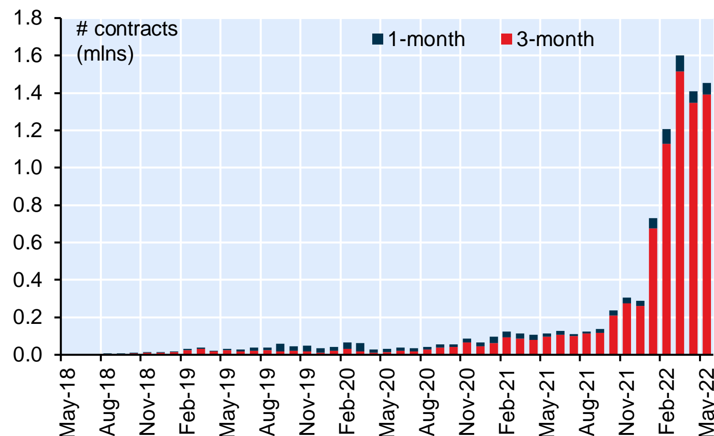
In May of 2020, the Department of the Treasury requested comments on the possibility of issuing an FRN indexed to SOFR. We've yet to learn if a SOFR-linked Treasury security will be in the

cards as part of its regular course of operations, however, its discussion alone should have a positive influence on broader SOFR adoption.

SOFR futures, first launched in May 2018, have also seen a strong pick-up in usage over the last couple of years. Average daily volumes have steadily risen from just under 7,000 contracts in 2018 to roughly 36,000 in 2019 and nearly 46,000 in 2020.

Chart: SOFR futures market growing

1-month and 3-month SOFR futures volume since May 2018



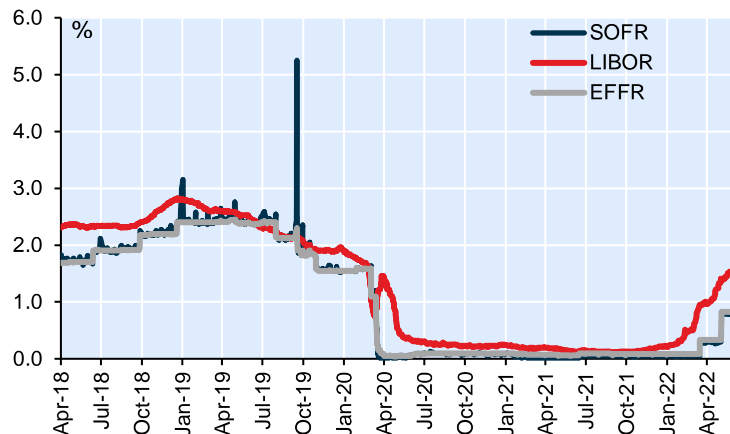
Source: NBF, Bloomberg, CME

How SOFR trades vs. LIBOR and other rates

There are a few important distinctions between SOFR and LIBOR that should result in different rate settings. Firstly, inherent in LIBOR is the riskiness of the banking sector, as banks will demand compensation for lending to other banks on an unsecured basis. SOFR is, as the name implies, secured and thus, less risky. Secondly, the most commonly quoted LIBOR setting, the 3-month term, has a term premium component. SOFR meanwhile, is an overnight rate. For these reasons, we generally see a positive spread between LIBOR and SOFR. Since SOFR publication began in April 2018, the LIBOR-SOFR spread has averaged roughly 30 bps. SOFR also closely tracks effective Fed funds. The spread between these two rates averaged 2 bps since April 2018.

Chart: SOFR's brief empirical record

SOFR, LIBOR and EFFR since SOFR's publication began in April 2018

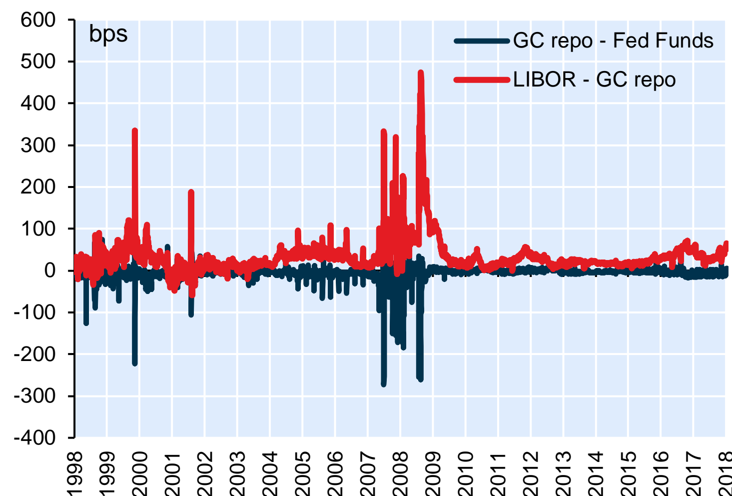


Source: NBF, Bloomberg, New York Fed

However, SOFR is not immune to idiosyncratic factors in the repo market, as we saw late last summer. With a major shortage of cash in the system, repo rates skyrocketed and the LIBOR-SOFR and EFFR-SOFR spreads fell to deeply negative territory until the Fed stepped in to provide a liquidity lifeline. It's important to note that although these events will take place on rare occasions, they are largely technical in nature and can be dealt with via central bank intervention. And thanks to the power of compounding, these short-term spikes will have a very muted impact over the course of a 3-month interest accrual period, for example.

Chart: A longer-term SOFR proxy

Spread between GC repo rate (SOFR proxy) and Fed funds and LIBOR



Source: NBF, Bloomberg, New York Fed

As for financial crises, while we don't have SOFR data back to the 2007-09, the New York Fed has published a historical overnight treasury general collateral repo primary dealer survey rate, which can act as a good proxy for SOFR. Using that we find that the spread between these two rates ballooned to more than 300 basis points in 2007 and 2008, when markets were under significant stress. Meanwhile, as safe collateral took on a premium, SOFR plunged well below effective fed funds. Generally speaking, in times of stress we can expect SOFR to trade with more volatility and richen significantly owing to the scarcity of and premium placed on safe, high-quality collateral.

External References

Organization	Document	Date	Hyperlink
IOSCO	IOSCO Principles	Jul-13	Link
FSB	Reforming Major Interest Rate Benchmarks	Jul-14	Link
ARRC	Paced Transition Plan	Oct-17	Link
ARRC	Second Report of the ARRC	Mar-18	Link
ARRC	Guiding Principles for More Robust LIBOR Fallback Contract Language in Cash Products	Jul-18	Link
ARRC	A User's Guide to SOFR	Apr-19	Link
ARRC	Recommended Fallback Language for Floating Rate Notes and Syndicated Loans	Apr-19	Link
Federal Reserve	Indicative Forward-Looking SOFR Term Rates	Apr-19	Link
ARRC	Recommended Fallback Language for Bilateral Business Loans and Securitizations	May-19	Link
ISDA	Preliminary Results of Supplemental Consultations on LIBOR Fallbacks	Jul-19	Link
Bank of Canada	Benchmark Reform – Global and Domestic Overview	Jul-19	Link
Bank of Canada	Enhancements to the Calculation Methodology for CORRA	Jul-19	Link
ARRC	Practical Implementation Checklist for SOFR Adoption	Sep-19	Link
ISDA	Summary of Responses to the ISDA Pre-Cessation Consultation	Oct-19	Link
ISDA	Consultation on the Final Parameters for Benchmark Fallback Adjustments	Nov-19	Link
ARRC	Recommended Fallback Language for Residential Adjustable-Rate Mortgages	Nov-19	Link
ARRC	Recommendations for Inter-Dealer Cross-Currency Swap Market Conventions	Jan-20	Link
ARRC	Proposed Legislative Solution to Minimize Legal Uncertainty and Adverse Economic Impact Associated with LIBOR Transition	Mar-20	Link
ISDA	Summary of Responses to the ISDA 2020 Consultation on How to Implement Pre-Cessation Fallbacks in Derivatives	May-20	Link
ARRC	Best Practices for Completing Transition From LIBOR,	May-20	Link
ARRC	Recommended Fallback Language for Private Student Loans	Jun-20	Link
ARRC	SOFR Starter Kit	Aug-20	Link
ARRC	Paced Transition Plan (Updated)	Oct-20	Link
ISDA	IBOR Fallback Supplement	Oct-20	Link
ISDA	IBOR Fallback Protocol	Oct-20	Link
ARRC	Guide on the Endgame for USD LIBOR	Dec-20	Link
FCA	*Announcement on future cessation & loss of representativeness of LIBOR benchmarks*	*Mar-21*	Link
ISDA	ISDA Statement on UK FCA LIBOR Announcement	Mar-21	Link
ISDA	ISDA Guidance Future Cessation and Non-Representativeness	Mar-21	Link
Bloomberg	IBOR Fallbacks: Spread Fixings	Mar-21	Link
ARRC	FAQs Regarding the Occurrence of a Benchmark Transition Event	Mar-21	Link
NY State	Assembly Bill A164B (Relates relation to the discontinuance of LIBOR)	Apr-21	Link
ARRC	ARRC-recommended Loan Conventions and Best Practices for SOFR Term Rates	Jul-21	Link
CARR	Recommended fallback language for FRNs referencing CDOR	Jul-21	Link
CME	SOFR Term Reference Rates	-	Link
Bloomberg	IBOR Fallbacks: Technical Note	-	Link
New York Fed	SOFR Data	-	Link
ISDA	Benchmark Reform and Transition from LIBOR Informational Page	-	Link
ISDA	Understanding IBOR Benchmark Fallbacks	-	Link
ARRC	All ARRC Publications	-	Link
ARRC	All ARRC Announcements	-	Link
ARRC	Fallback Contract Language	-	Link
Bank of Canada	Methodology for Calculating the Canadian Overnight Repo Rate Average (CORRA)	-	Link
Refinitiv	CDOR Informational Page	-	Link
Bank of Canada	CORRA data	-	Link
Bank of Canada	CARR's Review of CDOR: Analysis & Recommendations	Dec-21	Link

Note: ARRC = Alternative Reference Rate Committee; ISDA = International Swaps and Derivatives Association; IOSCO = International Organization of Securities Commissions; FSB = Financial Stability Board

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