BlackRock

BlackRock's Guide to LIBOR Transition

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The transition from LIBOR continues to gather pace with less than two years remaining until LIBOR is expected to cease. At the same time, inquiries from clients, regulators, and vendors regarding preparedness, market dynamics, and portfolio implications have understandably increased. 2020 is a pivotal year for LIBOR transition, with several key milestones expected to build liquidity in risk-free rates, increase certainty around newly issued products and timing, and drive progress. This *ViewPoint* focuses on providing a status update on LIBOR transition, information on upcoming milestones, BlackRock's transition planning, and other information to serve as a reference and guide for clients, industry participants, and stakeholders during the next critical steps of transition from LIBOR.

Background & Market Overview

The UK Financial Conduct Authority (FCA), the regulator of the LIBOR administrator who publishes the rate, announced in July 2017 that it will no longer compel banks to submit to LIBOR after year-end 2021. LIBOR is present throughout the financial system. It serves as an interest rate benchmark for hundreds of trillions of dollars of financial instruments and is used as both performance and risk benchmarks. However, over the past several years there has been little transactional volume supporting the rate, raising concerns about its go-forward suitability as a global benchmark. BlackRock published a *ViewPoint* in April 2019 providing several perspectives on benchmark reform.

Alternative reference rates (ARRs) have been identified across major currencies through official sector working groups.[1] Markets for ARRs are at different stages of development and adoption. As liquidity grows in ARRs, further education and preparation is necessary to become familiar with key differences between them, how they compare to LIBOR, as well as considerations for how to address existing positions that reference LIBOR. Importantly, alternatives to global IBORs differ by region and ARRs are not the same as LIBOR.

USD LIBOR vs. SOFR

In the US, SOFR differs from LIBOR in two key ways. The industry and regulators are in the process of assessing how to address these differences. Importantly, SOFR was not selected to be a direct equivalent to LIBOR but to be a representative benchmark backed by high transactional volume. SOFR is derived from the large volume of transactions in the overnight repo market.

Overnight vs. Term

SOFR is an overnight rate where LIBOR is typically quoted at forward points (1-month, 3-month, 6-month). For interest rate products, a 3-month SOFR rate, for example, will be derived by compounding the overnight rate in arrears. This is consistent with the conventions for interest rate swaps using overnight index swaps (OIS). The production of forward-looking "term SOFR" has been included in the Alternative Reference Rates Committee's (ARRC) Paced Transition Plan; however, many products could transition ahead of this release and adjust to SOFR compounded in arrears.

The ARRs

Currency	Rate	Description	Began Publishing
US Dollar	Secured Overnight Financing Rate (SOFR)	Repo-based index to reflect overnight funding rates (calculated as volume-weighted median based on tri-party repo data from Bank of New York Mellon and general collateral financing repo data from DTCC)	NY Fed began publishing the overnight rate in April 2018 and SOFR Averages and Index in March , 2020
Sterling	Sterling Overnight Index Average (SONIA)	Effective overnight interest rate for unsecured GBP bank transactions	Bank of England reformed SONIA in April 2018 and it will publish a compounded daily index and averages from July 2020
Euro	Euro Short-Term Rate (€STR)[2]	€STR reflects the wholesale euro unsecured overnight borrowing costs of euro area banks	European Central Bank began to formally publish the €STR rate in October 2019
Swiss Franc	Swiss Average Rate Overnight (SARON)	Repo-based index to reflect overnight funding rates	SARON introduced in August 2009 with historical data available from June 1999
Japanese Yen	Tokyo Overnight Average Rate (TONA)	Transaction-based benchmark for the uncollateralized overnight call rate	Study Group on Risk Free Reference Rates identified TONA in 2016 as the risk-free rate

Lack of a Credit Component

SOFR is a secured funding rate derived from the repo market. This differs from LIBOR which is unsecured and incorporates an element of credit risk. The lack of a dynamic credit component within SOFR has been a point of discussion. Some alternative indices that capture an element of bank credit have been proposed. We believe this credit component should be considered thoughtfully by product and separately from SOFR.

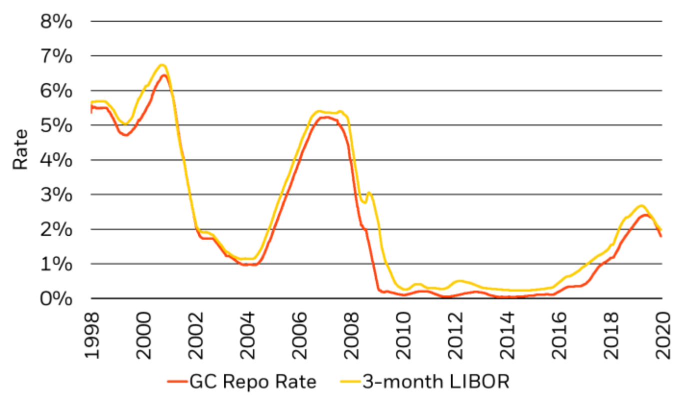
Reconciling Between LIBOR and SOFR

Great effort has been taken by official sector working groups to recommend standardized language to be inserted into new contracts that would clearly, and hopefully consistently, state how a contract will behave in a LIBOR cessation event. For derivatives, ISDA has consulted on the topic and has recommended (i) fallback indices across currencies and (ii) a benchmark spread adjustment methodology. The ARRC consulted on this as well and is likely to endorse this same methodology, which applies a static spread adjustment fixed at a specified time at or before LIBOR's cessation.[3] We will elaborate on fallback language later in this *ViewPoint*.

Notably, while the overnight General Collateral (GC) repo rate (thus SOFR) can be volatile, it closely correlates with LIBOR over longer timeframes.

GC Repo Rate and 3-month LIBOR

(rolling 6-month mean)



Data as of February 6, 2020. Source: Federal Reserve Bank of New York: https://apps.newyorkfed.org/markets/autorates/rates-search-page?startdate=06212017&enddate=06212017&rateType=NA and Federal Reserve Bank of St. Louis: https://fred.stlouisfed.org/categories/33003?cid=33003&et=&pageID=1&t=

Recent Transition Progress

Over the past year, the industry has made significant progress on adopting ARRs and building liquidity as well as finalizing fallback language.

ARR Adoption & Trading Volume

Markets and liquidity are growing in alternative reference rates. The UK is the most advanced with SONIA trade volumes increasing across the curve. Japan is behind, as

LIBOR vs. ARR Interest Rate Derivatives Volume in 2019

	Notional (billions)	Trade Count
USD LIBOR	**$120,381**	**686,193**
SOFR	$380	1,277
GBP LIBOR	**$10,440**	**91,889**
SONIA	$8,057	12,661
CHF LIBOR	**$620**	**8,747**
SARON	$28	67
JPY LIBOR	**$3,975**	**40,010**
TIBOR/Euroyen TIBOR	**$11**	**105**
TONA	$250	503
EUR LIBOR	**$1**	**9**
EURIBOR	**$23,084**	**201,502**
€STR	$5	11

Source: ISDA SwapsInfo http://swapsinfo.org/derivatives-transaction-data/

industry participants differ on whether to use TIBOR or TONAR. The lack of consensus has slowed transition, with many companies continuing to reference LIBOR, even in new contracts. In the US, SOFR futures volumes have increased, but swaps trading further out the curve has been somewhat limited. CME launched SOFR options trading in January 2020 and we view the growth in options markets as a natural progression as liquidity expands in linear product. As part of the transition, the CME has begun to evaluate alternatives to Eurodollar futures (LIBOR is the underlying index for Eurodollar futures). In the EU, €STR trading began in October 2019. The exhibits below show global ARR swap trading volume in 2019 and SOFR futures volume in 2019.

SOFR Futures Volume in 2019

SOFR futures volumes have increased in line with the overall growth we are observing in markets and liquidity across alternative reference rates. In 2019, we observed:

- SOFR futures surpassed 10M contracts traded at the CME and participation deepened to over 350 global participants.
- Average Daily Volume (ADV) grew to 47K contracts over the final four months of 2019 (full-year ADV of 36K), further indicating increased volume in the futures market.
- Open interest reached 578k contacts.
- SOFR issuance steadily increased from mid-2018 through mid-2019. While there was a dip in issuance in the last few months of 2019, the volume picked up again at the start of 2020.

Fallback Language

Until recently, most financial contracts contemplated short disruptions to the publication of LIBOR and did not generally contemplate permanent LIBOR cessation. As a result, fallback methodologies may be suitable for a short period of time but may not be workable over longer periods. Therefore, official sector working groups have been focused on developing fallback language that addresses the permanent cessation of LIBOR for various asset classes.

In 2019, the ARRC finalized fallback language for adjustable rate mortgages, bilateral business loans, floating rate notes, securitizations, and syndicated loans.[4] ISDA is in the process of finalizing fallback parameters for derivatives contracts. More recently issued LIBOR-based products also contain fallback language that is consistent with the standardized language suggested by industry groups, like the ARRC. The ARRC was formed in the US to identify an alternative reference rate to USD LIBOR. BlackRock was an advisor to the original ARRC and was invited to join the newly constituted ARRC after the selection of SOFR was made and the Paced Transition Plan announced.

The following is an overview of the ARRC-proposed benchmark replacement waterfalls:

Hardwired Benchmark Replacement Waterfalls

Replacement	Description
Term SOFR + spread adjustment	Forward-looking term SOFR for the applicable corresponding tenor. *Note: Loan recommendations allow use of the next longest tenor term SOFR rate if the corresponding tenor is unavailable*
Compounded SOFR + spread adjustment	Compounded average of daily SOFRs over the relevant period depending on the tenor of USD LIBOR being replaced
Relevant selected rate + spread adjustment	Rate selected by the Relevant Governmental Body, lender, or borrower & administrative agent
Relevant ISDA replacement rate + spread adjustment	The applicable replacement rate (without spread adjustment) that is embedded in ISDA's standard definitions
Issuer, designated transaction representative, or note holder replacement + spread adjustment	An identified party will select a replacement rate, in some cases considering any industry-accepted rate in the related market. *Note: in certain circumstances this step could be omitted*

Source: ARRC Summary of LIBOR Fallback Language, November 2019: https://www.newyorkfed.org/medialibrary/Microsites/arrc/files/2019/LIBOR_Fallback_Language_Summary

Key Concern: Legacy Contracts

While the finalization and incorporation of fallback language has greatly increased market certainty in newly issued products, some legacy cash instruments do not have mechanisms to efficiently allow for revising fallback language. **Legislation is needed to allow for these changes**, which the ARRC is currently exploring.[5] The legislation under consideration would permit the application of an ARRC-recommended SOFR fallback rate and spread adjustment to US LIBOR instruments governed by NY law across all asset classes. Instruments with fallbacks to rates other than LIBOR would not be subject to the legislation.

Without an effective legislative solution, the fallback provisions (or lack thereof) in certain legacy instruments may result in interest rates defaulting to being fixed at the last published LIBOR rate, or being left to the discretion of an issuer or trustee. In order to mitigate the risk of such outcomes, we are supportive of the ARRC's legislative initiatives.

For OTC derivatives traded under an ISDA agreement, a protocol will be made available to facilitate transition of legacy products.

Upcoming Milestones

Two significant milestones upcoming in 2020 are ISDA's finalization of fallback methodology for OTC derivatives contracts and the shifting of discount curves at the clearinghouses (CCPs) for cleared derivatives. We expect these events to further grow liquidity in ARRs.

ISDA Fallback Methodology

ISDA is in the process of finalizing fallback language for derivatives contracts. Derivative products that are traded under an ISDA agreement (most interest rate swaps and options) will be affected by a change to ISDA's 2006 Definitions that is expected to be released in the first half of 2020. This means that any new derivative traded after these new definitions take effect will have a newly incorporated fallback methodology included. Along with these updated definitions, ISDA intends to release a protocol which will allow the application of the same fallback methodology to all legacy OTC derivatives and other certain contracts. Bloomberg has been retained by ISDA to publish the compounded in arrears rate, the benchmark adjustment spread, and the "all-in" adjusted rate.

CCP Discounting Shift

The major CCPs have announced that they will migrate discounting and price alignment interest (PAI) for all cleared USD interest rate swap (IRS) products from effective fed funds rate to SOFR in October 2020.

Similarly, CCPs will migrate to an €STR-based discounting and PAI for Euro-denominated interest rate swaps in July 2020. This migration has been dubbed the "Single Step" by the CCPs. The CCP discounting and PAI change will be important for further embedding €STR and SOFR within the derivatives market and driving liquidity in €STR and SOFR products. As dealers usually hedge their discounting liabilities, the switch to SOFR discounting and PAI is expected to create additional trading in SOFR overnight index swaps (OIS), EFFR-SOFR basis swaps, and SOFR futures.[6]

Key Dates	
March 2020	• NY Fed publishes 30-, 90-, 180-day SOFR averages as well as SOFR Index • Bank of England and FCA encourage market makers to switch the convention for sterling interest swap rates from LIBOR to SONIA
Spring 2020	Quick Corp. to publish prototype rates for "Term Reference Rates" (formal rates to be released in mid-2021)
July 2020	CCPs switch discounting for Euro-denominated interest rate swaps from EONIA to €STR
July 2020	Bank of England to produce a SONIA Compounded Index and possibly Sonia Period Averages
Q2-Q3 2020	ISDA to publish final parameters for benchmark fallback adjustments for derivatives
October 2020	CCPs switch discounting for USD-denominated interest rate swaps from Fed Funds rate to SOFR
Q1 2021	Market participants should cease issuance of cash products linked to sterling LIBOR as per Sterling Risk-Free Reference Rates (RFRWG)

While we are not aware of any delays to these key dates as a result of the COVID-19 global pandemic, we will keep our clients and counterparties updated should any changes be announced.

BlackRock Transition Planning

BlackRock has convened a Steering Committee to drive internal efforts via several workstreams and we are committed to supporting our clients throughout this change. We have dedicated significant resources to the IBOR transition and continue to invest in the development of analytics, tools, and processes to support the transition to ARRs.

The Steering Committee meets regularly and provides oversight and guidance to internal working groups focused on several areas of the LIBOR transition:

- Client Engagement
- Investments
- Analytics & Tools
- Data
- CCP PAI/Discounting Switch
- Tax & Accounting

Key objectives for the working groups include:

- Assessing exposures to LIBOR for each investment business and each portfolio, when applicable
- Coordinating data, technology, and operational needs
- Responding to industry consultations, client, and regulatory inquiries
- Educating our clients and business partners on market structure changes and developments

Managing IBOR Exposures

There is no one size fits all solution for every portfolio we manage. Investment teams manage their funds for clients differently, which means there will be disparate holdings of LIBOR-based instruments, at varying maturity points. However, investment teams with exposure to LIBOR are assessing exposures and evaluating transition plans. In some cases, providing input into market structures and awaiting liquidity to develop in longer-dated SOFR product is part of the current transition plan.

To help Aladdin users (including BlackRock) assess LIBOR exposures, we have built a proprietary tool which enables users to look up both LIBOR and ARR exposures in a portfolio or a group of portfolios.

Some of the steps that our investment teams are taking include:

- Assessing current LIBOR exposure by currency, product, maturity
- Reviewing fallback language embedded within the documentation for current exposures and record where fallback terms are unclear, inadequate or missing
- Identifying exposures that cannot be easily transitioned due to investment mandate, liquidity, accounting, or hedging concerns
- Planning for a reduction in exposures that reference LIBOR
- Planning for performance benchmark transition for those benchmarks tied to LIBOR

Fund Benchmarks

We have performed an assessment of funds that contain either a performance or risk benchmark that references LIBOR and we are holding internal discussions with our Risk, Product Strategy, and other internal teams regarding suitable replacements rates. We will be reaching out to clients and fund boards in due course on amending fund benchmarks that reference LIBOR.

While there are differences between ARRs and global IBORs, the release of fallback methodologies by ISDA and the ARRC provides guidance as to how to reconcile these differences. Liquidity is still growing in ARRs so discussions on transitioning fund benchmarks should include flexibility to incorporate new information as markets and market structure evolves.

Analytics & Aladdin Readiness

Our technology platform that houses LIBOR data as part of the investment management process will be updated to take in and incorporate new data streams with respect to new ARRs. In addition, our systems will need to calculate an implied term structure for overnight rates and embed new analytics to account for additional basis risks that may be introduced due to the presence of new benchmark rates.

All participants in the ecosystem, from CCPs, to custodians, to asset managers and asset owners, will need to make the appropriate preparations including both user acceptance and integration testing periods. **Given the magnitude of system builds that may be required, market participants should actively be considering what changes are needed in the future.**

BlackRock has already made numerous enhancements to our Aladdin platform to support analytics for ARR-linked instruments:

- Building €STR and SOFR curves for discounting and cashflow projection
- Analytical support for SOFR swap and floating rate note (FRN) compounding conventions
- Support for SONIA/SOFR futures
- Analytical support for Options on SOFR Futures

We plan on making additional enhancements, including:

- Unwinding usage of Libor curves in existing Aladdin mortgage models
- Enabling discounting of exchange traded derivatives using ARR curves
- Support for the ARR swaption analytics
- ARR Cross Currency Basis Swaps / ARR Caps / ARR Floors

The new ARR data that powers BlackRock's analytics, modeling, valuation and downstream processes requires significant analysis as well as a close partnership with data providers. Our Reference & Market Data team has engaged with various third-party providers to assess and minimize potential impacts stemming from loading the new benchmark data in our platform. To prepare for this change we are finalizing the data model to identify coupon calculation methods for ARR-linked assets and updating Aladdin's integration with third party vendor libraries to support ARR linked assets. We are also enhancing our infrastructure to store coupon calculation methods, releasing data model features for lockout periods, and partnering with other teams to create ARR-based test securities to assess impact to downstream tools and processes.

Discounting and Price Alignment Interest (PAI) Transition

As previously mentioned, CCPs will migrate Discounting and Price Alignment interest for cleared USD interest rate swaps to SOFR in October 2020. Similarly, they will migrate to an €STR Discounting and Price Alignment for Euro-denominated interest rate swaps in July 2020.

BlackRock is taking concrete steps to prepare and mitigate any impact to BlackRock-managed funds as a result of this transition. Specifically, we have:

- Analyzed portfolio impact resulting from the SOFR/€STR Discounting and Price Alignment switch, including estimates of (i) change in position MTM and (ii) compensating basis swaps and cash adjustments
- Partnered with Global Investment Operations, Trading, Portfolio Management, Analytics, and BlackRock Solutions teams to design a workflow for uploading cash compensations in our platform and processing it downstream
- Provided input to the CCPs on the auction process and timing of the rollout

Accounting & Tax

To ease the accounting and reporting burden, the global accounting standard setters (FASB and IASB) are in the process of proposing operational accounting relief guidance. While the approaches of the two boards are different the results are expected to be similar. Optional expedients and exceptions will be temporarily provided to current accounting rules for contract modification and hedge accounting. Based on recent discussions, the industry is generally supportive of the standard setters' timely efforts to address the intricacies and complexities caused by rate reform and view it as an important first step in streamlining the transition.

We are having discussions with our fund accounting administrators to understand their impact assessments as well as their current plans and readiness for the upcoming changes.

Industry & Regulator Engagement

BlackRock actively participates with many industry groups and frequently engages with regulatory bodies.

ARRC

The ARRC was formed in the US to identify an alternative reference rate to an IBOR. BlackRock was an advisor to the original ARRC and was invited to join the newly constituted ARRC after the selection of SOFR was made and the Paced Transition Plan announced.

The ARRC meets on a monthly basis and has several subcommittees and working groups to address transition issues specific to various asset classes and stakeholders. In addition, the ARRC engages with all industry participants and stakeholders by soliciting feedback through public consultations.

The ARRC maintains several resources on its website, which we recommend viewing for greater detail on LIBOR transition.

Sterling and Euro Risk-Free Rate Working Groups

In addition to our representation on the ARRC, BlackRock is represented in other industry groups such as the Working Group on Sterling Risk-Free Reference Rates and the Working Group on the Euro Risk-Free Rates. Even though benchmark reform initiatives vary by country, there is global connectivity and dialogue across regions. Our Steering Committee coordinates BlackRock's participation efforts across the platform.

Regulators

When the FCA first made the announcement in 2017 that it would no longer compel banks to submit to LIBOR after year-end 2021, regulators were rightly focused on identifying alternative reference rates (ARRs) and encouraging awareness and preparedness. Globally, regulators are now encouraging market participants to identify IBOR exposures and provide more concrete information on transition planning.

Many regulators have issued statements, proposals, and guidance to provide clarity to the industry on various transition elements.

SEC's Division of Corporate Finance, Investment Management, and Trading & Markets and the Office of the Chief Accountant issued a statement in July 2019 highlighting risks for market participants as they transition away from LIBOR.

IOSCO issued a statement in July 2019 noting that the early transition to risk-free rates can mitigate potential risks.

Federal Accounting Standards Board (FASB) issued proposed accounting relief in September 2019 for contract modifications and hedging relationships impacted by the transition away from LIBOR.

Treasury and IRS issued proposed rules in October 2019 providing guidance on the tax consequences of the transition to the use of reference rates other than IBORs. The proposed rules are intended to minimize potential market disruption and to facilitate an orderly phase-out of IBORs.

Federal Reserve, FSIC, Farm Credit Administration, Federal Housing Finance Agency, and Office of the Comptroller of the Currency issued a proposed rule in October 2019 allowing certain technical amendments to legacy swaps without altering their status under the swap margin rules.

NY State Department of Financial Services issued a letter in December 2019 requesting that regulated institutions provide plans to address LIBOR cessation and transition risk

CFTC issued three no-action letters in December 2019 that provide relief to swap dealers and other market participants in connection with amending swaps to update provisions referencing IBORs to replacement rates.

Bank of England and the **Financial Conduct Authority** published a set of documents in January 2020 outlining priorities and milestones for 2020 on LIBOR transition.

FASB issued an Accounting Standards Update in March 2020 to provide temporary optional guidance to ease the potential burden in accounting for reference rate reform.

LIBOR Administrator

The ICE (Intercontinental Exchange) Benchmark Administration (IBA) has been the LIBOR administrator since February 2014. Steps were taken in early 2018 to create a 'waterfall methodology' and strengthen the submissions process. On April 1, 2019, IBA announced that it had successfully completed the transition of all LIBOR Contributor Banks to the Waterfall Methodology. IBA is using the results of 2019 survey on the use of LIBOR to work with global banks to seek their support to continue publishing certain widely-used LIBOR rates after 2021.

The IBA also created the U.S. Dollar Ice Bank Yield Index, which is a forward-looking, credit sensitive benchmark, designed as a potential replacement for LIBOR for U.S. dollar lending activity. The index measures the average yields at which investors are willing to invest U.S. dollar funds over one-month, three-month, and six-month periods on a wholesale, senior, unsecured basis in large, internationally active banks. Further analysis and commentary on the Index can be found in an IBA-published white paper from October 2019.

Key Takeaways and Recommendations

- LIBOR's future is uncertain and the time to plan for transition is now.
- Policymakers and the various Risk-Free Rate working groups should provide a pathway for certain legacy contracts to transition away from LIBOR. Specifically, legislation is needed to address legacy contracts that do not have mechanisms to efficiently allow for revising fallback language.
- We view benchmark reform as having three components: Awareness, Assessment, Action. This process is iterative and continued education is important.
- Basis risks will increase in the market with the introduction of new products that reference alternative reference rates; however, with appropriate preparation, these basis risks can be managed alongside the many other risks that currently exist in the markets.
- The need for global coordination is important because of the interconnectedness across products, sectors, and markets.
- As we enhance our analytical tools, our systems will be flexible enough to handle new data and market conventions as new standardized features emerge in practice.
- We will carefully monitor liquidity growth in new products while managing legacy products that reference global IBORs.
- We are engaging with clients to assess LIBOR exposures within portfolios and will propose recommendations regarding benchmark replacement rates.
- We are coordinating the firm and with the industry at-large to identify challenges and collaborate on solutions as we move closer to the transition from LIBOR.

Additional Resources

- BlackRock published a *ViewPoint* in April 2018, updated in April 2019, on LIBOR Benchmark Reform titled **LIBOR: The Next Chapter** https://www.blackrock.com/corporate/literature/whitepaper/viewpoint-libor-the-next-chapter-april-2018.pdf
- ARRC website https://www.newyorkfed.org/arrc/sofr-transition
- Bank of England, RFR Working Group https://www.bankofengland.co.uk/markets/transition-to-sterling-to-risk-free-rates-from-libor
- European Central Bank https://www.ecb.europa.eu/paym/initiatives/interest_rate_benchmarks/WG_euro_risk-free_rates
- Bank of Japan https://www.boj.or.jp/en/paym/market/jpy_cmte/index.htm/
- Swiss National Bank https://www.snb.ch/en/ifor/finmkt/fnmkt_benchm/id/finmkt_reformrates
- CME Discounting Transition https://www.cmegroup.com/education/articles-and-reports/sofr-price-alignment-and-discounting-propos al.html
- LCH Discounting Transition https://www.lch.com/membership/ltd-membership/ltd-member-updates/transition-eustr-discounting-swapclear
- ISDA Fallback Consultations https://www.isda.org/2020/01/10/benchmark-fallback-consultations/

Endnotes

1. IOSCO released a report, *Principles for Financial Benchmarks*, in July 2013. The selected ARRs conform to these guidelines.
2. €STR is the new interbank rate slated to replace EONIA. Euribor, on the other hand, will not be discontinued rather reformed.
3. https://www.newyorkfed.org/medialibrary/Microsites/arrc/files/2020/ARRC_Spread_Adjustment_Consultation.pdf
4. https://www.newyorkfed.org/arrc/fallbacks-contract-language
5. https://www.newyorkfed.org/medialibrary/Microsites/arrc/files/2020/ARRC_Press_Release_Proposed_Legislative_Solution.pdf
6. https://www.isda.org/a/WhXTE/Adoption-of-Risk-Free-Rates-Major-Developments-in-2020.pdf

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