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THE BANKING SOFTWARE COMPANY

LIBOR Retirement:
Are you prepared?

Executive Summary

From the end of 2021 and after 30 long years, LIBOR (London Interbank Offered Rate) often referred to as the "world's most important number in finance" will be retired. This will have a far-reaching impact on all floating rate contracts – loans, deposits, bonds, derivatives – which currently reference interbank offered rates (IBORs).

Each central bank has chosen an overnight near risk-free rate (RFR) as a replacement for LIBOR, however, a simple rate substitution for existing contracts is not possible as RFRs are not equal to IBORs.

In moving away from LIBOR, not only will banks need to adjust margins on contracts to mitigate changes in the economic terms but they will also have to modify the way interest rates are processed.

Regulators are already requesting banks to set-out their readiness for these changes and present a plan on how they will manage the transition.

The timeframe for action is shrinking and banks, along with their software providers, need to begin transition efforts NOW. All entities affected by the discontinuation need to assess their exposures to, and plan for a comprehensive transition away from, LIBOR.

Background

> **The survival of LIBOR on the current basis, as a dynamic benchmark based on daily submissions and updates, could not and would not be guaranteed.**
>
> Andrew Bailey - Chief Executive of the Financial Conduct Authority, UK

The size, scale and scope of LIBOR usage make this shift arguably the biggest challenge facing the finance industry today[1]. The magnitude is extensive as more than $350 trillion of notional outstanding is currently referencing LIBOR as a benchmark.

Andrew Bailey, CEO of the Financial Conduct Authority, stated in a speech that companies should prepare for the permanent discontinuation of LIBOR. Since then, new alternatives to LIBOR, known as 'risk-free reference rates', or RFRs, and instruments linked to them have been gaining momentum.

Still, due to the nature of the new replacement rates – all based on actual transactions and which are near risk-free – the transition process is complex. All current 'Interbank Offered Rates' (IBORs) are forward-looking and contain an element of counterparty risk. Therefore, the operational challenge banks face is not a simple rate substitution in contracts but rather a complex matrix is in place with wide -ranging consequences on operations, risk calculations, and the way institutions will conduct business in the future.

Why is LIBOR no longer an appropriate benchmark?

LIBOR is the primary benchmark rate for short-term interest and a key indicator of a bank's health. It represents the average interest rate at which large banks are willing to lend to one another. However, the lack of actual transaction data underlying LIBOR and other IBORs is believed to incentivize panel banks to report figures aligned with their own business interests. Multiple instances of manipulation of LIBOR generated widespread concerns about its reliability as a benchmark rate. The LIBOR scandal uncovered in 2012 revealed a series of fraudulent actions by major banks altering the rates to obtain financial gains. Many Tier-1 banks incurred substantial fines and penalties for their involvement in the manipulation of LIBOR.[2]

1. JP Morgan LIBOR Primer: Setting the Stage for SOFR
2. https://www.cfr.org/backgrounder/understanding-libor-scandal

Consequently, the Financial Conduct Authority of the UK announced that member banks would no longer be required to submit rates and LIBOR would be phased out by the end of 2021.[3] Low trading activity and decreased representative power of the underlying market along with the inherent subjectivity in the rate formation process were the other main reasons for FCA's decision.

Which are the impacted areas?

Interbank Offered Rates are deeply embedded in the financial industry and LIBOR, in particular, is estimated to be the primary benchmark reference rate for more than $350 trillion notional outstanding – reaching to $400 trillion in Bank for International Settlements reports.[4] This further proves the role of LIBOR as the 'world's most important number'.

Any discontinuation and a transition away from LIBOR will inevitably affect a wide range of financial instruments.[5]

Usage of IBORs by Instrument Type:

Instrument	USD-LIBOR	GBP-LIBOR	EURIBOR	Euro-LIBOR	JPY-LIBOR	TIBOR	CHF-LIBOR
Syndicated Loans	High	Medium	Medium	Low	Medium	Medium	Low
Business Loans	High	Medium	High	Low	Medium	Medium	Medium
Retail Loans	Low	Low	Medium	Low	Low	Low	Medium
FRNs	High	Medium	High	Low	Medium	Low	Low
Securitisation	High	Medium	Medium	Low	Low	Low	Low
OTC Derivatives	High	High	High	Low	High	Medium	High
ETD	High	High	High	Low	Medium	Medium	Medium
Deposits	Low	Low	Low	Low	Low	Low	Low

High >$1tn **Medium** $100bn<x<$1tn **Low** <$100bn Source: MPG Report to OSSG

3. https://www.fca.org.uk/news/speeches/the-future-of-libor
4. https://www.bis.org/publ/qtrpdf/r_qt1903e.pdf
5. Any type of financial contract utilising IBORs for determination of floating leg obligations will be impacted

What are the alternatives?

Since Andrew Bailey announced the intentions for a transition away from LIBOR, numerous Central Bank working groups constituted to determine the replacement rates for each currency and jurisdiction. Each respective working group selected the following alternatives:

Currency Alternative Reference Rate	Publication Time	Administrator – Publication Date	Description
USD SOFR Secured Overnight Financing Rate	8:00 ET, T+1	**Federal Reserve bank of NY** April 2018	Secured rate that covers multiple overnight repo market segments
GBP SONIA Sterling Overnight Index Average	09:00 GMT, T+1	**Bank of England** April 2018	Unsecured rate that covers overnight wholesale deposit transactions
EUR €STR Euro Short-Term Rate	08:00 CET, T+1	**European Central Bank** October 2019	Unsecured rate that captures overnight wholesale deposit transactions
JPY TONAR Tokyo Overnight Average Rate	10:00 JST, T+1	**Bank of Japan** Since 1992	Unsecured rate that captures overnight call rate market
CHF SARON Swiss Average Rate Overnight	12:00, 16:00 and 18:00 CET, same day	**SIX Exchange** Since 2009	Secured rate that reflects interest paid on interbank overnight repo
CAD CORRA Canadian Overnight Repo Rate Average	09:00 ET, T+1	**Bank of Canada** September 2018	Secured rate based on trimmed median repo rate of daily transactions

Subjectivity and lack of actual transactional data to base the rates on, are considered the primary reasons for LIBOR's susceptibility to manipulation. Therefore, the accepted alternatives to IBORs in each currency are designed to be calculated out of actual data in liquid markets[6] instead of being determined through a poll amongst certain banks. In order to do so, all qualifying transactions for a particular day are gathered and a rate on them is subsequently published either at the end of a day (EOD) or at the next business day.

Employing real data from executed transactions means rate availability at the end of the respective period (alternative RFRs are overnight rates, so a new rate is published every business day with a lag).

LIBOR, on the other hand, is a forward-looking rate published for various time buckets such as 1 week, 1 month, 3 month, 6 month etc. As a result, it is available at the beginning of the period, in advance.

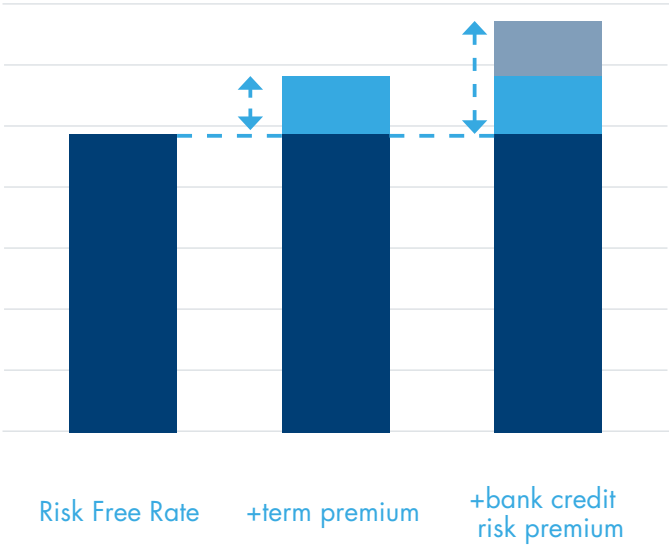
6. SOFR – Secured rate, based on cost of borrowing cash overnight collateralised by US Treasury securities in the repo market
SONIA – Unsecured rate, based on BoE's Sterling Money Market daily data collection (interest paid on sterling short-term wholesale funds/deposits);
€STR – Unsecured rate, based on MMSR (Money Market statistical reporting) regulation daily data, designed to reflect the wholesale euro unsecured overnight borrowing costs of euro area banks; available from October 2019 onwards (replacing current EONIA rates)
TONAR – Unsecured rate, based on uncollateralised overnight call rates provided by money market brokers
SARON – Secured rate, based on Swiss Franc interbank repo market data;
CORRA – Secured rate, based on Canadian daily repo market transactions.

Not just a simple rate substitution

The complexity of the disruption to banks' business operations is primarily due to the inability to perform simple rate substitutions in the contracts affected. The very nature of the selected alternative rates, as outlined above, is fundamentally different from LIBOR.

While the London Interbank Offered rate is forward looking with an element of counterparty and credit risk embedded, the new alternatives are based on actual transactional data, near risk-free and backward-looking. RFRs lack the so-called 'term structure', or the credit risk element embedded in IBORs.

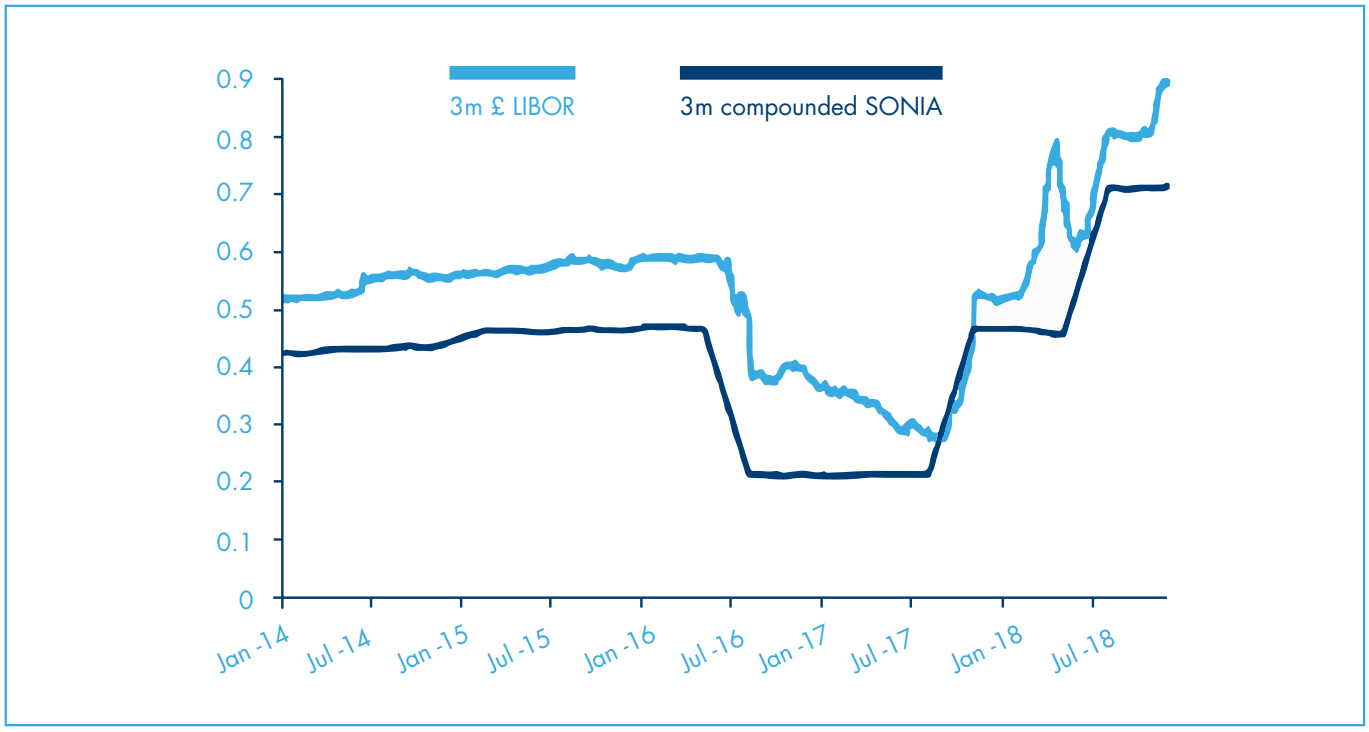
Difference between LIBOR and RFR



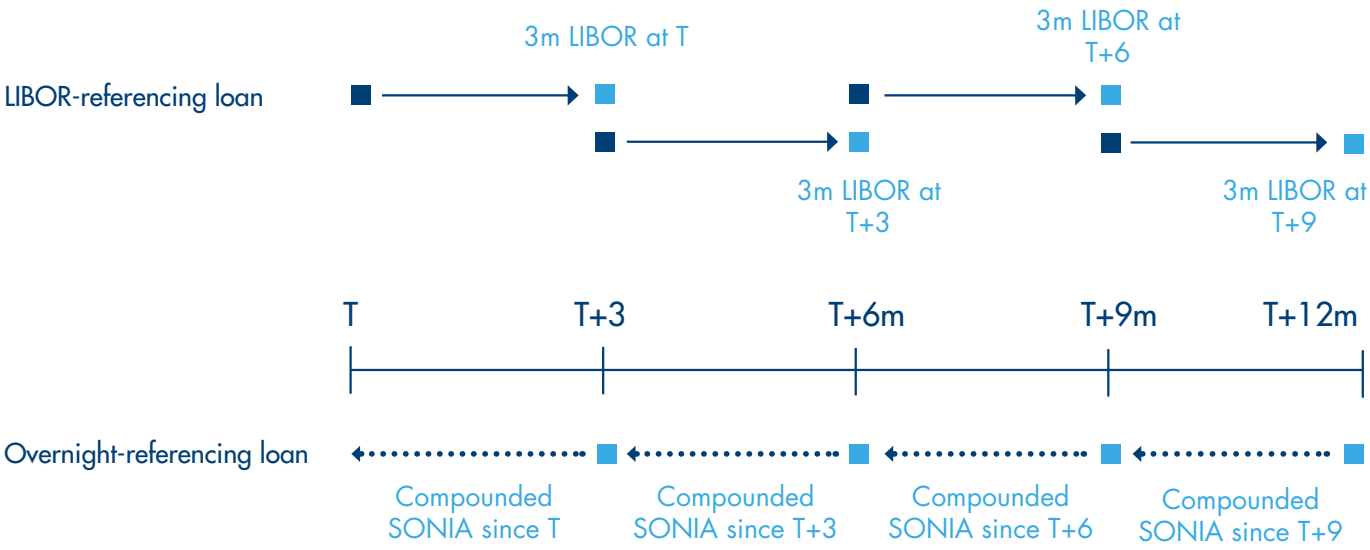
RFR ≠ LIBOR

Historically, there have been substantial differences in values observed between the two types of rates. Therefore, a straightforward GBP LIBOR replacement in a particular contract with SONIA rates, for instance, will inevitably lead to an economic gain for one counterparty and a loss for the other.

The nature of the new RFRs suggests a change in the way calculations on floating rate contract is performed. Unavailability of the new RFRs by the end of the respective interest period creates further complexity for banks. Investors and debtors having little knowledge of the amount of necessary payment on a bond, for instance, could facilitate liquidity risk. Operational systems need to adapt to a fundamentally different methodology of calculations – compounding interest and fixing in arrears. Pricing, risk modelling, accruing interest and projecting cash flows are examples of the complicated puzzle that banks need to solve with rates in arrears (not in advance).



Source: Bank of England



Interest rate known

Interest payment made at end of interest period

Source: Bank of England

Additionally, deriving a yield curve through new alternative rates will not be easily achievable with yet insufficient risk-free rate data and lack of term structure. Regulatory calculations of capital costs and liquidity metrics will have to be revised and with the existing burden of Basel III implementation, there is significant pressure on banks.

There is an evident desire of authorities to facilitate more trading with the newly suggested RFRs and banks are encouraged to migrate most of their IBOR exposure to RFRs now instead of waiting until the end of 2021. The Financial Conduct Authority, along with the Prudential Regulation Authority, sent a letter in September 2018 to the CEOs of major banks and insurers within the UK to emphasize the importance of early preparations for transition from LIBOR to risk-free rates.[7]

> **The purpose of this letter is to seek assurance that firms' senior managers and boards understand the risks associated with this transition and are taking appropriate action now so that your firm can transition to alternative rates ahead of end-2021.**
>
> FCA and PRA letter to CEOs of major banks and insurers supervised in the UK

The purpose of the letter was to emphasize the certainty of LIBOR discontinuation while seeking assurance that associated risks are understood and appropriate transition plans are in place.

7. https://www.fca.org.uk/publication/correspondence/dear-ceo-letter-firms-transition-from-libor-insurers.pdf

Banks have clearly outlined their approach to the transition process. Received client feedback is aligned with expectations of the national authorities – there is an evident desire to limit LIBOR exposure and move to deal with new RFRs. Industry data confirms the idea of decreasing reliance on LIBOR before the end of 2021. Fannie Mae, the Federal National Mortgage Association (FNMA) in the US, issued the first-ever SOFR denominated securities in July 2018 and a month earlier there was a £1 billion SONIA linked bond issuance by the European Investment Bank.[8] Overnight Index Swaps (OIS) have emerged as the primary non-cash product for hedging interest rate exposures and account for the majority of derivatives admitted for clearing by the London Clearing House.[9]

Industry approach is still evolving

Taking into account the difference between IBORs and new RFRs, the International Swaps and Derivatives Association (ISDA) recommended a fall-back language to existing derivative contracts maturing beyond 2021 in the case of sudden discontinuation of the IBORs in major currencies (except for US Dollar and Euro). ISDA's consultation proposed a 'compounded setting in arrears with a historical mean/median adjusted spread' as a substitute for the floating rate. Daily compounding of interest rates and an additional adjustment spread is identified as the approach to eliminate the differences between LIBOR and the risk-free alternatives. ISDA is committed to launching a series of consultations for the US dollar and Euro – the two major currencies not covered in the first consultation.[10]

Similar developments have also been observed for other instruments (non-derivatives) as recommended by other working groups. Alternative Reference Rates Committee (ARRC) published a set of fall-backs for cash products (floating rate notes, syndicated loans, business loans and securitization) – all identifying term RFRs with an adjustment spread as the primary rate substitution mechanism and compounded RFR with an adjustment spread as the second most preferred fall-back.

There is an evident distinction between product types – while for derivatives the backward looking RFRs appear to be the more appropriate choice for hedging purposes, cash instruments prefer forward looking term RFRs to achieve greater certainty of payment obligations. Bank of England and ARRC have plans for publishing RFRs with term structure – timeline and development of sufficient liquidity for forward-looking RFRs, however, are not clear.

8. http://www.fanniemae.com/portal/media/financial-news/2018/fannie-mae-pioneers-sofr-securities-6736.html
https://www.eib.org/en/investor_relations/press/2018/fi-2018-12-eib-issues-markets-first-sonia-gbp-benchmark-with-gbp-1bn-5y-issuance.htm
9. https://www.lch.com/services/swapclear/volumes
10. Consultation to cover USD LIBOR, EUR LIBOR and EURIBOR

Need for preparation

Given the complexity of the transition away from IBORs and the potential size of the disruption to the financial industry, any strategic initiative on the subject should be carefully calibrated. Banks need to work closely between each other and with any other affected entity in order to limit any losses in the process of moving to RFRs. The operational challenge for all financial institutions will be enormous as a fundamentally new approach will be required.

In turn, software vendors need to provide the ability to deal with the alternative to LIBOR reference rates so as to achieve migration of exposure prior to 2022.

Providing solutions for referencing backward looking overnight rates and considerations for future term RFRs are essential in navigating through the complex puzzle created by the retirement of LIBOR.

Availability of RFRs and functionality requirements

The first step towards a solution for a transition away from LIBOR (and all other IBORs) is the ability to reference new rates, e.g. SONIA and SOFR. Hence, products linked to a floating rate, need to be equipped with the capabilities of linking transactions to RFRs. It is further important to provide the optionality of spread add-ons so banks can mitigate the risks arising from the differences between IBORs and RFRs.

Interest Calculation

The nature of the overnight rates means compounding interest in arrears. Current products that are referencing LIBOR, function on the basis of interest rates, that are available in advance at the beginning of the interest periods. The expected shift away from LIBOR to risk-free rates would necessitate calculations throughout the interest period. Additionally, publication lag existing with the new RFRs would require supplementary modifications of payment processing, settlement timing, cash flow projections, revaluations and position management in general.

Support for existing client base

The retirement of LIBOR is date-bound, software providers need to ensure that solutions are in place for all their clients, especially the ones on older releases who will not be able to perform wholesale system upgrades within the allotted time frame.

Conclusion

While there are still unknowns in terms of the future availability of term rates for pricing, cash flow projection, and risk modelling, it is clear that risk-free rates will replace LIBOR as the main market reference rate for floating contracts.

This is a fundamental change in market practice affecting many contract types.

So that client banks can perform an orderly transition before the end of 2021, infrastructure and systems providers need to be prepared. This means:

- Performing an impact analysis of products currently referencing LIBOR
- Scoping the work required to allow impacted products to reference RFRs
- Scoping the work required to ensure that impacted products are able to process compounding interest, in arrears, with the ability to manage a settlement lag
- Publish a migration guide to new and existing customers, with timelines, and promote greater awareness of the transition process amongst clients, partners and other impacted stakeholders.

While the market is still to finalize a universal fall-back language for LIBOR based contracts running beyond the cut-off date, this document has not drawn any conclusions relating to this element. As soon as clarity emerges on the fall-back approach, a uniform method emerges and data becomes available all necessary actions will be assessed and published.

Glossary

Compound Interest – interest calculated on the initial principal, which also includes all of the accumulated interest of previous periods of a deposit or loan. Simple interest, on the other hand, is calculated only on the initial principal.

Compounded Setting In Arrears – compounding of interest (rate) throughout the applicable interest period (daily compounding) and determination of obligation (payment, receivable, rate etc.) at the end of the period instead of having knowledge of the rates and any amounts payable/receivable at the beginning of the respective period.

Compounding Formula:

$$\left[\prod_{i=1}^{d}\left(1+\frac{r_i \times a_i}{b}\right)-1\right]\times\frac{b}{n}$$

IBORs – Interbank offered rates, reference rates or benchmarks used in financial transactions to determine payments/receivables for the floating leg of the respective financial contract; forward-looking and containing term structure (bank's perception of risk), published daily for several time intervals (time buckets).

Rate reset lag – inability to perform rate reset activity on the contractually scheduled date due to unavailability of a rate until a later period (publication lag).

RFRs – risk free rates, alternative rates selected to replace LIBOR (and other respective IBORs); backward-looking and based on actual transactions in liquid markets; published daily and usually applicable for the previous working date.

Settlement lag – inability to perform settlement activity on the contractually scheduled date due to unavailability of a payment amount until a later period because of a rate reset lag.

Where n is the number of calendar days from (and including) the start date to (but excluding) the end date, d is the number of business days in the same period, b is the applicable day count fraction denominator, r_i is the applicable overnight rate in respect of business day i, and a_i is the number of calendar days in the period in respect of which rate r_i applies.

Appendix

Further reading on the topic of LIBOR discontinuation:

- ARRC, Fall-back Language for FRNs (Floating Rate Notes) and Syndicated Loans: https://www.newyorkfed.org/medialibrary/Microsites/arrc/files/2019/ARRC-Apr-25-2019-announcement.pdf
- ARRC, Paced Transition Plan: https://www.newyorkfed.org/arrc/sofr-transition
- ARRC, User's Guide to SOFR: https://www.newyorkfed.org/medialibrary/Microsites/arrc/files/2019/Users_Guide_to_SOFR.pdf
- Bank of England, Consultation on Term SONIA Reference Rates, Summary of Responses: https://www.bankofengland.co.uk/-/media/boe/files/markets/benchmarks/term-sonia-reference-rates-consultation-summary-of-responses
- Bank of England, Conventions for Referencing SONIA in New Contracts: https://www.bankofengland.co.uk/-/media/boe/files/markets/benchmarks/discussion-paper-conventions-for-referencing-sonia-in-new-contracts.pdf
- Bank of England, Infrastructure Forum, Working Group on Sterling RFR - https://www.bankofengland.co.uk/-/media/boe/files/markets/benchmarks/infrastructure-forum-summary-notepdf?la=en&hash=F79205C92F5714B4B6B935247D55F0EA13D033F6
- Bank of England, Overview of the Risk-Free Rate Transition: https://www.bankofengland.co.uk/-/media/boe/files/markets/benchmarks/infrastructure-forum-presentation-slideshow
- Bank of England, SONIA – Key Features and Policies: https://www.bankofengland.co.uk/-/media/boe/files/markets/benchmarks/sonia-key-features-and-policies
- Bank of Japan, Draft Public Consultation on RFRs: https://www.boj.or.jp/en/paym/market/jpy_cmte/cmt190424n.pdf
- Federal Reserve Bank of New York, Introducing SOFR, Key Features: https://www.newyorkfed.org/medialibrary/media/newsevents/speeches/2017/Frostpresentation.pdf
- Financial Stability Board, Reforming Major Interest Rate Benchmarks: https://www.fsb.org/wp-content/uploads/P141118-1.pdf
- ICMA, Market Conventions for Referencing SONIA: https://www.icmagroup.org/assets/documents/Regulatory/Quarterly_Reports/Articles/Q2-2019-article-Market-conventions-for-referencing-SONIA-150419.pdf
- ISDA, Final Results of Benchmark Fall-backs Consultation: http://assets.isda.org/media/04d213b6/db0b0fd7-pdf/
- Lloyds Banking Group, LIBOR: The Countdown to 2021: https://resources.lloydsbank.com/insight/phasing-out-libor-august-2018.pdf
- Loan Market Association, The Future of LIBOR: https://www.lma.eu.com/application/files/3815/3855/5150/ACT_and_LMA_LIBOR_Guide.pdf
- PwC, Financial Reporting Impacts from Replacement of LIBOR and Other IBORs: https://www.pwc.com/gx/en/audit-services/ifrs/publications/pwc-financial-reporting-impacts-from-replacement-of-libor-and-other-interbank-offered-rates-pwc-in-depth.pdf
- SONIA Futures Settlement Calculation: https://www.cmegroup.com/education/articles-and-reports/sonia-futures-settlement-calculation.html

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About Temenos

Temenos AG (SIX: TEMN), headquartered in Geneva, is the world's leader in banking software, partnering with banks and other financial institutions to transform their businesses and stay ahead of a changing marketplace. Over 3,000 banks across the globe, including 41 of the top 50 banks, rely on Temenos to process both the daily transactions and client interactions of more than 500 million banking customers. Temenos offers cloud-native, cloud-agnostic front office and core banking, payments, fund management and wealth management software products enabling banks to deliver consistent, frictionless customer journeys and gain operational excellence.

Temenos software is proven to enable its top-performing clients to achieve industry-leading cost-income ratios of 25.2% and returns on equity of 25.0%, 2X better than the industry average. These clients also invest over 53% of their IT budget on growth and innovation versus maintenance, which is 2.5X the industry average, proving the banks' IT investment is adding tangible value to their business.

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