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Financial Markets**

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## **End of the LIBOR Era and the Road Ahead for Financial Markets**

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### **ABSTRACT**

This article provides an overview of the impending cessation of the London Interbank Offer Rate (LIBOR) and its implications for Indian markets. As a key reference interest rate, the LIBOR dominated global financial markets for over three decades but its credibility came under scrutiny post the financial crisis of 2007-2008. To replace LIBOR, alternative reference rates (ARRs) were developed by financial authorities worldwide. However, there were multiple legal, operational and strategic challenges for financial institutions in switching over to the ARRs, which are highlighted in the context of the measures taken by the Reserve Bank of India (RBI) to facilitate a smooth transition away from LIBOR.

**Keywords:** LIBOR, ARRs, interest rates, financial markets, financial instruments

**JEL classification:** D47, E43, G21, G23

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# **End of the LIBOR Era and the Road Ahead for Financial Markets**

## **1. Introduction**

The end of the LIBOR (London Interbank Offer Rate) era is imminent as we approach the final transition deadline of June 30, 2023, when all LIBOR rates will cease to be published, as per the decree of the Financial Conduct Authority (FCA), UK. The LIBOR served the markets well and possibly became the most important fulcrum of global financial transactions. However, it had started to outlive its usefulness and credibility in the recent past. Working groups were formed by financial authorities of different countries to identify benchmark rates, which would ultimately replace the LIBOR. The pervasiveness of the LIBOR across cash and derivative markets posed a number of challenges for both financial regulators and the industry in the process of switching to alternative benchmarks. The Indian economy too had LIBOR dependencies which needed to be addressed. Thus, in line with the international roadmap of LIBOR cessation, the Reserve Bank of India (RBI) issued various guidelines which proactively urged Indian banks and financial institutions to take the necessary steps for a non-disruptive transition.

This article aims to explain the LIBOR cessation story from a global perspective and extend its implications for Indian markets. The next section describes the rise and fall of the LIBOR. Section 3 introduces the alternative reference rates (ARRs) and compares them with LIBOR. The fourth section discusses India's financial market linkages to LIBOR and the RBI's initiatives for LIBOR transition. Section 5 highlights the key challenges in the LIBOR phase-out process. The article concludes with some observations on the road ahead.

## **2. The Historical Context of LIBOR**

For nearly three and a half decades till end-2021, the LIBOR ruled the global markets as the key reference interest rate for multiple financial products. Its birth can be traced to the mid-1980s, when the British Bankers Association (BBA) formalised the LIBOR fixings for actively traded market segments. LIBOR rates for various settings in terms of currency and maturity, would be polled daily from a panel of large, international banks as interest rate quotes for unsecured lending and borrowing from other banks. The trimmed mean of the submitted rates would be derived and published every day. Initially, rates were submitted for 3 currencies (USD, GBP, and JPY) and later expanded to 10 currencies across 15 maturities. The administration of these rates was taken over by Intercontinental Exchange Benchmark Administration (ICE) in 2014. Subsequently, LIBOR settings were reduced to 7 maturities (1 day to 12 months) across 5 currencies (USD, GBP, EUR, JPY and CHF).

The LIBOR rates found wide acceptance world-wide for domestic and cross-border financial transactions which required reliable and standardized floating interest rate benchmarks that were sensitive to market liquidity conditions across tenors. They were used as:

- Reference rates for unsecured interbank funding in different currencies;
- Reference rates for syndicated loans, floating rate mortgage loans, bonds, securities, deposits etc.
- Benchmark rates for derivatives
- Discount rates for valuation of various financial positions

Furthermore, the LIBOR-OIS spread provided a measure of the banks' credit, liquidity and tenor premiums, and was used by regulators as a gauge of the banking system's health. By mid-2021, the total outstanding financial contracts referencing USD LIBOR was in the range of USD 200 – 400 trillion and the average daily volume of 3-month LIBOR-linked wholesale funding transactions by major global banks was around USD 500 million.

In the period preceding its formal cessation, various developments in financial markets reduced the credibility of the LIBOR and raised regulatory concerns. At the onset of the global financial crisis in 2007, LIBOR spreads over other short term risk-free rates like Treasury yields and Overnight Index Swap (OIS) rates widened substantially; whereas, it had averaged less than 10 basis points when markets were benign from 2005 to mid-2007. During the crisis, LIBOR rates were also more volatile vis-à-vis other funding rates. A number of LIBOR related scandals involving reputed global banks had also started emerging. As a non-binding quote, it had been deliberately manipulated by these banks to their own advantage (Vaughan and Finch, 2017). The money market volumes linked to LIBOR had also been gradually shrinking, which raised questions about the benchmark's foundation on actual trades.

As early as 2012, the Wheatley Report (FCA, 2012) had recommended that the BBA should cease the compilation and publication of LIBOR for those currencies and tenors for which there was insufficient trade data to corroborate submissions. On 27 July 2017, Andrew Bailey of FCA proclaimed, *'While significant improvements have been made to LIBOR since April 2013, the absence of active underlying markets raises a serious question about the sustainability of the LIBOR benchmarks that are based upon these markets. ....Work must begin in earnest on planning the transition to alternative reference rates that are based firmly on transactions'*. Thus, there were sufficient early warning signals of the imminent demise of LIBOR. It was no surprise when the FCA formally announced on March 5, 2021 that the majority of LIBOR rates (all settings for GBP, EUR, CHF and JPY and 1-week and 2-month USD settings) would be discontinued immediately after December 31, 2021 and the remaining USD settings would retire after June 30, 2023.

### **3. Alternative Reference Rates and their Off-take**

Much before the formal announcement of LIBOR cessation by FCA, financial market authorities of many countries had already developed and started publishing Alternative Reference Rates (ARRs) (Table 1). The objective was to create new (or reformed) benchmarks for various currencies that would retain the desirable features of LIBOR while by being based on transactions in liquid markets. These ARR were expected to 1) provide a robust and credible representation of risk-free interest rates in core money markets that were not susceptible to manipulation; 2) be offered as reliable

reference rates for financial contracts beyond the money markets; and 3) serve as benchmarks for term lending and funding (Schrimpf and Sushko, 2019).

Market regulators prescribed that the ARRs should replace LIBOR in LIBOR-linked transactions outstanding as of transition date and should be used for all new transactions post-transition date. However, there were material differences between the LIBOR and ARRs (Table 2). These divergences implied that there was an implicit spread between the LIBOR and ARRs, representing the compensation for unsecured funding over different tenors in the interbank market. The daily compounding in-arrears for the ARRs also implied that their use as a benchmark rate in financial contracts would create uncertainty of interest cost prediction.

Since almost all the ARRs of major currencies were being published for at least two years prior to the termination of LIBOR, historical data of these rates was already available. Figures 1 and 2 depict the trends of USD LIBOR and SOFR for the overnight and 1-month tenors. The summary statistics of the USD LIBOR-SOFR spreads for the period Apr-2018 to Jul-2021 is given in Table 2. The data clearly indicate that there was a strong correlation between the LIBOR and the SOFR. It is also evident that there was a spread between the two rates, which widened for longer terms and for periods of financial volatility (for example, the 2019-2020 period associated with the Covid Pandemic).

As the ARRs started stabilizing, derivative products with ARR underlying were developed by global Exchanges. For example, SOFR futures were designed by the CME Group and launched in May 2018. Over-the-counter derivatives like the SONIA-OIS also started trading in the interbank markets. The volumes of such transactions burgeoned over time and their prices then became the basis for other forward-looking benchmarks. CME started publishing forward-looking term SOFR for 1, 3, 6 and 12 month tenors, derived from SOFR futures since July 2021. Term SONIA reference rates derived from SONIA-OIS order book data of committed quotes, were made available by ICE from January 2021. These forward-looking term reference rates closely track their compounded in-arrears ARR (Figure 3) and received regulatory approval for use in financial markets.

As per data of the Federal Reserve Bank of New York (FEDNY), SOFR cash market transactions had a daily average transaction volume of roughly USD 1 trillion by December 2021, which had increased to USD 1.5 trillion by May 2023.

Some of the early security issuances in US which referenced their floating rate coupon payments to an ARR included the USD 6 billion Fannie Mae bond priced at SOFR plus spread which was issued in July 2018 and a two-year bond issued by JP Morgan in October 2018, which came at overnight SOFR in-arrears plus 55 basis points. The World Bank issued its first 2-year, USD denominated SOFR bond in August 2018, raising USD 1 billion from global investors, which was the first by a supranational agency. These pioneering issuances laid the grounds for greater market participation in the ARR based funding markets. SOFR is now the predominant reference rate, with almost all USD floating rate notes and all USD adjustable-rate agency mortgages being tied to SOFR. In addition, almost all new USD loans currently reference term SOFR and for syndicated loans, nearly 100% of USD syndicated lending references SOFR, compared to 30% in December 2021 (FSB, 2022).

#### **4. RBI's LIBOR Transition Measures for Indian Banks and Financial Institutions**

The Indian economic players and financial markets participants have had substantial exposure to the LIBOR, which was contractually embedded in or indirectly impacted most foreign currency denominated transactions (Hemachandran, 2020). RBI data shows that as of end-March 2022, India's total external debt was the equivalent of USD 620.74 trillion and there was more than USD 3.24 trillion notional amount of forex and interest rate derivatives outstanding as of March 2022. It can be presumed that a substantial proportion of these were LIBOR dependent, like the external commercial borrowings (ECBs), bilateral and multilateral borrowings by the government, private and public sector, trade credit, foreign currency deposits and foreign currency denominated derivative and swap transactions. As on March 31, 2022, India had sanctioned 310 foreign lines of credit, covering 66 countries with credit commitments of over USD 31.96 billion (Exim Bank, 2022), most of which referenced the LIBOR.

Furthermore, the Mumbai Interbank Forward Offer Rate (MIFOR) published by the Financial Benchmarks India Ltd. (FBIL), was derived from USD LIBOR and used as a rupee reference rate by banks to set prices on forward rate agreements and to cover currency swaps offered to clients using MIFOR-OIS. FBIL played a pivotal role in modifying the MIFOR to conform to global standards. From June 2021 onwards, it started publishing a daily Adjusted MIFOR and a Modified MIFOR, using the SOFR instead of LIBOR.

Post the FCA announcement, the RBI issued its first notification on July 8, 2021 (RBIa, 2021), advising all commercial banks and financial institutions to address the issues pertaining to the move away from LIBOR. This included 1) incorporating robust fallback clauses in legacy financial contracts referencing LIBOR beyond the first transition target date; 2) designing new products referencing the ARRs; 3) discontinuing the use of MIFOR beyond the LIBOR cut-off date and changeover to daily adjusted-MIFOR or Modified-MIFOR for legacy and fresh contracts respectively, 4) undertaking a comprehensive review of exposures to LIBOR in order to mitigate risks on account of transition issues. This was followed up with a circular dated December 8, 2021 (RBIb, 2021), which prescribed redefining the benchmark rate and changes to the all-in cost ceiling for new and existing external commercial borrowings and trade credits. In 2021, some of the larger Indian Banks also started initiating dollar transactions linked to SOFR. ICICI Bank and SBI undertook interbank - money market deals, SBI arranged an ECB for a large public sector enterprise and Axis Bank booked a derivative trade for its client.

Now that all LIBOR rates are set to completely cease for good beyond June 2023, RBI's latest notification on May 12, 2023 (RBIc, 2023), acknowledges the efforts already made by the banks, financial institutions and industry associations in India and urges them to complete the processes for all residual LIBOR exposures.

#### **5. The Implications and Challenges of LIBOR transition**

Due to its deep entrenchment in financial markets, LIBOR phase-out was expected to throw up multiple operational challenges, primarily for banks and financial institutions. While the phase-out roadmap provided some headroom for using limited USD LIBOR settings for 18 months between the transition deadlines, it was critical for financial institutions around the world to develop early, clear-cut plans to address these

challenges. The first task of this process required identifying, by currencies, products, geographies, counterparties and maturity, all the exposures and transactions which were directly or indirectly based on LIBOR.

For the legacy deals which would remain outstanding beyond the transition date(s) the pressing issue was to review the existing fallback clauses and renegotiate the financial contracts. This involved identifying and agreeing to a suitable ARR to replace LIBOR and incorporating the appropriate fallback language. The choice of the ARR would necessarily depend upon the client's comfort, product features and availability of the appropriate benchmark. For example, corporate borrowers who were comfortable with the term LIBOR set in advance for greater certainty of interest costs would prefer adopting a similar forward-looking term ARR as opposed to the in-arrears overnight ARR.

The buy-in by clients and counterparties would also be contingent upon spread adjustments, given the differences between LIBOR and selected ARR. Without a fair spread, the shift from LIBOR could bias the deal value in favor of one party vis-à-vis the other, leading to legal, conduct and reputational risks and accounting complications. In order to minimize value transfer to the extent possible, industry working groups recommended the usage of a standardized, static Credit Adjustment Spread (CAS), estimated as a median value of the difference between the LIBOR and corresponding ARR for different tenors, based on a historical look back period over 5 years' daily data points. Table 4 provides the CAS for USD LIBOR settings migrations to SOFR published by Bloomberg as of March 5, 2021.

The second crucial aspect of the LIBOR transition roadmap required revising valuation analytics for various types of ARR-linked instruments. Thus, yield curves for various ARRs needed to be constructed for both cash flow projection and discounting. These would be the inputs for revaluation of outstanding positions on occurrence of fallback triggers. The accounting and tax implications of the revalued portfolios would be an important consideration for the concerned organization. In this context, effective from March 12, 2020, the Financial Accounting Standards Board (FASB) of US issued guidance to provide temporary (till end-December 2022) respite and exceptions to the treatment of contract modifications and hedge accounting differences arising from the switch from LIBOR to an ARR. However, not all contracts would necessarily benefit from the relief and the extent of modifications could still be substantial enough to impact P&L (E&Y, 2020).

The next step pertained to updating existing internal models, processes and systems for risk management and asset liability management to accommodate transitioning deals and fresh ARR linked transactions. This would require incorporating new data streams of ARRs, computing implied term structures for overnight rates, identifying appropriate hedging instruments to minimize basis risk and accounting for the basis risk of new benchmark rates. The back-testing and stress-testing frameworks for interest rate and liquidity risk would also need to be revised.

Last, but not the least, financial institutions would need to stop issuing new LIBOR contracts after 2021. Thus, they would have to come up with new financial products designed keeping the ARR specifications, market protocols and regulatory expectations in mind and start sensitizing existing and potential customers of the same.

## 6. Conclusion

Admittedly, the LIBOR transition path has not been easy. However, due to the timely and concerted efforts of financial market regulators, industry working groups, policy-makers, standard-setting bodies and exchanges, the global financial markets have started to adjust to a world without LIBOR. These efforts have paid off, both in establishing credible alternative benchmarks and encouraging the off-take of cash and derivative products based on the substitute rates. While work is still on-going for enhancing the basket of robust reference rates that are suitable to all needs of the markets, it now remains for the individual banks and financial institutions to tie-up the loose ends for residual LIBOR deals and complete the adaption of their processes and systems to the new ARR regime.

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**Table 1: Alternative Reference Rates across Major Currencies**

<b>ARR</b>	<b>SOFR</b> <i>(Secured Overnight Financing Rate)</i>	<b>SONIA</b> <i>(Sterling Overnight Index Average)</i>	<b>ESTR</b> <i>(Euro Short Term Rate)</i>	<b>SARON</b> <i>(Swiss Average Rate Overnight)</i>	<b>TONA</b> <i>(Tokyo Overnight Average Rate)</i>
<b>Region</b>	United States	United Kingdom	Europe	Switzerland	Japan
<b>Authority</b>	Federal Reserve Bank of NY	Bank of England	European Central Bank	SIX Swiss Exchange	Bank of Japan
<b>Working Group</b>	Alternative Reference Rates Committee (ARRC)	Working Group on Sterling Risk Free Rates	Working Group on Euro Risk Free Rates	National Working Group on CHF Reference Rates	Study Group on Risk Free Reference Rates
<b>Publication Date</b>	April 2018	March 1997	October 2019	August 2009	December 2016

Source: Author's compilation from Central Bank Websites

**Table 2: Differences between LIBOR and ARRs**

<b>LIBOR</b>	<b>ARR</b>
Interbank wholesale lending rates polled from quotes provided by "High Credit Quality" Banks	Derived from nearly risk-free transactions in robust underlying money markets
Quotes for unsecured funding	Transactions collateralized by risk-free securities like T bills, govt. bonds etc. for SOFR and SARON; unsecured for TONA, ESTR and SONIA
Term LIBORs also quoted for longer tenors	Overnight rates
Set in advance and applied as a simple interest rate	Compounded daily and set in arrears

Source: Author's own compilation

**Table 3: Summary Statistics of USDLIBOR – SOFR Spread (in %) for Different Maturities**

	<b>Overnight</b>	<b>1-Month</b>	<b>2-Month</b>	<b>6-Month</b>
Average	-0.0172	0.1226	0.3290	0.4781
Median	-0.0085	0.0849	0.2058	0.3523
Standard Deviation	0.1276	0.1661	0.2791	0.3239

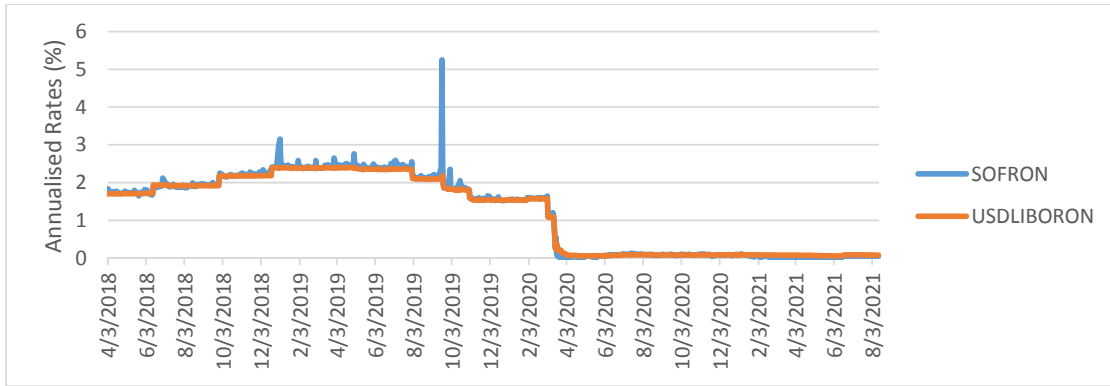
*Source:* Federal Reserve Bank of New York

**Table 4: Static CAS for USD LIBOR Transition to SOFR**

Tenor	CAS (%)
Overnight	0.00644
1-week	0.03839
1-month	0.11448
2-month	0.18456
3-month	0.26161
6-month	0.42826
12-month	0.71513

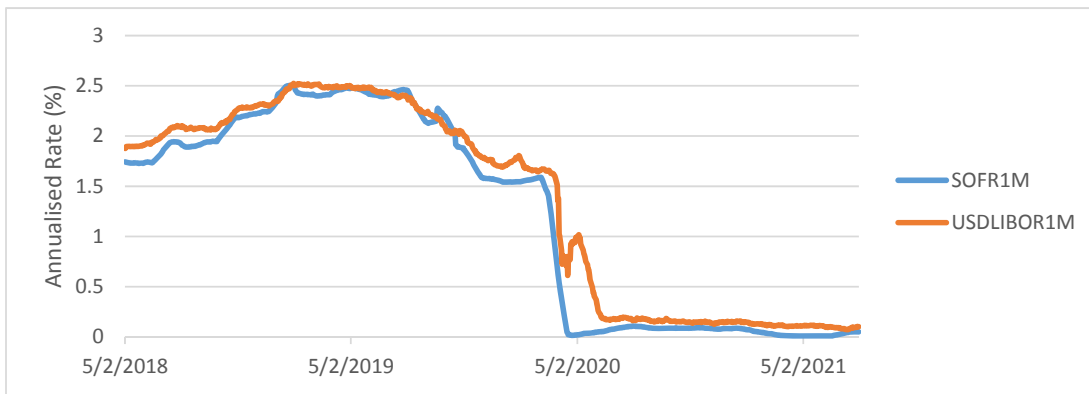
*Source:* Bloomberg

**Figure 1: Overnight SOFR versus Overnight USD Libor**



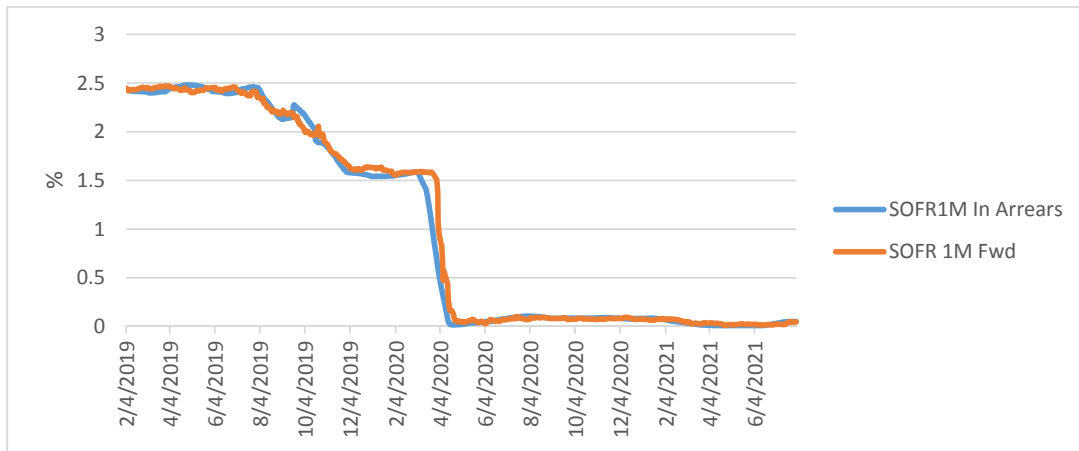
Source: Federal Reserve Bank of New York

**Figure 2: 1-month SOFR (in-arrears) versus 2-month USD Libor**



Source: Federal Reserve Bank of New York

**Figure 3: 1-month SOFR (in-arrears) versus Forward-looking 1-month term SOFR**



Source: New York Fed Reserve and CME