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SOFR Index- A Plausible Tool for Computing the Modified MIFOR Curve in India

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Abstract

Market participants and regulators around the globe have been gearing up for the eventual transition of LIBOR to their preferred alternative risk free rates based on their jurisdiction. In the Indian context, it has become imperative to review the methodology for computing synthetic interest rate curves such as the FBIL MIFOR curve that are linked to LIBOR in light of such transition. Specifically, The FBIL MIFOR is an implied domestic interest rate based on the covered interest rate parity theory and is computed using the USD/INR Forward Premia Rates and the USD London Interbank Offered Rate (LIBOR). The FBIL MIFOR curve is in turn used as a reference rate for pricing/valuation of MIFOR-linked Interest Rate Swap contracts and is often used by market participants in hedging long term cross currency swap contracts undertaken with their clients.

Market participants in India have been deliberating on the appropriate replacement rate to LIBOR for legacy MIFOR linked contracts as well as new contracts that would be linked to MIFOR. Based on initial deliberations, market participants have defined the use of an 'Adjusted MIFOR' which is computed from the Adjusted SOFR (SOFR compounded in Arrears) plus a spread adjustment for legacy contracts.

For new MIFOR-linked contracts, a modified MIFOR rate is being proposed. Market participants have been looking at suitable interest rates such as the Compounded SOFR as well as domestic interest rates. This paper looks at how the SOFR could be used as an alternative to LIBOR in case of new MIFOR-linked contracts. The paper lays down a framework for computing the Modified MIFOR curve using the SOFR Index Published by Federal Reserve. The Compounded SOFR Average Rate implied from the SOFR index is a 'compounded in advance rate'.

JEL Classification: D47, E43, G21, G23, G01
Keywords: Covered Interest Rate Parity, Market Design, Interest rates, Banks, Non-Banks, LIBOR transition, Benchmark rate, MIFOR Curve, Index

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1. INTRODUCTION

Central banks and regulatory bodies across various jurisdictions, have been initiating reforms to transition from LIBOR and move towards a more credible and reliable alternative reference rate, that is rooted in transaction-based data from liquid markets. In case of USD LIBOR, the SOFR has been chosen as an appropriate replacement rate. A comparison of the USD LIBOR with the SOFR, suggest that there are certain adjustments that would need to be taken into account while using the alternative reference rate as a replacement to the LIBOR. First, the LIBOR is a curve polled from the overnight tenor upto 1 year, while the SOFR is an overnight traded rate. Hence a term structure adjustment would be required to align the two rates. The SOFR could be adjusted by either compounding in advance or compounding in arrears. Second, the LIBOR is an unsecured rate that reflects credit risk while the SOFR is a secured rate and is considered as a risk-free/near risk free rate.

In the Indian context, there are various financial products such as external commercial borrowing (ECB) loan that use the LIBOR as a floating interest rate. There are also synthetic products used by market participants that have been built on the LIBOR curve. The FBIL MIFOR curve is one such synthetic interest rate curve and is computed from the FBIL Forward Premia curve and the LIBOR curve. The FBIL MIFOR curve is in turn used as a reference rate for pricing/valuation of MIFOR-linked Interest Rate Swap contracts and is often used by market participants in hedging long term cross currency swap contracts undertaken with their clients.

In line with the LIBOR transition, market participants have been deliberating on the appropriate replacement rate to LIBOR for legacy MIFOR linked contracts as well as new contracts that would be linked to MIFOR. Based on initial deliberations, market participants have defined the use of an 'Adjusted MIFOR' which is computed from the Adjusted SOFR (SOFR compounded in Arrears) plus a spread adjustment for legacy contracts. The Spread Adjustment is computed as a historical median spread with a 5 year look-back period between LIBOR and Adjusted SOFR.

This paper, however, looks at how the SOFR could be used as an alternative to LIBOR in case of new MIFOR-linked contracts. In case of new contracts, a 'Modified MIFOR' rate is proposed without any spread adjustment value to the SOFR. This paper takes a closer look at how the SOFR index published by Federal Reserve Bank of New York could be used in computing the MIFOR curve.

2. Methodology for Modified MIFOR Using SOFR Index

Based on the methodology defined in *Federal Reserve (2020),* the SOFR Index measures the cumulative impact of compounding the SOFR on a unit of investment over time, with the initial value set to 1.00000000 on 02/04/2018 which is the first value date of the SOFR. The SOFR Index value represents the effect of compounding the SOFR on each business day and allows the calculation of compounded SOFR averages over a custom time period. On each business day, the New York Fed publishes the SOFR Index on the New York Fed's website, shortly after the SOFR is published at approximately 8:00 a.m. ET. Specifically, the SOFR Index is calculated as:

$$SOFR\ Index = \begin{cases} 1.00000000, & i = April\ 2, 2018 \\ \prod_{April\ 2,2018}^{i} \left(1 + \frac{SOFR_i \times n_i}{360}\right), & i > April\ 2, 2018 \end{cases} \quad \ldots (1)$$

where:

- $SOFR_i$ = SOFR applicable on business day i
- n_i = number of calendar days for which $SOFR_i$ applies
- i represents a series of ordinal numbers representing each business day in the calculation period

The flexibility of calculating the compounded SOFR average rate over a custom time period from the SOFR index, could serve as an effective tool while computing the Modified MIFOR curve. The Compounded SOFR average rate implied from the SOFR index represents a rate that is compounded in advance. As such, the compounded SOFR rate would be made available as on the MIFOR trade date itself and applicable for the time period of the MIFOR contract.

For example, the 6-month Compounded SOFR average rate as on 03/10/2018, can be computed as follows:

$$Compounded\ SOFR\ Avg.Rate_{03/10/2018} = \left(\frac{SOFR\ Index_{03/10/2018}}{SOFR\ Index_{03/04/2018}} - 1\right) x (360/180\ )\ x\ 100 \quad \ldots(2)$$

$$Compounded\ SOFR\ Avg.Rate_{03/10/2018} = \left(\frac{1.00954731}{1.00005000} - 1\right) x \left(\frac{360}{180}\right)\ x\ 100$$

$$Compounded\ SOFR\ Avg.\ Rate_{03/10/2018} = 1.89937$$

The 6-month Compounded SOFR average rate of 1.89937% as on 03/10/2018 and the 6 month USD/INR Forward Premia rate of 4.3588% with a trade date of 03/10/2018, can then be used to compute the 6 month Modified MIFOR rate for the trade date of

03/10/2018 (with a spot settlement date of 05/10/2018 and a forward settlement date of 05/04/2019) as:

$$Modified\ MIFOR_{03/10/2018}$$

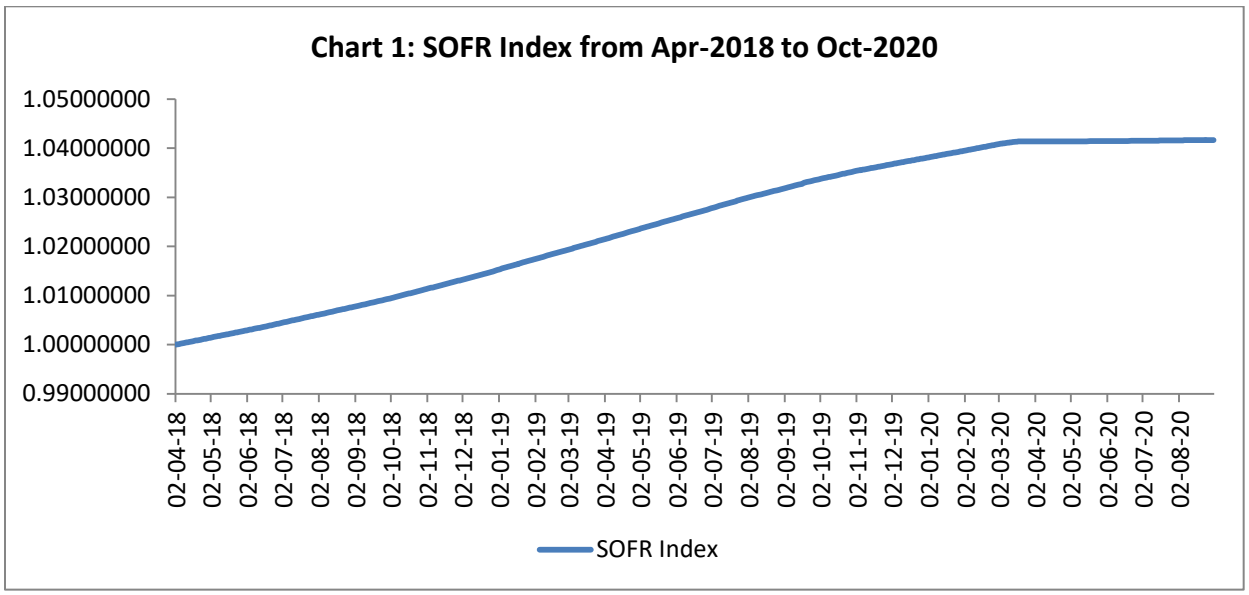
$$=\left[\left(1+Comp.SOFR\ Average\ \times\frac{N}{36000}\right)\times\left(1+Forward\ Premia\ Rate\ \times\frac{N}{36500}\right)-1\right]\ \times\frac{365}{N}$$

$$=\left[\left(1+1.89937\times\frac{05/04/2019\ -05/10/2018}{36000}\right)\times\left(1+4.3588\times\frac{05/04/2019\ -05/10/2018}{36500}\right)-1\right]\ \times\frac{365}{05/04/2019\ -05/10/2018}$$

$$=6.3264\%$$

3. Empirical Results

This section highlights the results of computing the Modified MIFOR curve based on the Compounded SOFR Average rate implied from the SOFR Index. The sample period considered was April 2018 to October 2020. *Chart 1* represents the movement of the SOFR Index since the launch date upto October 2020, while *Chart 2* highlights the tenor-wise Compounded SOFR Average Rates implied from the SOFR index.



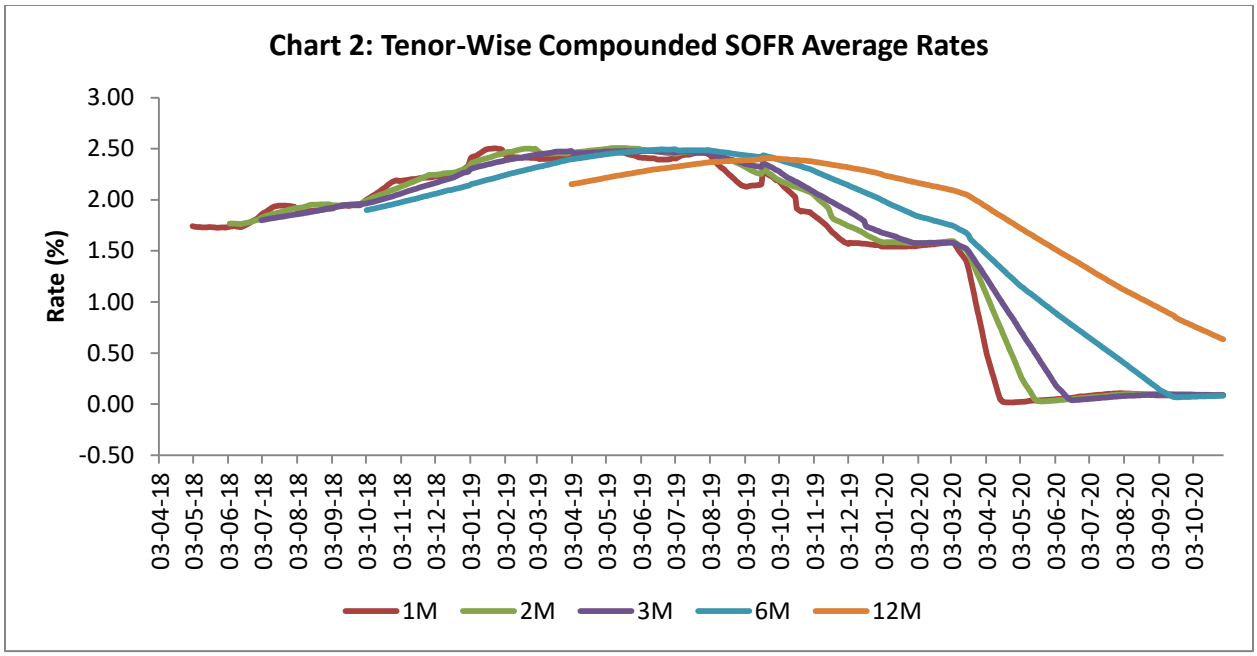


Table 1 highlights the descriptive statistics of the Modified MIFOR rates implied from the Compounded SOFR Average Rate versus the FBIL MIFOR rates.

Table 1: Descriptive Statistics of Modified MIFOR V/s FBIL MIFOR

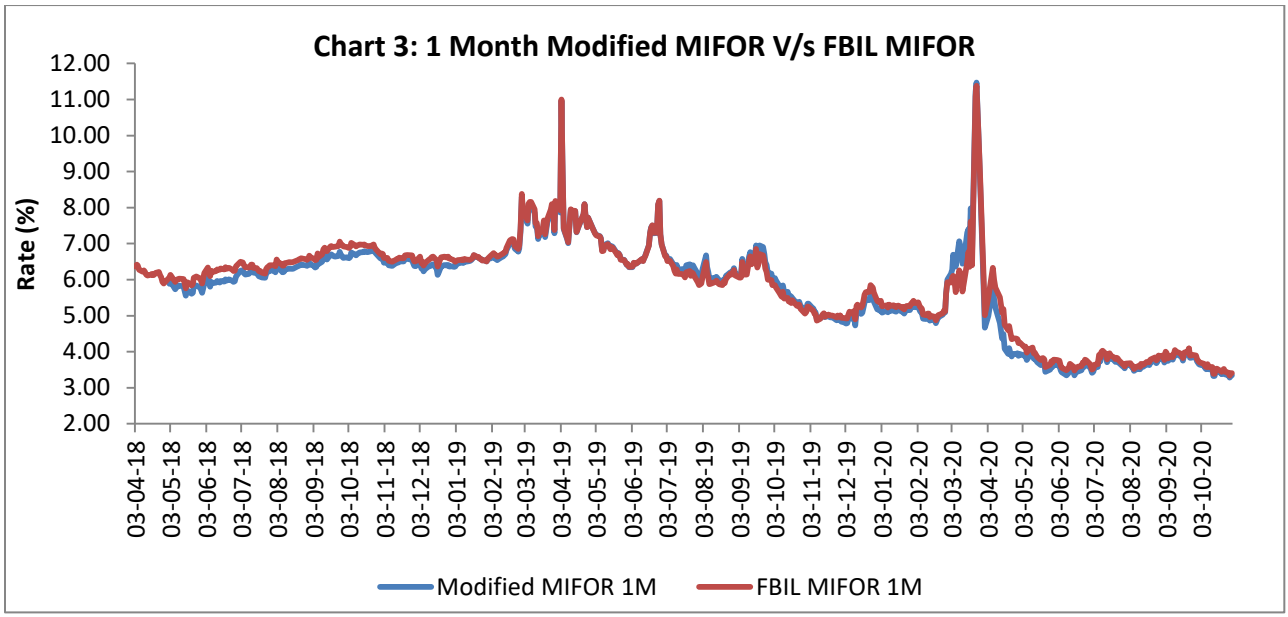
	O/N		1M		2M	
	Modified MIFOR	***FBIL MIFOR***	***Modified MIFOR***	***FBIL MIFOR***	***Modified MIFOR***	***FBIL MIFOR***
Mean	5.6268	5.5942	5.7000	5.7798	5.7300	5.8326
Median	5.8220	5.7816	6.1110	6.1435	6.2037	6.3304
Stdev.	2.0755	2.0536	1.3479	1.3209	1.2337	1.2159
Kurtosis	105.6991	107.1754	0.3652	0.3863	-0.7568	-0.8666
Skewness	7.4548	7.5394	-0.0160	-0.0354	-0.5680	-0.5431
Range	35.6006	35.3371	8.1913	8.0387	5.4626	5.4752
Minimum	2.3802	2.3709	3.2813	3.3395	3.3652	3.4493
Maximum	37.9808	37.7080	11.4725	11.3782	8.8278	8.9245
Count	589	589	608	608	585	585
	3M		**6M**		**12M**	
	Modified MIFOR	***FBIL MIFOR***	***Modified MIFOR***	***FBIL MIFOR***	***Modified MIFOR***	***FBIL MIFOR***
Mean	5.7664	5.9103	5.9018	5.9135	6.1207	5.6967
Median	6.1961	6.3829	6.2829	6.2137	6.3657	6.0180
Stdev.	1.1603	1.1976	0.9851	1.1144	0.6896	0.9615
Kurtosis	-0.7380	-1.0189	-0.7997	-1.2386	-1.1570	-1.5033
Skewness	-0.7627	-0.6539	-0.7985	-0.5316	-0.4316	-0.0527
Range	4.5964	4.6023	3.5498	3.4162	2.6829	3.0053
Minimum	3.4904	3.6186	3.9372	3.9707	4.6807	4.2978
Maximum	8.0868	8.2209	7.4870	7.3869	7.3636	7.3031
Count	565	565	504	504	385	385

Table 2 illustrates the percentage of total trading days when absolute spread of modified MIFOR over FBIL MIFOR was within the threshold criteria. For example, in case of the 6 month tenor, the absolute spread of Modified MIFOR over FBIL MIFOR was within 50 bps to 100 bps for around 20% of the total trading days in the sample period.

Table 2: Percentage of Total Trading Days when Absolute Spread of Modified MIFOR over FBIL MIFOR was within the Threshold Criteria

Threshold Spread in Bps	***O/N***	***1M***	***2M***	***3M***	***6M***	***12M***
0-1 Bps	28.55	4.77	1.54	1.24	0.40	0.26
1-5 Bps	47.85	10.69	4.62	5.31	1.79	1.04
5-10 Bps	14.35	28.45	14.87	6.37	11.11	2.08
10-20 Bps	6.86	33.88	31.79	37.17	17.06	7.53
20-30 Bps	1.28	14.47	31.79	21.77	17.46	6.75
30-50 Bps	0.64	4.28	13.68	14.87	31.75	38.96
50-100 Bps	0.32	3.45	1.71	13.27	20.24	38.96
100-200 Bps	0.00	0.00	0.00	0.00	0.20	4.42
>200 Bps	0.16	0.00	0.00	0.00	0.00	0.00

Charts 3 to *Chart 7* provide a tenor-wise analysis of the Modified MIFOR vis-à-vis the FBIL MIFOR.



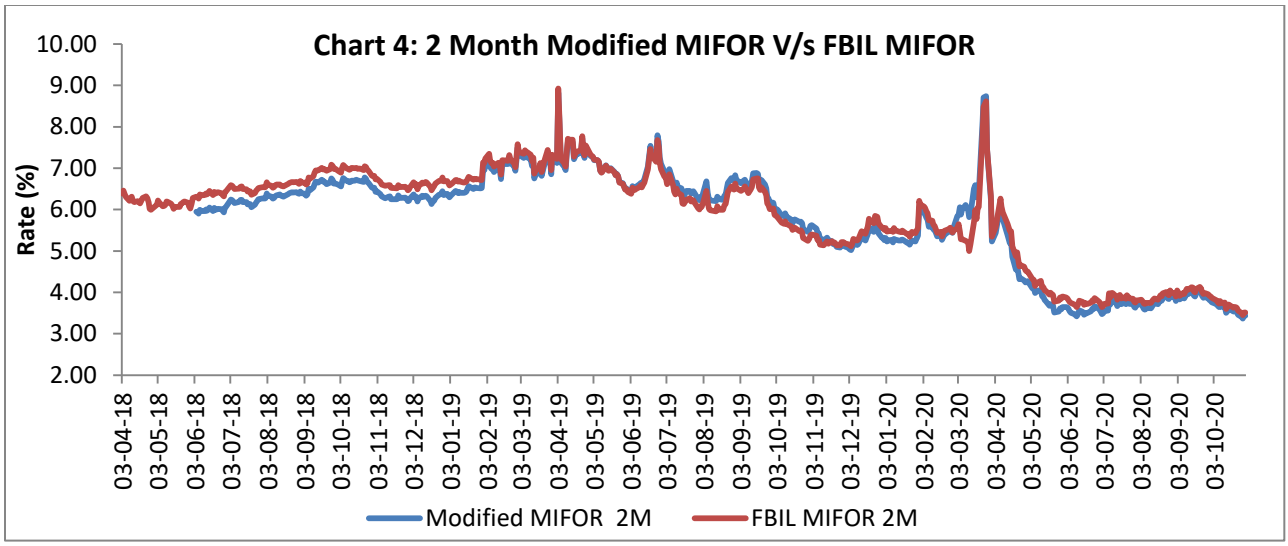


Chart 4: 2 Month Modified MIFOR V/s FBIL MIFOR
Rate (%)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
03-04-18
03-05-18
03-06-18
03-07-18
03-08-18
03-09-18
03-10-18
03-11-18
03-12-18
03-01-19
03-02-19
03-03-19
03-04-19
03-05-19
03-06-19
03-07-19
03-08-19
03-09-19
03-10-19
03-11-19
03-12-19
03-01-20
03-02-20
03-03-20
03-04-20
03-05-20
03-06-20
03-07-20
03-08-20
03-09-20
03-10-20
Modified MIFOR 2M
FBIL MIFOR 2M

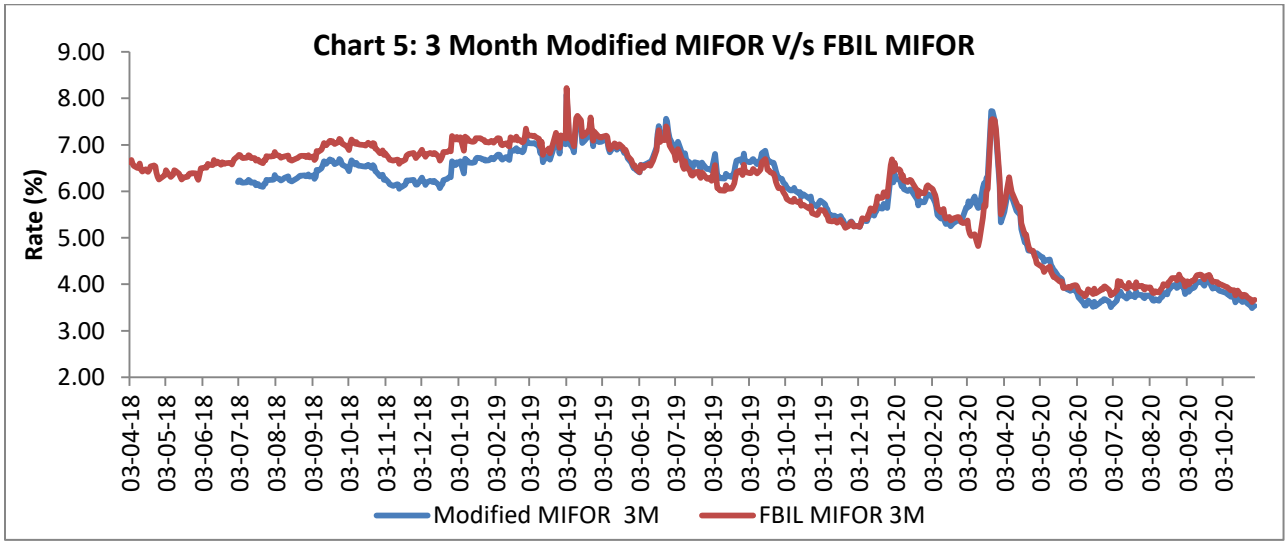


Chart 5: 3 Month Modified MIFOR V/s FBIL MIFOR
Rate (%)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
03-04-18
03-05-18
03-06-18
03-07-18
03-08-18
03-09-18
03-10-18
03-11-18
03-12-18
03-01-19
03-02-19
03-03-19
03-04-19
03-05-19
03-06-19
03-07-19
03-08-19
03-09-19
03-10-19
03-11-19
03-12-19
03-01-20
03-02-20
03-03-20
03-04-20
03-05-20
03-06-20
03-07-20
03-08-20
03-09-20
03-10-20
Modified MIFOR 3M
FBIL MIFOR 3M

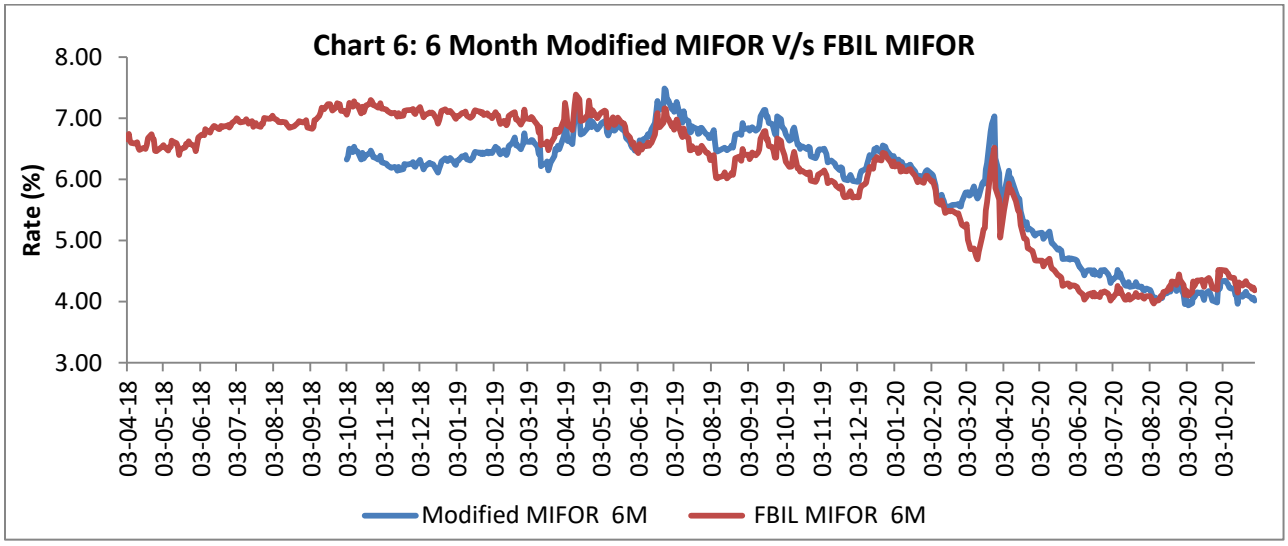
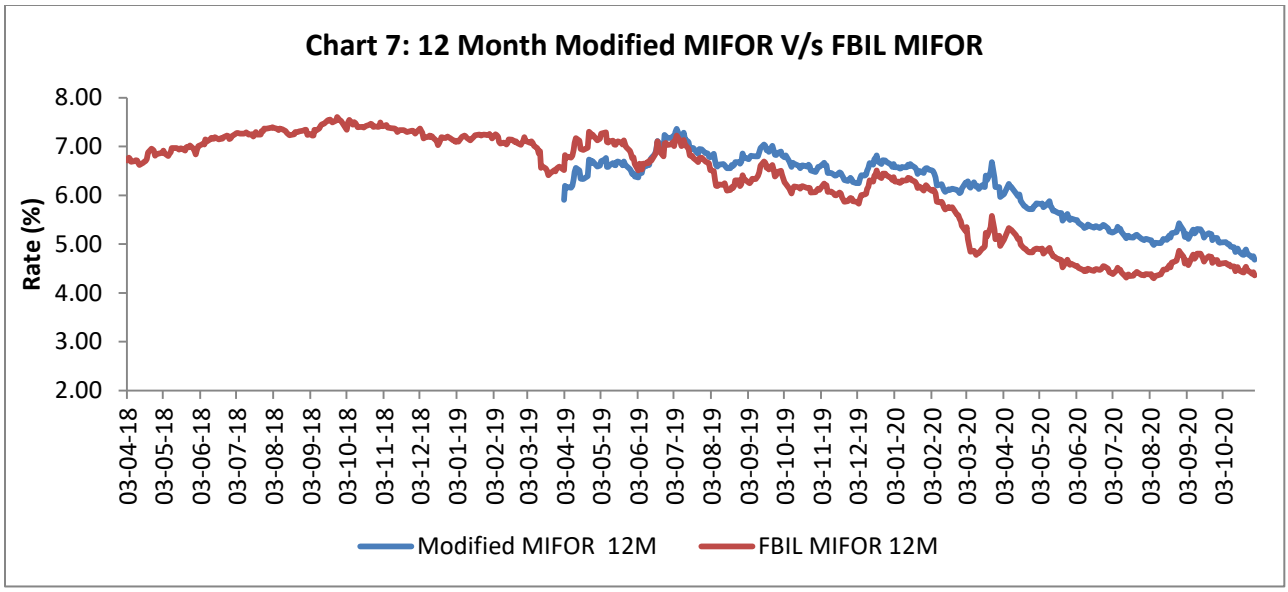


Chart 6: 6 Month Modified MIFOR V/s FBIL MIFOR
Rate (%)
8.00
7.00
6.00
5.00
4.00
3.00
03-04-18
03-05-18
03-06-18
03-07-18
03-08-18
03-09-18
03-10-18
03-11-18
03-12-18
03-01-19
03-02-19
03-03-19
03-04-19
03-05-19
03-06-19
03-07-19
03-08-19
03-09-19
03-10-19
03-11-19
03-12-19
03-01-20
03-02-20
03-03-20
03-04-20
03-05-20
03-06-20
03-07-20
03-08-20
03-09-20
03-10-20
Modified MIFOR 6M
FBIL MIFOR 6M



4. Concluding Remarks

This paper examined how the SOFR could be used as an alternative to LIBOR in case of new MIFOR-linked contracts. The paper put in place a framework for computing the Modified MIFOR curve using the SOFR Index Published by Federal Reserve. Specifically, a Compounded SOFR Average Rate was implied from the SOFR index to arrive at a 'compounded in advance rate'. The Compounded SOFR Average Rate was used along with the USD/INR FBIL Forward Premia curve to compute the Modified MIFOR Curve.

In the global landscape, other markets such as Singapore and Thailand, have also considered the use of a domestic interest as a possible long term solution, following the cessation of LIBOR. These issues remain a notable area for future research work in the Indian context.

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