FBIL ADJUSTED MUMBAI INTERBANK FORWARD OUTRIGHT RATE (MIFOR) CURVE

FINANCIAL BENCHMARKS INDIA PVT LTD.

Methodology Document For FBIL Adjusted MIFOR Curve

29th October 2020

DRAFT Version 2
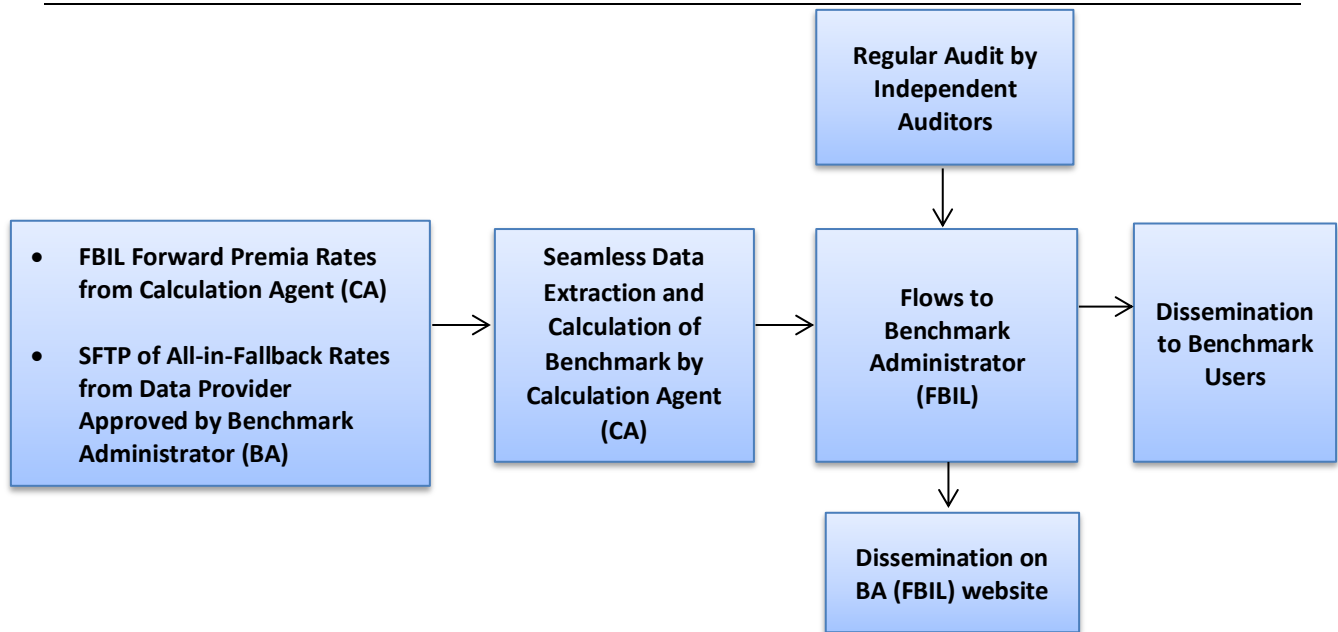
Overview

The FBIL MIFOR Curve is an implied Rupee interest rate curve derived from the FBIL Forward Premia Curve and the USD LIBOR curve and is being published by FBIL since April 2018. It is computed for 6 tenors, viz. the Overnight, 1 month, 2 month, 3 month, 6 month and 12 month.

In light of the permanent cessation of LIBOR by the end of 2021, this methodology document details the computation of FBIL MIFOR Curve following the LIBOR cessation date. After the cessation of LIBOR, the FBIL MIFOR Curve would be replaced by the FBIL Adjusted MIFOR Curve and is applicable for legacy contracts. The FBIL Adjusted MIFOR Curve will be computed using the All-in Fallback Rate to the USD LIBOR curve and the FBIL Forward Premia Curve.

The All-in Fallback Rate, which will be published by Bloomberg, is computed as sum of the Adjusted SOFR and the Spread Adjustment. The Adjusted SOFR, is the overnight SOFR compounded in arrears for the applicable tenor using the methodology defined in the Bloomberg's IBOR Fallback Rate Adjustments Rule Book. The Spread Adjustment value is a historical median spread between the LIBOR and Adjusted SOFR for a 5-year lookback period using the methodology defined in the Bloomberg IBOR Fallback Rate Adjustment Rule Book.

The FBIL Forward Premia Curve is a transaction based benchmark that is computed from the Cash-Tom and Spot-Forward forex swap transactions which are reported to the Clearing Corporation of India (CCIL) for settlement. Specifically, the MIFOR is calculated based on the FBIL forward premia rates and All-in Fallback rates.

Structure

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┌──────────────────────┐         ┌──────────────────────┐         ┌─────────────────────┐         ┌──────────────────┐
│ • FBIL Forward Premia │         │   Seamless Data      │         │   Regular Audit by  │         │                  │
│   Rates from          │         │   Extraction and     │         │    Independent      │         │                  │
│   Calculation Agent   │         │   Calculation of     │         │     Auditors        │         │                  │
│   (CA)                │   →     │   Benchmark by       │   →     └─────────────────────┘         │                  │
│                       │         │   Calculation Agent  │                    ↓                     │                  │
│ • SFTP of All-in-     │         │   (CA)               │         ┌─────────────────────┐   →     │  Dissemination   │
│   Fallback Rates from │         │                      │         │   Flows to          │         │  to Benchmark    │
│   Data Provider       │         │                      │         │   Benchmark         │         │  Users           │
│   Approved by         │         │                      │         │   Administrator     │         │                  │
│   Benchmark           │         │                      │         │   (FBIL)            │         │                  │
│   Administrator (BA)  │         │                      │         │                     │         │                  │
└──────────────────────┘         └──────────────────────┘         └─────────────────────┘         └──────────────────┘
                                                                             ↓
                                                                  ┌─────────────────────┐
                                                                  │  Dissemination on   │
                                                                  │  BA (FBIL) website  │
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Key Features of the Calculation

- The FBIL Adjusted MIFOR Curve will replace the FBIL MIFOR curve for legacy contracts.
- The FBIL Adjusted MIFOR Curve would be computed using the FBIL Forward Premia Curve and the All-in Fallback Rate published by Bloomberg.
- The FBIL Forward Premia Curve is a transaction based benchmark computed from swap pairs of Cash-Tom and Spot-Forward trades reported to CCIL for settlement.
- The All-in Fallback Rate consists of two components, namely, the Adjusted SOFR and the Spread Adjustment Value.
- The Adjusted SOFR, is the overnight SOFR compounded in arrears for the applicable tenor using the methodology as defined in the Bloomberg's IBOR Fallback Rate Adjustments Rule Book. The Spread Adjustment value is a historical median spread between the LIBOR and Adjusted SOFR for a 5-year lookback period using the methodology defined in the Bloomberg IBOR Fallback Rate Adjustment Rule Book.
- Since the All-in Fallback Rate is computed and published in arrears, the FBIL Adjusted MIFOR Curve for the relevant tenors would also be published in arrears.

Detailed Methodology

1. The FBIL Adjusted MIFOR for the applicable tenors will be published in arrears, following the publication of the relevant All-in Fallback Rate by Bloomberg. The FBIL Adjusted MIFOR will be published in arrears for each Original Rate Record Date, such that the Trade Date of the FBIL Forward Premia Rate would be mapped to a unique Original Rate Record Day for the relevant tenor.

2. In case of the Overnight tenor, the Adjusted MIFOR is estimated from the Overnight rate of FBIL Forward Premia Curve (%) and the All-in Fallback Rate to the USD LIBOR for the overnight tenor, as defined in the Bloomberg's IBOR Fallback Rate Adjustments Rule Book.

   As an example, the Overnight Adjusted MIFOR for the 27/01/2020 can be computed as:

   $$\text{O/N Adjusted MIFOR}_{27/01/20}$$
   $$= \left[\left(1 + \text{All in Fallback Rate} \times \frac{N}{36000}\right) \times \left(1 + \text{O/N Forward Premia Rate} \times \frac{N}{36500}\right) - 1\right] \times \frac{365}{N}$$

   where

   - All in Fallback Rate is for the Rate Record Date of 27/01/20 and Fallback Observation Date of 27/01/20 as published by Bloomberg.
   - O/N Forward Premia Rate is for the Cash Date of 27/01/20 and a Tom Date of 28/01/20.
   - N is the number of days from Tom Date to Cash Date.

3. The Adjusted MIFOR for tenors of 1 month, 2 months, 3 months, 6 months and 12 months are estimated using the computed US Dollar/Rupee forward premia (%) and the All-in Fallback Rate to the USD LIBOR, as defined in the Bloomberg's IBOR Fallback Rate Adjustments Rule Book, for the respective tenors using the equation (2) below.

   For the purpose of illustration, the time line for the computation of the 1-Month Adjusted MIFOR for the Trade Date of 27/01/2020 is provided in Annexure 1 and can be computed as follows:

   $$\text{MIFOR}_{27/01/20} = \left[\left(1 + \text{All in Fallback Rate}^1 \times \frac{N}{36000}\right) \times \left(1 + \text{FBIL Forward Premia Rate} \times \frac{N}{36500}\right) - 1\right] \times \frac{365}{N}$$

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[1] All in Fallback Rate would be replacing the erstwhile LIBOR

$$MIFOR_{27/01/20} = \left[\left(1 + 1.67969 \times \frac{28/02/20 - 29/01/20}{36000}\right) \times \left(1 + 3.5843 \times \frac{28/02/20 - 29/01/20}{36500}\right) - 1\right] \times \frac{365}{28/02/20 - 29/01/20}$$

$$= 5.2923\%$$

where

- All in Fallback Rate is for the Rate Record Date of 27/01/20 and Fallback Observation Date of 27/02/20 as published by Bloomberg.
- FBIL Forward Premia Rate is for the Trade Date of 27/01/20 having a Spot Date of 29/01/20 and Settlement Date of 28/02/20.
- N is the number of days from Forward Premia Settlement Date to Spot Date

4. The FBIL MIFOR for a given tenor will be published subject to the availability of the All-in Fallback rate by Bloomberg for a given Rate Record Date.

5. In case the fallback mechanism is triggered for FBIL Forward Premia Curve and the said Curve (% and Rupee premia) is repeated, the FBIL Adjusted MIFOR Curve would be computed using the repeated FBIL Forward Premia Curve but with the All-in Fallback Rate published for the day for the respective tenor.

6. In case the Rate Record Date falls on a USD Holiday, the O/N Adjusted MIFOR will not be disseminated, as the O/N FBIL Forward Premia would not published on that day. For tenors from 1 month to 12 month, the forward premia rates would be published for the respective tenors with the Trade Date of Forward Premia being the same as the Rate Record Date of the All-in Fallback Rate. The All-in Fallback Rates for such tenors if published by Bloomberg for the associated Rate Record Dates would be used in the Adjusted MIFOR computation (Illustration in Annexure 2 (a)).

7. In case the Rate Record Date falls on an INR holiday, then there will be no dissemination of the Adjusted MIFOR for that tenor on that day (Illustration in Annexure 2 (b)).

8. In case the Calculation Date of the All-in Fallback Rate is either a USD holiday, Saturday or Sunday, the All-in Fallback Rate corresponding to that day would be released by Bloomberg on the following USD business day. Hence, for such days, the Adjusted MIFOR would be calculated after the Fallback rates are released on the following USD business day. In such a scenario, the Adjusted MIFOR for multiple Rate Record Date for a specific tenor may be calculated and published on a unique Calculation Date (Illustration in Annexure 2 (c)).

9. In case the Calculation Date of the All-in Fallback Rate falls on an INR holiday, the Adjusted MIFOR would not be published on that day. However, both the All-in Fallback rate and the

FBIL Forward Premia corresponding to the Rate Record Dates for the tenors would be available. Therefore, the Adjusted MIFOR calculated for such days would be disseminated on the following INR business day (Illustration in Annexure 2 (d)).

10. All computations are rounded off at each stage to 4 decimal places.

Publication of FBIL Adjusted MIFOR Curve

Currently the Federal Reserve publishes the SOFR next day at 8 am EST. Bloomberg will publish the fallbacks within 45 minutes thereafter under normal circumstances. The Adjusted MIFOR Curve publication time would be 45 minute after the data on rates for all tenors is made available by Bloomberg, which is at around 19:00 IST. Annexure 3 gives the format for website display of the Adjusted MIFOR Curve.

Given that the Federal Reserve has a restatement window of 6.5 hours, there could be a revision of the SOFR rate, which would be published by 2.30 PM EST. Bloomberg will similarly publish the restated fallbacks within 45 minutes of that announcement. In case of revision of the SOFR rates at around 2.30 PM EST and subsequent updation of rate by Bloomberg, the revised Adjusted MIFOR Curve would be published on the next business day at around 13:30 IST. The Re-fix for Adjusted MIFOR will take place only if the difference in the revised rate and the published rate is 5 basis points or more.

The publication time would be suitably adjusted in case of changes in Daylight Savings.

Reference:

1. Issues and Challenges in Computation of Benchmark Forward Premia and MIFOR Curve by Golaka C. Nath, Sahana Rajaram and Manoel Pacheco, Rakshitra, April 2018. https://www.ccilindia.com/Research/CCILPublications/Lists/lstRakshitraArticles/Attachments/203/REvised_article.pdf
2. Bloomberg IBOR Fallback Rate Adjustments Rule Book (last updated 22 April 2020)
3. Impact of LIBOR Transition on MIFOR Benchmark (Version 2) by Golaka C Nath, Vardhana Pawaskar & Manoel Pacheco. CCIL Working Paper Series. WP/011, 22 September 2020. https://www.ccilindia.com/Research/Lists/CCILKnowledgeCenter/Attachments/49/WP011_Impact%20of%20LIBOR%20transition%20on%20MIFOR%20Benchmark_Version_2.pdf

Abbreviations

- BA-Benchmark Administrator
- CA-Calculation Agent
- CCIL-The Clearing Corporation of India Ltd.
- FBIL- Financial Benchmarks India Limited
- INR- Indian Rupee
- LIBOR-London Interbank Offered Rate
- MIFOR-Mumbai Inter-Bank Forward Outright Rate
- O/N- Overnight
- USD- United States Dollar

Annexure 1: Timeline for Computation of 1- month FBIL Adjusted MIFOR with a Trade Date of 27-01-20

Table 1, highlights the application of the 1 month All-in Fallback Rate in the computation of the 1 month FBIL MIFOR for the trade date of 27-01-2020. The FBIL Forward Premia rate for the trade date of 27-01-20 would be published on 27-01-20 itself. The 1-month All-in Fallback Rate for the Rate Record Date of 27-01-20 would be known and published at the end of the Accrual period viz. 27-02-20. Accordingly, the 1-month FBIL adjusted MIFOR for 27-01-20 would be published on 27-02-20.

Table 1: Timeline for Computation of 1- month FBIL Adjusted MIFOR with a Trade Date of 27-01-20												
Date	**27-01-20**	**28-01-20**	**29-01-20**	**30-01-20**	**31-01-20**	**. . .**	**26-02-20**	**27-02-20**	**28-02-20**	**29-02-20**	**01-03-20**	**02-03-20**
Day	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**. . .**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**	**Mon**
All-in Fallback Rate	LIBOR Rate Record Date / Accrual Start Date / Offset Lag of 2 Business Days		Accrual Spot Date			**. . .**		Accrual End Date / All in Fallback Calculation Date				Payment Date
FBIL Forward Premia Rate	Trade Date		Spot Value Date			**. . .**			1 month Settlement Date			
FBIL MIFOR	Trade Date		Spot Value Date			**. . .**		**1-month MIFOR Publication Date for a Trade Date of 27-01-20**	1 month Settlement Date			

Annexure 2: Holiday Considerations in Adjusted MIFOR Curve Computation

a) **Rate Record Date falling on USD Holiday** – In case the Rate Record Date falls on a US holiday, the O/N Adjusted MIFOR is not disseminated, as the O/N Forward Premia is not available on that day. For tenors from 1 month to 12 month, the forward premia rates would be published for the respective tenors with the Trade Date of Forward Premia being the same as the Rate Record Date of the Fallback Rate (Table 2). The fallback rates for such tenors published by Bloomberg for the associated Rate Record Date would be used in the Adjusted MIFOR computation.

Tenor	Bloomberg Calculation Date	Rate Record Date	Adjusted MIFOR Publication
O/N	07-09-20	07-09-20	There would be no dissemination of O/N MIFOR as the Overnight USD/INR Forward Premia would not be published.[2]
1M	05-10-20	07-09-20	Adjusted MIFOR will be calculated and disseminated on 05-10-20. It will be computed from: • 1M forward premia with a Trade Date of 07-09-20. • 1M Fallback Rate having a Rate Record Date of 07-09-20 and calculated on 05-10-20.

Table 2: Rate Record Date Falling on a USD Holiday: 07-09-2020 (Labour Day US Holiday)

b) **Rate Record Date falling on INR Holiday:** In case the Rate Record Date falls on an INR holiday, then there will be no dissemination of the Adjusted MIFOR for that tenor on that day. For Example, for all tenors having their Rate Record Date as 07-05-2020 which is an INR holiday (Buddha Purnima Holiday), there will be no dissemination of Adjusted MIFOR as the corresponding FBIL Forward Premia Rate will not be available as indicated in Table 3.

Table 3: Rate Record Date Falling on an INR Holiday-07-05-2020 (Buddha Purnima INR Holiday)

Tenor	Bloomberg Calculation Date	Rate Record Date	Adjusted MIFOR Publication
O/N	07-05-20	07-05-20	
1M	08-06-20	07-05-20	No dissemination of Adjusted MIFOR as the FBIL Forward Premia Rates for the Trade Date of 07-05-20 would not be published.
2M	07-07-20	07-05-20	
3M	07-08-20	07-05-20	

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[2] There would be no dissemination of O/N MIFOR on the US business day prior to the US holiday as well, due to non-availability of the Overnight USD/INR Forward Premia.[2]

c) **Calculation Dates falling on USD Holiday/Saturday/Sunday:** In case the Calculation Date of the All-in Fallback Rate is either a USD holiday, Saturday or Sunday, the All-in Fallback Rate corresponding to that day would be released by Bloomberg on the following USD business day. Hence, for such days, the Adjusted MIFOR would be calculated after the Fallback rates are released on the following USD business day. In such a scenario, the Adjusted MIFOR for multiple Rate Record Dates for a specific tenor may be calculated and published on a unique Calculation Date. For example, in case of the 1-month tenor, the All-in Fallback Rates for the Record Dates of 05-08-20, 06-08-20 and 07-08-20 would be calculated and disseminated on a Calculation Date of 08-09-20 as 05-09-20 is a Saturday, 06-09-20 is a Sunday and 07-09-20 is a Labour Day US Holiday. The Adjusted MIFOR for the 1 month tenor would be disseminated on 08-09-2020 for multiple Rate Record Dates, as indicated in Table 4.

Table 4: Calculation Date Falling on an USD Holiday/Saturday/Sunday				
Tenor	**Bloomberg Calculation Date**	**Rate Record Date**	**Rate Record Day**	**Adjusted MIFOR Publication**
1M	08-09-20	05-08-20	Saturday	The Adjusted MIFOR for the 1 month tenor would be disseminated on 08-09-20 for multiple Rate Record Dates.
1M	08-09-20	06-08-20	Sunday	
1M	08-09-20	07-08-20	Monday	

The tenor-wise rates for Adjusted MIFOR disseminated as on 08-09-2020 is depicted in Table 5. Each tenor would have multiple Rate Record Dates and hence multiple rates for Adjusted MIFOR corresponding to each Rate Record Date, disseminated on the same Calculation Date.

Table 5: Calculation Date Falling on an USD Holiday/Saturday/Sunday			
Tenor	**Bloomberg Calculation Date**	**Rate Record Date**	**Adjusted MIFOR Publication**
O/N	08-09-20	08-09-20	The O/N Adjusted MIFOR for 08-09-20 would be disseminated on 08-09-20.
1M	08-09-20	05-08-20	The 1 month Adjusted MIFOR for 05-08-20, 06-08-20 and 07-08-20 would be disseminated on 08-09-20.
1M	08-09-20	06-08-20	
1M	08-09-20	07-08-20	
2M	08-09-20	06-07-20	The 2 month Adjusted MIFOR for 06-07-20, 07-07-20 and 08-07-20 would be disseminated on 08-09-20.
2M	08-09-20	07-07-20	
2M	08-09-20	08-07-20	
3M	08-09-20	05-06-20	The 3 month Adjusted MIFOR for 05-06-20 and 08-06-20 would be disseminated on 08-09-20.
3M	08-09-20	08-06-20	
6M	08-09-20	05-03-20	The 6 month Adjusted MIFOR for 05-03-20 and 06-03-20 would be disseminated on 08-09-20.
6M	08-09-20	06-03-20	
12M	08-09-20	05-09-19	The 12 month Adjusted MIFOR for 05-09-19 and 06-09-20 would be disseminated on 08-09-20.
12M	08-09-20	06-09-19	

Calculation Dates falling on INR Holiday: In case the Calculation Date of the All-in Fallback Rate falls on an INR holiday, the Adjusted MIFOR would not be published on that day. However, both the All-in Fallback rate and the FBIL Forward Premia corresponding to the Rate Record Dates for the tenors would be available. Therefore, the Adjusted MIFOR calculated for such days would be disseminated on the following INR business day. For example, the Adjusted MIFOR would not be disseminated on 02-10-20 (Friday) as it is an INR holiday. However, the Fallback rate and the Forward Premia corresponding to the Rate Record date for 02-10-20 for the various tenors are available. Hence, the Adjusted MIFOR for 02-10-20 would be released on the next business day i.e. 05-10-2020 as shown in Table 6. (Note: 03-10-20 and 04-10-20 are Saturday and Sunday respectively.)

Table 6: Calculation Date falling on an INR Holiday –Dissemination Date as on 05-Oct-2020				
Tenor	**Bloomberg Calculation Date**	**Rate Record Date**	**Rate Record Day**	**Adjusted MIFOR Publication**
O/N	05-Oct-20	05-Oct-20	Monday	The O/N Adjusted MIFOR for 05-10-20 would be disseminated on 05-10-20.
1M	**02-Oct-20**	**02-Sep-20**	**Wednesday**	The 1 month Adjusted MIFOR for 02-09-20, 03-09-20, 04-09-20 and 07-09-20 would be disseminated on 05-10-20.
1M	05-Oct-20	03-Sep-20	Thursday	
1M	05-Oct-20	04-Sep-20	Friday	
1M	05-Oct-20	07-Sep-20	Monday	
2M	05-Oct-20	03-Aug-20	Monday	The 2 month Adjusted MIFOR for 03-08-20, 04-08-20 and 05-08-20 would be disseminated on 05-10-20.
2M	05-Oct-20	04-Aug-20	Tuesday	
2M	05-Oct-20	05-Aug-20	Wednesday	
3M	**02-Oct-20**	**02-Jul-20**	**Thursday**	The 3 month Adjusted MIFOR for 02-07-20 and 03-07-20 would be disseminated on 05-10-20.
3M	**02-Oct-20**	**03-Jul-20**	**Friday**	
6M	**02-Oct-20**	**02-Apr-20**	**Thursday**	The 6 month Adjusted MIFOR for 02-04-20 and 03-04-20 would be disseminated on 05-10-20.
6M	05-Oct-20	03-Apr-20	Friday	
12M	**02-Oct-20**	**02-Oct-19**	**Wednesday**	The 12 month Adjusted MIFOR for 02-10-19 03-10-19 and 04-10-19 would be disseminated on 05-10-20.
12M	05-Oct-20	03-Oct-19	Thursday	
12M	05-Oct-20	04-Oct-19	Friday	
--Figures in bold indicate that the Calculation Date falls on an INR Holiday. -- Based on the data taken from Bloomberg, it is observed that the Fallback Rate having a Rate Record Date of 07-09-2020 had a Calculation Date of 05-10-2020. --Further clarification is sought from Bloomberg as to why the Calculation Date was 05-10-2020 and not of 07-10-2020 for Rate Record date of 07-09-2020.				

d) ***Adjusted MIFOR Calculations Falling on LIBOR Holidays***: In case of a LIBOR holiday, the Adjusted MIFOR would be published on that day if it is not a US Holiday. In such cases the Fallback Rate for a Rate Record Date falling on the LIBOR Holiday is being computed by Bloomberg as on the Calculation Date at the end of the Accrual period. Accordingly, the Adjusted MIFOR would be published on the said Calculation Date using the Fallback rate. The Forward Premia Rate as published on the Rate Record Date would be used. For example, 31-08-20 is a LIBOR Holiday (Summer Bank Holiday) but is a US Business Day. The 1 month Adjusted MIFOR for 31-08-20 would be published on 30-09-20 using the Fallback Rate having a Rate Record Date of 31-08-20.

Annexure 3: Website Display of Adjusted MIFOR Curve

Adjusted MIFOR As of Calculation Date: dd-mmm-yyyy				
Rate Record Date	**Time**	**Tenor**	**Settlement Date**	**FBIL MIFOR (%)**
dd-mmm-yyyy	7:00:00 PM	O/N	dd-mmm-yyyy	6.1151
dd-mmm-yyyy	7:00:00 PM	1M	dd-mmm-yyyy	6.4477
dd-mmm-yyyy	7:00:00 PM	2M	dd-mmm-yyyy	6.8353
dd-mmm-yyyy	7:00:00 PM	3M	dd-mmm-yyyy	6.6543
dd-mmm-yyyy	7:00:00 PM	6M	dd-mmm-yyyy	6.5463
dd-mmm-yyyy	7:00:00 PM	12M	dd-mmm-yyyy	6.7062

* Rate record date is the Trade Date for the corresponding All-in-Fallback rate for a given tenor

*Settlement date follows modified following day convention