

FINANCIAL BENCHMARKS INDIA PVT LTD.

FBIL MODIFIED MUMBAI INTERBANK FORWARD OUTRIGHT RATE (MODIFIED MIFOR) CURVE

Methodology Document

October 22, 2021

Version 2

Overview

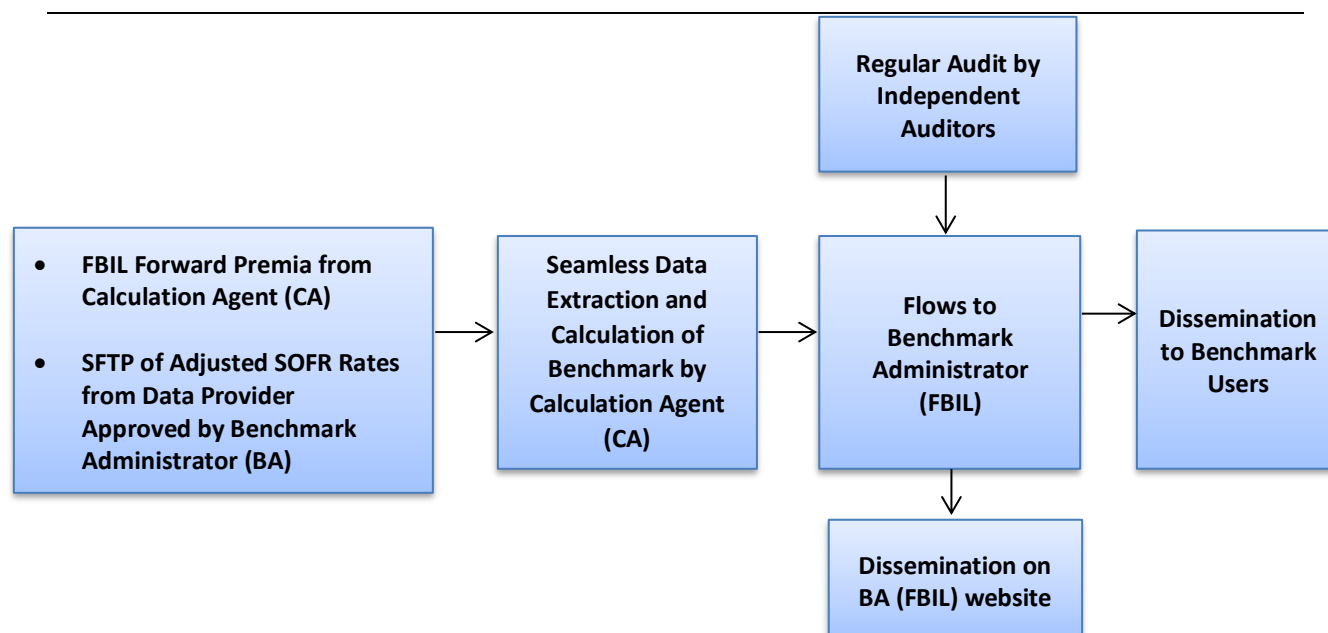
The FBIL MIFOR Curve is an implied Rupee interest rate curve derived from the FBIL Forward Premia Curve and the USD LIBOR curve and is being published by FBIL since April, 2018. It is computed for 6 tenors, viz. the Overnight, 1-month, 2- month, 3-month, 6-month and 12-month. The cessation of publication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

In this context, the Work Stream set up by Indian Banks Association (IBA) has recommended the development of Modified MIFOR which may be used by the market participants in new transactions/ contracts upon the cessation of MIFOR.

Accordingly, it has been decided that the FBIL Modified MIFOR Curve will be computed using the Adjusted SOFR rate and the FBIL Forward Premia rate.

The Adjusted SOFR compounded in arrears for various tenors is obtained from the Bloomberg Index Services Ltd. (BISL). The FBIL Forward Premia Curve is a transaction-based benchmark that is computed from the USD/INR Cash-Tom and Spot-Forward trades which are reported to the Clearing Corporation of India (CCIL) for settlement. The methodology for computation of the forward premia curve is placed on the FBIL website www.fbil.org.in.

Structure



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Key Features of the Calculation

- The FBIL Modified MIFOR Curve will replace the FBIL MIFOR curve for new contracts.
- The FBIL Modified MIFOR Curve would be computed by combining the FBIL Forward Premia Curve published by the FBIL and the Adjusted SOFR Rate published by the BISL.
- The FBIL Forward Premia Curve is a transaction-based benchmark computed from swap pairs of USD/INR Cash-Tom and Spot-Forward trades reported to CCIL for settlement and published at 4.45 PM (or at the time notified by FBIL) on all Mumbai Business Days on the FBIL Website www.fbil.org.in.
- The Adjusted SOFR, is the overnight SOFR compounded in arrears for the applicable tenor using the methodology approved by the Benchmark Administrator.
- Since the Adjusted SOFR is published in arrears, the FBIL Modified MIFOR Curve for the relevant tenors, to be published by FBIL would also be in arrears.

Detailed Methodology

1. The FBIL Modified MIFOR for the applicable tenors will be rates in arrears, following the publication of the relevant Adjusted SOFR rates by the Bloomberg Index Services Ltd. (BISL). FBIL will publish Modified MIFOR in arrears for each Original Rate Record Date, such that the Trade Date of the FBIL Forward Premia Rate will be mapped to a unique Original Rate Record Day for the relevant tenor.
2. In case of the Overnight tenor, the Modified MIFOR is estimated from the Overnight rate of FBIL Forward Premia Curve (%) and the Adjusted SOFR rate for the overnight tenor, using Equation 1 below:

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

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

... (1)

where

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- Adjusted SOFR is for the Rate Record Date of 27/01/20 and Calculation Date of 27/01/20.
 - O/N Forward Premia (%) 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 Modified 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 Adjusted SOFR, for the respective tenors using the equation (2) below:

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

$$\text{Modified MIFOR} = \left[\left(1 + \text{Adjusted SOFR} \times \frac{N}{36000} \right) \times \left(1 + \text{FBIL Forward Premia}(\%) \times \frac{N}{36500} \right) - 1 \right] \times \frac{365}{N} \quad \dots(2)$$

$$\text{Modified MIFOR}_{27/01/20} = \left[\left(1 + 1.58101 \times \frac{28/02/20 - 29/01/20}{36000} \right) \times \left(1 + 3.5843 \times \frac{28/02/20 - 29/01/20}{36500} \right) - 1 \right] \times \frac{365}{28/02/20 - 29/01/20} = 5.1920\%$$

where

- Adjusted SOFR is for the Rate Record Date of 27/01/20 and the Calculation Date of 27/02/20. For the Rate Record Date of 27/01/20, the 1-month Adjusted SOFR published by BSL is 1.58101
 - FBIL Forward Premia(%) is for the Trade Date of 27/01/20 having a Spot Date of 29/01/20 and Settlement Date of 28/02/20. For the Trade Date of 27/01/20, the 1-month FBIL Forward Premia published by FBIL is 3.5843%.
 - N is the number of days from Forward Premia Settlement Date to Spot Date.
4. The FBIL Modified MIFOR for a given tenor will be published subject to the availability of the Adjusted SOFR 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/discount) is repeated, the FBIL Modified MIFOR Curve would be computed using the repeated FBIL Forward Premia Curve but with the Adjusted SOFR published for the day for the respective tenor.

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6. In case of non-availability of the Adjusted SOFR for a given Rate Record Date due to unforeseen reasons, the latest available Adjusted SOFR would be repeated.
7. In case the Rate Record Date falls on a US Holiday, the O/N Modified MIFOR will not be disseminated, as the O/N FBIL Forward Premia will not be published on that day. For tenors from 1 month to 12 months, the forward premia (%) will be published for the respective tenors with the Trade Date of Forward Premia being the same as the Rate Record Date of the Adjusted SOFR. The Adjusted SOFR for such tenors if published by Bloomberg Index Services Ltd. (BISL) for the associated Rate Record Dates will be used in the Modified MIFOR computation (Illustration in Annexure 2 (a)).
8. In case the Rate Record Date falls on an India holiday, then there will be no dissemination of the Modified MIFOR for that tenor on that day [Illustration in Annexure 2 (b)].
9. In case the Calculation Date of the Adjusted SOFR is either a US holiday, Saturday or Sunday, the Adjusted SOFR corresponding to that day will be released by the FBIL approved data service provider on the following US business day. Hence, for such days, the Modified MIFOR will be calculated after the Adjusted SOFR are released on the following US business day. In such a scenario, the Modified MIFOR for multiple Rate Record Dates for a specific tenor may be calculated and published on a unique Calculation Date (Illustration in Annexure 2 (c)).
10. In case the Calculation Date of the Adjusted SOFR falls on an India holiday, the Modified MIFOR will not be published on that day. However, both the Adjusted SOFR and the FBIL Forward Premia corresponding to the Rate Record Dates for the tenors will be available. Therefore, the Modified MIFOR calculated for such days would be disseminated on the following India business day [Illustration in Annexure 2 (d)].
11. All computations are rounded off at each stage to 4 decimal places.
12. The Methodology will be reviewed periodically (preferably annually) to align with any required modification.
13. Modified MIFOR rates are provided on an “as is” basis without any warranties of any kind, and FBIL shall not be liable for any damage or loss which may arise from reliance on the data obtained from the FBIL website and other dissemination channels of API and SFTP.

Publication of FBIL Modified MIFOR Curve

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Currently the Federal Reserve publishes the SOFR next day at 8 AM EST of USA. The FBIL-approved data service provider will publish the Adjusted SOFR within 45 minutes thereafter under normal circumstances.

The Modified MIFOR Curve will be published at around 19:45 IST / around 20:45 IST post US Day Light Saving period.

Annexure 3 gives the format for website display of the Modified MIFOR Curve.

Given that the Federal Reserve has a restatement window of 6.5 hours, there could be a revision of the SOFR, which would be published by 2.30 PM EST. The FBIL-approved data service provider will similarly publish the restated Adjusted SOFR within 45 minutes of that announcement.

In case of revision of the SOFR and / or any error detected by FBIL, the Re-fix for the Modified MIFOR Curve would be published on the next business day at around 10:30 IST. Further, the Re-fix for Modified MIFOR will take place only if the difference in the revised rate and the published rate is **1 basis point or more.**

In case of delayed availability of the Adjusted SOFR from BISL for any / all tenor(s) beyond 18:30 / 19:30 IST, the Modified MIFOR Curve for that / those tenor(s) would be published as per the methodology fallback using the last available Adjusted SOFR.

The FBIL Modified MIFOR will be published on the website of FBIL www.fbil.org.in.

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Reference:

1. 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
2. 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/1stRakshitraArticles/Attachments/203/REvised_article.pdf
3. Bloomberg IBOR Fallback Rate Adjustments Rule Book (last updated 22 April 2020)

Abbreviations

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

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

Table 1, highlights the application of the 1 month Adjusted SOFR in the computation of the 1-month FBIL Modified MIFOR for the trade date of 27-01-2020. The FBIL Forward Premia for the trade date of 27-01-20 would be published on 27-01-20 itself. The 1-month Adjusted SOFR 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 Modified MIFOR for 27-01-20 will be published on 27-02-20.

Table 1: Timeline for Computation of 1- month FBIL Modified 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
Adjusted SOFR	LIBOR Rate Record Date		Accrual Spot Date			...		Accrual End Date				Payment Date
	Accrual Start Date							Adjusted SOFR Calculation Date				
	Offset Lag of 2 Business Days											
FBIL Forward Premia	Trade Date		Spot Value Date			...			1 month Settlement Date			
FBIL Modified MIFOR	Trade Date		Spot Value Date			...		1-month Modified MIFOR Publication Date for a Trade Date of 27-01-20	1 month Settlement Date			

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Annexure 2: Holiday Considerations in Modified 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 Modified 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 Adjusted SOFR Rate (Table 2). The Adjusted SOFR rates for such tenors published by the FBIL approved data service provider for the associated Rate Record Date would be used in the Modified MIFOR computation.

Table 2: Rate Record Date Falling on a USD Holiday: 07-09-2020 (Labour Day US Holiday)			
Tenor	Calculation Date	Rate Record Date	Modified MIFOR Publication
O/N	07-09-20	07-09-20	There will be no dissemination of O/N Modified MIFOR for the 04-09-20 and 07-09-20 as the Overnight USD/INR Forward Premia will not be published due to non-availability of tom trades and cash trades respectively.
1M	05-10-20	07-09-20	The Modified MIFOR will be calculated and disseminated on 05-10-20. It will be computed using: • 1M Forward Premia with a Trade Date of 07-09-20. • 1M Adjusted SOFR having a Rate Record Date of 07-09-20 and calculated on 05-10-20.

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

Table 3: Rate Record Date Falling on an India Holiday-07-05-2020 (Buddha Purnima INR Holiday)			
Tenor	Calculation Date	Rate Record Date	Modified MIFOR Publication
O/N	07-05-20	07-05-20	No dissemination of Modified MIFOR as the FBIL Forward Premia for the Trade Date of 07-05-20 would not be published.
1M	08-06-20	07-05-20	
2M	07-07-20	07-05-20	
3M	07-08-20	07-05-20	

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- c) **Calculation Dates falling on US Holiday/Saturday/Sunday:** In case the Calculation Date of the Adjusted SOFR is either a US holiday, Saturday or Sunday, the Adjusted SOFR corresponding to that day will be released by the FBIL-approved data service provider on the following US business day. Hence, for such days, the Modified MIFOR will be calculated after the Adjusted SOFR are released on the following USD business day. In such a scenario, the Modified 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 Adjusted SOFR for the Record Dates of 05-08-20, 06-08-20 and 07-08-20 will 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 Modified 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 US Holiday/Saturday/Sunday				
Tenor	Calculation Date	Rate Record Date	Rate Record Day	Modified MIFOR Publication
1M	08-09-20	05-08-20	Saturday	The Modified 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 Modified MIFOR disseminated as on 08-09-2020 is depicted in Table 5. Each tenor will have multiple Rate Record Dates and hence multiple rates for Modified MIFOR corresponding to each Rate Record Date, disseminated on the same Calculation Date.

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

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- d) Calculation Dates falling on India Holiday:** In case the Calculation Date of the Adjusted SOFR falls on an India holiday, the Modified MIFOR will not be published on that day. However, both the Adjusted SOFR and the FBIL Forward Premia corresponding to the Rate Record Dates for the tenors would be available. Therefore, the Modified MIFOR calculated for such days would be disseminated on the following India business day. For example, the Modified MIFOR will not be disseminated on 02-10-20 (Friday) as it is an India holiday. However, the Adjusted SOFR and the Forward Premia corresponding to the Rate Record date for 02-10-20 for the various tenors are available. Hence, the Modified MIFOR for 02-10-20 will 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 India Holiday –Dissemination Date as on 05-Oct-2020				
Tenor	Calculation Date	Rate Record Date	Rate Record Day	Modified MIFOR Publication
O/N	05-Oct-20	05-Oct-20	Monday	The O/N Modified MIFOR for 05-10-20 will be disseminated on 05-10-20.
1M	02-Oct-20	02-Sep-20	Wednesday	The 1-month Modified MIFOR for 02-09-20, 03-09-20, 04-09-20 and 07-09-20 will 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 Modified MIFOR for 03-08-20, 04-08-20 and 05-08-20 will 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 Modified MIFOR for 02-07-20 and 03-07-20 will 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 Modified MIFOR for 02-04-20 and 03-04-20 will 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 Modified MIFOR for 02-10-19 03-10-19 and 04-10-19 will 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 India Holiday.

Annexure 3: Website Display of Modified MIFOR Curve

Modified MIFOR As of Calculation Date: dd-mmm-yyyy				
Rate Record Date	Time	Tenor	Settlement Date	FBIL Modified MIFOR (%)
dd-mmm-yyyy	7:45:00 PM	O/N	dd-mmm-yyyy	2.3842
dd-mmm-yyyy	7:45:00 PM	1M	dd-mmm-yyyy	3.6054
dd-mmm-yyyy	7:45:00 PM	2M	dd-mmm-yyyy	3.6985
dd-mmm-yyyy	7:45:00 PM	3M	dd-mmm-yyyy	3.7211
dd-mmm-yyyy	7:45:00 PM	6M	dd-mmm-yyyy	4.4568
dd-mmm-yyyy	7:45:00 PM	12M	dd-mmm-yyyy	4.8398

* Rate record date is the Trade Date for the corresponding Adjusted SOFR for a given tenor.

*Settlement date follows modified following day convention.

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Annexure 4 : Summary of Revision in Calculation of FBIL Modified MIFOR Curve

Description as per the approved Methodology	Revisions in the Methodology
<u>Para 6:</u> In case of non-availability of the Adjusted SOFR for a given Rate Record Date due to unforeseen reasons, the Adjusted SOFR of the previous day would be repeated (subject to the repetition upto 2 business days).	<u>Para 6:</u> In case of non-availability of the Adjusted SOFR for a given Rate Record Date due to unforeseen reasons, the latest available Adjusted SOFR would be repeated.
<u>Publication of FBIL Modified MIFOR Curve:</u> The Re-fix for Modified MIFOR will take place only if the difference in the revised rate and the published rate is 5 basis points or more.	<u>Publication of FBIL Modified MIFOR Curve:</u> In case of revision of the SOFR and / or any error detected by FBIL, the Re-fix for the Modified MIFOR Curve would be published on the next business day at around 10:30 IST. Further, the Re-fix for Modified MIFOR will take place only if the difference in the revised rate and the published rate <u>is 1 basis point or more.</u>
<u>Publication of FBIL Modified MIFOR Curve:</u> The Modified MIFOR Curve publication time will be 45 minutes after the Adjusted SOFR for all tenors is made available by BISL, which is at around 19:15 IST.	<u>Publication of FBIL Modified MIFOR Curve:</u> The Modified MIFOR Curve will be published at around 19:45 IST / around 20:45 IST (post US Day Light Saving period).
<u>Review:</u> No review clause	<u>Review: Para 12:</u> The Methodology will be reviewed periodically (preferably annually) to align with any required modification.
<u>Disclaimer:</u> No. Disclaimer	<u>Disclaimer:</u> Modified MIFOR rates are provided on an “as is” basis without any warranties of any kind, and FBIL shall not be liable for any damage or loss which may arise from reliance on the data obtained from the FBIL website and other dissemination channels of API and SFTP.