FBIL - Certificates of Deposit (FBIL - CD) Benchmark

Methodology Document

22nd November, 2017

Version 2

FBIL Certificates of Deposit Curve (FBIL - CD) Benchmark will be computed on daily basis as per the following methodology:

Computation Methodology

1. For the purpose of computation of the Benchmark CD Rates, secondary market transactions pertaining to scheduled commercial bank (excluding Small Finance Banks) and financial institutions issuers upto 364 days residual maturity with the highest Credit Rating reported to FTRAC platform and settling on T+0 and T+1 basis will be considered. All T+1 deals will be discounted by the day's overnight MIBOR to arrive at the modified price which will be used with T+0 trades (Annexure – 1). All implied yields will be rounded off to 4 decimals (viz. 6.8516%).

2. The relevant trades will be extracted after the close of Market hours (typically at 5.00PM).

3. All deals having value of `5crores and above will be considered in the dataset. The trades would be classified based on their residual maturity from the settlement date. These trades will be put into various time buckets representing the benchmark tenors of 14 days, 1 month, 2 months, 3 months, 6 months, 9 months and 12 months. The trades in each of these buckets will serve as a medium for computation of a benchmark rate to represent a particular benchmark tenor. The following table will be used for bucketing the transactions.

Table- 1: Trades Captured in Tenor Buckets		
Classification on the basis of Residual maturity		
Bucket	Residual maturity (days)	Benchmark Tenor
1	1 to 16	14 Days
2	17 to 45	1 Month
3	46 to 71	2 Months
4	72 to 115	3 Months
5	116 to 200	6 Months
6	201 to 300	9 Months
7	>300	12 Months

4. Once the trades are put into their respective tenor buckets, the weighted average rate would be computed with the Standard Deviation of the Rates provided there are at least 3 trades in the tenor bucket.

5. Outliers would be removed using +/-3SD criteria for each bucket. After such removal of outliers, if a tenor fails to have minimum trades of 3, the relevant Rate for the tenor will be computed using relevant information from TBCURVE Rate as explained in point no. 8.

6. For the purpose of computation of the Final Benchmark CD Curve Rate for a particular Tenor, the methodology takes into consideration four parameters, namely, the *Distance*, *Volume, Amount and Rate*.

    a. Distance: To calculate the *Distance* we follow steps i to v as under*:*

        i. Calculate the difference between the residual tenors of a given trade with its respective benchmark tenor. For example, in case of trades with a residual tenor of 15 days, this difference is computed as 15 minus 14 which equals -1.

        ii. Calculate the absolute value of this difference. Following our example, |-1| is equal to 1.

iii.   Calculate the sum of these absolute differences, for all trades in the relevant maturity bucket. If we have trades with the differences of 12, 8, 6 and 1 day, then this is the sum of 12, 8, 6 and 1 which equals to 27.

iv.   Each tenor is then assigned a weight, based on its percentage share in the sum of these absolute differences in that relevant bucket. In our case, this is equal to 0.0370 i.e. 1 (calculated from Step ii) divided by 27 (calculated from Step iii).

v.   *Distance* is then calculated as the inverse of this percentage share. In our example, this equals to 27 i.e. 1 divided by 0.0370.

Thus, the parameter of *Distance* will vary depending upon the proximity of the residual tenor of a given trade to its benchmark tenor. Indeed, given the benchmark tenor of 14 Days, trades with a residual tenor of 15 days will have a greater weight (i.e. a weight of 27) vis-à-vis trades with a residual tenor of 2 days (i.e. a weight of 2.25), as it lies closer to our benchmark tenor.

b. **Volume:** The volume is computed as the percentage share of the number of trades (frequency), for a given residual tenor, in the total number of all the trades within that respective maturity bucket. As an example, there has been only one trade with a residual maturity of 15 days, within the 14 Days maturity bucket which consists of a cumulative of 5 trades. Hence the weight assigned to this trade is 0.20 (i.e. 1 divided by 5). Thus, larger the number of trades at a given tenor, greater would be its influence on the benchmark rate.

c. **Amount:** For a given maturity bucket, the third parameter used in computation is the *Amount* (value in `Crores[1]) of all the trades which have a residual maturity that fall within that maturity bucket*.* The greater the value of the trades, the larger would be its weight in the computation process. For example, in case of the 1st maturity bucket, the trades with a residual maturity of 8 days and an amount of `70crores will play a larger role in

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[1] 1Crore is 10Million

influencing the 14-Days benchmark rate vis-à-vis trades with a residual maturity of 15 days and an amount of `5crores.

Having computed the parameters, Weighted Average Rate (WAR) (Annexure -2) for each benchmark Tenor of the Curve will be:

$$WAR = WAR(Amount, Distance, Volume) = \frac{\sum(Rate \times Amount \times Distance \times Volume)}{\sum(Amount \times Distance \times Volume)}$$

(1)

7. Using the traded data, the Rates (yields) for each Tenor for the day will be computed provided the Tenor has at least 3 surviving trades after outlier removal process.

8. If the criteria for calculation of CDCURVE rate for a particular tenor are not met, it will be computed by using the previous day's CDCURVE rate for that tenor and adding to it the average spread of CDCURVE rates of two adjacent tenors by way of linear interpolation, provided the CDCURVE rates for the two adjacent tenors have not been calculated using this provision.

9. If the CDCURVE rate for a particular tenor is not possible to be computed using the foregoing steps, it will be determined by using the day's TBCURVE rate for the same tenor and adding to it the spread between the CDCURVE rate and TBCURVE rate for the same tenor of the previous day.

10. If the CDCURVE rate for a particular tenor is still not possible to be calculated, it will be determined by using the day's TBCURVE rate for the same tenor adding to it the spread between the CDCURVE rate and TBCURVE rate for the nearest tenor for the same day.

	A	B	C	D	E	F	G	H
1	DTBCURVE							
2	Date	14 Days	1 Month	2 Months	3 Months	6 Months	9 Months	12 Months

3	18-Sep-2017	6.0497	6.0070	6.0807	6.1053	6.2011	6.2387	6.2410
4	19-Sep-2017	6.0110	6.0581	6.0610	6.0984	6.1842	6.2300	6.2300
5	20-Sep-2017	6.0730	6.0535	6.0821	6.0907	6.1932	6.2175	6.2374
6	**CDCURVE**							
7	**Date**	**14 Days**	**1 Month**	**2 Months**	**3 Months**	**6 Months**	**9 Months**	**12 Months**
8	18-Sep-2017	6.0730	6.0535	6.0821	6.0907	6.2032	6.2475	
9	19-Sep-2017	6.0672	**BLANK**	**BLANK**	6.0861	**BLANK**	6.2193	**BLANK**
10	20-Sep-2017	6.0614	7.0535	6.0821	6.0815	6.2032	6.1911	**BLANK**

11. The calculation process for the missing values is given below:

	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**
7	**CDCURVE**							
8	**Date**	**14 Days**	**1 Month**	**2 Months**	**3 Months**	**6 Months**	**9 Months**	**12 Months**
9	18-Sep-2017	6.0730	6.0535	6.0821	6.0907	6.2032	6.2475	
10	19-Sep-2017	6.0672	**=C4+(C9-C3)**	**=D4+(D9-D3)**	6.0861	**=F9+((G10-G9)+ (E10-E9))/2**	6.2193	**=H4+(G10-G4)**
11	20-Sep-2017	6.0614	7.0535	6.0821	6.0815	6.2032	6.1911	**=H5+(H10-H4)**

12. In case no CDCURVE Rate for a Tenor is possible to estimate for the day, the CDCURVE Rate for the previous day would be repeated.

13. The CDCURVE Rate will be published at 5.45PM subject to the calculation of TB Curve. If the TB curve estimation is delayed because of market time extension, CD curve Rate publication time may also be suitably extended.

Reference:

ESTIMATION BENCHMARK CERTIFICATE OF DEPOSIT (CD) CURVE (Technical Document by Golaka C Nath, Member, FBIL OC and Manoel Pacheco, AM, CCIL)

Conversion of T+1 trade price to T+0 price

	A	B	C	D	E	F
1	**Type**	**Price**	**Sett Date**	**Maturity Date**	**IMPLIED YLD**	**PRICE**
2	**T+1**	99.7232	17-Oct-17	2-Nov-17	6.33%	99.7232
3	**MIBOR (O/N)**	6.05%				
4	**T+0 conversion**	99.7067	16-Oct-17[2]	2-Nov-17	6.32%	99.7067

The T+1 Price of 99.7232 is discounted using the overnight MIBOR rate of 6.05% to arrive at the T+0 price as follows:

$$99.7232 / (1 + 6.05\% \times \left(\frac{1}{365}\right)) = 99.7067$$

The implied yield from the discounted price is arrived as:

$$\left(\left(\frac{100}{99.7067}\right) - 1\right) \times \left(\frac{365}{17}\right) \times 100 = 6.32\%$$

Where,

17 = (02-Nov-2017-17-Oct-2017) +1

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[2] Modified Settlement Date

For the purpose of illustration we consider the transactions to be used for computation of the 14 Day benchmark Tenor. These transactions are categorized on the basis of their residual tenor and are aggregated to arrive at a cumulative Amount and Weighted Value (WV) for each residual maturity as indicated in *'Panel A of Table 2'*. The number of trades, Amount and WV are then aggregated for those transactions with the same residual tenor as indicated in *'Table 1'*.

Table 2: CD Transaction for computation of 14 Days Benchmark Rate								
Panel A				*Panel B*				
Residual Tenor	*Amount (Rs. Cr.)*	*Yield*	*WV*	*Residual Tenor*	*Number of Trades*	*Amount (Rs. Cr.)*	*WV*	*Rate*
	(a)	*(b)*	*(a) x(b)*			*(a)*	*(b)*	*(c)= (b)/(a)*
2	10.00	6.6089	66.089	2	2	20.00	132.18	6.6089
2	10.00	6.6089	66.089	6	1	50.00	330.08	6.6015
6	50.00	6.6015	330.08	8	1	70.00	458.64	6.5520
8	70.00	6.5520	458.64	15	1	5.00	32.50	6.4997
15	5.00	6.4997	32.50					

The outliers are removed using a 3SD criteria from the mean weighted average rate in each bucket. Only trades of 5 crores and above are used for computation.

For the purpose of computation of the benchmark rate, the methodology takes into consideration four parameters, namely, the *Distance*, *Volume, Amount and Rate*. The computation of these parameters is illustrated in *'Table 3'* and is explained as follows:

Table 3: Computation of 14 Days WAR					
Variable	**Notation**	**14 Day WAR**			
Panel A: Tenor-Wise Information					
Residual Tenor$	*(a)*	2	6	8	15
Benchmark Tenor@	*(b)*	14			
Days	*(c) = (a) – (b)*	12	8	6	-1
ABS(Days)	*(d) = |(c)|*	12	8	6	1
Sum of ABS(Days)	*(e) = ∑(d)*	27			
Share in ABS(Days)	*(f) = (d)/(e)*	0.4444	0.2963	0.2222	0.0370
Distance	*(g) = 1/(f)*	2.2500	3.3750	4.5000	27.0000
No. of trades$	*(h)*	2	1	1	1
Sum of No. of Trades	*(i) = ∑(h)*	5			
Volume	*(j) = (h)/(i)*	0.4000	0.2000	0.2000	0.2000
Amount (`. Cr.) $	*(k)*	20.00	50.00	70.00	5.00
Rate$	*(l)*	6.6089	6.6015	6.5520	6.4997
Panel B: Computed WAR					
WAR	$\dfrac{\sum (l)\cdot(k)\cdot(g)\cdot(j)}{\sum (k)\cdot(g)\cdot(j)}$	6.5610			
Rate to Closest Applicable Tenor$		6.4997			
Notes: $ Figures from Panel B of Table 2. @Figures from Table 1.					