Calculation Methodology

This document provides a detailed description of the methodology IBA use in the calculation of the ICE RFR Indexes. IBA are producing 6 separate ICE RFR Indexes for each RFR, as set out in the table below. IBA are not explicitly publishing any indexes calculated using a shift, as such indexes can be derived manually using the index with no lookback.

Floor	Lag	Lookback (business days)	Index Calculated for Non-Business Days
None	None		Yes
	Lag	2	
		5	
0%	None		
	Lag	2	
		5	

For consistency all ICE RFR Indexes are published using a base value of 100 and with a precision of 8 decimal places.

All ICE RFR Indexes use the same underlying calculation methodology for determining index values for business days.

$$Compounded\ Index_i = Compounded\ Index_{i-1} \times \left(1 + \frac{RFR_{i-N-1} \times Weighting}{Day\ Count\ Convention}\right)$$

Where:

$Compounded\ Index_i$ = The index for business day i, calculated and published on day i. All published ICE RFR Index values are rounded to 8 decimal places. $Compound\ Index_1 = 100$.

Day 1 for each of the ICE RFR Indexes without a lookback matches the official RFR index and is as follows:

RFR	**Day 1**
SOFR	Monday 2 April 2018
€STR	Tuesday 1 October 2019
SONIA	Monday 23 April 2018
TONA	Wednesday 14 June 2017

For indexes with an N day lookback, Day 1 is N business days after the date shown above.

$Compounded\ Index_{i-1}$ = The index value calculated on business day i-1. While the published value of the index is always rounded to 8 decimal places, the underlying calculation uses the previous day's index value that has been rounded to 18 decimal places.

RFR_{i-N-1} = The RFR rate with an effective date of i-N-1, calculated and published by the relevant official body on business day i-N. Where N is the number of days lookback or 0 for an index without any lookback. For indexes without any lookback, this will be equal to i-1, i.e. the calculation on Day i uses the RFR rate for the previous business day, which is published on day i.

Indexes using a Floor	=	For an index with a floor, if the RFR value on the relevant business day is below the floor value, then the floor value will be used within the index calculation instead of the actual RFR value. For an index with a floor the rate used in a calculation is as follows. $$Maximum(Floor\ value, RFR_{i-N-1})$$
Weighting	=	The weighting to apply to the RFR rate for business day i-N-1. The Weighting will equal the number of calendar days from business day i-1 to business day i, i.e. the number of calendar days between the previous calendar day and the current calendar day. For a typical week with no holidays, the weighting will be 1 on Monday through to Thursday and 3 on Friday.
Day Count Convention	=	360 for SOFR and €STR indexes 365 for SONIA and TONA indexes

ICE RFR Index - Standard

The index value for each day is calculated using the RFR rate for the previous business day, which is published on the same day as the index calculation.

ICE RFR Index - Standard - Calculation for Non-Business Days

The standard ICE RFR Index provides index values for non-business days. The index value for a non-business day is calculated as follows:

$$Compounded\ Index_{nbd} = Compounded\ Index_{bd} \times \left(1 + \frac{RFR_{bd-N-1} \times Weighting}{Day\ Count\ Convention}\right)$$

Where:

Compounded $Index_{nbd}$	=	The index value for non-business day, nbd. This index value will be calculated and published on the business day that follows this non-business day.
Compounded $Index_{bd}$	=	The index value for the business day, bd, that preceded the non-business day, nbd. For a typical Saturday and Sunday, the preceding business day will be Friday. Index values for non-business days are always calculated based upon the preceding business day and are never calculated based upon the index value for a previous non-business day. For example, the index value for a Sunday is calculated based upon the index value on the preceding Friday, not upon the index value for Saturday.
RFR_{bd-N}	=	Where N is the number of days lookback, or 0 for an index without any lookback. The RFR rate with an effective date of bd-N, calculated and published on business day bd-N+1. For example, for an index with no lookback, the calculation of an index value for a typical Saturday will reference the RFR rate with an effective date of the previous business day, Friday. This RFR value would be published on Monday. (This is why index values for non-business days can only be published on the following business day.)
Indexes using a Floor	=	For an index with a floor, if the RFR value on the relevant business day is below the floor value, then the floor value will be used within the calculation instead of that RFR value. For an index with a floor the rate used in a calculation is as follows. $$Maximum(Floor\ value, RFR_{bd-N-1})$$
Weighting	=	The weighting to apply to the RFR rate for business day bd-N-1. The Weighting equals the number of calendar days from business day bd to non-business day nbd. For a typical weekend with no holidays, the weighting will be 1 on Saturday and 2 on Sunday.
Day Count Convention	=	360 for SOFR and €STR indexes 365 for SONIA and TONA indexes

The index values for non-business days are calculated and published on the first business day following the non-business day(s). For example, the index values for both a Saturday and Sunday are typically published on a Monday. ICE RFR Index values are always calculated and published on the same days relevant RFR value is published.

ICE RFR Index - with a 0% floor

This index can be used by borrowers and lenders that do not wish to have negative accruals on RFR based loans.

The ICE RFR Index with 0% floor is calculated using a minimum interest rate of 0%. If the daily RFR value falls below 0% then this index is calculated using 0%, instead of the actual RFR value.

Negative RFR rates result in the index having the same value each day, until the RFR rate becomes positive again.

ICE RFR Index - with a Lookback

An index calculated using an N day lookback can be calculated and published N days in advance. IBA publishes ICE RFR Indexes using the two most frequently used lookback periods, of 2 business days and 5 business days, corresponding to typical payment clearing timescales.

More specifically, IBA provides RFR Indexes calculated using a lookback with **no observational shift**. This approach is also referred to as a lag. With a lag, the weighting applied to the RFR rate that is referred to within the calculation, is always determined by the calculation period and not the observation period. For example, if on the day of calculation there has been only one calendar day since the last business day, then the RFR rate that is referenced will always have a weighting of 1. This is the case even if the RFR rate that is referred to was for a Friday and would have had a weighting of 3 applied for an index with no lookback. This is illustrated in the following example.

Using the ICE RFR Indexes

The ICE RFR Indexes can be used to calculate the annualised interest rate and interest amounts due on an RFR based loan as follows:

- Step 1 - Use the index to calculate the annualised interest rate
- Step 2 - Round the calculated rate to the precision specified in the loan contract
- Step 3 - Add any specified spread(s)
- Step 4 - Use the rounded interest rate and spread(s) to calculate the interest amount

Step 1 - Calculating the Annualised Interest Rate

The annualised interest rate on a loan is calculated using the following formula.

$$Annualised\ Interest\ Rate\ = \left(\frac{Index\ Value\ on\ End\ Date}{Index\ Value\ on\ Start\ Date} - 1\right) \times \frac{Day\ Count\ Convention}{Duration\ in\ Days}$$

Step 2 - 4 - Calculating the Interest Amount

Lenders and borrowers can use the rounded annualised interest rate, combined with any specified spread(s) to calculate the interest amount as follows:

$$\begin{aligned} &Interest\ Amount \\ &\quad = Notional\ \times (Rounded\ Annualised\ Interest\ Rate + Spread) \\ &\quad \times \frac{Duration\ in\ Days}{Day\ Count\ Convention} \end{aligned}$$

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