

## ICE SONIA Indexes - Calculation Methodology

This document provides a description of the methodology ICE Benchmark Administration Limited (IBA) uses in the calculation of the ICE SONIA Indexes. IBA is producing 6 separate ICE SONIA Indexes, as set out in the table below.

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

All ICE SONIA Indexes use the same underlying calculation methodology for determining index values for business days. This is based upon the equation used by the Bank of England.

$$\text{Compounded Index}_i = \text{Compounded Index}_{i-1} \times \left( 1 + \frac{\text{SONIA}_{i-N-1} \times \text{Weighting}}{365} \right)$$

Where:

Compounded Index<sub>i</sub> = The index for business day i, calculated and published on day i. All published ICE SONIA Index values are rounded to 8 decimal places. Compounded Index<sub>1</sub> = 100. Day 1 for ICE SONIA Indexes without a lookback is 23 April 2018. For indexes with an N day lookback, Day 1 is N business days after 23 April 2018.

Compounded Index<sub>i-1</sub> = 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.

SONIA<sub>i-N-1</sub> = The SONIA rate with an effective date of i-N-1, calculated and published by the Bank of England 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 SONIA rate for the previous business day, which is published by the Bank of England on day i.

Indexes using a Floor = For an index with a floor, if the SONIA 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 SONIA value. For an index with a floor the rate used in a calculation is as follows.

$$\text{Maximum}(\text{Floor value}, \text{SONIA}_{i-N-1})$$

Weighting = The weighting to apply to the SONIA 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 UK holidays, the weighting will be 1 on Monday through to Thursday and 3 on Friday.

## ICE SONIA Index - Standard

The standard ICE SONIA Index replicates the Bank of England SONIA Index calculation.

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

### ICE SONIA Index - Standard - Calculation for Non-Business Days

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

$$\text{Compounded Index}_{nbd} = \text{Compounded Index}_{bd} \times \left( 1 + \frac{\text{SONIA}_{bd-N-1} \times \text{Weighting}}{365} \right)$$

Where:

Compounded Index<sub>nbd</sub> = 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<sub>bd</sub> = 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.

SONIA<sub>bd-N</sub> = Where N is the number of days lookback, or 0 for an index without any lookback. The SONIA rate with an effective date of bd-N, calculated and published by the Bank of England 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 SONIA rate with an effective date of the previous business day, Friday. This SONIA value would be published by the Bank of England on Monday. (This is why index values for non-business days can only be published on business days.)

Indexes using a Floor = For an index with a floor, if the SONIA value on the relevant business day is below the floor value, then the floor value will be used within the calculation instead of that SONIA value. For an index with a floor the rate used in a calculation is as follows.

$$\text{Maximum}(\text{Floor value}, \text{SONIA}_{i-N-1})$$

Weighting = The weighting to apply to the SONIA rate for business day i-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 UK holidays, the weighting will be 1 on Saturday and 2 on Sunday.

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 SONIA Index values are always calculated and published on the days that the Bank of England publishes SONIA i.e. London good business days.

### **ICE SONIA Index - with a 0% floor**

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

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

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

### **ICE SONIA Index - with a Lookback**

An index calculated using an N day lookback can be calculated and published N days in advance. IBA publishes ICE SONIA 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 SONIA 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 SONIA 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 SONIA rate that is referenced will always have a weighting of 1. This is the case even if the SONIA rate that is referred to was for a Friday and would have had a weighting of 3 applied for an index with no lookback.

### **Using the ICE SONIA Indexes**

The ICE SONIA Indexes can be used to calculate the annualised interest rate and interest amounts due on SONIA based loans 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.

$$\text{Annualised Interest Rate} = \left( \frac{\text{Index Value on End Date}}{\text{Index Value on Start Date}} - 1 \right) \times \frac{365}{\text{Duration}}$$

#### **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:

$$\text{Interest Amount} = \text{Notional} \times (\text{Rounded Annualised Interest Rate} + \text{Spread}) \times \frac{\text{Duration}}{365}$$

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