STIBOR Calculation Methodology

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SFBF
SWEDISH FINANCIAL BENCHMARK FACILITY

Contents

1 Introduction

The Swedish Financial Benchmark Facility (SFBF) is the administrator of STIBOR, the Swedish interest reference rate for the unsecured segment of the money market. Since the beginning of 2020, the SFBF has been working on the development of a revised Calculation Methodology for STIBOR that would enhance its current determination, guaranteeing its alignment with Regulation (EU) 2016/1011 of the European Parliament and of the Council of 8 June 2016 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of investments funds (EU BMR or Benchmarks Regulation), and its classification as a critical interest rate benchmark by the European Commission in October 2018.

In the development of the STIBOR Calculation Methodology, the SFBF has sought to endow the reference rate with a methodology anchored in real transactions to the greatest extent possible, while specifying calculation rules for cases in which additional techniques and data may be used. The specificities of the Swedish money market have been taken into account in the formulation of the Calculation Methodology.

2 The definition of STIBOR

The STIBOR definition or underlying interest is stated as:

"STIBOR is a measure of the interest rate applied by panel banks for unsecured lending in Swedish krona (SEK) to leading banks[1]."

The tenors for STIBOR are Tom/Next, 1 week, 1 month, 2 months, 3 months, and 6 months. Individual tenors are calculated as the arithmetic mean of input data contributions provided by the Panel Banks according to a clearly defined STIBOR Calculation Methodology.

3 Overview of STIBOR's Calculation Methodology

STIBOR is determined with the Input Data contributed by a panel of credit institutions (Panel Banks) that are representative of the Swedish financial market. A Panel Bank's contribution toward STIBOR is based on executed transactions, when available, and on a combination of other sources of information and mathematical techniques when transactional evidence is insufficient.

The calculation process of a Panel Bank's contribution toward STIBOR is divided into two distinct steps:

Step 1 - A measure of the contributing bank's cost of funds calculated by means of an Input Data priority waterfall;

Step 2 - A Bid to Offer Spread, which reflects the difference between an estimated cost of funds' rate and STIBOR's underlying interest, is added to the Panel Bank's cost of funds as determined in step 1.

3.1 Hierarchy of Input Data

Panel Bank's contribution toward STIBOR is created from Input Data contributed by the Panel Bank, and other sources, based on the hierarchical Input Data waterfall. What constitutes Input Data and the process of its contribution is described in STIBOR Panel Bank Code of Conduct.

To the greatest extent possible a Panel Bank's cost of funds is determined in Step 1 using Panel Bank contributed transactional evidence. To ensure robustness in the absence of transactions the STIBOR

1 A leading bank is defined as a bank of investment grade credit rating that is a participant in money and foreign exchange markets on competitive terms.

Calculation Methodology follows a hierarchical Input Data waterfall resulting in three possible levels of Panel Bank's contribution towards STIBOR.

These levels are employed progressively and, in the order, specified below:

- Level 1 consists of contributions based on transactions executed by the Panel Bank during the previous day that reflect the Panel Bank's cost of funds.
- Level 2 consists of contributions derived from the evidence of Level 1 transactions, using interpolation, extrapolation, and the application of a Market Adjustment Factor (MAF).
- Level 3 consists of contributions based on commercial paper (CP) and certificates of deposit (CD's) issuance prices, using data through the application of a combination of modelling techniques and the Panel Bank's judgement.

The application of the Input Data waterfall can be demonstrated through the use of an example as follows: if Input Data contributed by a given Panel Bank qualifies for a Level 1 contribution for the 1 month tenor, no further waterfall levels will be used for that tenor. In contrast, if conditions for a Level 1 contribution for a 3 months tenor are not met, then the STIBOR calculation system will assess whether criteria for a Level 2 contribution for that tenor are fulfilled, and if they are, no further waterfall level will be used. If the criteria for Level 1 and Level 2 cannot be met the Input Data from Level 3 will be utilised.

A high-level description of the three levels of the Input Data waterfall is presented in Figure 1. A more detailed view is elaborated in Section 4.

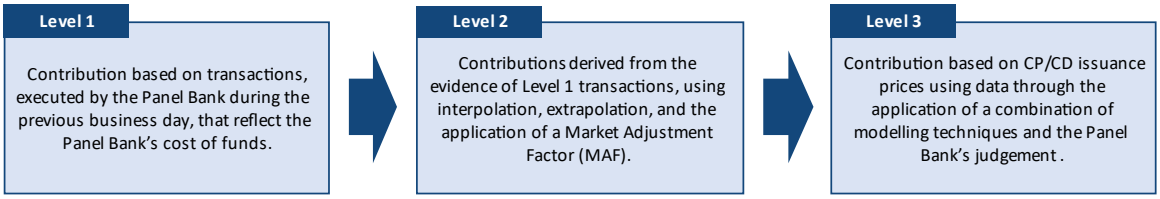

Figure 1: Diagram of STIBOR's Input Data waterfall

After an estimate of the Panel Banks' cost of funds has been obtained in Step 1 the STIBOR determination process progresses to Step 2. In Step 2 the STIBOR calculation system adds a Bid to Offer Spread (BOS), which represents the difference between the calculated estimated cost of funds rate and STIBOR's underlying interest. Further details on the criteria in the determination of the BOS can be found in Section 5.

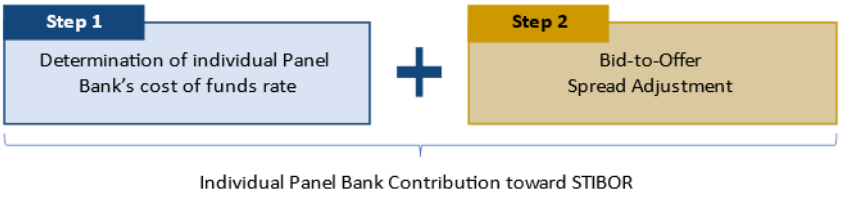

Figure 2: Determination of a Panel Bank's Contribution toward STIBOR

After all contributions have been calculated, STIBOR is determined as a trimmed arithmetic mean of the resulting rates, following the rules described in Section 6.

4 STEP 1: Determination of Individual Panel Bank's Cost of Funds Rate

Level 1 Contribution Calculation

Level 1 Contributions are calculated as a volume-weighted average of the rates of all transactions executed on the business day T prior to that of the publication[2] of STIBOR, T+1, that satisfy a series of eligibility criteria (see Levels 1.1 and 1.2). Panel Banks are required to report their transactions to the SFBF which undertakes the calculations for Level 1 (and Level 2) of the Calculation Methodology using the STIBOR calculation system.

Level 1 is subdivided into two different sub-levels, depending on the currency in which the underlying set of transactions was performed. In sub-level 1.1, only transactions executed in Swedish krona (SEK) are considered as eligible; in sub-level 1.2, transactions from a wider basket of foreign currencies are deemed eligible, including euro (EUR), British pound (GBP), and United States dollar (USD). In this second case, transaction rates and volumes are converted to their SEK-implied rates and SEK-denominated volumes relying on standard formulas. Levels 1.1 and 1.2 are applied hierarchically, i.e. a Level 1.1 contribution takes precedence over Level 1.2.

LEVEL 1.1: SEK DENOMINATED ELIGIBLE TRANSACTIONS

Level 1.1 eligible transactions must meet the following criteria:

Currency denomination: Only transactions directly denominated in Swedish krona are eligible.

Transaction timing: Only transactions executed on business day T for Level 1.1 contribution for calculation of STIBOR on day T+1 are eligible.

Funding and counterparty type: Plain vanilla *funding* transactions conducted at a fixed rate, i.e. transactions with embedded options are not eligible, transactions conducted at a floating rate are not eligible.

The following funding types are eligible:

- Unsecured term deposits;
- Short-term securities (certificates of deposit (CDs) and commercial paper (CP)), primary issuance).

The counterparty type must be in one of the following sector and or sub-sector categories:[3]

Non-financial corporations (S11)	Other financial intermediaries (except insurance corporations and pension funds) (S125)
General government (S13)	Financial auxiliaries (S126)
Central bank (excluding monetary policy operations) (S121);	Captive financial institutions and money lenders (S127)
Deposit-taking corporations (except the central bank) (S122)	Insurance corporations (S128)
Money Market Funds (MMFs) (S123)	Pension funds (S129);
Non-MMF investment funds (S124)	

[2] STIBOR is calculated each day commercial banks are open for general business in Sweden. A list of bank holidays is maintained by the Sveriges Riksbank.
[3] The counterparty types of classification rely on the definitions of institutional sectors and subsectors described in European System of Accounts (ESA 2010).

Settlement dates: Only transactions with a standard settlement date of T, T+1 or T+2 (business days) are eligible.

Maturity dates: Only transactions with a maturity date on Swedish business days are eligible.

Tenor bucketing: For each tenor, only transactions within the following maturity range, in business days are eligible.

Tenor	Maturity window
Tom/Next	+/- 0 days
1 Week	+/- 2 days
1 Month	+/- 5 days
2 Months	+/- 5 days
3 Months	+/- 10 days
6 Months	+/- 15 days

Individual transactions notional volume threshold: Only transactions with notional volume equal to or above SEK 100 million are eligible.

On a given day, a Panel Bank's contribution at a given tenor shall be made using the Level 1.1 methodology if there is at least one qualifying transaction bucketed in the respective tenor.

The Panel Bank's contribution rate is calculated as the volume-weighted average of the rates in the set of qualifying transactions for the respective official tenor, that is,

$$WVA = \frac{\sum_{i=1}^{n}(r_i \cdot vol_i)}{\sum_{i=1}^{n} vol_i} \qquad (1)$$

where r_i and vol_i are the transactional rate and notional volume of transaction i, respectively, in the set of all qualifying transactions, and n is the number of qualifying transactions.

LEVEL 1.2: FOREIGN CURRENCY DENOMINATED ELIGIBLE TRANSACTIONS

The qualifying criteria described in the previous section apply in a similar manner to foreign currency denominated transactions, although with some variation.

Level 1.2 is not applicable for the Tom/Next tenor.

Level 1.2 eligible transactions must meet the following criteria:

Currency denomination: Only transactions directly denominated in United States dollar (USD), euro (EUR), and British pound (GBP) are eligible.

Transaction timing: Only transactions executed on business day T for Level 1.2 contribution for calculation of STIBOR on day T+1 are eligible.

Funding and counterparty type: Plain vanilla funding transactions conducted at a fixed rate, i.e. transactions with embedded options are not eligible, transactions conducted at a floating rate are not eligible.

Only short-term securities (CD) and (CP) (primary issuance) are eligible.

The counterparty type must be in one of the following sector and or sub-sector categories[4]:

Non-financial corporations (S11)	Other financial intermediaries (except insurance corporations and pension funds) (S125)
General government (S13)	Financial auxiliaries (S126)
Central bank (excluding monetary policy operations) (S121);	Captive financial institutions and money lenders (S127)
Deposit-taking corporations (except the central bank) (S122)	Insurance corporations (S128)
Money Market Funds (MMFs) (S123)	Pension funds (S129);
Non-MMF investment funds (S124)	

Settlement dates: Only transactions with a standard settlement date of T, T+1 or T+2 (business days) are eligible.

Maturity dates: Only transactions with a maturity date on Swedish business days are eligible.

Tenor bucketing: For each tenor where Level 1.2 applies, only transactions within the following maturity range, in business days are eligible.

Tenor	Maturity window
Tom/Next	+/- 0 days Not eligible
1 Week	+/- 2 days
1 Month	+/- 5 days
2 Months	+/- 5 days
3 Months	+/- 10 days
6 Months	+/- 15 days

Individual transactions notional volume threshold: Only transactions with exchanged notional volume equal to or above SEK 100 million are eligible.

Similar to Level 1.1, a Panel Bank's contribution at a given tenor shall be made using the Level 1.2 methodology if there is at least one qualifying transaction bucketed in the respective tenor.

The Panel Bank's contribution rate is calculated as the volume-weighted average of the rates in the set of qualifying transactions for the respective official tenor adjusted to reflect STIBOR's underlying interest, that is:

$$WVA = \frac{\sum_{i=1}^{n}\left(r_i^{SEK} \cdot vol_i^{SEK}\right)}{\sum_{i=1}^{n} vol_i^{SEK}} \qquad (2)$$

where r_i^{SEK} and vol_i^{SEK} are the *implied rate and notional volume in SEK*, respectively, of the i-th eligible Level 1.2 eligible transaction.

For the calculation of the implied rate in SEK from the foreign currency rate, the following standard formula is applied:

$$1 + r_i^{SEK}\frac{Act}{Y_{SEK}} = \frac{F_{FCY}^{SEK}}{S_{FCY}^{SEK}}\left(1 + r_i^{FCY}\frac{Act}{Y_{FCY}}\right) \qquad (3)$$

[4] The counterparty classification is based on the definitions of the European System of Accounts (ESA 2010)

where r_i^{FCY} represents the rate of the eligible transaction in the original foreign currency, F_{FCY}^{SEK} is the foreign currency to SEK forward exchange rate, S_{FCY}^{SEK} is the foreign currency to SEK spot rate[5][6], Act is the actual number of days between the transaction's settlement and maturity dates, taking into consideration the appropriate day-count convention, Y_{SEK} equals 360 (which is the standardized year length in the SEK market), and Y_{FCY} represents the standardized year length in the corresponding foreign currency market (360 for transactions originally denominated in USD and EUR, and 365 for transactions in GPB).

Likewise, the volume conversion is made according to the formula:

$$vol_i^{SEK} = vol_i^{FCY} \cdot S_{FCY}^{SEK} \quad (4)$$

where vol_i^{FCY} represents the notional volume of the eligible transaction expressed in the original foreign currency.

Level 2 Contribution Calculation

Level 2 contributions are calculated when a Panel Bank does not have sufficient transactions to qualify for a Level 1 contribution, but has had transactions in a nearby tenor or recent transactions to support a Level 1 contribution. Level 2 is subdivided into three different sublevels, that apply hierarchically:

Level 2.1 - Adjusted linear interpolation from neighbouring tenors.

Level 2.2 - Transactions with maturity at broken dates

Level 2.3 - Transactions from previous days.

LEVEL 2.1: ADJUSTED LINEAR INTERPOLATION FROM NEIGHBOURING TENORS

This level of the methodology may only be applied for the calculation of contributions toward the 1 week, 1 month, 2 months, and 3 months tenors, and only when Level 1 contributions for the day have been determined for both the respective neighbouring tenors, i.e. a 1 month contribution under Level 2.1 is derived from Level 1 contributions in the 1 week and 2 months tenors.

For the purpose of calculation of a Level 2.1 contribution, the original currency in which the transactions supporting the respective Level 1 contributions at the neighbouring tenors were carried out is not relevant, as they have been adequately converted to represent the bank's cost of funds in SEK.

A Panel Bank's Level 2.1 contribution rate is calculated in two steps:

Step 1 - A simple linear interpolation for tenor $t \in$ {1 week, 1 month, 2 months, 3 months} is calculated, using as anchors the neighbouring Level 1 contributions:

$$r_t^{int} = r_{t-1}^{L1} + \frac{(r_{t+1}^{L1} - r_{t-1}^{L1}) \cdot d_{t-1}}{d_{t-1} + d_{t+1}} \quad (5)$$

[5] WM/Refinitiv Closing Mid Spot Rates and the WM/Refinitiv Closing Mid Forward Rates (4pm London time, day T) are used for the calculations. The forward rates are linearly interpolated to match the exact day count of each transaction.

[6] Refinitiv shall not be liable for any errors in or delays in providing or making available the data contained within this service or for any actions taken in reliance on the same where the WM/Refinitiv Closing Spot Rates and the WM/Refinitiv Closing Forward Rates are the appropriate information reference as listed above.

where r_t^{int} denotes the interpolated rate, r_{t-1}^{L1} denotes the rate of the Level 1 contribution for tenor t-1, r_{t+1}^{L1} denotes the rate of the Level 1 contribution for tenor t+1, d_{t-1}denotes the day count of tenor t-1 over spot, and d_{t+1}denotes the day count of tenor t+1 over spot.

Step 2 - A Spread Adjustment Factor (SAF) is added to r_t^{int}, with the expectation of correcting the curvature of the money market yield curve. Its calculation depends solely on STIBOR. The SAF is calculated as follows:

- For each of the last five days of published STIBOR values, the linearly interpolated rate at the contribution tenor is calculated based on the determined rates at the two adjacent tenors
- The spread of these linearly interpolated rates to the actual determined rates is taken
- The SAF is the arithmetic mean of these spreads over the past five days of published STIBOR values

In formulaic terms:

$$SAF = \frac{1}{5}\sum_{i=1}^{5}\left(S_{t-1,i} + \frac{(S_{t+1,i} - S_{t-1,i}) \cdot d_{t-1,i}}{d_{t-1,i} + d_{t+1,i}} - S_{t,i}\right) \quad (6)$$

where, $S_{t,i}$ denotes the official STIBOR rate for tenor t published i days before the day for which the Level 2.1 contribution is being determined. Hence, the final Level 2.1 contribution rate is:

$$r_t \ = r_t^{int} + SA$$

LEVEL 2.2: OFF-TENOR TRANSACTIONS

For a contribution at Level 2.2, the methodology considers transactions that do not satisfy the standard tenor corridors for a Level 1 contribution, but satisfy all other eligibility criteria. Transactions eligible for a Level 2.2 contribution must have maturities of more than 1 week and less than 6 months.

Level 2.2 is applied only in cases in which a contribution could not be derived from any of the previous methodological levels. The objective of this technique is to derive contributions for STIBOR tenors via the reallocation of volume and derivation of rates from off-tenor transactions using simple mathematical tools. Level 2.2 rates are determined based on a parallel shift which replicates the slope of the STIBOR yield curve from the previous day.

a) Volume Reallocation

   i. For each relevant off-tenor transaction, weights corresponding to each of the neighbouring STIBOR maturities are calculated as the relative proportions of the number of days over the spot settlement date:

$$\omega_- = \frac{|d_i - d_-|}{d_+ - d_-} \qquad \omega_+ = \frac{|d_i - d_+|}{d_+ - d_-} \quad (7)$$

   where ω_- and d_- denote the weight associated and the day count over spot of the neighbouring tenor to the left of the off-tenor transaction, respectively; ω_+ and d_+ denote the weight associated and the day count over spot of the neighboring tenor to the right of the off-

tenor transaction, respectively; and d_i denotes the day count over spot of the off-tenor transaction i .

For example, if the off-tenor transaction has a 5 months maturity, the relative weights would be approximately 34% and 66% for the neighbouring 3 months and 6 months STIBOR tenors, respectively.

ii. The volume of the off-tenor transaction is divided between the two neighbouring STIBOR tenors based on these weights in the following manner:

$$vol_- = vol_i \cdot \omega_- \qquad vol_+ = vol_i \cdot \omega_+ \tag{8}$$

where vol_- (resp. vol_+) denotes the volume allocated to the neighbouring tenor to the left (resp. right) of the off-tenor transaction and vol_i denotes the notional volume of transaction i .

If the volume reallocated to either of the neighbouring tenors does not meet the threshold for a Level 1 contribution, the transaction cannot be used to make a Level 2.2 contribution for that tenor.

iii. For off-tenor transactions carried out in a foreign currency, the volume is first exchanged into SEK using formula (4) above, and then reallocated to the neighbouring STIBOR tenors by means of the procedure described above.

b) Rate Derivation

i. Using the previous day's published STIBOR rates at each of the off-tenor transaction's neighbouring STIBOR tenors, an off-tenor maturity rate is calculated by simple linear interpolation,

$$S_{int,-1} = S_{-,-1} + \frac{\left(S_{+,-1} - S_{-,-1}\right) \cdot d_-}{d_- + d_+} \tag{9}$$

where $S_{int,-1}$ denotes the "linearly interpolated STIBOR rate" at the maturity of the off-tenor transaction, $S_{-,-1}$ denotes the published STIBOR rate for the STIBOR tenor to the left (hence the subscript -) of the off-tenor transaction maturity on the day prior to that for which the calculation of STIBOR is taking place (hence the subscript "-1"), and $S_{+,-1}$ denotes the published STIBOR rate for the STIBOR tenor to the right (hence the subscript +) of the off-tenor transaction maturity on the day prior to that for which the calculation of STIBOR is taking place. As described earlier, d_-, resp. d_+, denote the day count over spot of the neighbouring tenor to the left (resp. to the right) of the off-tenor transaction.

ii. The differential between the rate of the i-th off-tenor transaction (r_i) and the linearly interpolated STIBOR rate $S_{int,-1}$ is calculated

$$SAF = r_i \; - S_{int,-1} \tag{10}$$

iii. The rate derived from the off-tenor transaction at each of the neighbouring STIBOR tenors is calculated as the sum of the SAF in (10) and the previous day's published STIBOR at the respective tenor:

$$r_{-} = S_{-,-1} + SAF \qquad r_{+} = S_{+,-1} + SAF \tag{11}$$

iv. The Panel Bank's contribution rate at the corresponding neighbouring tenor is calculated as the volume-weighted average of all rates obtained after repeating the procedure above for all off-tenor transactions, and the corresponding volumes.

LEVEL 2.3: HISTORICAL TRANSACTIONS

Level 2.3 applies only to the 1 month, 2 months, 3 months and 6 months tenors and it is applied only in cases in which a contribution could not be derived from any of the previous methodological levels in the designated hierachy. Level 2.3 applies solely to transactions in any of the eligible foreign currencies[7] that have been previously used in the calculation of Level 1 contributions.[8]

The historical 'look-back' period for level 2.3 contributions is set according to the following table:

Tenor	**Transactions with trade date on any of**	
Tom/Next	**Not eligible for Level 2.3 calculation**	
1 Week	**Not eligible for Level 2.3 calculation**	
1 Month	5 previous business days	(Days T-1 to T-5)
2 Months	5 previous business days	(Days T-1 to T-5)
3 Months	5 previous business days	(Days T-1 to T-5)
6 Months	5 previous business days	(Days T-1 to T-5)

As a means to capture possible moves in interest rates between the date of the execution of the original transaction and the current date, a Market Adjustment Factor (MAF) will be added to the original trade rate, i.e.

$$r_i^{adj} = r_i \ + MAF$$

where r_i denotes the rate of transaction i on the respective trade date and r_i^{adj} the adjusted rate.

This procedure applies irrespective of the foreign currency in which the transaction was originally executed. For each currency, the SFBF stipulates the use of a specific MAF, as detailed below. For transactions executed in any of the eligible foreign currencies, the adjustment is performed prior to their conversion into SEK. For the calculation of the implied rate in SEK from the foreign currency rate, the standard formula in (3) is used.

The Level 2.3 contribution is calculated as the volume-weighted average of all eligible transactions from the most recent day within the time windows defined in the table above, after adjustment and conversion, as required.

[7] Historical SEK denominated transactions are not considered eligible under Level 2.3 due to lack of an appropriate market adjustment factor for moves in Swedish rates that fulfils the necessary criteria regarding transparency and verifiability.

[8] In accordance with the STIBOR Panel Bank Code of Conduct, Panel Banks are required to report any changes in the details of previously reported transactions. For the purpose of a Level 2.3 contribution calculation, only transactions in a foreign currency used under Level 1, and not cancelled, or otherwise reported as erroneous, are considered. In case corrections on those transactions are reported, Level 2.3 will use the details of the most recent contribution.

MARKET ADJUSTEMENT FACTOR

As mentioned above, the MAF intends to reflect overall movements in interest rates. The MAF is calculated relative to changes in the futures market in the currency underlying the original transaction, i.e. USD, EUR, or GBP, between the trade date of the original transaction and day T, in respect of a STIBOR calculation on day T+1. More concretely, the MAF is based on changes in the closing prices of the ICE futures contracts[9] in the corresponding quarterly months.

Tenor	Transactions with trade date on any of
1 Month	First front 3 months contract
2 Months	First front 3 months contract
3 Months	First front 3 months contract
6 Months	First and second front 3 months contracts

In formulaic terms, the MAF is calculated as follows:

$$MAF = F_0^{FCY} - F_{-d}^{FCY} \quad (12)$$

where F_0^{FCY} represents the value of the appropriate future contract rate on day T and F_{-d}^{FCY} represents the rate of the corresponding future contract on day $T - d$, where $1 \leq d \leq 5$, as per the table describing the applicable look-back period per tenor above.

Note

It is worth mentioning the specifics in the calculation of the MAF at the dates in which the futures contracts expire, also known as IMM dates.

The future contracts on which the Level 2.3 methodology relies cease trading on the Monday preceding the third Wednesday of a March quarterly cycle. This means the third Wednesday of March, June, September, and December. For the calculation of a MAF on any third Tuesday of either of these months, the methodology relies on the contract that is about to expire. After the third Wednesday, the MAF is calculated based on the moves of the new contract.

For example, let us consider the contract that settles on Wednesday, 16 June 2021, which stopped trading on Monday, 14 June 2021. If Level 2.3 were to be used to calculate a contribution on Tuesday, 15 June 2021 (day T+1), the methodology would rely on the June contract to estimate market movements since the trade date of the transaction until day T (assuming eligibility of the historical transaction). However, for a Level 2.3 contribution on Wednesday, 16 June 2021, the MAF would be calculated on the basis of moves in the next available, September contract.

[9] 3M EURIBOR C1, C2, C3; 3M SOFR C1, C2, C3; 3M SONIA C1, C2, C3.

Level 3 Contribution Calculation

Level 3 contributions are required where a Panel Bank's contribution for a STIBOR tenor cannot be calculated automatically using either Level 1 or Level 2 of the STIBOR Calculation Methodology.

Level 3 contributions should reflect the Panel Bank's estimated cost of funds for day T (the day preceding the calculation and publication of STIBOR);

For the determination of Level 3 contributions, Panel Banks shall take into consideration their short-term wholesale funding strategy, in particular their reliance on local currency (SEK) and derived SEK produced from foreign currency. Detailed guidance for Panel Banks is provided in the STIBOR Panel Bank Code of Conduct document.

5 STEP 2: Bid to Offer Spread Adjustment

The methodology described in the previous sections is anchored in executed transactional evidence, and other sources of data, to calculate an estimate of the rate at which Panel Banks in the STIBOR panel fund themselves in Swedish krona, their cost of funds (COF) rate. In contrast, as mentioned above, STIBOR represents a measure of the rate applied by Panel Banks for unsecured lending in Swedish krona. The final step of STIBOR's Calculation Methodology addresses this difference in value by adding a 'Bid to Offer Spread' (BOS), which guarantees full representativeness of a Panel Bank's contribution toward STIBOR, effectively moving the calculated COF rate to that of a 'lending rate'.

The application of the BOS is automatically performed by the STIBOR calculation system. Based on statistical studies performed by the SFBF, the following table lists the value (in basis points) of the BOS adjustment factor for each of STIBOR's official tenors.

Tenor	**BOS**
Tom/Next	8 basis points
1 Week	10 basis points
1 Month	15 basis points
2 Months	15 basis points
3 Months	15 basis points
6 Months	15 basis points

The SFBF has however defined two specific scenarios where Panel Banks may be allowed to alter their default BOS due to specific circumstances that require adjustment to the calculated COF rate under Step 1 of the STIBOR Calculation Methodology.

The two specfic scenarios are:

- Balance-Sheet Considerations - the additional cost related to the adjustment of the bank's balance sheet for key reporting dates, most notably over year-end;
- Riksbank Deposit Rate – the calculation of an implied SEK rate derived from foreign currency funding generated by CP and CD issuance is out of line with the perceived SEK term rate structure determined by the floor created by the Riksbank overnight deposit rate;

6 STIBOR Calculation

After the calculation of all Panel Banks contributions using the STIBOR Calculation Methodology described in the previous sections, the STIBOR Calculation Methodology is endowed with an outlier removal technique that aims at removing any idiosyncratic (non-market driven) volatility and reducing any potential for manipulation.

STIBOR is calculated as the arithmetic mean, rounded to three decimal places, for the all STIBOR official tenors (Tom/Next, 1 week, 1 month, 2 months, 3 months and 6 months), in the following manner:

No. of Panel Bank contributions	Calculation method and contingency calculations (applied separately for each tenor)
9 or more	Arithmetic mean of the rates, net of the two highest and two lowest rates
6 - 8	Arithmetic mean of the remaining rates net of the highest and lowest rates
4 - 5	Arithmetic mean of all contributions
2 – 3 Contingency	The shortfall of one or two contributions will be replaced by using the previous day's STIBOR rates once or twice respectively
0-1 Contingency	Yesterday's STIBOR rate will be published

In extreme cases ,such as natural disasters or extreme market events that lead to less than four Panel Banks contributing, the contingency calculation will be applied for an indefinite period. Stakeholders can be assured that should the contingency calculation be applied that after three consecutive business days the SFBF, as administrator, will consider all matters in respect to the immediate future publication of STIBOR.

Once announced and published, the STIBOR rates shall be final subject to the the SFBF Post Publication Re-determination policy.

6.1 Timings of Contributions, Calculations and Publication

The contributed Input Data for the calculation of STIBOR shall be contributed by Panel Banks to the SFBF every good business day (being defined as a day when banks are open in Sweden). Transactional evidence will be contributed between 6:30am and 9:00am. Level 3 contributions will be contributed between 9:00am and 10:00am local time.

The calculation and publication of STIBOR shall take place at 11:00am local time.

Activity	Key times
Contribution of transactional evidence	6:30am - 9:00am
Contribution of COF and any BOS adjustment	9:00am – 10:00am
Calculation and Publication of STIBOR	11:00am
DRP calculation time	12:30pm
Reporting of errors	11:00am – 1:00pm
Notification of re-determination	2:00pm
Re-determination time	3:00pm

6.2 Quorum for Calculation

The quorum for calculation is 4. In the case that less than 4 contributions are received the contingency calculation will apply.

6.3 Re-determination Due to Erroneous Contributions

The SFBF may publish re-determined STIBOR rates before 3:00pm local time at the latest, having announced the intention to republish corrected STIBOR rates by 2:00pm local time. Full details of this process are detailed in the SFBF Post Publication Re-Determination policy which is publicly available on the SFBF website.

6.4 Business Continuity Plan

In the event that the Business Continuity Plan is initiated the STIBOR Calculation Methodology will still be applied. In the event that the STIBOR Calculation System is unavailable, collection from Panel Banks of their Level 3 contributions will be applied.

7 Disclosure of and Changes to the STIBOR Calculation Methodology

This STIBOR Calculation Methodology shall be published by the SFBF via its website www.swfbf.se

The method for calculating STIBOR may be changed by the SFBF upon recommendation by the Benchmark Oversight Committee and in accordance with the SFBF Consultation Policy.

When amendments are made to the STIBOR Calculation Methodology, the Panel Banks shall be given reasonable and adequate time to adjust their procedures and processes.

8 Effect

The procedures detailed in this document shall come into force on 15 November 2021.

9 Appendix 1 - Definitions

For the purposes of the STIBOR Calculation Methodology the following definitions shall apply:

"Benchmark Administrator" shall mean the Swedish Financial Benchmark Facility (SFBF)

"Benchmark Oversight Committee" shall mean the committee (**the Committee**) within the SFBF that has the primary governance oversight of the methodology, determination, and dissemination of the Benchmark. The Committee's purpose is to support the integrity, accuracy, and reliability of the Benchmark to the benefit of all users of the benchmark and reliant market participants

"Input Data" shall mean the definition of Input Data, and the priority of Input Data as described in the SFBF STIBOR Calculation Methodology and SFBF STIBOR Panel Bank Code of Conduct

"Panel Bank" shall mean a bank which has been assigned the status of Panel Bank pursuant to Section 1 of the Panel Bank Code of Conduct and contributes Input Data for the calculation of the Benchmark

"STIBOR" is a measure of the interest rate applied by panel banks for unsecured lending in Swedish krona to leading banks.

"T" shall mean the date of Panel Bank transactions

"T+1" shall mean the business day (being defined as a day when banks are open in Sweden) upon which STIBOR will be calculated and published

"The Benchmark" shall mean STIBOR®