



Swiss Index

Methodology Rulebook Governing the Swiss Reference Rates

Table of Content

1	Structure of Swiss Reference Rates	4
1.1	Introduction	4
1.2	General Principles	4
1.3	Index Family Overview	5
1.4	Data Availability and Publication	6
2	Calculation of Average Rates (for Example SARON)	8
2.1	Trades	8
2.2	Quotes	8
2.2.1	Quote Filter	8
2.2.2	Quote Rules	8
2.2.3	Quote Volume	8
2.2.4	Restrictions	9
2.3	Formula	9
2.4	Sample Calculation: Reference Price R_q	10
2.5	Calculation Interval and Publication Times	10
3	Calculation of Current Rates (for Example SCRON)	11
3.1	Trades and Quotes	11
3.2	Formula	11
3.3	Sample Calculation	11
3.4	Calculation Interval and Publication Times	12
4	Calculation of Average and Current Indices (for Example SARON Index)	13
4.1	Formula	13
4.2	Sample Calculation	13
4.3	Calculation Interval and Publication Times	13
5	Calculation of SARON Compound Rates	14
5.1	Formula	14
5.2	Definition of Start and End Dates for SARON Compound Rates	15
5.3	Definition of Start and End Dates for SARON IMM Compound Rates	15
5.4	Examples to Determine Start Dates	16
5.5	Calculation Example SARON 1 Month Compound Rate	17
5.6	Calculation Interval and Publication Times	17
6	Additional Information	18
6.1	Formula for Compounded SARON on Non-Business Days	18
6.2	Example for Non-Business Days	19
7	Correction Policy	20
7.1	Unavailable Data	20
7.2	Wrong Data	20
8	Governance	20
9	External Communication	21
9.1	Reports	21
9.2	Vendor Code Sheet	21
9.3	Newsletter Email Service	22

10	Trademark, Protection, Use and Licensing	22
11	Contact	22
12	Static Data	23
12.1	Average and Current Rate	23
12.2	Indices on the Average, Current and Compound Rates	24
12.3	SARON Compound Rates	24

1 Structure of Swiss Reference Rates

1.1 Introduction

Repo transactions are an important instrument in day-to-day liquidity management. To serve the financial markets, SIX calculates and publishes Swiss Franc reference rates and indices for various terms (overnight to 12 months and compounding in arrears). The specifications for the reference rates have been drawn up in conjunction with the Swiss National Bank (SNB), the National Working Group on Swiss Reference Rates and the index commission.

The reference rates and indices are based on transaction data from SIX Repo Ltd's CHF repo interbank market. Repo transactions are an important tool in the banks' day-to-day liquidity management. The repo transaction has advanced to become a major money market instrument around the world. The SNB also uses the repo market to implement its monetary policy.

Only standardised, CHF-denominated GC contracts¹ against fixed-income securities eligible for SNB repo transactions are used to calculate the reference rates and indices.

1.2 General Principles

In order to achieve the stated index objective, SIX defines the general principles that govern the index methodology. SIX publishes the index objective and rules for all indices.

- **Representative:**
The development of the market is represented by the index.
- **Tradable:**
The index components are tradable in terms of company size and market.
- **Replicable:**
The development of the index can be replicated in practice with a portfolio.
- **Stable:**
High index continuity.
- **Rules-based:**
Index changes and calculations are rule-based.
- **Projectable:**
Changes in rules are with appropriate lead time (usually at least 2 trading days) – no retrospective rule changes.
- **Transparent:**
Decisions are based on public information.

¹ GC contract: GC stands for General Collateral. In a repo transaction, the money that is loaned out is secured against securities of a defined quality that are drawn from a GC basket.

1.3 Index Family Overview

The Swiss Reference Rates comprise of reference rates and indices that cover a range of terms from overnight to 12 months, both in advance and compounded in arrears.

Terms	Average Rates	Current Rates	Average Indices	Current Indices
Overnight ON – in advance	SARON	SCRON	SARON Index (SAION)	SCION
1 week – in arrears	SARON 1 week Compound Rate	n/a	SARON 1 week Compound Index	n/a
1 month - in arrears	SARON 1 month Compound Rate	n/a	n/a	n/a
2 months - in arrears	SARON 2 months Compound Rate	n/a	SARON 2 months Compound Index	n/a
3 months - in arrears	SARON 3 months Compound Rate	n/a	SARON 3 months Compound Index	n/a
6 months - in arrears	SARON 6 months Compound Rate	n/a	n/a	n/a
9 months - in arrears	SARON 9 months Compound Rate	n/a	SARON 9 months Compound Index	n/a
12 months – in arrears	SARON 12 months Compound Rate	n/a	SARON 12 months Compound Index	n/a
1 month IMM - in arrears	SARON 1 IMM Compound Rate	n/a	n/a	n/a
3 months IMM - in arrears	SARON 3 IMM Compound Rate	n/a	n/a	n/a
Tom/Next TN – in advance	SARTN	SCR TN	n/a	n/a
Spot/Next SN – in advance	SAR SN	SCR SN	n/a	n/a
1 Week 1W – in advance	SAR1W	SCR1W	n/a	n/a
2 Weeks 2W – in advance	SAR2W	SCR2W	n/a	n/a
3 Weeks 3W – in advance	SAR3W	SCR3W	n/a	n/a
1 Month 1M – in advance	SAR1M	SCR1M	n/a	n/a
2 Months 2M – in advance	SAR2M	SCR2M	n/a	n/a
3 Months 3M – in advance	SAR3M	SCR3M	n/a	n/a
6 Months 6M – in advance	SAR6M	SCR6M	n/a	n/a
9 Months 9M – in advance	SAR9M	SCR9M	n/a	n/a
12 Months 12M – in advance	SAR12M	SCR12M	n/a	n/a

The calculations for a compounded SARON are offered for pre-defined time periods in arrears beyond the overnight tenor. These SARON Compound Rates support the market for benchmarking and for the determination of the observation period of a compounded SARON in financial products like mortgages, deposits, bonds, floating rate notes, overnight indexed swaps and futures.

- The SARON 1 week Compound Rate reflects the aggregation of all daily SARON rates over the time period of one week and is calculated in arrears. The time period for the SARON 1 week Compound Rate ends on each business day of a given week and starts on a business day one week earlier.

- The SARON 1 month Compound Rate reflects the aggregation of all daily SARON rates over the time period of one month and is calculated in arrears. The time period for the SARON 1 month Compound Rate ends on each business day of a given month and starts on a business day one month earlier.
- The SARON 2 month Compound Rate reflects the aggregation of all daily SARON rates over the time period of two months and is calculated in arrears. The time period for the SARON 2 months Compound Rate ends on each business day of a given month and starts on a business day two months earlier.
- The SARON 3 months Compound Rate reflects the aggregation of all daily SARON rates over the time period of three months and is calculated in arrears. The time period for the SARON 3 months Compound Rate ends on each business day of a given month and starts on a business day three months earlier.
- The SARON 6 months Compound Rate reflects the aggregation of all daily SARON rates over the time period of six months and is calculated in arrears. The time period for the SARON 6 months Compound Rate ends on each business day of a given month and starts on a business day six months earlier.
- The SARON 9 months Compound Rate reflects the aggregation of all daily SARON rates over the time period of nine months and is calculated in arrears. The time period for the SARON 9 months Compound Rate ends on each business day of a given month and starts on a business day nine months earlier.
- The SARON 12 months Compound Rate reflects the aggregation of all daily SARON rates over the time period of twelve months and is calculated in arrears. The time period for the SARON 9 months Compound Rate ends on each business day of a given month and starts on a business day twelve months earlier.
- The SARON 1 IMM Compound Rate reflects the aggregation of all daily SARON rates over the time period of one month and is calculated in arrears. The time period for the SARON 1 IMM Compound Rate ends on the 3rd Wednesday of a given month and starts on the 3rd Wednesday one month earlier.
- The SARON 3 IMM Compound index reflects the aggregation of all daily SARON rates over the time period of three months and is calculated in arrears. The time period for the SARON 3 IMM Compound index ends on the 3rd Wednesday of a given month and starts on the 3rd Wednesday three months earlier.

Further SARON Compound Rates and indices for other periods or other calculations for a compounded SARON can be provided on request.

1.4 Data Availability and Publication

All Swiss Reference Rates, including SARON, the SARON Index and the SARON Compound Rates are calculated and published according to the CHF repo calendar of the SIX Repo trading platform (the CHF repo calendar is identical with the CHF currency or CHF money market calendars) and there is no publication on non-business days.² SARON prior to any weekend or other holiday is based on market transactions that consider the upcoming overnight period including the weekend or currency holiday. The following table is giving examples for how many days SARON applies specifically around weekends with a_i being the number of calendar days in the period for which SARON applies.

² <https://www.six-group.com/en/products-services/the-swiss-stock-exchange/market-data/news-tools/trading-currency-holiday-calendar.html#/currencyCalendar>

Date	Weekday	a_i	Comment
08.10.2018	Monday	1 day	SARON calculated on Monday applies for the upcoming overnight period until Tuesday.
07.10.2018	Sunday	n/a	No SARON available. The SARON value from Friday already includes the period over the weekend.
06.10.2018	Saturday	n/a	See above
05.10.2018	Friday	3 days	SARON determined on Friday implicitly includes the longer overnight period over the weekend and applies for the upcoming overnight period until Monday.
04.10.2018	Thursday	1 day	SARON calculated on Thursday applies for the upcoming overnight period until Friday.

2 Calculation of Average Rates (for Example SARON)

The Average Rate is calculated on the basis of trades concluded (T_p), or on a reference price (R_q) that is based on quotes and rounded to six decimal places. The Average Rate is recalculated every time a trade is concluded or a new quote issued, providing they meet the following specifications.

2.1 Trades

The price of a trade and its volume (V_T) are fed directly in to the index calculation, providing the price is within the trade filter of 50 basis points (bp): $P_{n-1} - 50 \text{ bp} \leq T_p \leq P_{n-1} + 50 \text{ bp}$. Prices that correspond exactly to the marginal value are factored in to the calculation. There is no limit to trade volume. The Average Rate is not corrected if a trade is reversed.

2.2 Quotes

2.2.1 Quote Filter

The reference price (R_q) is calculated on the basis of the quotes available in the order book, providing they lie within the quote filter³. The starting point for the quote filter is the price which lies halfway between the bid and ask sides (mid price, m). It corresponds to the volume-weighted average of the best buy and sell quotes. Measured at the mid price and rounded to five decimal places, the quote spread (q_n) amounts to three basis points: $m + 3 \text{ bp} \geq \text{quote} \geq m - 3 \text{ bp}$. The calculation factors in both quotes that correspond exactly to the marginal value and those which are available to only a selection of participants.

2.2.2 Quote Rules

Any number of quotes may be used to calculate the reference price (R_q), providing the quotes concerned lie within the quote spread (q_n) and order book depth 10, i.e. a maximum of ten best buy and sell quotes are factored in to the calculation. Where quotes differ, one quote only from each bank will be included for each side of the order. Furthermore, it may be that the number of prices included from the ask side is greater than that from the bid side, and vice versa. If no quotes are available within the quote spread (q_n), the mid price (m) is used as the new reference price (R_q).

2.2.3 Quote Volume

The volume of quotes is restricted to CHF 100 million. If there are several identical quotes on each side of the order, but their volumes differ, then the volumes of these quotes are aggregated for the purposes of calculating the mid price (m). The aggregated volume is capped at CHF 100 million.

The volumes of identical quotes that lie within the quote spread (q_n) are cumulated and capped at CHF 100 million. The volumes given for the quotes that are to be factored in are also included in the calculation of average volume (no fractions), but the aggregated volume per quote is once again limited to CHF 100 million. This average volume is then fed into the recalculation of the Average Rate.


³ The use of a quote filter prevents quotes that diverge sharply from the current interest level distorting the Average Rate.

2.2.4 Restrictions

In the cases described below, the Average Rate is not recalculated and the last reference price remains valid:

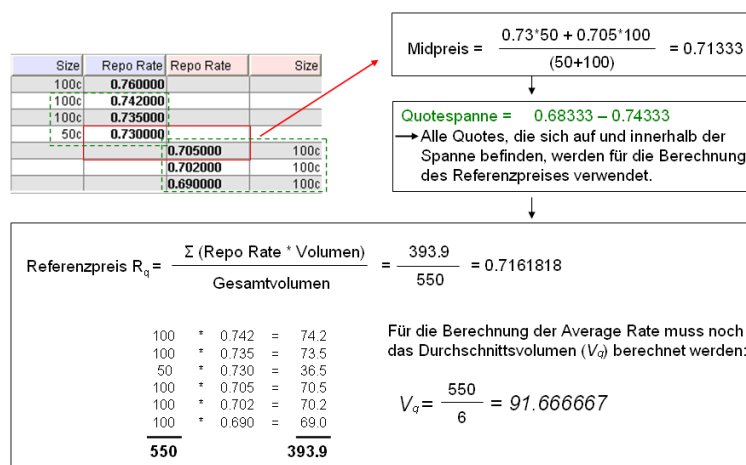
- The order book contains quotes for only one side of the transaction (buy or sell), or contains no quotes at all.
- New quotes are entered in the order book, but they do not change the reference price (R_q) compared with its previous value, neither do they impact on the total volume for the reference price (R_q).
- Changes in volume relating to quotes that are already in the order book do not trigger a recalculation.
- The spread between the best buy and sell quotes exceeds 20 basis points.

2.3 Formula

	Formula	Legend
Average Rate (AR_n)	$AR_n = \frac{AR_{(n-1)} \cdot \sum_{j=1}^{n-1} v_j + P_n \cdot v_n}{\sum_{j=1}^n v_j}$	$\sum_{j=1}^{n-1} v_j$ = Past volume for reference prices and trades used in calculating the reference rate
Trade Filter	$P_{n-1} - 50 \text{ BP} \leq T_p \leq P_{n-1} + 50 \text{ BP}$	
Price (P_n)		P_n = Relevant price for the calculation, based on a trade (T_p) or a reference price (R_q)
Volume (V_n)	when $P_n = T_p \rightarrow V_n = V_T$ when $P_n = R_q \rightarrow V_n = V_q$	T_p = Price of a trade V_T = Volume of a trade (unlimited)
Calculation of the Reference Price (R_q):		
Mid Price (m):	$m = \frac{b \cdot v_b + s \cdot v_s}{v_b + v_s}$	b = Best Buy v_b = Volume b (max.100 M) s = Best Sell v_s = Volume s (max.100 M)
	If $s=0$ and/or $b=0 \rightarrow$ no update	
Quote Spread (q_n)	$(m + 3 \text{ BP} \geq q_n \geq m - 3 \text{ BP})$	q_n = Buy and sell price within the spread
Reference Price (R_q)	$R_q = \frac{\sum_{j=1}^n q_j \cdot v_j}{\sum_{j=1}^n v_j}$	q_j = Quotes in q_n v_j = Volume of quote j $j = 1, 2, 3, \dots$ max. volume per quote = CHF 100 M max. aggregated volume for identical quotes = CHF 100 M
Volume of R_q (V_q)	$V_q = \frac{\sum_{j=1}^n v_j}{n}$	V_q = Average volume max. volume per quote = CHF 100 M max. aggregated volume for identical quotes = CHF 100 M
If $q_n = \{ \}$	$R_q = m$ and $V_q = (V_b + V_s) / 2$	v_b = Volume b (max. 100 M) v_s = Volume s (max. 100 M)

2.4 Sample Calculation: Reference Price R_q

Market participants may enter the price of a trade, and quotes, at up to six decimal places. Prices that correspond exactly to the marginal value are factored in to the calculation. In the example given below, a new quote triggers recalculation.



All quotes that lie within the quote spread (q_n) are used to calculate the reference price (R_q). They are weighted according to their volume, added together and finally divided by the total volume (the sum of all volumes for the quotes to be factored in to the calculation). The average volume must be taken into account in calculating the Average Rate.

2.5 Calculation Interval and Publication Times

The Average Rate is calculated for the first time when the first constellation arises in the order book. It is published for the first time at 08.30 and for the last time at the end of the trading day. The Average Rates for different durations may have different cut-off times. The cut-off time determines the end of the trading day, and the rates for different durations may have different cut-off times. Since the cut-off time is not necessarily the same as the publication time for the Average Rate, the publication of the last Average Rate figure may fall outside the defined publication interval of ten minutes.

The market value of the Average Rate is published every day at 12.00, 16.00 and at the end of the trading at 18.00. These figures are referred to as fixed rates⁴.

Average Rates are calculated in real time but are published every ten minutes.

Reference rates and indices are calculated and published on all official trading days on the Swiss franc repo market.

In case the fixing of the Average Rates (except for SARON) is not available, the last published rate from the previous business day remains valid and no new value will be published.

In case the fixing of the overnight rate SARON is not available the last published rate from the previous business day will be re-published.

All data is distributed by SIX Exfeed Ltd, a subsidiary of SIX Group Ltd.

⁴ Given the different trading hours, it may be that individual durations or interest rates have only two fixed rates (12:00 and 18:00) rather than the usual three average fixed rates (12.00, 16.00 and 18:00), or that the 16.00 fixed rate corresponds to that at 18:00.

3 Calculation of Current Rates (for Example SCRON)

The Current Rate shows the progress of trading during the day and reflects the current market price. The Current Rate gives an indication of the direction in which the market is moving. It may thus also serve as an indicator of short-term shifts.

3.1 Trades and Quotes

Rather than in real time, the Current Rate is calculated and published every three minutes and rounded to six decimal places. It gives the last trade observed during the publication interval. In the absence of a trade during this period, the mid price is calculated and published as the Current Rate. Trades take precedence over the mid price, however. If no new trades have been concluded within the three-minute period, or no new quotes have been entered in the order book, the previous Current Rate is published again. This also applies if no trade has taken place and the spread between the best buy and sell quotes exceeds 20 basis points.

3.2 Formula

	Formel	Legend
Current Rate (CR_t)	If T exists in the interval prior to publication: $CR_t = T$ Otherwise: $CR_t = M$	T = Trade M = Mid Price
Mid Price (M)	$M = \frac{b + s}{2}$ If $s = 0$ and/or $b = 0$ → last available mid price	b = Best Buy s = Best Sell

3.3 Sample Calculation

Times at which the current rate is published:	The intervals are:
- V1 = 8:30:00	- bis 8:29:59 = V1
- V2 = 8:33:00	- 8:30:00 - 8:32:59 = V2
- V3 = 8:36:00	- 8:33:00 - 8:35:59 = V3
- V4 = 8:39:00	- 8:36:00 - 8:38:59 = V4

Timing	8.29	8.31	8.32	8.37
Bester Sell	0.59		0.60	0.65
Bester Buy	0.61		0.62	0.75
Trade		0.63		
M or T	M	T	M	M

Publication:

V1 (8:30)	No trade so far	$CR_{V1} = (0.59 + 0.61) / 2 = 0.60$
V2 (8:33)	Trade at 8:31 within the interval	$CR_{V2} = 0.63$
V3 (8:36)	No changes to quotes or trades	$CR_{V3} = CR_{V2} = 0.63$
V4 (8:39)	No trade within the interval	$CR_{V4} = (0.65 + 0.75) / 2 = 0.70$

3.4 Calculation Interval and Publication Times

The Current Rate is published for the first time at 08.30 and for the last time at the end of the trading day. The Current Rates for different durations may have different cut-off times. The cut-off time determines the end of the trading day, and the rates for different durations may have different cut-off times. Since the cut-off time is not necessarily the same as the publication time for the Current Rate, the publication of the last Current Rate figure may fall outside the defined publication interval of three minutes.

The Current Rate is calculated immediately prior to publication in each case. This takes place every three minutes.

Reference rates and indices are calculated and published on all official trading days on the Swiss franc repo market.

In case the Current Rates (except SCRON) are not available, the last published rate from the previous business day remains valid and no new value will be published. In case the fixing of the current rate SCRON is not available, the last published rate from the previous business day will be re-published.

All data is distributed by SIX Exfeed Ltd, a subsidiary of SIX Group Ltd.

4 Calculation of Average and Current Indices (for Example SARON Index)

For the “overnight” duration, SIX calculates and publishes two indices on the basis of the Average and Current Rates respectively. These give the performance generated by daily overnight transactions. Further indices are available based on the SARON Compound Rates.

4.1 Formula

Index I_t

$$I_t = I_T \left(1 + \frac{SRR_T}{360} D_{T,t} \right)$$

Legend:

I:	Index
t:	Current trading day
T:	Last trading day prior to t
SRR	Swiss Reference Rate (as a percentage) for the corresponding duration and price type
D:	Number of calendar days between t and T
Interest Convention:	Current/360 Publication at time t with date stamp t (no time stamp)

4.2 Sample Calculation

Index at time T	100
Swiss Reference Rate (overnight) at time T	0.15
Number of calendar days between t and T	1
Index at time t	$I_t = 100 \left[1 + \left(\frac{0.15/100}{360} \right) 1 \right] = 100.000417$

4.3 Calculation Interval and Publication Times

The indices are calculated and published once a day at the end of the trading day (rounded to six decimal places).

Reference rates and indices are calculated and published on all official trading days on the Swiss franc repo market.

All data is distributed by SIX Exfeed Ltd, a subsidiary of SIX Group Ltd. and published on the website in the Index Data Center.

5 Calculation of SARON Compound Rates

5.1 Formula

The SARON Compound Rates are calculated in arrears for pre-defined time periods using the following formula.

$$SARON\ Compound\ Rate = \left[\prod_{i=1}^{bd} \left(1 + \frac{r_i a_i}{360} \right) - 1 \right] \frac{360}{n}$$

-
- bd** Number of business days in the observation period from (and including) the start date to (but excluding) the end date. E.g. bd equals one for an observation period from Monday to Tuesday
 - i** Index from one to bd
 - n** Number of calendar days of the observation period from (and including) the start date to (but excluding) the end date. E.g. n equals one for an observation period from Monday to Tuesday
 - r_i** SARON on business day i
 - a_i** Number of calendar days for which SARON r_i applies
-

As an alternative method to calculate a compounded SARON, the SARON Index (SAION) can be used as input source. The SARON Index is described in section 4 and represents the performance generated by a daily compounding of SARON.

$$SARON\ Compound\ Rate = \left(\frac{SARON\ Index_E}{SARON\ Index_S} - 1 \right) \frac{360}{n}$$

-
- n** Number of calendar days of the observation period from (and including) the start date S to (but excluding) the end date E
- SARON Index_S and SARON Index_E - SARON Index value at the start date S and end date E
-

The advantage of using the SARON Index is that for any given time period only two data points are needed to obtain a compounded SARON while the standard formula requires the collection of every daily SARON value. Both formulas can be applied to calculate a compounded SARON for any combination of business days.

Given that the SARON Index reflects the same arithmetic as a compounded SARON and the SARON Compound Rates, rates calculated using the SARON Index with the same start and end dates should effectively produce equivalent results. However, because the SARON Index is rounded, its values do not maintain the same precision as the compounded SARON. As a result, minor differences may occasionally occur at the fourth decimal place.

The SARON Compound Rates are calculated with four decimals and rounded to half away from zero.

5.2 Definition of Start and End Dates for SARON Compound Rates

The SARON Compound Rates are provided for pre-defined time periods. The end date for each period is the current business day on which the underlying rate, SARON, is being calculated. The start date for each daily SARON Compound Rates is the business day the respective number of weeks/months before the end date. The determination of the start date is aligned with the CHF money market calendar.⁵ If a determined start date falls on a non-business day like a weekend or a currency holiday the start date will be adjusted.

In the CHF money market calendar the end date is defined in advance based on the start date and non-business days are adjusted using the Modified Following Business Day Convention. There are three scenarios:

- If the start date is the last business day of a month, the end date must also be the last business day of a month
- The time period is extended by moving the end date to the next business day if it falls on a non-business day, except if this leads to a new month.
- The time period is shortened by moving the end date to the previous business day, if otherwise moving the date forward would result in a new month.

Note: For the SARON Compound Rates with a tenor of below one month (e.g. weekly) the scenarios no longer apply, as the month-end restrictions are obsolete in such a case.

The SARON Compound Rates are calculated in arrears therefore the Modified Following Business Day Convention cannot be applied directly, but to align and be as close as possible with the CHF money market calendar and the Business Day Convention the start date determination applies the following sequence:

- If the start date is unique according to the CHF money market calendar, this start date is used.
- If the end date is the last business day of a month, the start date must also be the last business day of a month.
- For each end date with multiple start date possibilities according to the CHF money market calendar – unless the end date is the last business day of a month – the following steps are taken:
 - the middle date is selected as the start date, if there is an uneven number of possible start dates
 - the preceding of the two dates surrounding the mid-point is chosen, if there is an even number of possible start dates
- Otherwise, if the initially determined start date falls on a non-business day or non-existing date (e.g. 30th of February), the business day that precedes the calculated start date will be the used start date, unless this new start date would fall within a different month. In such cases not the preceding business day, but the following business day will be used as the final start date.

Generally, for SARON Compound Rates with a tenor of below one month (e.g. weekly) the procedure to identify start- and end dates simplifies, as the month-end restrictions are redundant. However, everything else should be treated in the same way.

5.3 Definition of Start and End Dates for SARON IMM Compound Rates

SIX provides the SARON IMM Compound Rates for pre-defined time periods. The end date of such time periods is the 3rd Wednesday of the month according to IMM (International Money Market Calendar) and is by definition always a business day. The start date is the 3rd Wednesday the respective number of months before the end date.

⁵ <https://www.six-group.com/en/products-services/the-swiss-stock-exchange/market-data/news-tools/trading-currency-holiday-calendar.html#/currencyCalendar>

5.4 Examples to Determine Start Dates

The following table is giving examples on how the end and start dates are defined for the SARON Compound Rates.

Time Period	End Date	Start Date	Comment
1 month	30.04.2018	29.03.2018	Last business day of the month. The start date is moved to the last business day of a month
1 month	15.06.2018	15.05.2018	One option in the money market calendar
1 month	08.10.2018	06.09.2018 or 07.09.2018	Two options in the money market calendar that lead to the end date 08.10.2018. The earlier date 06.09.2018 is selected
1 month	23.04.2018	21.03.2018 or 22.03.2018 or 23.03.2018	Three options in the money market calendar that lead to the end date 23.04.2018. The middle date 22.03.2018 is selected
1 month	10.12.2019	08.11.2019	The previous business day is used because 10.11.2019 is a non-business day

A compounding in arrears and the money market calendar lead to the same dates for the time periods at month end. Around currency holidays like Easter and Christmas or within a month there may be differences. The impact on the calculations is low, especially for longer tenors. Around such currency holidays typically one data point is added to a time series of 30, 90 or 180 calendar days.

5.5 Calculation Example SARON 1 Month Compound Rate

end_date	08.10.2018
start_date (two options in the money market calendar that lead to the end date 08.10.2018. The earlier date 06.09.2018 is selected)	06.09.2018
day_count	32
SARON Compound Rate: (product (multiplier) -1) *360 / day_count)	-0.7451
SARON Compound Rate: (SARON Index (end) / SARON Index(start) -1)* (360/ day_count)	-0.7451

Date	SARON	multiplier (1+ SARON x day_count / 360)	day_count	SARON Index
06.09.2018	-0.739773	0.999979	1	11048.90141
07.09.2018	-0.737137	0.999938572	3	
10.09.2018	-0.73405	0.99997961	1	
11.09.2018	-0.742549	0.999979374	1	
12.09.2018	-0.744533	0.999979319	1	
13.09.2018	-0.739139	0.999979468	1	
14.09.2018	-0.734535	0.999938789	3	
17.09.2018	-0.732281	0.999979659	1	
18.09.2018	-0.739414	0.999979461	1	
19.09.2018	-0.741015	0.999979416	1	
20.09.2018	-0.740611	0.999979427	1	
21.09.2018	-0.743656	0.999938029	3	
24.09.2018	-0.736047	0.999979554	1	
25.09.2018	-0.745040	0.999979304	1	
26.09.2018	-0.760342	0.999978879	1	
27.09.2018	-0.753971	0.999979056	1	
28.09.2018	-0.785767	0.999934519	3	
01.10.2018	-0.738704	0.99997948	1	
02.10.2018	-0.734949	0.999979585	1	
03.10.2018	-0.743903	0.999979336	1	
04.10.2018	-0.742927	0.999979363	1	
05.10.2018	-0.746194	0.999937817	3	
08.10.2018				11041.58344

5.6 Calculation Interval and Publication Times

The SARON Compound Rates are published in a report produced end of day after the SARON is published.

6 Additional Information

To support customers to determine a compounded SARON outside of the standard 1, 3 and 6 month periods, SIX is providing the "SARON Compound calculation matrix". This file contains the compounded SARON value for all date combinations including weekends and non-business days of the last 12 months. Further, a web-based calculator for a compounded SARON is available for ad-hoc calculations.

6.1 Formula for Compounded SARON on Non-Business Days

For instances when a compounded SARON is required for a non-business day (e.g. starting or ending on a weekend) the National Working Group on Swiss Franc Reference Rates has developed the following approximation to cover non-business days.

$$\text{compounded SARON} = \left[\prod_{i=1}^{bd} \left(1 + \frac{r_i a_i}{360} \right) - 1 \right] \frac{360}{n}$$

bd Number of business days in the observation period from (and including) the first calendar date (start date) to, but excluding the last calendar date (end date), except if, the start date is not a business day, then "bd" is increased by one. E.g. bd equals one for an observation period from Monday to Tuesday, two for an observation period from Sunday to a Tuesday and one for an observation period from Friday to Sunday.

i Index from one to bd

n Number of calendar days in the observation period from (and including) the start date to (but excluding) the end date. E.g. n equals one for an observation period from Monday to Tuesday

r_i SARON for business day i. In case the start date is not a business day, SARON from the preceding business day is used.

a_i number of calendar days for which SARON r_i applies. If the observation period ends on a Sunday, a_i equals two. If the observation period starts on a Sunday, a_i equals one and SARON from the preceding business day is used.

6.2 Example for Non-Business Days

The following overview shows the day count depending on whether the observation period is starting or ending on non-business days.

	TH	FR	SA	SU	MO	TU	WE	TH	FR	SA	SU	Number of Business Days	Number of Calendar Days
Example SARON Compound Rates (Monday to Monday)	-0.72	-0.75			-0.78	-0.74	-0.75	-0.76	-0.71				
applicable days	1	3			1	1	1	1	1			bd = 5	n = 7
Example Non-Business Days (Monday to Sunday)	-0.72	-0.75			-0.78	-0.74	-0.75	-0.76	-0.71				
applicable days					1	1	1	1	2			bd = 5	n = 6
Example non-business days (Sunday to Sunday)	-0.72	-0.75		-0.75	-0.78	-0.74	-0.75	-0.76	-0.71				
applicable days				1	1	1	1	1	2			bd = 5 + 1	n = 7

7 Correction Policy

An index-related correction is to be made due to two causes. Either because the necessary data is not available or because it is wrong.

7.1 Unavailable Data

If data which is necessary to determine the price or weight of an index component is not available to SIX due to trade suspensions or market distortions the latest available data is used. Such cases may lead to a deviation from the general principles of the indices defined in the respective rulebooks. These changes may be related to review schedules, ordinary reviews as well as component and weighting changes outside of ordinary index reviews and are publicly announced with a notification period of at least 2 trading days.

7.2 Wrong Data

Errors in the necessary data can be caused by calculation errors or by incorrect input data.

Calculation errors which are detected within a trading day are immediately corrected. Intraday tick data is not corrected retrospectively. Calculation errors that are older than a trading day and incorrect input data are only corrected if technically possible and economically viable. If the correction leads to a significant difference in the index levels those can be corrected retrospectively.

8 Governance

The indices are internally managed by the index team of SIX. The team ensures that the rules of the indices are applied and the indices fulfil the required quality standards. The index team works against structured processes to ensure compliance with a regulatory framework. Further documentation on regulation and processes can be found on the SIX website. Based on the general principles outlined in section 1.2, SIX reserves the right to adjust index compositions, component weightings or notification periods.

Index Commission

- SIX is supported by the Index Commission Swiss Reference Rates. The Index Commission provides inputs on index-related matters, notably in connection with changes to the index rules and adjustments, additions and exclusions outside of the established review and acceptance period.
- The Commission convenes at least twice a year and provides valuable input on how existing products can be improved and new ones created.

Review of Index Concepts

- The validity of the index concepts and rules is reviewed on a regular basis by SIX. For significant changes a broad market consultation is conducted. The changes to the index rules are publicly announced with appropriate lead time (usually 3 months).

Termination of Indices

- A decision to discontinue an index will be publicly announced with appropriate lead time.
- In case of existing financial products linked to the index of which SIX is aware a market consultation is conducted in advance and a transition period is introduced before the definitive termination. Otherwise no market consultation will be carried out.

Controls and Rules for the Exercise of Expert Judgement

The rules for each of the indices have been designed to eliminate discretion or expert judgement for the index calculation to the greatest extent possible. However, potential limitations of the methodology can materialize in situations including:

- unexpected events, such as complex corporate actions
- technical reasons, for example the inability of a stock exchange to provide a close price due to a computer outage
- where a rule allows for several interpretations (“unclear rule”)
- the absence of a rule in the methodology which potentially leads to a benchmark value which does not properly reflect the nature of the index (“insufficient rule”)
- determination of materiality of changes to the index methodology

In such unexpected cases, a pre-defined incident and escalation process has been established. SIX will evaluate and document the use of discretion as part of the incident management process. To the extent possible, this rulebook will be updated to capture such unexpected cases with a new transparent rule.

In addition, any feedback from market participants about the use of discretion will usually be discussed in the upcoming Index Commission meeting.

9 External Communication

SIX uses the following tools in order to inform the market about index changes. Index changes are changes in index compositions, component weights as well as ordinary and extraordinary index adjustments.

9.1 Reports

SIX creates and maintains reports containing index compositions, component weights, corporate action forecasts and other index-relevant information. SIX publishes the reports on its website, the majority of the reports is only made available to license holders. However, since the information of some reports is index-specific, the number of reports which are relevant for an index varies from index to index. Depending on the recency of their information, the reports are updated with different frequencies ranging from daily to annual.

For the Swiss Reference Rates the following reports are provided:

- historical value reports for all rates and indices
- an end of day report with the latest SARON and SARON Index values
- the SARON Compound calculation matrix with all compounded SARON values of the last 12 months

9.2 Vendor Code Sheet

Information on the actual ticker symbols, index standardizations, launch dates and calculation parameters of the indices can be found in the Vendor Code Sheet which is published under ‘Current list of all indices calculated by SIX Swiss Exchange’ on the website of SIX.

9.3 Newsletter Email Service

SIX provides the Index Service Swiss Reference Rates to inform in depth on corrections of historical index values, corporate actions, and information regarding the index composition. Interested parties may subscribe to the newsletter e-mail service on the website⁶. SIX distributes all notifications regarding indices over this channel. This may include but is not limited to

- Changes in corporate actions and dividends
- Updates to the periodic index reviews
- Problems and error in the index calculation
- The launch or discontinuation of indices
- Market consultations
- Issuer surveys

Index Messages

The messages from the newsletter email service with regards to index adjustments are uploaded on the SIX website⁷. Those index messages are publicly available and do neither need a subscription nor a licensing agreement.

Media Release

If an index message is of broad public interest, SIX can decide to publish a media release in order to inform the public about the index adjustment. Furthermore, media releases can be made for marketing purposes which do not refer to index adjustments.

10 Trademark, Protection, Use and Licensing

The Indices Trademarks are the intellectual property (including registered trademarks) of SIX Swiss Exchange, Zurich, Switzerland. SIX Swiss Exchange does not give any warranty, and excludes any liability (whether in negligence or otherwise) with respect to their usage. The use of SIX Swiss Exchange Indices and their registered trademarks (®) as well as the access to restrictive index data are governed by a licensing agreement. Information about licensing and the format of the disclaimer can be found on the SIX website⁸.

11 Contact

Any requests with respect to the indices may be directed to one of the following addresses:

Swiss Index Business Support

Index Sales, Licensing and Data

T +41 58 399 26 00

indexdata@six-group.com

Swiss Index Technical Support

Index Operations

T +41 58 399 22 29

indexsupport@six-group.com

⁶ www.six-group.com/indices > Market Data > Indices > Request account

⁷ www.six-group.com/indices > Market Data > Indices > Index messages

⁸ www.six-group.com/indices > Market Data > Indices > Licensing

12 Static Data

12.1 Average and Current Rate

Name	Short Name	Symbol	ISIN
SAR Swiss Average Rate ON	SAR [®] ON	SARON	CH0049613687
SAR Swiss Average Rate TN	SAR [®] TN	SARTN	CH0049613703
SAR Swiss Average Rate SN	SAR [®] SN	SARSN	CH0049613711
SAR Swiss Average Rate 1W	SAR [®] 1W	SAR1W	CH0049613737
SAR Swiss Average Rate 2W	SAR [®] 2W	SAR2W	CH0049613745
SAR Swiss Average Rate 3W	SAR [®] 3W	SAR3W	CH0049613752
SAR Swiss Average Rate 1M	SAR [®] 1M	SAR1M	CH0049613760
SAR Swiss Average Rate 2M	SAR [®] 2M	SAR2M	CH0049613778
SAR Swiss Average Rate 3M	SAR [®] 3M	SAR3M	CH0049613786
SAR Swiss Average Rate 6M	SAR [®] 6M	SAR6M	CH0049613802
SAR Swiss Average Rate 9M	SAR [®] 9M	SAR9M	CH0049613810
SAR Swiss Average Rate 12M	SAR [®] 12M	SAR12M	CH0049613828
SCR Swiss Current Rate ON	SCR [®] ON	SCRON	CH0049613901
SCR Swiss Current Rate TN	SCR [®] TN	SCR TN	CH0049613919
SCR Swiss Current Rate SN	SCR [®] SN	SCR SN	CH0049613927
SCR Swiss Current Rate 1W	SCR [®] 1W	SCR1W	CH0049613935
SCR Swiss Current Rate 2W	SCR [®] 2W	SCR2W	CH0049613950
SCR Swiss Current Rate 3W	SCR [®] 3W	SCR3W	CH0049613968
SCR Swiss Current Rate 1M	SCR [®] 1M	SCR1M	CH0049613976
SCR Swiss Current Rate 2M	SCR [®] 2M	SCR2M	CH0049613984
SCR Swiss Current Rate 3M	SCR [®] 3M	SCR3M	CH0049613992
SCR Swiss Current Rate 6M	SCR [®] 6M	SCR6M	CH0049614008
SCR Swiss Current Rate 9M	SCR [®] 9M	SCR9M	CH0049614016
SCR Swiss Current Rate 12M	SCR [®] 12M	SCR12M	CH0049614024

12.2 Indices on the Average, Current and Compound Rates

Name	Short Name	Symbol	ISIN
SARON Index	SAION®	SAION	CH0100517157
Swiss Current Index ON	SCION®	SCION	CH0100484986
SARON 1 week Compound Index	SARON1WC Index	SARO1WI	CH0599147359
SARON 1 month Compound Index	SARON1MC Index	SARO1MI	CH0599147292
SARON 2 months Compound Index	SARON2MC Index	SARO2MI	CH0599147300
SARON 3 months Compound Index	SARON3MC Index	SARO3MI	CH0572109855
SARON 6 months Compound Index	SARON6MC Index	SARO6MI	CH0599147318
SARON 9 months Compound Index	SARON9MC Index	SARO9MI	CH0599147326
SARON 12 months Compound Index	SARON12MC Index	SARO12MI	CH0599147334

12.3 SARON Compound Rates

Name	Short Name	Symbol	ISIN
SARON 1 week Compound Rate	SARON1W Comp	SAR1WC	CH0599147342
SARON 1 month Compound Rate	SARON1M Comp	SAR1MC	CH0477123886
SARON 2 months Compound Rate	SARON2M Comp	SAR2MC	CH0477123894
SARON 3 months Compound Rate	SARON3M Comp	SAR3MC	CH0477123902
SARON 6 months Compound Rate	SARON6M Comp	SAR6MC	CH0477123910
SARON 9 months Compound Rate	SARON9M Comp	SAR9MC	CH0477123928
SARON 12 months Compound Rate	SARON12M Comp	SAR12MC	CH0477123936
SARON 1 IMM Compound Rate	SARON1IMM Comp	SAR1IMMC	CH0477123860
SARON 3 IMM Compound Rate	SARON3IMM Comp	SAR3IMMC	CH0477123878



A current list of all indices calculated by SIX is accessible at the SIX website:

https://www.six-group.com/exchanges/downloads/indexinfo/online/calculated_indices.xls

SIX

Pfingstweidstrasse 110

8005 Zurich

Switzerland

T +41 58 399 2111

The information contained in this document is given without warranty, implies no obligation of any kind on the part of SIX Group Ltd or the companies associated with SIX Group Ltd (referred to below as SIX Group Ltd) and may be altered by SIX Group Ltd at any time without further notice. To the extent permitted by law, SIX Group Ltd accepts no liability whatsoever for any errors contained in this document. SIX Group Ltd is under no obligation whatsoever to draw attention to such errors. Technical documentation must be used only in conjunction with the correct software version and may be used and copied only in accordance with the terms of the licence. All software described in the technical documentation is supplied on the basis of a licence agreement and may be used or copied only in accordance with the terms of the said licence agreement.

© Copyright SIX Group Ltd, 2021. All rights reserved. All trademarks observed.