



**Recommendation on the use
of the POLSTR reference
rate in floating-rate
debt securities**

**Document of the National Working
Group for benchmark reform**

Recommendation on the use of the POLSTR reference rate in floating-rate debt securities

The Steering Committee of the National Working Group for benchmark reform on 6 December 2024 made a decision to select the POLSTR index as the target interest rate benchmark that would replace the WIBOR benchmark. Thus, the Steering Committee of the National Working Group verified and modified its earlier decision to select WIRON. The selection of the new proposed index was preceded by a review and analysis process of alternative Risk Free Rate (RFR) benchmarks for WIBOR that commenced on 29 March 2024. This process included conducting additional internal analyses by institutions involved in the work of the Steering Committee of the National Working Group, including the Polish Financial Supervision Authority, the National Bank of Poland and GPW Benchmark S.A., as well as two rounds of public consultations directed to all stakeholders, including financial market participants, conducted from 24 May to 1 July 2024 (first round of public consultations) and from 4 to 31 October 2024 (additional round of public consultations).

In response to the indicated decision of the Steering Committee, the Bonds Stream of the National Working Group for benchmark reform has prepared this recommendation, which **completely replaces the recommendation on the application of the WIRON index in issues of floating-rate debt securities published on 10 March 2023**. The recommendation consists of two recommendations on the rules for calculating interest payments along with justification and two annexes with a description of the recommended and alternative methods and with a comparative analysis of the selected methods. These recommendations are not obligatory and they may be applied freely, considering the specific aspects of each debt security issuance. This Recommendation aims to provide financial market entities with the best practices for applying the POLSTR reference rate to the calculation of interest payments for floating-rate debt securities. This recommendation may be supplemented with further recommendations in the future.

Recommendation 1

For calculating interest payments in floating rate debt securities issuances, it is recommended to use the POLSTR reference rate compounded using the observation period shift method by 5 business days (*lookback with observation period shift*), hereinafter referred to as "*shift*".

Recommendation 2

Calculating interest payments according to the recommended "*shift*" method should be performed by dividing the POLSTR Compound Index value from the end of the observation period by the value from the beginning of the observation period.

Justification:

1. Among the considered methods for calculating interest payments – used or potentially applicable in floating rate debt securities issuances – the recommended "*shift*" method offers the best balance of desirable characteristics, namely economic correctness, comprehensibility for purchasers, and adaptation of market infrastructure.

2. Other methods are not recommended for widespread use, although they may be applicable in selected issuances due to their specific nature or as simplified methods during a transitional period. An example is the last reset method – on one hand requiring minimal adaptation of market infrastructure, but on the other hand generating interest rate risk due to the use of historical interest rate values instead of current ones.
3. Calculating interest payments according to the recommended "*shift*" method can be performed in two mathematically equivalent ways: through compounding the POLSTR reference rate over a specified observation period, or through the ratio of POLSTR Compound Index values from the end and beginning of that period. The second approach is less prone to calculation errors, which increases reliability and enables faster verification of obtained results.

Annex 1: Description of selected conventions for calculating rates based on Risk Free Rates (RFR).

Annex 2: Comparative analysis of selected conventions for defining interest rate payments.

Description of selected methods for determining interest rates based on risk-free rates (RFR)

Methods for determining interest rates based on risk-free rates (RFR) can be divided into two main types:

- **forward-looking** – based on derivative transaction quotations (e.g. OIS), taking into account expectations regarding the level of future RFR values – they allow determining interest payment before the beginning of the interest period,
- **backward-looking** – based solely on RFR values determined in the past.

Among backward-looking methods, depending on the moment of determining the interest payment, we can distinguish the following types:

- **in arrears** – the interest payment is determined at the end or just before the end of the interest period,
- **in advance** – the interest payment is determined at the beginning or before the beginning of the interest period,
- **hybrid (interest rollover, mixed)** – part of the interest payment is determined at the beginning of the interest period, and the adjustment – resulting from the difference to the RFRs determined in that period – is determined at the end of that period. This additional interest payment is made with a certain, fixed delay (e.g. equal to the entire next interest period) – methods of this type have been rejected by all foreign working groups as impractical.

Since product contracts very often contain references to interest rates for maturity terms longer than O/N (overnight), there arose a need to construct analogous interest rates determined based on RFR. While in forward-looking methods such interest rates are obtained directly (derivative transaction quotations for specific maturity terms), in backward-looking methods an economically correct interest rate for a maturity term longer than O/N can be obtained by applying specific mathematical transformations, based on RFR values determined in the past. The most commonly used convention is the calculation of compound rate, by compounding (capitalisation) of RFRs determined on business days (business days, bd) in a defined past observation period:

$$\left[\prod_i \left(1 + \frac{RFR_i \times n_i}{365} \right) - 1 \right] \times \frac{365}{d}$$

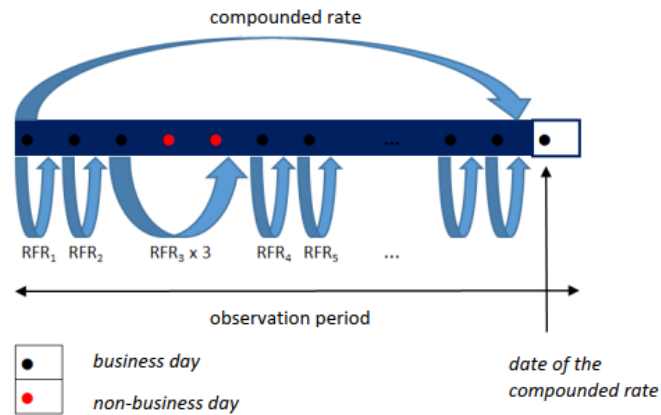
where:

i – each business day in the observation period (excluding¹ the last day of the period)

RFR_i – RFR with index date falling on the i -th day

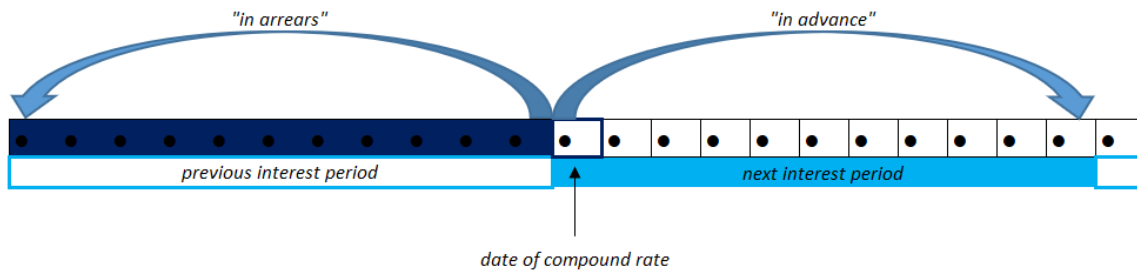
n_i – weight² for RFR_i

d – duration of the observation period = $\sum_i n_i$ (expressed in calendar days; excluding the last day of the period)



There are also other, less common (or so far not at all) conventions. Differences concern, among others, the use of calendar days (*calendar days, cd*) instead of business days or the use of weights from the interest period instead of weights from the observation period (colloquially called "freezing" of weights). Instead of the compounding mechanism, arithmetic mean can also be used.

It should also be mentioned that compound rates constructed in this way can be used both "in arrears" and "in advance" depending on which interest period they will be used to determine the interest rate:



Below is a description of selected (variants) of backward-looking methods divided into "in arrears" and "in advance" types. If not otherwise indicated in the description of a given method, the "classical" formula for calculating compound rate described above applies.

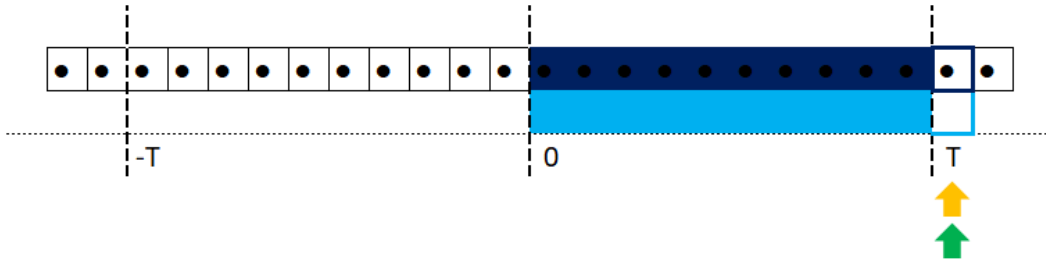
"In arrears" methods

¹ In the document, for determining the observation period, a dominant convention has been adopted whereby the last day of that period is not used to determine the compound rate; this convention is consistent with that for determining the interest period, whereby the last day of the interest period is simultaneously the beginning of the next period, and interest for that day is already attributed to that next period.





² Number of calendar days between consecutive index dates i and $i+1$ for RFR

Plain variant (plain, base case)

In principle, to determine the interest payment for a given interest period, interest rates that "economically correspond" to that period should be used, which in the case of compound rates naturally leads to a method where the observation period coincides with the given interest period:



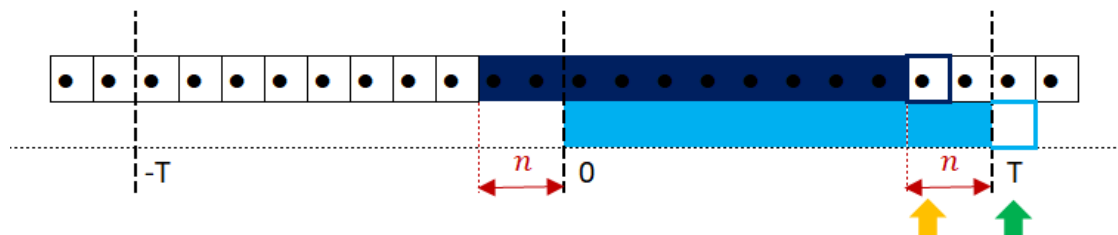
where:

-  observation period
-  interest period
- 0 start date of the interest period
- T end date of the interest period/start date of the next period
- $-T$ start date of the previous interest period
-  payment determination date
-  date of the interest payment

Then, due to usually delayed publication of RFR, the interest payment can only be determined on the last³ day of the interest period (which is simultaneously the first day of the next period and the interest payment date), which usually makes it impossible to effectively execute it on time in practice.

Due to the need for earlier – than in the plain variant – determination of the interest payment, a number of its modifications are considered:

Lookback with observation period shift (colloquially "shift")



The beginning and end of the observation period are shifted independently backward by n business days. This allows determining the interest payment n business days before its execution. To minimize the negative effect of such shift in the form of changing the duration of the observation period, $n=5\text{bd}$ is usually recommended.

Lookback with observation period lag (colloquially "lag")

³ According to the adopted convention, the last RFR used for calculations is the RFR with index date falling on the last business day preceding the end of the observation period, which was published with delay on the last day of that period

The beginning and end of the observation period are shifted independently backward by n business days, while weights for RFR are determined based on the interest period, not the observation period:

$$\left[\prod_i \left(1 + \frac{RFR_{i-n} \times n_i}{365} \right) - 1 \right] \times \frac{365}{d}$$

gdzie:

i – each business day in the interest period (excluding the last day of the period)

RFR_i – RFR with index date falling on the i -th day

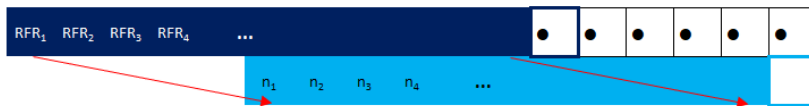
n_i – weight for RFR_i

d – duration of the interest period = $\sum_i n_i$ (expressed in calendar days; excluding the last day of the period)

Lookback with observation period shift



lookback with observation period lag



To minimize the negative effect in the form of inconsistency of RFR values with the weight applied to them, $n=5bd$ is usually recommended.

Calendar day lookback (colloquially "calendar")

The observation period is shifted backward by n calendar days. This variant requires determining (synthetic) RFR values also for non-business days, which in turn allows for abandoning weights – each RFR then has a weight equal to 1. The "classical" formula is therefore simplified to the following:

$$\left[\prod_i \left(1 + \frac{RFR_i \times 1}{365} \right) - 1 \right] \times \frac{365}{d}$$

where:

i – each calendar day in the observation period (excluding the last day of the period)

RFR_i – RFR with index date falling on the i -th day

d – duration of the observation period (expressed in calendar days; excluding the last day of the period)

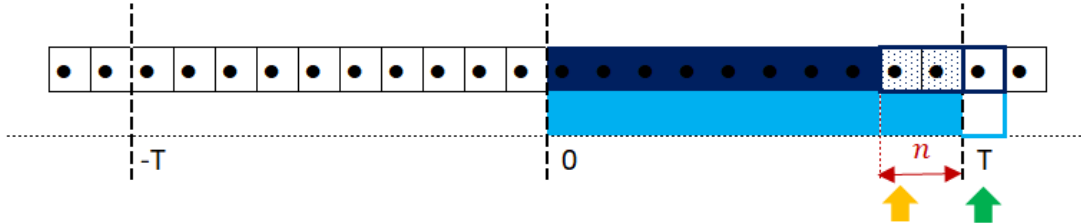
To maintain consistency with the classical convention based on business days, synthetic RFRs for non-business days can be determined using one of two considered methods:

- through linear interpolation of compound indices from days before and after a given non-business day,
- through decomposition of RFR from the day before a given non-business day.

The equivalent of the usually recommended shift by $n=5bd$ is a shift by $n=7cd$. In addition to undoubted benefits related to simplification of calculations, formulas, use of calendars for

individual currencies, this variant is characterized by a variable number of business days between the date of determining the interest payment and the date of its execution.

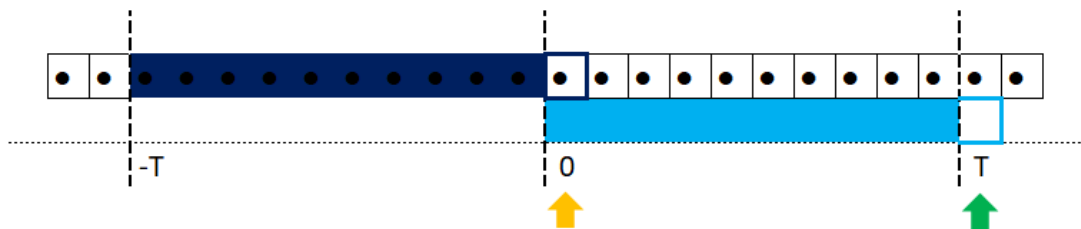
Lockout period (colloquially "lockout")



The interest payment is determined n business days before its execution, while for the last n business days of the interest period, the last RFR value from before the date of its "freezing" is adopted.

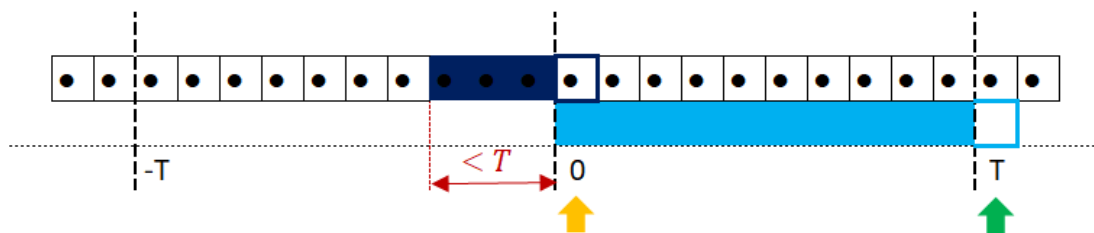
"In advance" methods

Last reset



The observation period covers the previous interest period directly preceding the current interest period. Thanks to this, the interest payment can be determined already on the first day of the current interest period. An undoubted disadvantage of this method is the use of historical RFR values. However, considering the entire lending period in the case of multi-year loans with a defined schedule of principal and interest payments, the difference to the plain variant in the form of the "missing" last interest period can be valued (with an already developed derivatives market) and included as a "compensating margin".

Last recent



The observation period covers the last (short) part of the previous interest period, which means that compared to the last reset method, more current RFR values are used. However, the duration of the observation period is not maintained. This type of solution was applied in the European

Commission regulation defining a replacement for LIBOR-CHF 6M and 1Y, where a compound rate for a 3-month period was indicated.

Calculation of compound rates

Each of the methods described above requires (mathematical) calculation of compound rate. For a given interest period, this calculation can be performed:

- directly, i.e., through compounding of RFRs determined in the observation period appropriate for a given method,
- or – if possible – indirectly, i.e., using RFR compound index or RFR compound rate for a specific pre-defined backward maturity term, which can be calculated and made available by the appropriate administrator.

Indirect calculation of compound rate is only possible when the compounding convention used by the administrator is identical to the convention used in a given method – primarily in terms of the choice of type of days (business or calendar) and in terms of the method of determining weights (from the observation period or from the interest period). GPW Benchmark, when publishing RFR compound index and RFR compound rates, uses the "classical" convention, i.e., based on business days and weights from the observation period:

RFR compound index

RFR compound index I_t represents the current value of initial investment I_0 for maturity term O/N, renewed each day (for the same maturity term) until the last business day preceding the day of its calculation t , where on each renewal day the RFR with index date falling on that day is used:

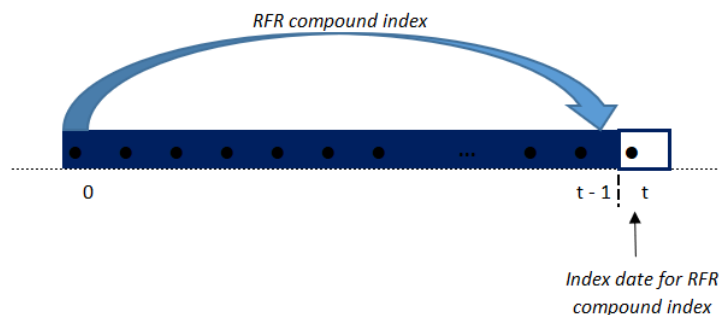
$$I_t = I_0 \times \prod_{i=0}^{t-1} \left(1 + \frac{RFR_i \times n_i}{365} \right) \quad \text{dla } t > 0$$

where:

i – each business day from initial day 0 to the last business day preceding index date t

RFR_i – RFR with index date falling on the i -th day

n_i – weight for RFR_i



Using the RFR compound index defined in this way, compound rate can be calculated for any observation period (x, y) :

$$RFR_t(x, y) = \left(\frac{I_y}{I_x} - 1 \right) \times \frac{365}{d}$$

gdzie:

d – duration of the observation period = $y - x$ (expressed in calendar days; excluding the last day of the period)

RFR compound rate

$$RFR_t(T) = \left[\prod_i \left(1 + \frac{RFR_i \times n_i}{365} \right) - 1 \right] \times \frac{365}{d}$$

where:

$RFR_t(T)$ – RFR compound rate with index date falling on day t for pre-defined backward maturity term T

i – each business day in the observation period (excluding the last day of the period)

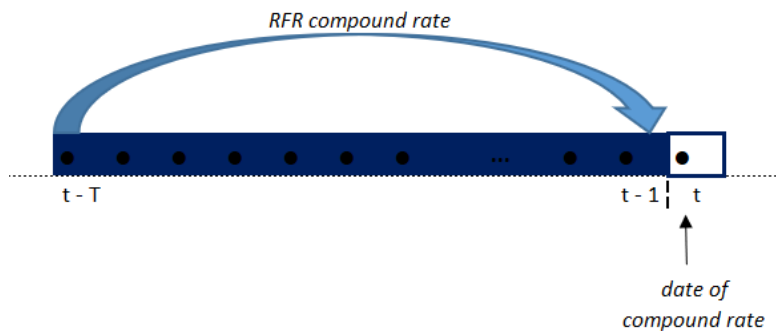
RFR_i – RFR with index date falling on the i -th day

n_i – weight for RFR_i

d – duration of the observation period = $\sum_i n_i$ (expressed in calendar days; excluding the last day of the period)

where the observation period is determined as follows:

- the first day of the period is the business day falling T -months before index date t for RFR compound rate determined according to the "modified preceding" convention
- the last day of the period is index date t for RFR compound rate, where according to the adopted convention, RFR with that index date is not used for compounding:



Use of RFR compound rate is only possible when the observation period resulting from a given method coincides (day by day) with the observation period of a given RFR compound rate.

In principle, calculation of compound rate using RFR compound index is (mathematically) equivalent to direct calculation. However, in practice, differences between these two calculations may occur. These differences result from rounding – both those used in the publication of RFR compound index and those resulting from the implemented compounding algorithm in the software used.