

SOFR “In Arrears” Conventions for Use in Bilateral Business Loans

In this note, the ARRC Business Loans Working Group focuses on use of SOFR “in arrears,” meaning the calculation of interest using daily SOFR rates published during the relevant interest periods (and not over a period of time prior to the start of the interest periods).¹ The recommended “in arrears” structures are: (i) Daily Simple SOFR and (ii) Daily Compounded SOFR. These structures allow for interest accruals to be calculated daily, however, unlike forward-looking term LIBOR rates, they are not set in advance and fixed during each interest period.² The recommended conventions identified herein address both new loans that are originated using SOFR and legacy loans that “fall back” from LIBOR to SOFR upon LIBOR cessation or LIBOR being declared to be unrepresentative. These convention recommendations are voluntary and may not be applicable to all segments of the business loan markets.

It is also recognized that parties that wish to adopt the ARRC-recommended conventions may still need to make certain modifications so that they are administratively feasible in a particular transaction.³ Moreover, because these recommended conventions are voluntary, parties always retain the option to vary any of these conventions by agreement.

New SOFR Loans

Compound versus Simple Interest

The ARRC recognizes that bilateral business loans may either be based on simple or compound interest. Although compound interest more accurately reflects the time value of money and will have less hedging basis relative to SOFR OIS, implementing simple interest is more straightforward and the basis between simple and compounded SOFR, if any, is typically a few basis points or less. In the case of either compounded or simple interest in arrears, the rate for the entire interest period would not be known at the beginning of the interest period. Instead, overnight SOFR would be pulled daily (and compounded based on a previous day’s rate in the case of Daily Compounded SOFR).

¹ When a lookback is used (as recommended below), several of the initial daily SOFR rates will technically come from *before* the interest period. Please see definition of “lookback” for more detail.

² Compounded SOFR “in advance” or, if available, a forward-looking SOFR term rate, would be known in advance of each interest period, which match many of the current loan market conventions for referencing forward-looking term LIBOR. These “in advance” rates are not discussed herein.

³ The [ARRC's updated recommended fallback language for bilateral business loans](#) references the ARRC recommended conventions for business loans in the definition of “Daily Simple SOFR” and provides that the Lender shall establish conventions for that rate in accordance with the ARRC recommended conventions. However, the definition further provides that the Lender may establish other conventions if any of the ARRC recommended conventions are not administratively feasible in its reasonable discretion. Use of the SOFR “In Arrears” Conventions for Use with Bilateral Business Loans with any modifications in the administration of a SOFR in arrears loan facility necessary to make the facility administratively feasible would still be in accordance with the SOFR “In Arrears” Conventions for Use with Bilateral Business Loans.

Compound interest: For Daily Compounded SOFR, the overnight SOFR rate⁴ is compounded daily during the interest period to determine the loan’s interest rate.⁵ There are several practical methods to calculate the daily accrual of interest for Daily Compounded SOFR:

- **Compound the Balance.** In this approach, the overnight SOFR rate is multiplied by outstanding principal and unpaid accrued SOFR interest (collectively, the balance). It accurately compounds interest regardless of whether the principal changes during the interest period.
- **Compound the Rate**
 - *Cumulative Compounded Rate.* This method is based on ISDA’s formula for Compounded SOFR in Arrears (the same formula on which SOFR Averages and the SOFR Index published by the Federal Reserve Bank of New York are based).
 - *Noncumulative Compounded Rate.* The Noncumulative Compounded Rate is a variation of the “Compound the Rate” methodology, which applies a calculated compounded interest factor based on the difference between the cumulative compounded effective rate⁶ for that given day and the prior day to arrive at a daily compounded accrual.
 - Both “Compound the Rate” approaches accurately compound interest when principal is unchanged within an interest period or, if principal is paid down, when any accompanying interest is paid down at the same time.

Simple Interest: For Daily Simple SOFR in arrears, SOFR is sourced daily⁷ and multiplied by the outstanding principal of the loan.⁸

Reference documents: Please see the [technical appendices](#) supporting this document, which demonstrate the calculations and cash flows for each method discussed herein.⁹

Market Feedback: Please see the ARRC Business Loans Working Group survey results for feedback on preferences on interest rate methodologies.¹⁰

Lookback/Lockout/Payment Delay

Lookbacks, lockouts and payment delays are methods to provide sufficient time at the end of the interest period to invoice a borrower and permit the borrower to pay interest by the last day of the interest period.

⁴ Overnight SOFR is published at approximately 8 a.m. ET and reflects the previous day’s SOFR. See <https://apps.newyorkfed.org/markets/autorates/sofr> for information and published rate.

⁵ The convention for Daily Compounded SOFR in this document is similar to the convention of SOFR “Compound in Arrears” in the ARRC’s recommended conventions for other cash products.

⁶ The Noncumulative Compound Rate is discussed in further detail in the [technical appendices](#).

⁷ Overnight SOFR is published at approximately 8 a.m. ET and reflects the previous day’s SOFR. See <https://apps.newyorkfed.org/markets/autorates/sofr> for information and published rate.

⁸ The daily accrual is based on a daily SOFR rate and not an average of rates; if principal is constant, calculation via Daily Simple SOFR will be the same as a simple average of SOFR in arrears at the end of the interest period. However, if principal changes, it will not be possible to apply the simple average of SOFR to the fixed principal at the end of the interest period.

⁹ The technical appendices were published separately.

¹⁰ The technical appendices (which include the survey results) were published separately.

Business day lookback with no observation shift is recommended for SOFR loans. A lookback permits the Lender to determine the rate of interest for the interest period before the period ends and the interest payment is due. This thus provides the Lender time to invoice the borrower and for the borrower to pay the interest in a timely fashion.

The following is a simplified, hypothetical example of a five business day lookback. A loan starts on June 1, 2020. In order to apply a five business day lookback, the Lender will “look back” to May 25, 2020¹¹ and apply that day’s SOFR rate to the June 1st balance. On June 2nd, the Lender will “look back” to May 26th and apply that day’s SOFR rate to the June 2nd balance. By June 23rd, the Lender will know the daily rates through the end of the 30-day interest period. The Lender will be able to invoice the borrower and the borrower will be able to pay the interest by June 30th.

It was determined that a lookback with an observation shift (i.e., when compounding SOFR, weighting the rate by the daycount weight of the “lookback” day in the compounding formula) could result in a borrower paying too much or too little interest if the loan is prepaid in a period when there is a mismatch in the number of days in the observation period vs the number of days in the interest period. A similar mismatch could occur between the buyer and seller in loan trading. Although there are technical solutions to address these issues, those solutions would introduce some added complexities and did not materially reduce the hedging basis relative to a standard SOFR OIS contract. For this reason, the ARRC is recommending a business day lookback without an observation shift for SOFR bilateral business loans. Please see the [technical appendices](#) for additional details.

Conventions for Use with New Hedged Loans

As discussed in the [ARRC's updated recommended fallback language for bilateral business loans](#), certain borrowers enter into interest rate swaps to offset or hedge their floating rate interest exposure. Such borrowers may wish to avoid **any** basis risk (i.e. any mismatch between the terms of their loan and the related hedge) in the event that LIBOR is discontinued. The conventions ISDA implements for standard derivatives do not align in key respects with the rate language in ARRC’s recommended fallback language (which market participants may choose to use in new SOFR loans) – in particular, the convention for new SOFR derivatives is compound SOFR in arrears (which corresponds to Daily Compounded SOFR) and typically includes a payment delay. Market participants that seek a full hedge with a standard derivative convention in new SOFR loans will instead follow derivative market conventions which include that payment delay. Conversely, there may be ways to design derivatives with non-standard conventions in order to align with other bilateral business loan conventions, including Daily Simple SOFR loans.¹²

Holiday and Weekend Convention

SOFR is published on all SIFMA government securities market business days (“business days”).

Compound Interest: Interest is compounded on business days; the preceding business day's rate is applied over weekends or holidays, weighted by the number of calendar days until the next business day.

¹¹ The example assumes May 25th is not a holiday for the purposes of the hypothetical example.

¹² While it may be important for the loan and derivative to fall back to the same rate and use exactly the same conventions to achieve a *perfect* hedge, loans and hedges that use different SOFR rates and conventions can often achieve an *effective* hedge. The outcome will depend on the exact details of the loan and hedge.

Simple Interest: For all days simple interest based on SOFR is used; the preceding business day's rate is applied over weekends or holidays, weighted by the number of calendar days until the next business day.

Borrowings and payments are expected to work similarly to LIBOR today, including for offshore deals. For instance, if a SOFR loan is repaid to a UK lending office on a US Business Day that is not a UK Business Day, it would remain in the swift/clearing account of the UK lending office until the following UK Business Day when the lending office processes the payment. A borrowing notice for a USD borrowing sent to a UK Bank on any day other than a UK Business Day will be processed on the next succeeding UK Business Day.

Daycount

Recommendation is Actual/360 days for SOFR, which is the standard convention in U.S. money markets; however it is possible to use other daycounts and ARRC recognizes that the norm is Actual/365 days for sterling.

Business Day Convention

The ARRC recommendation is “Modified Following Business Day Convention,” meaning that payments that should be paid on a day that falls on a non-Business Day will be adjusted to the next succeeding business day, unless that business day falls in the next succeeding calendar month, in which case the interest payment date will be the preceding business day.

Rounding

It is recommended that interest-rate calculations based on SOFR be rounded (not truncated) to 5 decimal points and dollar amounts be rounded to 2 decimal points, for example, for any invoice or ledger reports, but that calculations not be rounded internally.

Floors

If there are interest rate floors in a credit agreement, it is recommended that the floor be calculated daily and not at the end of an interest period because loans accrue interest daily and loan funds strike a daily net asset value based on this daily accrued interest. The floor on a newly originated SOFR loan will be applied to SOFR.

Distribution of Interest

Currently, daily accrued interest is calculated on the Lender’s share of principal that day. If a Lender sells out of the loan completely, they are owed interest based on the time they held part of the loan, but do not earn further interest thereafter, even if they will not be paid until the end of the interest period. The ARRC recommends the same convention for SOFR.

SOFR Index

The ARRC has indicated that the SOFR Index can be a useful tool for certain cash products, for example [Floating Rate Notes](#); however the specific conventions for and characteristics of many bilateral business loans may make the existing SOFR Index less useful for bilateral business loans. The existing SOFR Index is a compounded index, so it is not applicable to Daily Simple SOFR Loans. In addition, the existing SOFR Index could be of less use for Daily Compounded SOFR loans than other products for several reasons.

First, the Index requires use of an observation shift, which is not the recommended convention for USD SOFR bilateral business loans. Second, loans are frequently prepaid intra-period; Index-based calculations will work with prepayments, but only if interest is repaid with principal and if the principal is split into multiple components to account for the prepayments. Third, the existing SOFR Index is not compatible with widely-used interest rate floors. Because these SOFR Index characteristics do not conform to the anticipated behavior of the USD SOFR loan market, the utility of a SOFR Index for bilateral business loans may be more limited than for other products.

Compensation for Losses

While typical “breakage” language may not be applicable in a Daily Simple SOFR or Daily Compounded SOFR regime, there is recognition that credit agreements may include language that compensates lenders for funding losses, e.g., losses sustained due to an intra-period prepayment.

Legacy LIBOR Loans Converting to SOFR

Bilateral business loans are expected to “fall back” from LIBOR to SOFR at LIBOR cessation or upon LIBOR being declared unrepresentative. The recommended terms of LIBOR fallbacks are described in the [ARRC’s Recommended Hardwired Fallback Language for Bilateral Business Loans](#), published on August 27, 2020. Most of the conventions for SOFR discussed above would also apply to a LIBOR loan that had converted to a loan based on SOFR in arrears because a fallback provision was activated; however, a spread adjustment would be applied to the fallback rate¹³ and the application of a floor would be adjusted accordingly to maintain economic parity with the floor that had been applied to LIBOR.

Spread Adjustment

It is recommended that legacy loans that “fall back” from LIBOR to SOFR use a spread adjustment recommended by the ARRC or implemented by ISDA in standard derivatives documentation for the appropriate tenor (e.g., 3M LIBOR to 3M SOFR). The spread adjustment is the published five-year historical median difference between LIBOR and SOFR, and would be applied to loans that transition from LIBOR to SOFR. For loans that use the optional “opt-in” trigger, the spread adjustment would be reset at the beginning of each interest period at the corresponding day’s indicative spread adjustment until the announcement of LIBOR cessation or that LIBOR is non-representative and the final spread adjustment is fixed. For legacy LIBOR loans falling back to a Daily Compounded SOFR, the daily SOFR rates would be compounded while the spread adjustment and the loan margin would be treated as simple interest added to the compounded rate.

Floors

If there are interest rate floors in an existing LIBOR credit agreement that converts to SOFR, the ARRC Guiding Principles should be interpreted as applying that floor to SOFR plus the associated spread adjustment recommended by the ARRC. For legacy loans falling back to Daily Compounded SOFR, the corresponding floor would be applied to the daily SOFR rates, and would be the difference between the LIBOR Floor Rate and the SOFR spread adjustment. For example, if there were a 0 bps LIBOR floor prior to transition and the LIBOR-SOFR spread adjustment were 25 bps, then the applicable SOFR floor would be -25 bps. The SOFR component of the floored rate would be compounded, while the spread adjustment

¹³ The spread adjustment for legacy loans would be separate from and in addition to the loan’s contractual margin.

component would not be compounded. Please see the [technical appendices](#) for an ESTR floor example that demonstrates the interest rate floor calculation.

For a LIBOR loan converting to a Daily Simple SOFR loan, neither SOFR nor the spread adjustment would be compounded. The floor that was applied to LIBOR would be applied to SOFR plus the spread adjustment on a daily basis. For ease of coding, the method of applying a floor described for Daily Compounded SOFR could also be used for Daily Simple SOFR.

Conventions for Use with Legacy Hedged Loans Converting to SOFR

As noted above for new SOFR loans, borrowers sometimes enter into interest rate swaps to offset or hedge their floating rate interest exposure. They may wish to avoid **any** basis risk (i.e. any mismatch between the terms of their loan and the related hedge) in the event that LIBOR is discontinued. Similar to the conventions for new SOFR derivatives, the fallbacks ISDA implements for standard derivatives that reference USD LIBOR do not align in key respects with the ARRC's recommended fallback language – in particular, ISDA's fallback for USD LIBOR derivatives will be compound SOFR in arrears (which corresponds to Daily Compounded SOFR) and will include a lookback with an observation shift rather than a lookback without a shift. Market participants that adopt the Hedged Loan Approach fallback language will instead follow ISDA's selected conventions which include that lookback with an observation shift. Conversely, as noted above for new SOFR loans there may be ways to design derivatives with non-standard conventions in order to align with other bilateral business loan conventions, including Daily Simple SOFR loans.¹⁴

¹⁴ While it may be important for the loan and derivative to fall back to the same rate and use exactly the same conventions to achieve a *perfect* hedge, loans and hedges that use different SOFR rates and conventions can often achieve an *effective* hedge. The outcome will depend on the exact details of the loan and hedge.