Version 1.0

SECURED OVERNIGHT FINANCING OPTION (SOFR): GUIDE SUPPORTING ADOPTION AND LIBOR MIGRATION

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Contents

1.) Secured Overnight Financing Rate (SOFR)

As you may be aware, there is a significant industry-wide change underway related to index rates. The LIBOR index rate [London Interbank Offered Rate] is expected to be discontinued at the end of 2021. LIBOR is a widely used index rate and is one of the primary benchmarks for short-term interest rates worldwide including many variable rate consumer and commercial loans.

Based on the planned LIBOR sunset, the Federal Reserve and New York Fed created the Alternative Reference Rate Committee (ARRC) in 2017 to recommend a LIBOR index rate replacement, and to ensure a smooth transition. SOFR is now the leading candidate to replace LIBOR and therefore, Financial Institutions that currently use LIBOR, will require a replacement index including the ability to accrue loans based on SOFR.

SOFR is not simply a new index rate. The ARRC is considering options for SOFR that include five different accrual methods such as both simple and compounding that work in conjunction with different time observation periods, and configuration options that control index spread adjustments, lockout periods, and payment delays.

Fiserv has been actively monitoring the evolution of SOFR and planning for the transition activity impact that the LIBOR sunset will have on our clients. These activities include participating in ARRC calls and updates, understanding the current and evolving SOFR requirements, evaluating product options and impact with our Development Teams, gathering relevant data and hosting an ongoing client focus group. It is a priority for Fiserv to ensure a smooth SOFR implementation for those clients that plan to, or are required to, adopt SOFR.

What actions should you be taking?

We recommend that you review your loan portfolio for variable rate loans tied to LIBOR including purchased participations. Based on the current SOFR accrual methods, Signature may provide support for certain SOFR accrual methods already and may have unique roadmap plans for other methods and configuration options. We welcome the opportunity to discuss your portfolio and plans and to help engage on a migration/upgrade strategy.

2.) SOFR Accrual Methods Overview

The chart below includes the various SOFR methods, comments and current Signature support.

Methodology	Details	Status
Forward Looking Term SOFR	This option is similar to the way LIBOR works today and is the preferred replacement for LIBOR, **however a Forward Looking Term SOFR rate is not yet available.**	Currently Supported[1]
Compounded SOFR in Advance	This option uses one of the published backward looking compounded SOFR averages (i.e. 30, 90 or 180 day average) and the rate is set, in advance, for a fixed period of time, similar to a LIBOR loan.	Currently Supported[1]
Simple Daily SOFR in Arrears	This option uses the daily SOFR and behaves like a daily floating rate loan.	Currently Supported[1] [2]
Compounded SOFR in Arrears using compounded rate	This option compounds the SOFR daily and applies the compounded rate to the principal balance. The rate is compounded for the duration of the interest period.	Not Planned
Compounded SOFR in Arrears using compounded balance	This option applies the daily SOFR to the principal balance plus the unpaid interest, for each day in the interest period.	Planned 20Q4

Comparing Simple vs Compound Accrual Methods

Simple Interest: the additional amount of interest owed each day is calculated by applying the daily rate of interest to the principal borrowed, and the payment due at the end of the period is the sum of those amounts.

Compounded interest recognizes that the borrower does not pay back interest owed on a daily basis and it therefore keeps track of the accumulated interest owed but not yet paid. The additional amount of interest owed each day is calculated by applying the daily rate of interest both to the principal borrowed and the accumulated unpaid interest.

- Compound the Rate/Noncumulative Compounded Rate - this method is based on ISDA's formula for Compound SOFR (the same formula that SOFR Averages and the SOFR index published by the Federal Reserve Bank of New York are based on) and accurately compounds 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. The Noncumulative Compounded Rate is a subset of the "Compound the Rate" methodology, which applies a calculated compounded interest factor to the published daily rate to arrive at a daily compounded rate.
- Compound the Balance – in this approach, the overnight SOFR rate is multiplied by outstanding principal and unpaid accrued interest (collectively, the balance). It accurately compounds interest regardless of whether the principal changes during the interest period.

The ARRC recognizes that 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 compound interest is typically a few basis points or less. In the case of both compound and simple interest in arrears, the rate for the entire interest period *would not* be known in at the beginning of the interest period. Instead, overnight SOFR would be pulled daily (and compounded based on previous day's rate in the case of SOFR Compounded in Arrears).

Compounded SOFR in Arrears using compounded effective rate:

In this example, we show a calculation of how SOFR computes the daily accrual using the 'Compounded Effective Rate' and 'In Arrears'. 'In Arrears' uses the daily rate during the billing cycle. The sum of the daily accrual is used for the periodic billing. One outstanding clarification with this method is what is the recommended rate to show the borrower.

Assume the balance is $10,000,000, Interest Base is 360

Calendar Date	SOFR Rate	Daily Eff Rate	Compounded Eff Rate	Accumulated Interest	Daily Accrual
6/30/2020	2.3000%	0.00639%			
7/1/2020	2.3900%	0.00664%	0.00639%	$ 638.89	$ 638.89
7/2/2020	2.4100%	0.00669%	0.01303%	$ 1,302.82	$ 663.93
7/3/2020	2.4100%	0.00669%	0.01972%	$ 1,972.35	$ 669.53

Using 7/3/2020 row as an example:

1.) The Daily Effective Rate is computed by dividing the SOFR Print Rate by the Daily Eff Rate Basis:

2.41 % / 360 = .00669%

2.) Compute the Compounded Effective Rate

= ((1 + Prior Days Daily Effective Rate) X (1 + Prior Days Compounded Effective Rate) – 1)

= ((1 + .00664) X (1 +.01308) – 1) = .01972%

2.) Compute the Accumulated Interest

= (Balance X Compounded Effective Date X Days to Accrue)

NOTE: Days to accrue factors in non-business days, assume 1 in this example

= $10,000,000 X .01972 = $1,972.35

3.) Compute the Daily Accrual

= Today's 'Accumulated Interest' MINUS Yesterday's 'Accumulated Interest' PLUS Today's Interest Paid

= $1,972.35 MINUS $1,302.82 + 0 (Interest Paid) = $669.53

Comparing 'In Arrears' to 'In Advance'

'In Arrears' refers to using the current period's SOFR average index rate to compute the periodic interest due. This method uses the most recently published rates but provides the borrower with little advance notice of index changes.

To help address the 'In Arrears' issues caused by using current period SOFR Indexes, the following Configuration Options have been included:

a.) **Payment Delay**: The due date will be after the end of the interest period, so that billing can be done at the end of the interest period.

b.) **Lockout Period**: A rate lock at the end of the interest period, so that the rate doesn't change to accommodate billing in advance of the end of the interest period.

c.) **Lookback Period**: A number of business days prior to the current date to determine the Index Rate to use.

'In Advance' refers to using 'backward looking' published SOFR average rates that are made available prior to the current period. This method uses SOFR rates are not as current as 'In Arrears' but do provide borrowers with more advance notice of index changes. 'In Advance' SOFR published rates includes a 30-, 60- and 180-day index. 'In Advance' is closer to how LIBOR works.

Additional Terms

Published Rate: When there is a reference to a published SOFR Rate, that means that the rate will be computed and published, and not something that must computed. In Signature, this is like a T-Bill or LIBOR, where rate published rates and indexes are entered into Calculation Schedules.

Business Days: 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.

Spread Adjustment: It is recommended that legacy loans that "fall back" from LIBOR to SOFR use an ARRC spread adjustment published/recommended by either the ARRC or ISDA for the appropriate tenor (e.g., 3M LIBOR to 3M SOFR) and form of SOFR (e.g., SOFR Compounded in Arrears, Daily Simple SOFR, etc.). The spread adjustment is meant to reflect the historical difference between LIBOR and SOFR on loans that transition from LIBOR to SOFR.

For legacy LIBOR loans falling back to a 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.

3.) Signature SOFR Support

In this section, we highlight some of the Signature features that will come into play for supporting SOFR, and also distinguish between what is currently supported and what is planned.

1.) Signature Roadmap: As of July 2020, the current Signature Roadmap for SOFR support includes the following (These plans MAY be subject to change):

- Release 20.2 (October, 2020)
  - Business Days
- 20Q4 / 21Q1:
  - Compounding in Arrears on Balance
  - Lookback
- 21Q1 / 21Q2:
  - Lockout
  - Payment Delay
  - Spread Adjustment

As of July 2020, Signature supports the following Accrual Methods and Configuration Options:

Accrual Method	SOFR Index	Payment Delay	Lookback	Spread Adjustment
Forward Looking Term SOFR	Rate published – maintained in Loan Index Table.	Cycled Loans	Current Support + 20Q4 enhancement	Current Support + 21Q1 enhancement
Compounded SOFR in Advance	SOFR Rate published for backward looking compounded SOFR averages (i.e. 30, 90 or 180 day average) and the rate is set, in advance, for a fixed period of time, similar to a LIBOR loan. Compounding is factored into the published 'backward looking' average.	N/A		
Simple Daily SOFR in Arrears	Uses Daily SOFR and behaves like a daily floating rate loan.	Cycled Loans		

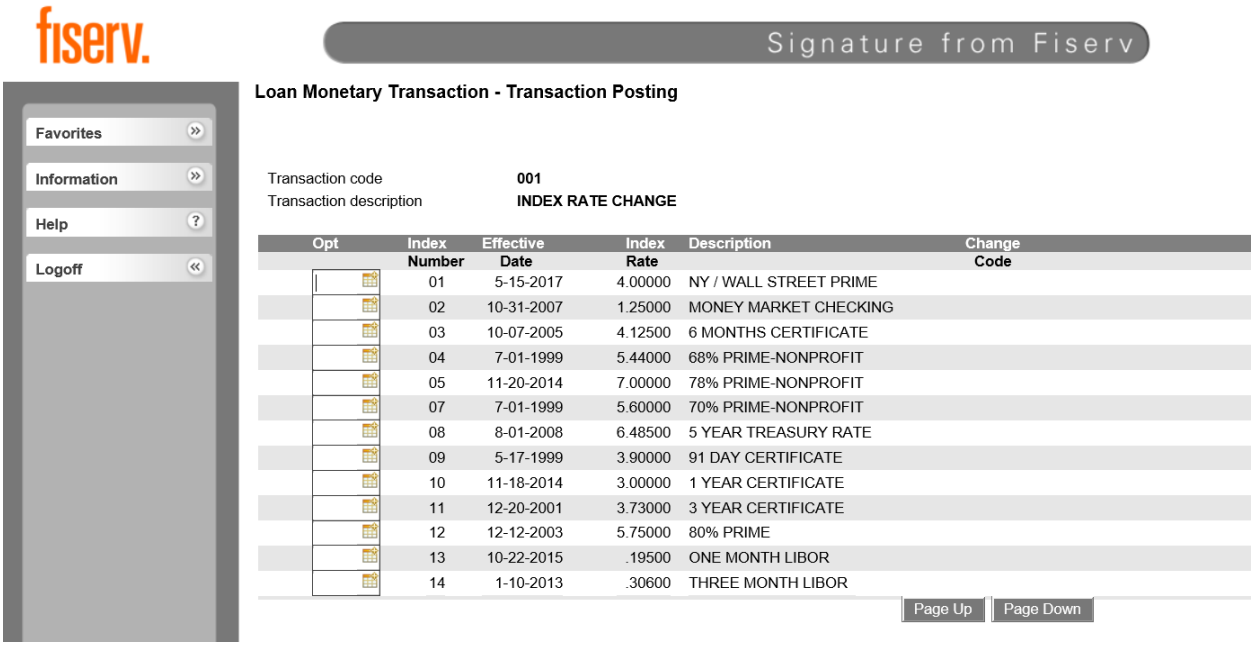
NOTE:

- SOFR Published rates would be entered into Signature Loan Index Table like LIBOR

Entering/Updating SOFR Rates

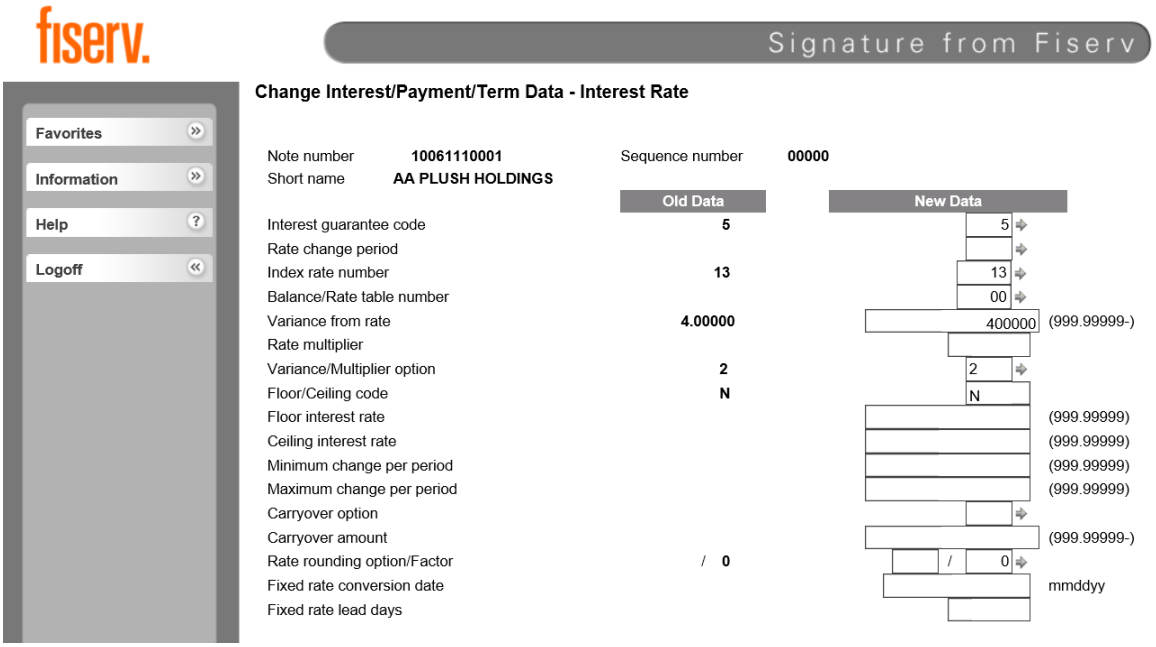
- In Signature, published SOFR Rates would be entered as Loan Indexes similar to LIBOR, Prime, 1 Year T-Bill.
- For SOFR, create a unique SOFR Index for each SOFR Rate used, i.e. Daily, 30-Day, 90-Day, 180-Day, etc.

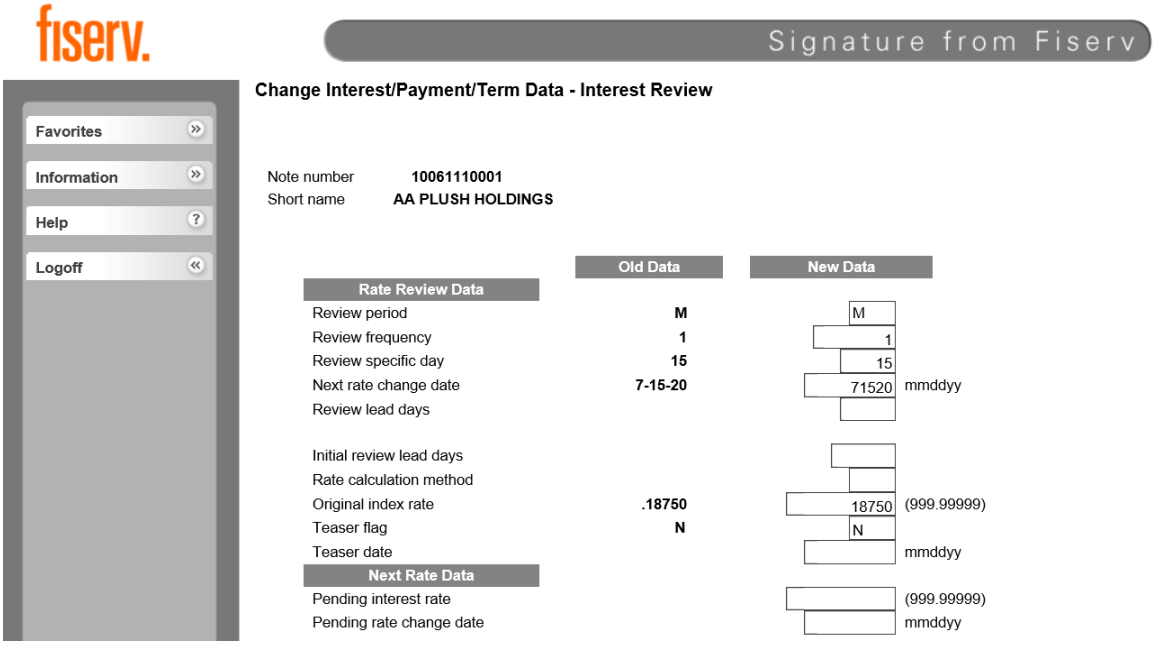
Signature Index Rates



Loans are then setup to 'point' to the appropriate Index and the appropriate rate change information can be setup.

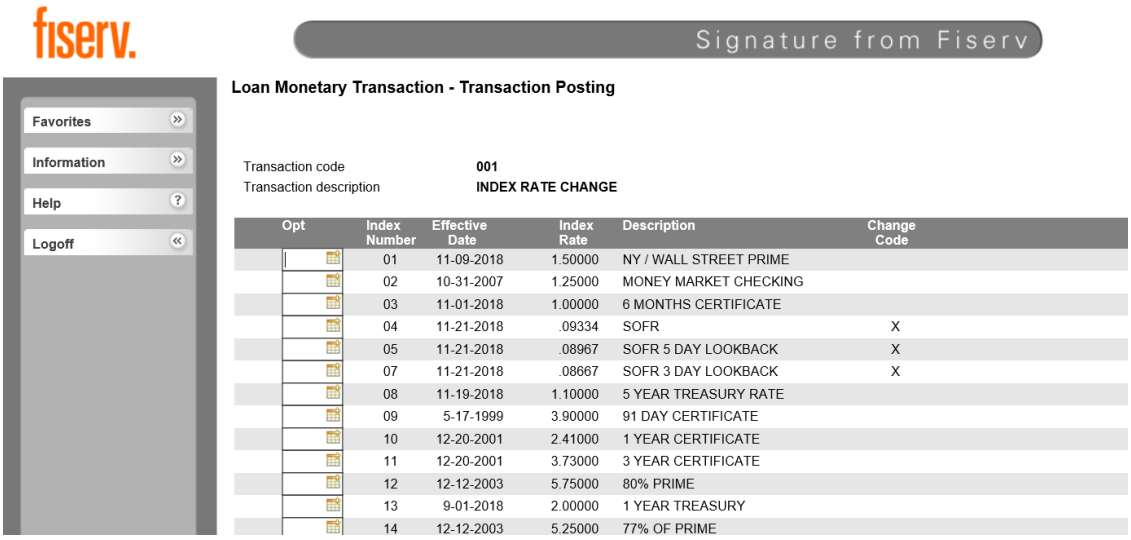
Signature Loan Interest Control





Signature SOFR Configuration Options

Lookback: The rate is based on the index a certain number of days in the past, so that interest for the interest period is known in advance. Until an enhancement can be delivered, Lookback can be supported in Signature by creating different indexes for SOFR for each lookback period you want to support:



Opt	Index Number	Effective Date	Index Rate	Description	Change Code
	01	11-09-2018	1.50000	NY / WALL STREET PRIME	
	02	10-31-2007	1.25000	MONEY MARKET CHECKING	
	03	11-01-2018	1.00000	6 MONTHS CERTIFICATE	
	04	11-21-2018	.09334	SOFR	X
	05	11-21-2018	.08967	SOFR 5 DAY LOOKBACK	X
	07	11-21-2018	.08667	SOFR 3 DAY LOOKBACK	X
	08	11-19-2018	1.10000	5 YEAR TREASURY RATE	
	09	5-17-1999	3.90000	91 DAY CERTIFICATE	
	10	12-20-2001	2.41000	1 YEAR CERTIFICATE	
	11	12-20-2001	3.73000	3 YEAR CERTIFICATE	
	12	12-12-2003	5.75000	80% PRIME	
	13	9-01-2018	2.00000	1 YEAR TREASURY	
	14	12-12-2003	5.25000	77% OF PRIME	

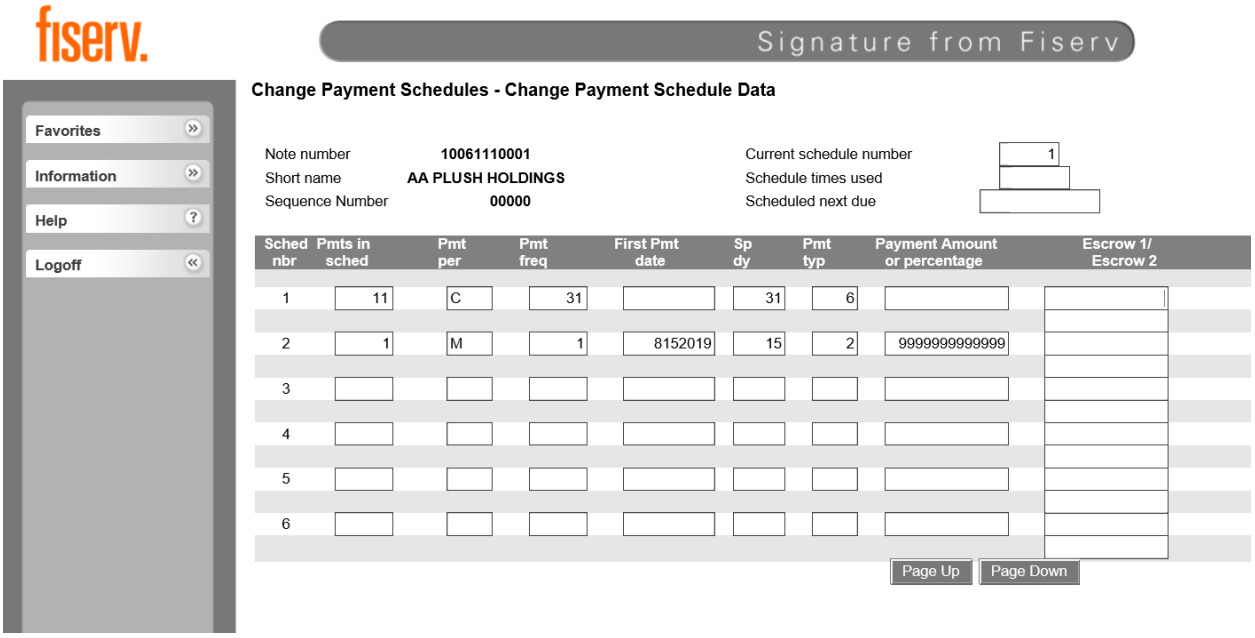
Loans are then setup to 'point' to the appropriate Index.

Note: This does not resolve the issue with statements having the correct projected interest.

Payment Delay: The due date will be after the end of the interest period, so that billing can be done at the end of the interest period. Payment Delay can be supported in Signature via 'cycled' vs 'calendar period' billing option. These loans work by maintaining a due date this is a number of days after the statement date, here's an example:

Payment Delay	
Payment Due X number of days after interest period	
Examples:	
Assume Period is May 2020	
May 1, 2020 thru May 31, 2020	
Lead Days	4
'Calendar' Billing Type	
Due Date	6/1/2020
Billing done prior to due date	5/28/2020
Due Date less Lead Days = Billing Date	
'Cycled' Billing Type	
Billing occurs at end of interest period	5/31/2020
Billing Date plus Lead Days = Due Date	6/4/2020

In Signature, a ‘Cycled Loan’ is controlled by the Payment Schedule. A loan must be Average Daily Balance in order to be cycled.



Spread Adjustment: In Signature, we are planning to add a support of Spread Adjustment, including manual and automatic updates. More information to follow.

Spread Adjustment Adjust for LIBOR and SOFR differential	
Loan Note Margin	3.000%
Signature Example:	
SOFR 6 Month Rate	2.500%
Spread Adjustment	0.250%
Input the Margin:	
Note Margin + Spread Adjustment	3.250%
Loan Rate	5.750%

SOFR Published Rates in Signature: As previously mentioned, a SOFR 'published' rate terminology is used to distinguish the SOFR Rate from a Daily SOFR Rate. A published rate can be entered as an Index. Individual loans are then tied to the Index via the account-level interest rate parameters.

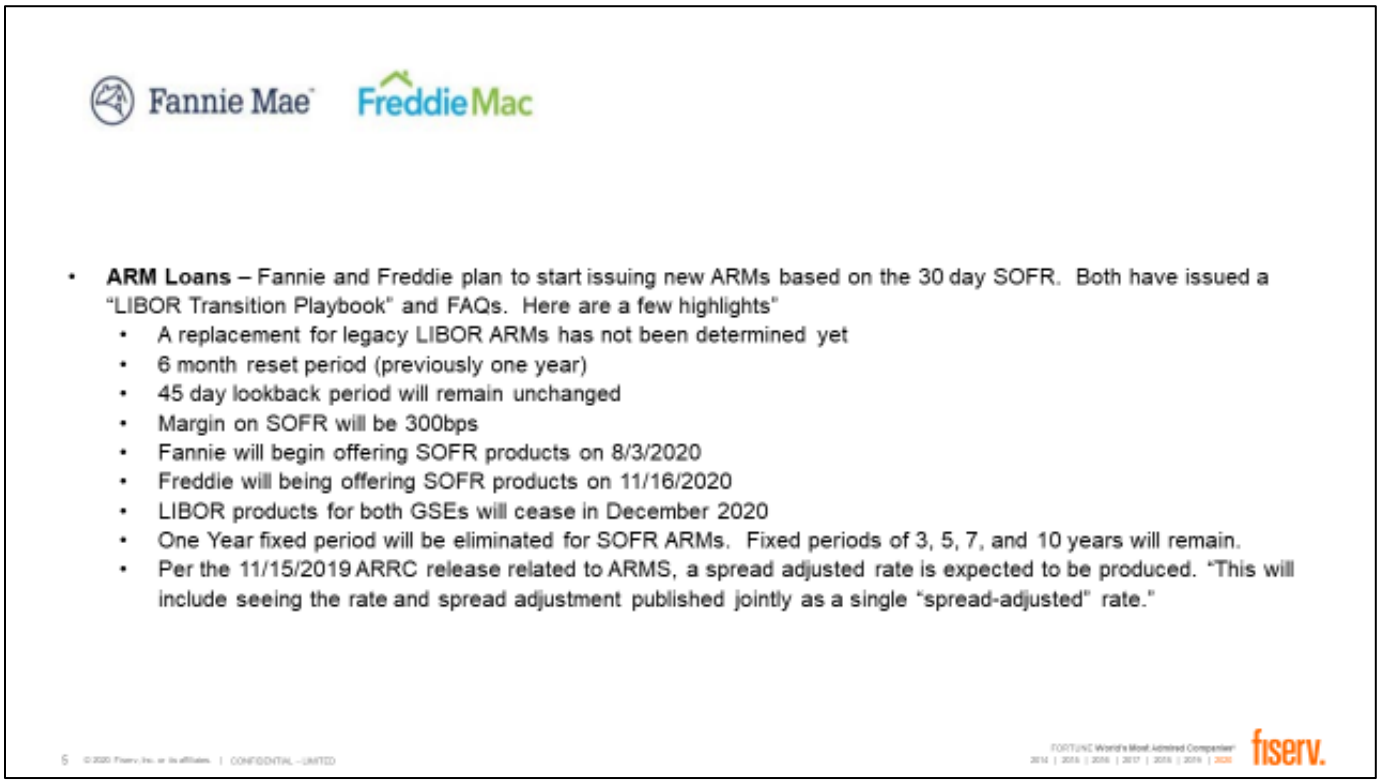
Rate changes are then defined by the Interest Guarantee Code as fixed, floating, or adjustable. Adjustable Rates change occur based on the defined number of rate change lead days.

As an example:

- Adjustable rate loan
- Next Rate Change Date = 10/1/2020
- Rate Change Lead Days = 45
- The new rate will be computed on 8/17/2020
- Based on the published SOFR rate in the Loan Index Table on 8/17/2020

Floating Rates change when the index is updated.

4.) Fannie Mae and Freddie Mac



5.) LIBOR to SOFR Migration Considerations:

We recommend that financial institutions review the following steps to help ensure a smooth transition from LIBOR to SOFR.

a.) Identify LIBOR loans and maturity dates

The LIBOR sunset is set to occur by 12/31/2021. Identify the loans that might be impacted by the LIBOR sunset. Are these loans:

- That are Variable Rate
- Tied to a LIBOR index rate
- Are scheduled to mature after 12/31/2021?
- How many LIBOR loans exist?
- How many loans are there by Loan Type?

b.) Do you have any purchased participations / syndications?

- Be sure to review any purchased participations / loan syndications and work to understand from the lead servicer what their migration plan is to convert loans that are tied to LIBOR.

c.) What is your policy for newly originated loans and purchased participations?

- When will you adopt a LIBOR alternative?
- What are purchased participation loans linked to?
- What is supported for Signature and what is not?

d.) What is your migration strategy?

- For each loan, or portfolio of loans, that is tied to LIBOR, map out the new SOFR Rate that will be used to replace LIBOR.
- Are there industry best practices?
- Loan contract provisions?

Loan Type	Number of Loans	Number Maturing Post 12/31/2021	SOFR Target Rate
Retail – Home Equity Loans			
Retail – Adjustable Rate Loans			
Purchased/Non-Lead participations			
Bi-lateral commercial loans			
Syndications (mid-market)			
Other			

e.) When and how will you transition your LIBOR portfolio?

- What is your migration to SOFR timing?
- Do you need support for Data updates from Fiserv? Fiserv Professional Services is available to help but advanced planning is required.
- Consider Spread Adjustments
- Consider other billing features
- Communicate with the borrowers

For Additional Information:

Alternative Reference Rates Committee:

https://www.newyorkfed.org/arrc/index.html

For more information: Contact your Fiserv Client Partner.