

**MEMORANDUM**

TO: Life Actuarial (A) Task Force

FROM: Pat Allison, NAIC Staff

DATE: November 17, 2022

RE: Recommended replacement related to APF 2022-04 Swap Spreads and LIBOR transition to SOFR

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**Background**

The purpose of this memo is to recommend: 1) LATF adoption of Secured Overnight Financing Rate (SOFR) swap spreads as the replacement for LIBOR swap spreads effective 12/30/22, which is the last business day coincident with or preceding 12/31/22 (which is a Saturday) so that prescribed spreads as of 12/31/22 (which equal those on 12/30/22) are based on the approach specified in this memo; 2) The approach to be used in calculating current and long-term swap spread curves as of 12/30/22; and 3) Technical implementation details as recommended by the American Academy of Actuaries. These recommendations are consistent with APF 2022-04 (which is effective for the 2023 *Valuation Manual*), which identifies the SOFR as the replacement for LIBOR, and the VM-20 Section 9.F.8.d Procedure for Setting Prescribed Gross Asset Spreads, cited below:

A current and long-term swap spread curve shall be prescribed for year one and years four and after, respectively, with yearly grading in between. The three-month and six-month points on the swap spread curves shall be the market-observable values for these tenors. Currently, this shall be the corresponding London Interbank Offered Rate (LIBOR) spreads over Treasuries. When the NAIC determines LIBOR is no longer effective, the NAIC shall recommend a replacement to the Life Actuarial (A) Task Force which shall be effective upon adoption by the Task Force.

The last sentence above notes that the NAIC shall recommend “a replacement”, which indicates an intent to replace the prescribed current and long-term swap spread curves with a single replacement, as opposed to continuing the NAIC’s prescription of LIBOR beyond the adoption date.

**Determination that LIBOR is no longer effective**

The Alternative Reference Rates Committee’s November 9 Meeting Readout highlighted continued progress in the transition from LIBOR to SOFR, with SOFR predominant across derivatives markets. Specifically, SOFR swaps have accounted for more than 90 percent of daily volumes on average of

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interest rate risk traded in the outright linear swaps market for the last two months while LIBOR swaps accounted for less than 4 percent of the overall volume in October. Based on this information, NAIC staff has determined that LIBOR is no longer effective.

Actuarial judgment may be required in the use of prescribed swap spreads (for example, in the case where companies have a combination of SOFR and LIBOR-based swaps). VM-20 Section 9.F.8.d states, in part “Interest rate swap spreads over Treasuries shall be prescribed by the NAIC for use throughout the cash-flow model *wherever appropriate* for transactions and operations...” (emphasis added).

### **Recommended Replacement for Current Benchmark Swap Spreads**

Effective December 30, 2022, NAIC staff recommends that for each month-end date, LIBOR swap spreads shall be replaced with SOFR swap spreads<sup>1</sup>:

- 3-month LIBOR spread should be replaced with 3m SOFR swap<sup>2</sup> spread
- 6-month LIBOR spread should be replaced with 6m SOFR swap spread
- 1-year swap spread should be replaced with 1yr SOFR swap spread
- ...
- 30-year swap spread should be replaced with 30yr SOFR swap spread

### **Recommended Replacement for Long-Term Benchmark Swap Spreads**

Effective December 30, 2022, NAIC staff recommends the following approach for the calculation of long-term benchmark swap spreads, consistent with APF 2022-04:

1. Extract daily swap spread data over the prescribed observation period (rolling 15-year period) ending on the last business day of the quarter from at least two reputable data sources. If the data source provides swap rates rather than swap spreads, convert the daily swap rate for each maturity to a swap spread by subtracting the corresponding maturity Treasury yield from the swap rate.
2. Calculate SOFR swap spreads as follows for the last business day “u” of 2022, where “u” is the 12/30/22 effective date of the adoption by the Life Actuarial (A) Task Force of SOFR swap spreads as the replacement for swap spreads previously prescribed:
  - a. For each maturity “m” = 0.25, 0.5, 1 ... 30 years, and business day “u”:  
$$\text{SOFR swap spread}(m,u) = \text{SOFR swap rate}(m,u) - \text{Treasury yield}(m,u).$$
3. Calculate SOFR swap spreads as follows for each business day before the 12/30/22 effective date of the adoption by the Life Actuarial (A) Task Force of SOFR swap spreads as the replacement for swap spreads previously prescribed, utilizing Bloomberg’s 2021-03-05 published USD Spread Adjustments:
  - a. For each maturity “m” = 3 or 6 months, and business day “u”,
    - i. 
$$\text{SOFR swap spread}(3 \text{ months},u) = \text{LIBOR swap spread}(3 \text{ months},u) - 0.26161\% \text{ (the USD 3-month Spread Adjustment)}$$

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<sup>1</sup> During 2021 the swap market evolved such that the definition of a standard n-year interest rate swap changed in January 2022 to be a SOFR swap from the LIBOR swap.

<sup>2</sup> 3-month and 6-month SOFR swap rates are defined herein as the fixed rate one party pays at the end of three months or six months in exchange for receiving at such time 3-month SOFR or 6-month SOFR, calculated on a compounded in arrears basis.

- ii.  $\text{SOFR swap spread}(6 \text{ months}, u) = \text{LIBOR swap spread}(6 \text{ months}, u) - 0.42826\%$  (the USD 6-month Spread Adjustment)
  - b. For each maturity “m” = 1 ... 30 years, and business day “u”:  
 $\text{SOFR swap spread}(m, u) = \text{LIBOR swap spread}(m, u) - 0.26161\%$  (the USD 3-month Spread Adjustment)
- 4. Average the swap spread data from the data sources by maturity over the prescribed observation (rolling 15-year period).
- 5. Calculate the Long-Term Benchmark Swap Spreads as the 85% conditional mean for each of the 32 maturity categories (three-month, six-month, one-year, two-year, ... 30-year) using the same business trading days as were used in the 85% conditional mean for long-term bonds spreads.
- 6. Publish the Long-Term Benchmark Swap Spreads in a table. Among tables published on the NAIC website (See Subsection H), Table J shows Long-Term Benchmark Swap Spreads

In Table J, NAIC staff shall clarify that from 12/31/22 forward, prescribed current and long-term benchmark swap spreads are SOFR swap spreads. [Drafting Note: The tables will be labeled to indicate they contain SOFR swap spreads.

### **Technical Implementation Details**

NAIC staff recommends that implementation of prescribed current and long-term benchmark SOFR swap spreads be based on guidance included in a November 17, 2022 comment letter to LATF from the American Academy of Actuaries. The Academy letter provides technical details on the calculation of treasury par yield curve rates, as well as prescribed swap spread calculations and their publication. The letter outlines three alternative approaches to handle inconsistencies in the historical swap spreads. NAIC staff recommends alternative #2, which is recommended by the Academy in such comment letter. This would mean that for purposes of calculating long-term swap spreads, historical current swap spreads would be recalculated for December 31, 2021 through December 29, 2022, but only to remedy the inconsistency where spreads were a 50/50 blend of LIBOR swap spreads and SOFR swap spreads.



AMERICAN ACADEMY of ACTUARIES

*Objective. Independent. Effective.™*

November 17, 2022

Ms. Rachel Hemphill  
Chair, Life Actuarial (A) Task Force (LATF)  
National Association of Insurance Commissioners (NAIC)

Re: Academy input on implementation on Treasury par yield curve rates and on prescribed swap spread calculations and their publication, for APF 2022-04 on swap spreads and London Inter-Bank Offered Rate (LIBOR) transition to Secured Overnight Financing Rate (SOFR) (the “APF”), and for the anticipated next version of a related memo (the “Memo”) from NAIC staff

Dear Ms. Hemphill,

The Life Reserves Work Group, Annuity Reserves and Capital Work Group, and Variable Annuity Reserves and Capital Work Group of the American Academy of Actuaries<sup>1</sup> (the “Academy”) appreciates the opportunity to provide guidance on this topic. The Academy is thankful to LATF and NAIC staff as well for the July 30 LATF adoption of the APF, the June 9 and May 26 exposures of earlier versions of the APF and of the Memo, as well as for additional communications throughout the calendar year.

The Academy has received an informal request from NAIC staff for input with regard to implementation of the APF and the Memo. More specifically, NAIC staff would like Academy input on what data source(s) and or methodology might be used, among numerous possibilities, to calculate Treasury rates that would be subtracted from SOFR swap rates (that the NAIC will obtain from other sources) on each business day to calculate prescribed swap spreads for SOFR swaps for the 32 maturities (3-month, 6-month, 1-year, 2-year, . . . , 29-year, 30-year) in VM-20. Given that this topic is quite technical, this letter also includes Academy input, which covers additional implementation details for the APF and the Memo beyond what is specified in the APF, on prescribed swap spread calculations and their publication by the NAIC.

<sup>1</sup> The American Academy of Actuaries is a 19,500-member professional association whose mission is to serve the public and the U.S. actuarial profession. For more than 50 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

## **Academy input on Treasury yields to implement the APF:**

After reviewing several possibilities and receiving some preliminary input from NAIC staff, the Academy recommends the following approach:

1. Obtain Treasury par yield curve rates for 10 on-the-run (OTR) maturities (3m, 6m, 1y, 2y, 3y, 5y, 7y, 10y, 20y, 30y) from either:
  - a. [https://home.treasury.gov/resource-center/data-chart-center/interest-rates/TextView?type=daily\\_treasury\\_yield\\_curve&field\\_tdr\\_date\\_value=2022](https://home.treasury.gov/resource-center/data-chart-center/interest-rates/TextView?type=daily_treasury_yield_curve&field_tdr_date_value=2022) ;  
or
  - b. <https://www.federalreserve.gov/releases/h15/> ; (note on this page the Treasury par yield curve rates are labeled as “Treasury constant maturities”)
  
2. Utilize the “monotone convex spline” (MC) method to calculate par yield curve rates for the 32 swap spread maturities prescribed in VM-20, as such method has been adopted by the U.S. Treasury starting December 6, 2021, either A) by using a spreadsheet (e.g., a historical saved version is available by copy/pasting the following into an internet browser:  
<http://web.archive.org/web/20180903055110/finmod.co.za/Monotone%20Convex%20Interpolation.xls>) created by Graeme West, who co-authored a paper titled “Methods for Constructing a Yield Curve” (as discussed below) or B) by using any mathematically equivalent approach:
  - a. Enter as percentages the par yield curve rates, for the 10 OTR maturities, into cells D1 to D10 of the “input” tab in the spreadsheet;
  - b. Click on the “Boot curve” button in the “input” tab in the spreadsheet; and
  - c. Extract from column B of the “curves” tab in the spreadsheet the Treasury par yield curve rates for the 32 maturities prescribed in VM-20 (which could be listed at the bottom of this tab via an Excel VLOOKUP formula or macro created by NAIC staff or the Academy).

## **Academy input on prescribed Current swap spread calculations and their publication:**

3. Convert SOFR swap rates obtained from each data source to a bond-equivalent semi-annual Actual/Actual basis as needed. To perform these calculations, please note the following market conventions that are used in the trading of such derivative instruments:
  - a. 3-month and 6-month SOFR swap rates are quoted by the Chicago Mercantile Exchange on a 3-month Actual/360 and a 6-month Actual/360 basis, respectively.
  - b. 1-year, 2-year, 3-year ... 29-year, 30-year SOFR swap rates are quoted on an annual Actual/360 basis.

4. Convert any LIBOR swap rates obtained from each data source to a bond-equivalent semi-annual Actual/Actual basis as needed. To perform these calculations, please note the following market conventions that are used in the trading of such derivative instruments:
  - a. 3-month and 6-month LIBOR are quoted on a quarterly Actual/360 and a semi-annual Actual/360 basis, respectively.
  - b. 1-year, 2-year, 3-year ... 29-year, 30-year LIBOR swap rates are quoted on a semi-annual 30/360 basis.
  
5. Calculate prescribed Current swap spreads for each of the 32 swap spread maturities prescribed in VM-20 on a bond-equivalent semi-annual Actual/Actual basis, after first calculating SOFR swap spreads from each data source as the SOFR swap rates from such data source, converted to a bond-equivalent semi-annual Actual/Actual basis as needed, minus the par Treasury yield curve rate of the same maturity (note this formula is consistent with the APF). If the NAIC also publishes LIBOR swap rates for as long as it has sufficient data from data sources to do so, these should be calculated on a bond-equivalent semi-annual Actual/Actual basis, after first calculating LIBOR swap spreads from each data source as the LIBOR swap rates from such data source, converted to a bond-equivalent semi-annual Actual/Actual basis as needed, minus the par Treasury yield curve rate of the same maturity.
  
6. Specify the following, in the NAIC spreadsheets where prescribed swap spreads are published, that starting with the effective date (that the Academy expects will be December 30, 2022, which is the last business day in 2022) specified in the Memo:
  - a. These 32 Current swap spreads prescribed in VM-20 are expressed on a bond-equivalent semi-annual Actual/Actual basis.
  - b. For each of the 32 swap spread maturities, the prescribed Current swap spread is calculated as the difference of:
    - i. the average SOFR swap rate obtained by the NAIC from data providers for such maturity, after each rate obtained is converted to a bond equivalent (semi-annual Actual/Actual) basis as needed, minus
    - ii. the Treasury par yield curve rate for such maturity, where such Treasury par yield curve rate is determined using the process described in the “Academy recommendation on Treasury yields” section of this letter.
  - c. If the NAIC also publishes LIBOR swap rates for as long as it has sufficient data from data sources to do so, then for each of the 32 Current swap spread maturities, the LIBOR swap spread is calculated as the difference of:
    - i. the average LIBOR swap rate obtained by the NAIC from data providers for such maturity, after each rate obtained is converted to a bond equivalent (semi-annual Actual/Actual) basis as needed, minus

- ii. the Treasury par yield curve rate for such maturity, where such Treasury par yield curve rate is determined using the process described in the “Academy recommendation on Treasury yields” section of this letter.
    - d. The purpose of specifying the above information is for a company that has one or more models that (i) require the input of swap spreads over Treasury rates that are expressed on a different payment frequency and/or day count basis (e.g., the market convention for each maturity), and/or (ii) calculate Treasury rates and/or swap rates, based on input for Treasury rates and prescribed swap spreads for some or all of the 32 prescribed swap spreads, in a different manner than described above (e.g., a different interpolation method, and/or a different method for calculating OTR constant maturity Treasury yield curve rates that might be implemented by an economic scenario generator that the company uses), so that the company can transform the prescribed swap spreads to be precisely equivalent for use in the company’s models. Given that the NAIC is still working on technical details for the interest rate model in the GEMS ESG, which potentially could result in (i) and/or (ii) above, the Academy offers the opportunity to address this topic at the appropriate time with the NAIC ESG Technical Drafting Group.
7. Also, we recommend stating the following in the NAIC spreadsheets where prescribed swap spreads are published: “Prior to the effective date specified in the Memo, prescribed Current spreads were calculated using a less precise methodology than that being used starting on that effective date, such that the older prescribed Current spreads could not be described as:
- a. being spreads over a Treasury curve calculated on a specific basis that could be replicated by third parties, or
  - b. as having for all 32 maturities a specific payment frequency or day count basis.”

Before NAIC implementation, if such is request, the Academy would be pleased to peer review any NAIC preliminary calculations and/or provide the NAIC with formulas to implement the above recommendations.

### **Academy input for prescribed Long term swap spread calculations**

The Academy has discussed the extent to which the Academy should recommend that starting on the effective date specified in the Memo, prescribed Long term swap spread calculations should involve NAIC recalculation of historical prescribed Current swap spreads to remedy inconsistencies discussed above. Below is a discussion of three alternatives for Long term swap spread calculations starting with the effective; the Academy views #2 as the most practical, as explained below.

- 1) Do not recalculate any historical Current swap spreads;

- 2) Recalculate historical Current swap spreads for December 31, 2021, through the business day preceding the effective date, but only to remedy that inconsistency where such spreads were a 50/50 blend of LIBOR swap spreads and SOFR swap spreads; or
- 3) Recalculate all historical swap spreads for the experience period (not longer than 15 years) to be used to calculate Long term swap spreads on the effective date, reflecting all of the modifications mentioned in this letter.

The Academy recommends that:

- Item #1 not be used because:
  - For 15 years starting with the effective date, about 1/15<sup>th</sup> of the prescribed Long term spread calculations (e.g., from 12/31/2021 to 12/30/2022) would involve use of Current swap spreads that deviated from VM-20.
- Item #2 is the most practical approach because:
  - It involves only a limited amount of extra work (e.g., following VM-20 to recalculate Current swap spreads from 12/31/2021 to 12/30/2022);
  - It does not involve the historical recalculation of Current swap spreads to reflect the above Academy input, starting with the effective date, on Treasury yields and Current swap spreads, and is this much easier for NAIC staff to implement than #3; and
  - Because, although #2 involves recalculation of about 1/15<sup>th</sup> of the historical prescribed Current swap spreads used in Long term swap spread calculations starting with the effective date, it is expected to result in a smoother transition than #3 (which involves recalculation of all of the historical prescribed Current swap spreads) in prescribed Long term swap spreads from the three month-end dates preceding the effective date.
- Item #3 not be used, even though it would be the most theoretically sound calculation prospectively, because
  - It involves more work for NAIC staff than #2; and
  - It is expected to result in a less smooth transition than #2 in prescribed Long term swap spreads from the three month-end dates preceding the effective date, which might cause an AAT, PBR or principles-based capital under RBC to result on the effective date for a company that is materially different from the qualified actuary's expectations.



### **Academy input on NAIC governance for prescribed swap spread calculations**

Given that the calculations above involve several steps and multiple sources, and the possibility that human error could occur at a data provider or at the NAIC, the Academy recommends that the NAIC implement a quality control process to be used to ensure that prescribed spreads that are calculated and published, starting with the effective date specified in the Memo (e.g., December 30, 2022) are consistent with the APF, the Memo, and this Academy letter. The Academy would be pleased to provide private comments directly to NAIC staff on their proposed quality control process.

### **Academy input on the Memo**

Please recall that on June 10, LATF exposed a June 9 draft of the Memo, which upon LATF adoption would implement the last sentence in Section 7.F.8.d, which reads: “When the NAIC determines LIBOR is no longer effective, the NAIC shall recommend a replacement to the Life Actuarial (A) Task Force which shall be effective upon adoption by the Task Force.” In coordination with NAIC staff, the Academy recommends that NAIC staff refine its earlier draft of the Memo to recommend LATF implementation of the Memo that is consistent with the above input in this Academy letter, ideally with an effective date of December 30, 2022, which is the last business day coincident with or preceding December 31, 2022 (which is a Saturday), so that prescribed spreads as of December 31, 2022 (which equal those on December 30, 2022) are based on the approach specified in the Memo and thus would be reflected in 2022 year-end reporting. In order to achieve such consistency, the Academy recommends that LATF expose for comment the next version of the Memo.

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The Academy appreciates the efforts of LATF and NAIC staff on the APF and Memo. If you have any questions or would like further dialogue on the above topics, please contact Amanda Barry-Moilanen, life policy analyst, at [barrymoilanen@actuary.org](mailto:barrymoilanen@actuary.org).

Sincerely,

Alan Routhenstein, MAAA, FSA  
Member, Life Valuation Committee  
American Academy of Actuaries