

Appendix: Accounting memorandum related to embedded derivative accounting considerations in connection with the market transition from LIBOR to SOFR

Background – SOFR to Replace LIBOR

1. The Board of Governors of the Federal Reserve System and the Federal Reserve Bank of New York convened the Alternative Reference Rates Committee (“ARRC”) in 2014 to identify alternative reference rates to replace U.S. dollar LIBOR (“LIBOR”), identify best practices for contract robustness in the interest rate market, and create an implementation plan to support an orderly adoption of new reference rates. The ARRC selected the Secured Overnight Financing Rate (“SOFR”), as the alternative reference rate to replace LIBOR.
2. SOFR is fundamentally different than LIBOR. SOFR is an overnight, nearly risk-free secured rate reflective of the cost of borrowing cash on an overnight basis collateralized by U.S. Treasury securities and is based upon actual transaction volume in the liquid repo market, while LIBOR is an unsecured rate intended to reflect a survey of the price of bank credit risk at various tenors (e.g., overnight, 1 week, 1-month, 3-month, 6-month and 1 year), for which there may or may not be significant volumes of activity originated each period.
3. Market participants are currently working to transition LIBOR-based products and processes to instead reflect alternative reference rates, as regulators expect banks to be ready for *LIBOR to cease to exist as soon as the end of 2021*.

Background – ARRC LIBOR Fallback Language for Commercial Products

4. The ARRC believes one way to reduce the risk related to a transition to a new benchmark rate is to incorporate stronger “fallback language” into existing and newly issued LIBOR-based contracts. Fallback language in a LIBOR-based contract refers to the contractual provisions that address what is to happen in the event that LIBOR rates are not available. Historically, fallback language was generally incorporated in a contract to address a temporary or technical issue that caused LIBOR to be unavailable for a short period. As a result, many contracts would not be sufficient to address a permanent cessation of LIBOR, which may lead to significant changes to contract economics or uncertain outcomes. For other contracts where market participants may have implemented fallback language, the terms can vary greatly across contracts, may lack sufficient specificity and/or may rely on one or more parties to exercise discretion to address uncertainties.
5. In response to concerns about existing and insufficient fallback language, in 2018 the ARRC began developing more robust fallback language that may be widely used for new issuances of U.S. dollar-denominated LIBOR-based cash products. To address this same issue in derivative products, the International Swaps and Derivatives Association, Inc. (“ISDA”) is developing new fallback language for LIBOR and other key interest rate benchmarks in its standard definitions for derivatives.
6. In the second half of 2018, the ARRC issued consultation papers that proposed specific LIBOR fallback language for inclusion in new issuances of four types of cash products in the commercial markets: floating rate notes, syndicated loans, bilateral business loans and securitizations. The consultations proposed that upon a triggering event, such as a LIBOR cessation, the cash product would pay a SOFR-based interest rate with an adjustment¹ so that the valuation of the product under the SOFR-based rate would be comparable to its prior value under LIBOR. The ARRC strived for uniformity across commercial products as much as possible.
7. Based upon the responses to the consultation papers, the ARRC has published recommended fallback language for each of the above commercial cash products. Specifically, the ARRC recommendations for floating-rate notes and syndicated loans were issued on April 25, 2019, and the ARRC recommendations for bilateral business loans and securitizations were issued on May 31, 2019. To the extent market participants continue to enter into LIBOR-based contracts for these products, the ARRC urges the inclusion of the fallback language contained in the recommendations, but acknowledges that including such fallback language is voluntary.

¹ Referred to as the “benchmark replacement adjustment” in the ARRC consultations and recommendations. This adjustment is different from and in addition to any existing credit spread on LIBOR products, which reflects the pricing of borrower or obligor credit risk over the LIBOR benchmark interest rate.

8. The following table summarizes the commercial cash products and provides links to the related contract fallback language papers issued by the ARRC:

Table 1: ARRC Consultation & Recommendation Papers – Commercial Cash Instruments

Cash Product	Description	ARRC Consultations	ARRC Recommendations
Floating-rate notes	Floating-rate notes referenced to LIBOR such as corporate bonds, municipal bonds and convertible debt	Link to Consultation <i>(issued Sept. 24, 2018)</i>	Link to Recommendations <i>(issued April 25, 2019)</i>
Syndicated loans	Floating-rate syndicated business loans referenced to LIBOR	Link to Consultation <i>(issued Sept. 24, 2018)</i>	Link to Recommendations <i>(issued April 25, 2019)</i>
Bilateral business loans	Floating-rate bilateral business loans referenced to LIBOR	Link to Consultation <i>(issued Dec. 7, 2018)</i>	Link to Recommendations <i>(issued May 31, 2019)</i>
Securitizations	Floating-rate securitized products referenced to LIBOR such as CLOs, ABS, etc.	Link to Consultation <i>(issued Dec. 7, 2018)</i>	Link to Recommendations <i>(issued May 31, 2019)</i>

9. Each of the consultation proposals identified two approaches to draft fallback language and select a successor interest rate. The first is an “amendment approach”, which does not identify specific replacement rates. This approach would provide a streamlined amendment mechanism for negotiating a replacement benchmark in the future and could serve as an initial step towards eventually adopting a “hardwired approach”. Because of the relative ease of amending a loan as compared to a note or securitization, the amendment approach – if chosen - applies only to loans.
10. The second approach is the “hardwired approach”, which may be applied to all four cash products. The hardwired approach establishes a hierarchy (a waterfall of steps) of specific replacement benchmark interest rates to LIBOR in which subsequent steps are only relevant to the extent benchmark rates in the prior steps are not available. Market participants that adopt the hardwired approach can know they will pay or receive a SOFR-based rate plus a spread adjustment upon the discontinuation of LIBOR, and parties will not be able to take advantage of the then-current market environment to capture economic value. Most consultation respondents preferred the hardwired approach.
11. Under the hardwired approach, the waterfall for benchmark replacement rates across the four commercial cash products are similar but not exactly the same. Certain differences inherent in the cash products warrant different

treatment. The following table summarizes the benchmark replacement rate waterfall recommended (as applicable) by the ARRC:

Table 2: Benchmark Replacement Rate Waterfall for Hardwired Approach – Commercial Products^(a)

Waterfall Step	Cash Products (x = step is applicable)			
	Floating-Rate Notes	Syndicated Loans	Bilateral Business Loans	Securizations
	Final	Final	Final	Final
Step 1: Term SOFR + Adjustment^{(b) (c)}	x	x	x	x
Step 2: Compounded SOFR + Adjustment^(d)				
• In-arrears	x	x	x	x
• In-advance		x	x	x
Step 3: ARRC Selected Rate + Adjustment^(e)	x			x
Step 4: ISDA Fallback Rate + Adjustment^(e)	x			x
Step 5: Issuer (or Designee) Selected Rate + Adjustment^(f)	x	x	x	x
<p>(a) The table presents the waterfall as recommended by the ARRC in its document published on April 25, 2019 for floating-rate notes and syndicated loans and May 31, 2019 for bilateral business loans and securitizations.</p> <p>(b) Currently, forward-looking SOFR term rates do not exist. There is no guarantee one will develop.</p> <p>(c) Given derivatives fallbacks are not expected to reference a term SOFR rate (but rather compounded SOFR), market participants can elect <i>not to include</i> the term SOFR waterfall step for cash products and still be considered to use ARRC recommended fallbacks.</p> <p>(d) Market participants are permitted to use simple average SOFR + adjustment as an alternative to compounded SOFR + adjustment. Additionally, for products other than floating-rate notes, the ARRC fallbacks permit use of either an “in-arrears” or “in-advance” convention to calculate interest in this step. For floating-rate notes, only the “in-arrears” convention is permitted.</p> <p>(e) Steps 3 and 4 are fallbacks if SOFR is discontinued. These steps are intended to mimic the fallbacks for derivatives, if SOFR is discontinued. Step 3 allows for the ARRC to select the rate. Step 4 refers to the ISDA fallback rates, which are first the Overnight Bank Funding Rate and then the FOMC Target Fed Funds Rate.</p> <p>(f) Step 5 presented in this table is for floating-rate notes, which permits the Issuer to select a rate in the future if and when this step applies. A similar step is contained in the waterfall for the other cash products in that it allows for a designated party to select the new benchmark rate in the future, however the step title is different.</p>				

12. The table in the prior paragraph identifies SOFR-based benchmark replacement rates for LIBOR floating-rate cash products in the commercial markets. All of those rates include an adjustment, which the ARRC calls a “benchmark replacement adjustment”. Because LIBOR and SOFR benchmark rates are based on different underlyings (e.g., unsecured versus secured transactions), a fixed-spread adjustment is required to make a SOFR-based rate comparable to a LIBOR rate at transition. This spread adjustment is different from and incremental to any existing contractual credit spread on LIBOR products that reflects the pricing of borrower or obligor credit risk negotiated amongst the transaction parties. As such, LIBOR-based products that transition to a SOFR-based rate will have a fixed-spread above the benchmark that reflects two components – (1) the existing borrower credit spread, and (2) the benchmark replacement adjustment.
13. The benchmark replacement adjustment, which can be positive or negative or zero, is determined at the time the replacement benchmark rate becomes effective in accordance with the waterfall in Table 2 above. However, the ARRC recommendations do not specify an amount or methodology for calculating the benchmark replacement adjustment. For cash products, the ARRC intends to develop recommendations in the future for calculating such an adjustment. On January 21, 2020, the ARRC released a [consultation](#) proposing spread adjustment methodologies for cash instruments referencing U.S. dollar LIBOR, which was open for feedback until March 6, 2020.

14. The following tables defines and describes application of the SOFR-based benchmark rates identified in Table 2:

Table 3: Definition of Benchmark Replacement Rates – Commercial Products

SOFR Rate	Definition	Example Application
Term SOFR	Pays interest based upon a published forward-looking term SOFR for the corresponding period (meaning a period equivalent to the LIBOR tenor for that instrument, e.g., 1-month SOFR, 3-month SOFR, etc.) that is selected, endorsed or recommended by the Relevant Governmental Body ^(a) .	For a debt instrument whose floating-rate index has changed from 3-month LIBOR to 3-month SOFR, the quarterly interest payment due on September 30 th is based upon the 3-month SOFR rate as of June 30 th . As a result, similar to forward-looking term LIBOR rates in practice today, the interest rate paid on the payment date is known prior to the beginning of the interest accrual period and is fixed throughout such period.
Compounded SOFR In Arrears	Pays interest equal based upon a daily compounded average of SOFR for the corresponding tenor (meaning a period equivalent to the LIBOR tenor for that instrument, e.g., 1-month, 3-month, etc.) implemented <i>in arrears</i> .	“In arrears” means the rate paid is based upon SOFR rates in the current interest accrual period. For a debt instrument whose floating-rate index has changed from 3-month LIBOR to Compounded SOFR <i>in arrears</i> , the quarterly interest payment due on September 30 th is based upon the daily compounded average of SOFR for the period July 1 st to September 30 th . As a result, the interest rate paid on the payment date is not known until the end of the interest accrual period because the average is not fixed throughout the period.
Compounded SOFR In Advance	Pays interest equal based upon a daily compounded average of SOFR for the corresponding tenor (meaning a period equivalent to the LIBOR tenor for that instrument, e.g., 1-month, 3-month, etc.) implemented <i>in advance</i> .	“In advance” means the rate paid is based upon SOFR rates in the prior interest accrual period. For a debt instrument whose floating-rate index has changed from 3-month LIBOR to Compounded SOFR <i>in advance</i> , the quarterly interest payment due on September 30 th is based upon the daily compounded average of SOFR for the period April 1 st to June 30 th . As a result, the interest rate paid on the payment date is known prior to the beginning of the interest accrual period and is fixed throughout such period.
^(a) Relevant Government Body means the Federal Reserve Board and/or the Federal Reserve Bank of New York, or a committee official endorsed or convened by the Federal Reserve Board and/or the Federal Reserve Bank of New York such as the ARRC, or successor thereto.		

Background – ARRC SOFR-Based Interest Rates for Consumer Products

15. The ARRC finalized in the first half of 2019 its recommendations for SOFR interest-rate reset features related to commercial products. However, the ARRC has not finalized similar recommendations for consumer products (e.g., residential mortgage loans, credit cards, student loans, etc.). In the second half of 2019, the ARRC focused on residential ARM products. In July 2019, the ARRC issued two documents for industry-wide comment:

- [Consultation](#) proposing fallback language for newly-issued LIBOR ARMs; and
- [Whitepaper](#) proposing a model for new SOFR-based ARM products.

16. On November 15, 2019, the ARRC finalized its fallback language [recommendations](#) for newly-issued LIBOR ARMs. However, those recommendations did not yet identify SOFR-based indices or rates. Rather, the fallback language references an interest rate index or rate to be named in the future by a relevant government body, such as the ARRC, and if such an index is not available the lender/note holder selects the index. The ARRC expects to specify such rates by 2021.
17. The ARRC whitepaper for new SOFR-based ARM products illustrated how key features of ARMs could use SOFR rates. The whitepaper recommends incorporating most aspects of existing US Dollar LIBOR-based ARMs, with the following notable differences:
- SOFR ARMs are based upon 30 or 90 day daily average SOFR rate implemented *in advance*, rather than 1-year LIBOR term rate implemented *in advance* for LIBOR ARMs
 - Once the fixed-rate period expires, the interest rate reset frequency should be every 6 months for SOFR ARMs, rather than every year for LIBOR ARMs
 - Fixed-rate margin for SOFR ARMs will likely be higher relative to margin for LIBOR ARMs
 - The cap for periodic floating-rate adjustments will be 1% for SOFR ARMs, as opposed to 2% for LIBOR ARMs

The following table summarizes the proposed changes to ARMs recommended by the ARRC whitepaper:

Table 4: Summary of Proposed Changes to ARMs to Use SOFR

Term	Current LIBOR ARM Model	Proposed Model for SOFR ARMs
Fixed-rate period	3, 5, 7 or 10 years	No change
Floating rate index	1-year LIBOR	30 or 90 day average of SOFR
Floating-rate adjustment period	1 year	6 months
Rate / payment determination	New rate determined 45 days in advance of payment date change	No change
Initial caps	2% for 3/1 and 5/1 ARMs 5% for 7/1 and 10/1 ARMs	No change
Subsequent caps	2%	1%
Lifetime caps	5%	No change
Margin	2.25%	Likely in range of 2.75 to 3%

18. On November 15, 2019, Fannie Mae and Freddie Mac (collectively, the government-sponsored entities or GSEs) announced their intention to offer new SOFR-based ARM products². Both GSEs indicated their SOFR ARM products are being developed based upon the ARRC whitepaper issued July 15, 2019.
19. On February 5, 2020, the GSEs announced³ (1) new closed-end residential ARMs originated June 1, 2020 or after must include the ARRC-recommended fallback language to be eligible for purchase by the GSEs, (2) they will cease purchasing LIBOR ARMs by December 31, 2020 and (3) further details of SOFR ARM product offerings, including that residential ARMs will reset every 6 months based upon a 30 day average daily SOFR rate implement *in advance*, and that (4) they anticipate to begin accepting deliveries of SOFR ARM loans in the 2nd half of 2020.

² For the November 15, 2019 announcements from the GSEs, see link to Fannie Mae’s announcement [here](#) and Freddie Mac’s announcement [here](#).

³ Refer to the Federal Housing Finance Agency’s (FHFA) February 5, 2020 [announcement](#) which provides links to Fannie Mae and Freddie’s Mac announcements related to residential and multi-family mortgage ARM products.

20. Final readiness of new SOFR-based ARM offerings for market execution is subject to internal reviews of policies, systems and processes by the GSEs, as well as regulatory approval by the Federal Housing Finance Agency (FHFA). Further details are expected from the GSEs.

Background – Publishing of SOFR Average Rates and SOFR Index

21. On March 2, 2020, the Federal Reserve Bank of New York (New York Fed), as administrator of SOFR, began publishing SOFR average rates and a SOFR index. The New York Fed will publish the following average rates each day, which are backward-looking:
- a. 30-day Average SOFR
 - b. 90-day Average SOFR
 - c. 180-day Average SOFR
22. The SOFR average rates employ daily compounding on business days and represent the trailing 30-, 90- and 180-average daily SOFR rates (based on calendar days) with the most recent SOFR value from the day prior to publication. Additionally, the New York Fed will publish a daily SOFR index to permit users to calculate average rates over custom time periods, in the event average rates are needed for tenors other than the 30-, 90-, and 180-average SOFR published rates.
23. These published average SOFR rates would be utilized to calculate the interest payment amounts for commercial and consumer products which reference average SOFR rates (whether “in advance” or “in arrears” convention is applied), including those rates proposed or recommended by the ARRC as specified above and evaluated in this paper. These published average SOFR rates are not Term SOFR rates, as the published average rates are backward-looking.

Interaction with FASB Reference Rate Reform Guidance Related to Contractual Amendments to Existing LIBOR-Based Cash Instruments

24. The *Debt Modification Memo* prepared by the ARRC Accounting & Tax Working Group addresses the accounting treatment under U.S. GAAP upon amendment of an existing LIBOR-based cash instrument to incorporate SOFR indexation, which includes SOFR fallback language. The memo highlights the concerns of performing the quantitative assessments outlined in ASC 310-20 and 470-50 to evaluate whether such amendments should be accounted for as minor modifications (i.e., a continuation of an existing instrument) or extinguishments (i.e., termination of an existing instrument and origination of a new instrument) and requested relief from performing these quantitative assessments for modifications that relate solely to reference rate reform. The Financial Accounting Standards Board (FASB) addressed this issue as part of its project on reference rate reform. On March 12, 2020, the FASB issued Accounting Standards Update (ASU) No. 2020-04 – Reference Rate Reform (Topic 848): *Facilitation of the Effects of Reference Rate Reform on Financial Reporting* (ASU 2020-04). The guidance in ASU 2020-04 provides temporary optional guidance designed to ease the potential burden in accounting for reference rate reform activities. Specifically, ASU 2020-04 states that provided the amendments are related to reference rate reform, (1) reporting entities are permitted to account for such amendments as a minor modification without performing a quantitative assessment and (2) clarifies an embedded derivative reassessment is not required.
25. As stated above, the embedded derivative evaluation in this paper applies to:
- Cash instruments indexed to SOFR; and
 - Cash instruments indexed to LIBOR that already include ARRC recommended SOFR interest rate reset features as the contractual fallback rates.

In accordance with ASU 2020-04, LIBOR-based cash instruments that require contractual amendments to incorporate SOFR fallback language do not require an embedded derivative reassessment *upon amendment* so long as that amendment “relates to reference rate reform”. However, for this latter category of LIBOR-based instruments, regardless of whether SOFR fallback language existed at original issuance or was incorporated subsequently via an amendment, this paper presumes an embedded derivative assessment of the SOFR interest rate reset features are required as eventually interest payment amounts will be SOFR-based. Hence the reason for including this latter category of LIBOR-based instruments within the scope of this paper. As such, upon the

occurrence of a future event triggering the switch from LIBOR to SOFR indexation for such instruments, further embedded derivative evaluation at that time is unnecessary as the possible SOFR interest rate reset features were already evaluated in this paper.

Embedded Derivative Accounting Guidance - General

- 26. The authoritative guidance promulgated by the Financial Accounting Standards Board (FASB) related to recognition and measurement of embedded derivatives in cash instruments is codified in FASB Accounting Standards Codification (ASC) Topic 815, *Derivatives and Hedging*, within Subtopic ASC 815-15, *Embedded Derivatives*.
- 27. The embedded derivative guidance in ASC 815 is designed to prevent reporting entities from avoiding derivative accounting by embedding a derivative in a non-derivative financial instrument or other contract. Instruments that contain embedded derivatives are referred to as hybrid instruments. Hybrid instruments are composed of a “host contract” and an embedded derivative that include one or more derivative features.
- 28. Embedded derivatives require derivative accounting, separate and apart from a non-derivative host contract, if both:
 - the derivative, considered on a freestanding basis, would be accounted for as a derivative instrument under ASC 815; and
 - the economic characteristics of the derivative and the host contract are not clearly and closely related to one another.
- 29. The first of these criteria ensures that only derivative instruments defined by, and subject to, the requirements of ASC 815 are accounted for separately from the host contract. The second criterion focuses on whether an embedded derivative bears a close economic relationship to the host contract and therefore would not be required to be bifurcated from the host contract. An embedded derivative bears a close relationship with the host contract when its underlying economic characteristics and risks (i.e., the factors that cause a derivative to fluctuate in value) are clearly and closely related to the underlying characteristics and risks of the host contract.
- 30. Generally, embedded derivatives that introduce risks that are not typical for debt instruments or provide significant leverage are not considered to bear a close economic relationship to a debt host contract. For example, a hybrid debt instrument that includes embedded derivative features that are unrelated to interest rates or inflation (e.g., an equity or commodity underlying), would not be considered to be clearly and closely related to the debt host contract. Conversely, embedded derivative features that represent non-leveraged interest rates, indices or inflation indices, or that are linked to the creditworthiness of the debtor are clearly and closely related to a debt host contract. However, embedded derivative features that are linked to interest rates but provide leverage or move in the opposite direction of the rate or index (e.g., an inverse floater), may not be clearly and closely related to a debt host contract, depending in part on the outcome of the “double-double test” (see next section below). The following table summarizes this guidance:

Table 5: General Guidance for Embedded Derivative Features in Debt Hosts

Embedded Derivative Feature	Host Contract	Clearly and Closely Related?
NOT related to interest rates or inflation (e.g., equity or commodity underlying)	Debt instrument	No
Leveraged inflation index	Debt instrument	No
Leveraged interest rate or index	Debt Instrument	Maybe *
Non-leveraged interest rate or index or inflation index	Debt instrument	Yes
Creditworthiness of debtor	Debt instrument	Yes
*Further analysis required under “double-double test” (see next section)		

Embedded Derivative Accounting Guidance – Interest Rate Reset Features

31. Paragraphs 815-15-25-24 through 29 provide the FASB guidance for assessing debt host contracts and embedded derivatives related to interest rate reset features. An interest rate or index is considered to be clearly and closely related to a host debt instrument, provided a significant leverage factor is not involved. The FASB requires application of a “double-double test” that is specified in paragraph 815-15-25-26 (reproduced in the following paragraph) to make this assessment.
32. An embedded derivative in which the only underlying is based on an interest rate or interest rate index that alters interest payments that otherwise would be paid or received on an interest-bearing host contract is not considered to be clearly and closely related to the host contract if either of the following conditions exists:
- a. The hybrid instrument could be contractually settled in such a way that the investor would not recover substantially all of its initial recorded investment (e.g., certain inverse floater bonds and levered inverse floater bonds); or
 - b. The embedded derivative meets both of the following conditions (also known as the “*double-double test*”):
 - (1) There is a possible future interest rate scenario (even though it may be remote) under which the embedded derivative would at least double the investor’s initial rate of return on the host contract (“double the initial return”); and
 - (2) For any of the possible interest rate scenarios under which the investor’s initial rate of return on the host contract would be doubled (as discussed in (1) above), the embedded derivative would at the same time result in a rate of return that is at least twice what otherwise would be the then current market return (under the relevant future interest rate scenario) for a contract that has the same terms as the host contract and that involves a debtor with a credit quality similar to the issuer’s credit quality at inception (“double the current market return”).
33. The interest rate reset features proposed or recommended by the ARRC would not by themselves cause bifurcation of such embedded features under condition (a) in the prior paragraph. Accordingly, the focus of the remainder of this memo will be application of the double-double test under condition (b) in the prior paragraph.
34. Conceptually, the double-double test involves comparing the investment return (in the current market and any future hypothetical market environment that is possible) of the host contract with the hybrid instrument in effort to isolate the impact of the embedded derivative feature (i.e., the difference in return between the two). If it is possible the investment return of the hybrid instrument can at least double that of the host contract (i.e., embedded derivative provides enough positive leverage), the embedded derivative is not clearly and closely related to the host contract. Under any interest rate scenario, there will be no difference in the investment return of the host contract and hybrid instrument to the extent that they share the same features. For example, if the host contract and hybrid instrument have the same interest rate reset feature (e.g., 3-month LIBOR, reset quarterly), no bifurcation would be required as it relates to this feature as essentially it would be deemed to be part of the host and not the embedded derivative component of the hybrid instrument.
35. It is worth noting the guidance requires that when assessing “any possible future interest rate scenario” in the conditions (b)(1) and (b)(2) of the double-double test, the evaluation should be performed without regard to probability of the event occurring (i.e., include remotely possible scenarios). Additionally, although the double-double test is conducted from the perspective of the investor, the outcome of the assessment is applied equally to both the investor’s and issuer’s accounting for the hybrid instrument.
36. Conducting the double-double test can require significant judgment, in particular, determining the terms of the host contract and the embedded derivative.

Double-Double Test - Determining the Terms of the Host Contract

37. Evaluation of any embedded derivative feature for potential bifurcation, including under the double-double test, first requires the identification of the terms of the host contract and embedded derivative(s). ASC 815 provides

general guidance related to determining the terms of the debt host contract⁴, which can be summarized as its characteristics shall generally be based upon the stated or implied substantive terms of the hybrid instrument. In the absence of stated or implied terms, judgment is required, and in making that judgment all factors should be considered, including the features of the hybrid instrument, the issuer and the market in which the instrument is issued. We generally understand market practice believes the host contract terms should mirror those of a “plain vanilla” debt instrument excluding embedded features (i.e. put/call options, interest rate multipliers, inverse floaters, range accruals, etc.) contained in the hybrid contract. Determining the terms of the host contract includes the terms of the interest rate reset feature, such as interest rate index, reset frequency, payment dates, interest period to which the interest payment relates, etc.

38. For purposes of determining the specifics of the interest rate features of the host contract, we believe it is reasonable to look to market conventions or standard interest rate reset features in debt instruments that are the same as or similar to the “plain-vanilla” debt host contract, including those indexed to the same benchmark interest rate curve as the hybrid instrument.
39. For example, presume evaluation is required of a floating-rate hybrid debt instrument indexed to LIBOR interest rates that resets every three months (regardless of what tenor point on the LIBOR curve the hybrid instrument resets to). The interest rate reset feature of the host contract would be 3-month LIBOR that resets every three months, as that is the market convention for plain-vanilla debt instruments indexed to LIBOR. In addition, to the extent additional details of the interest rate reset feature are necessary to infer on to the debt host contract, such as whether the interest is determined in advance or in arrears or the existence of lookback or suspension (aka, “lock-out”) periods, we similarly believe current practice would evaluate the market conventions for plain-vanilla debt instruments.

Analysis of SOFR-Based Interest Rate Reset Features

40. This section evaluates whether the interest-rate reset features proposed or recommended by the ARRC (as of the date of this memo) are clearly and closely related to the debt contract.
41. Evaluation can only be completed to the extent the fallback language or proposed SOFR-based interest rate is specific enough as to how the periodic interest rate cash flows will be determined, notably identifying the interest rate index, reset frequency, relevant interest period and calculation methodology of any spread adjustment upon transition from LIBOR to SOFR. Accordingly, this evaluation is limited to the SOFR-based interest rate reset features in the following table.

Table 6: SOFR Rates Evaluated for Embedded Derivative Considerations

SOFR Rate	Commercial or Consumer Products	Source
Term SOFR	Commercial	Step 1 – ARRC Fallback Language for Hardwired Approach
Compounded SOFR In Arrears	Commercial	Step 2 – ARRC Fallback Language for Hardwired Approach
Compounded SOFR In Advance	Commercial	
Average SOFR In Advance	Consumer ARM loans	ARRC Whitepaper SOFR ARMs; and GSEs February 5, 2020 announcement

Steps 3, 4 and 5 in the waterfall for the “hardwired approach” related to commercial products (see Table 2) do not specify an interest rate index, and accordingly are not evaluated. Additionally, the spread adjustment that will be added to the SOFR-based rate upon transition from LIBOR to SOFR is similarly not evaluated as calculation methodology is yet to be developed by the industry.

⁴ Paragraphs ASC 815-15-25-24 and 25

Evaluation of LIBOR-Based Commercial Debt Instrument

42. In order to evaluate the SOFR-based interest rate reset features for commercial cash instruments, we found it useful to illustrate application of those features to an example plain-vanilla floating-rate commercial debt instrument indexed to 3-month LIBOR plus an existing 50 basis points credit spread. The following table summarizes the terms of the Base Example:

Table 7: Base Example of LIBOR-Based Commercial Debt Instrument

Feature	Description
Instrument Type	Five-year noncallable floating rate notes
Issuance Date	January 1, 20x1
Principal	Bullet payment due at maturity
Base Rate	3-month LIBOR
Interest Reset Dates	Every three months on March 31, June 30, September 30 and December 31 with a two day look back *
Interest Payment Dates	March 31, June 30, September 30, December 31; the amount paid on the interest payment date is based upon the 3-month LIBOR rate as of the beginning of the interest period (for example, the interest payment on September 30 is based upon the 3-month LIBOR rate as of July 1)
Interest Payment Amounts	Interest is calculated as the 3-month LIBOR rate + 0.50% * the outstanding Principal
Maturity	December 31, 20x5
* Market convention is to have a one to three day “look back” or “lock up” period prior to the end of the interest period in order to operationally calculate what the interest payment will be for the next interest period. For example, the interest payment due on September 30, 20x1 is based upon the 3-month LIBOR interest rate that became effective on July 1, 20x1, which was determined by reference to rates in effect as of one-to-three business days prior to June 30, 20x1.	

43. Consistent with current practice, bifurcation of the embedded interest rate feature in this Base Example is not required, as no leverage is present in the hybrid instrument.

- (a) The interest payment is based upon a factor of 1 times the referenced index (i.e., 1 * 3-month LIBOR * principal);
- (b) The tenor of the interest rate and reset frequency match (i.e., both are three-months); and
- (c) The interest payment is based upon current market interest rates for the relevant interest period (i.e., the forward-looking term rate as of the beginning of the interest period is used to determine the interest payment for that period).

Stated another way, no embedded derivative exists, as the interest rate reset feature of the host contract and hybrid instrument are the same. This is further supported by the fact that the interest rate reset feature for the LIBOR-based instrument in the Base Example is consistent with the standard set of market conventions for “plain-vanilla” LIBOR-based debt instruments.

Commercial Products: Term SOFR

44. Term SOFR pays interest based upon a published forward-looking term SOFR for the corresponding period (meaning a period equivalent to the LIBOR tenor for that instrument, e.g., 1-month SOFR, 3-month SOFR, etc.) that is selected, endorsed or recommended by the Relevant Governmental Body. Similar to forward-looking term LIBOR rates in practice today, the interest rate used to determine the amount to be paid on the payment date is known prior to the beginning of the interest accrual period, and is fixed throughout such period. Therefore, if the indexation of the example debt instrument were to transition from LIBOR to Term SOFR, the only changes to the illustrative terms in the Base Example would be to the Base Rate, which would be 3-month Term SOFR instead of 3-month LIBOR.

45. Bifurcation of the embedded Term SOFR feature is not required, for reasons similar to the evaluation above for floating-instruments indexed to LIBOR. The interest rate reset feature of the host contract is the same as the hybrid

instrument. This is supported by the fact that Term SOFR is Step 1 in the waterfall for all commercial products covered by ARRC proposals and recommendations and market-wide adoption of the ARRC recommended fallbacks are expected such that it becomes the market standard for “plain-vanilla” floating-rate commercial cash instruments currently indexed to LIBOR term rates.

Commercial Products: Compounded SOFR In Arrears

46. Compounded SOFR “in arrears” pays interest based upon a compounded average of daily SOFR for the corresponding tenor (meaning a period equivalent to the LIBOR tenor for that instrument, e.g., 1-month, 3-month, etc.) implemented in arrears. Conceptually, the compounding interest feature simply means the interest amount accrued each day is based upon unpaid principal plus accrued but unpaid interest to-date, as opposed to a non-compounded rate is based upon the unpaid principal balance only. In arrears means the interest rate paid is based upon SOFR rate in the current interest accrual period. As such, the interest payment amount is not known until the end of the interest accrual period.
47. Therefore, if the indexation of the example debt instrument were to transition from LIBOR to Compounded SOFR in arrears, the terms would be summarized as follows (terms that changed relative to Base Example are in red font):

Table 8: Example Commercial Debt Instrument Indexed to Compounded SOFR In Arrears

Feature	Description
Instrument Type	Five-year noncallable floating rate notes
Issuance Date	January 1, 20x1
Principal	Bullet payment due at maturity
Base Rate	3-month Compounded SOFR
Interest Reset Dates	Every three months on March 31, June 30, September 30 and December 31 with a two day lock-out *
Interest Payment Dates	March 31, June 30, September 30, December 31; the amount paid on the interest payment date is based upon the 3-month compounded SOFR rate as of the end of the interest period (for example, the interest payment on September 30 is based upon SOFR rates from July 1 to September 30)
Interest Payment Amounts	Interest is calculated as the 3-month Compounded SOFR rate + 0.50% * the outstanding Principal
Maturity	December 31, 20x5
* Standard market conventions for “look back” or “lock-up” periods have not been established for use of compound SOFR in arrears as of yet. It is expected conventions for SOFR-based rates similar to the conventions for LIBOR-based instruments will be necessary in order to have operational certainty of the interest cash flows on the interest payment dates.	

48. Bifurcation of the Compounded SOFR in arrears feature is not required, for reasons similar to the above evaluation for the Base Example and Term SOFR. No leverage is present in the hybrid instrument. The compounding interest feature itself is not considered to create leverage, as it represents the time value of money computed using unlevered current market rates of the referenced index (daily SOFR). The interest on the note is equivalent to the daily SOFR rate where interest is capitalized each day and paid at the end of the 3-month period. The reset frequency of the floating-rate and the tenor of the rate are the same, which is either daily or every three months depending on how the market convention for the 3-month SOFR rate develops (i.e., whether it will be quoted as a 3-month rate or calculated based upon the compounded average of daily SOFR during the period). The interest coupon is based upon SOFR rates for the current interest period, and not SOFR rates in historical periods.
49. The interest rate reset feature of the host contract is the same as the hybrid instrument (i.e., no embedded derivative exists). This is supported by the fact that Compounded SOFR in arrears is Step 2 in the waterfall for all commercial products covered by ARRC proposals and recommendations⁵ and market-wide adoption of the ARRC

⁵ For floating-rate notes, the ARRC recommendations permit only the “in arrears” convention for Compounded SOFR. For the other commercial cash products, the ARRC proposals or recommendations permit use of either the “in arrears” or “in advance” convention.

recommended fallbacks are expected such that it becomes a common market convention for “plain-vanilla” LIBOR-based commercial cash instruments.

Commercial Products: Compounded SOFR In Advance

50. Similar to Compounded SOFR “in arrears”, Compounded SOFR “in advance” pays interest based upon a compounded average of daily SOFR for the corresponding tenor (meaning a period equivalent to the LIBOR tenor for that instrument, e.g., 1-month, 3-month, etc.), however is implemented *in advance*. In advance means the interest rate paid is based upon SOFR rates in the period prior to the interest accrual period. As such, the interest payment amount is known prior to the beginning of the interest accrual period and is fixed throughout such period.
51. Therefore, if the indexation of the example debt instrument were to transition from LIBOR to Compounded SOFR in advance, the terms would be summarized as follows (terms that changed relative to Base Example are in red font):

Table 9: Example Commercial Debt Instrument Indexed to Compounded SOFR In Advance

Feature	Description
Instrument Type	Five-year noncallable floating rate notes
Issuance Date	January 1, 20x1
Principal	Bullet payment due at maturity
Base Rate	3-month Compounded SOFR
Interest Reset Dates	Every three months on March 31, June 30, September 30 and December 31 with a two day lock-out *
Interest Payment Dates	March 31, June 30, September 30, December 31; the amount paid on the interest payment date is based upon the 3-month compounded SOFR rate as of the beginning of the interest period (for example, the interest payment on September 30 is based upon SOFR rates from April 1 to June 30)
Interest Payment Amounts	Interest is calculated as the 3-month Compounded SOFR rate + 0.50% * the outstanding Principal
Maturity	December 31, 20x5
* Standard market conventions for “look back” or “lock-up” periods have not been established for use of compound SOFR in arrears as of yet. It is expected conventions for SOFR-based rates similar to the conventions for LIBOR-based instruments will be necessary in order to have operational certainty of the interest cash flows on the interest payment dates.	

52. For evaluation of the Compounded SOFR in advance feature, we have presented a Recommended View (no bifurcation required) and an Alternative View (bifurcation required) as under certain interpretations of the double-double test an embedded derivative may exist that provides leverage.

Recommended View – No Bifurcation Required

53. Under the Recommended View, bifurcation of the Compounded SOFR in advance feature is not required based upon the following reasons:
- (a) Similar to Compounded SOFR in arrears, the compounding feature itself does not provide leverage and the reset frequency of the floating-rate and the tenor of the rate match.
 - (b) The interest rate reset feature of the host contract is deemed to be the same as the hybrid instrument (i.e., no embedded derivative exists), for a couple reasons:
 1. Based upon FASB paragraphs ASC 815-15-25-25 and 26, the interest rate reset feature of the host contract should be based upon stated or implied substantive terms of the hybrid instruments, and only in the absence of stated or implied substantive terms is it appropriate for a reporting entity to make its own determination of the terms of the host contract. The interest rate reset feature of the debt instrument (Compounded SOFR in advance) is clearly a substantive stated term and accordingly it should be used to determine the host contract terms. There is no basis to imply other

- non-contractual interest rate features should be used to determine the terms of the host contract, particularly for contractually stated terms intended to be a market convention.
2. Compounded SOFR is included in Step 2 of the ARRC recommended permitted fallbacks for all commercial cash products (except for floating-rate notes). The ARRC recommendation of the “in-advance” convention for calculating compounded SOFR by itself establishes this as a market convention for “plain-vanilla” debt instruments. ARRC working groups that developed the recommendations and respondents that participated in consultation process represent a broad array of market participants. Therefore, for products other than floating-rate notes it is reasonable to expect the “in advance” convention will develop into an acceptable market convention alongside the “in arrears” convention for computing Compounded SOFR under Step 2.
- (c) The purpose and intent of the ARRC including the “in-advance” convention for computing Compounded SOFR is not to provide leverage to investors in SOFR-based debt instruments. Rather, the ARRC recommended such an interest rate feature to provide a market based solution to LIBOR cessation. Specifically, the ARRC included the “in-advance” convention as it received feedback that certain market participants may prefer to know the interest rate prior to the start of the interest accrual period, which is consistent with the existing convention for term LIBOR rates. While a term SOFR rate would also be determined “in-advance”, a term SOFR rate construct has not yet developed in the market and there is no guarantee one will develop; therefore the ARRC included the Compounded SOFR “in-advance” rate anticipating it may be used for certain instruments in the market.

Alternative View –Bifurcation Required

54. Proponents of the Alternative View believe the host contract is a five-year note with a rate that resets every 3 months using either a forward-looking 3-month term SOFR rate or 3-month Compounded SOFR in arrears rate.
55. As such, an embedded derivative feature exists that provides the potential for leverage in a hypothetical scenario where SOFR interest rate rose significantly above the initial rate at inception followed by a sudden and significant decline in SOFR. The potential for leverage exists in such a scenario as the interest coupon for the hybrid instrument is based upon SOFR rates for the preceding 3-month period (i.e., interest rate payments are not based upon current market rates).
56. Using the example facts of the debt instrument in Table 9, consider the following scenario where positive leverage could exist. This scenario illustrates how bifurcation could be required under the double-double test
 - The notes initial stated rate and the host initial rate of return is 2% (3-month SOFR rate of 1.5% + 0.50% credit spread).
 - Subsequently, presume that the 3-month rate rose to 6% and remained there for at least two consecutive 3-month periods such that the interest coupon on the hybrid instrument is 6.5% (6% SOFR rate + 0.5% credit spread).

If suddenly and immediately on the first day of the following 3-month period SOFR rates declined to 1% and remained at that level for the period, the interest rate coupon on the Notes for that period would remain at 6.5%. The interest rate coupon of 6.5% would be at least twice the initial rate of return of the host contract (2%) while at the same time twice the then current market rate of 1.5% of the host contract (3-month SOFR rate of 1% + 0.5% credit spread).

Consumer ARM Products: Average SOFR In Advance

57. This section evaluates embedded derivative implications for SOFR consumer residential ARM products. The proposed interest rate feature for SOFR ARMs determines the floating-rate payment based upon a 30 or 90 day average of daily SOFR, implemented in advance and reset every 6 months. In advance means the interest rate paid is based upon SOFR rates in the period prior to the interest accrual period. As such, the interest payment amount is known prior to the beginning of the interest accrual period and is fixed throughout such period. An in advance replacement index is preferred over an in arrears replacement index for consumer ARM products as an in arrears

replacement index may be difficult to implement in a manner consistent with applicable consumer regulations. As the floating-rate will be reset once every 6 months, the indexed rate in effect will be fixed for a 6 month period based upon an average of daily SOFR rates for 30 or 90 days preceding that period.

58. Similar to the embedded derivative evaluation approach for commercial cash products, we found it useful to compare the embedded derivative evaluation for existing LIBOR ARMs to SOFR ARMs, as the ARRC recommended incorporating into SOFR ARMs most aspects of LIBOR-based ARMs and there is a well-established practice of evaluating LIBOR ARMs. For ease of reference, we have reproduced Table 4 below, which summarizes the proposed changes to ARMs recommended by the ARRC whitepaper:

Table 10: Summary of Proposed Changes to ARMs to Use SOFR

Term	Current LIBOR ARM Model	Proposed Model for SOFR ARMs
Fixed-rate period	3, 5, 7 or 10 years	No change
Floating rate index	1-year LIBOR	30 or 90 day average of SOFR
Floating-rate adjustment period	1 year	6 months
Rate / payment determination	New rate determined 45 days in advance of payment date change	No change
Initial caps	2% for 3/1 and 5/1 ARMs 5% for 7/1 and 10/1 ARMs	No change
Subsequent caps	2%	1%
Lifetime caps	5%	No change
Margin	2.25%	Likely in range of 2.75 to 3%

59. Consistent with current practice, bifurcation of the embedded interest rate feature in existing LIBOR ARM products is not required, as no leverage is present in the hybrid instrument.

- (a) The interest payment is based upon a factor of 1 times the referenced index (i.e., $1 * 1\text{-year LIBOR} * \text{Margin} * \text{principal}$);
- (b) The tenor of the interest rate and reset frequency match (i.e., both are 1 year); and
- (c) The interest payment is based upon current market interest rates for the relevant interest period. The forward-looking term rate prior to the beginning of the interest period is used to determine the interest payment for that period. Market convention for LIBOR ARMs is typically to determine the new rate 45 days in advance of when the first payment based upon the new rate is due. This 45-day standard permits lenders and servicers adequate time to provide borrowers required notice ahead of the payment due date, satisfying stipulated regulations and general expectations of consumers.
- (d) The presence of an interest rate cap does not lever the investor's return, rather serves to limit the return by capping the return of the hybrid instrument relative to a debt host that does not have a cap

Consistent with the Base Example for commercial LIBOR debt instruments, no embedded derivative exists (aside from the interest rate cap) in LIBOR ARMs, as the interest rate reset feature of the host contract and hybrid instrument are the same. This is further supported by the fact that the interest rate reset feature for the LIBOR

ARMs represents the market standard to use when developing the terms of a “plain-vanilla” LIBOR-ARM debt host.

60. For evaluation of the Average SOFR in advance feature for SOFR ARMs, we have presented a Recommended View (no bifurcation required) and an Alternative View (bifurcation required) as under certain interpretations of the double-double test an embedded derivative may exist that provides leverage.

Recommended View – No Bifurcation Required

61. Under the Recommended View, the interest rate reset feature for SOFR ARMs does not require bifurcation and separate derivative accounting based upon the following reasons:
- (a) The interest rate reset feature of the host contract is deemed to be the same as the hybrid instrument (i.e., no embedded derivative exists), for the following reasons:
 - 1. Based upon FASB paragraphs ASC 815-15-25-25 and 26, the interest rate reset feature of the host contract should be based upon stated or implied substantive terms of the hybrid instruments, and only in the absence of stated or implied substantive terms is it appropriate for a reporting entity to make its own determination of the terms of the host contract. The interest rate reset feature of the debt instrument (30 day Average SOFR in advance, reset every 6 months) is clearly a substantive stated term and accordingly it should be used to determine the host contract terms. There is no basis to imply other non-contractual interest rate features should be used to determine the terms of the host contract, particularly for contractually stated terms intended to be a market convention.
 - 2. Average SOFR in advance has been proposed by the ARRC to use in all SOFR ARMs. This recommendation contemplated input and considerations from a broad array of market participants, including originators, servicers, investors and consumers (borrowers). Specifically, residential SOFR ARM products require use of an *in advance* feature such that lenders and servicers can provide sufficient notice of payment changes to consumers in accordance with regulations. Currently, LIBOR ARMs reset in advance based upon forward LIBOR term rates. However, term SOFR market rates do not yet exist and there is no guarantee such a construct will develop. Additionally, the GSEs announced on November 15, 2019 their intention to begin offering for whole loan and MBS execution SOFR ARM products based upon the Average SOFR in advance rate and on February 5, 2020 announced further details of SOFR ARM product offerings, including that they will begin accepting deliveries of SOFR ARMs in the 2nd half of 2020 for whole loan and MBS execution. As such, it is clear this rate is intended to be and is expected to become market standard for SOFR ARMs and should be the basis for determining the terms of the interest rate reset features of a “plain-vanilla” debt host. It would be inappropriate to infer terms of the debt host based upon product terms that do not exist or at minimum do not represent a market convention.
 - (b) The purpose and intent of the ARRC designing Average SOFR to include an “in-advance” convention with a rate tenor (30 or 90 days) less than the reset frequency (6 months) is not to provide leverage to investors in SOFR-based ARM products. Rather, the ARRC recommended such an interest rate feature to provide a market based solution to LIBOR cessation and in the absence of term SOFR rates, the ARRC concluded average SOFR implemented in advance was most appropriate. Arriving at the recommended 30 or 90 day average rate in lieu of a longer average (e.g., 6 months) reflect balancing the tradeoffs of (1) having a sufficient number of daily observations in the average to smooth out day-to-volatility against (2) longer averages which are less representative of current market rates and could make the products less attractive to investors, which in turn, could result in higher initial results for ARM products. Lastly, the ARRC considered increasing the frequency of rate resets but concluded resetting more frequently than 6 months (e.g., every 3 months) would result in too much payment volatility for the consumer borrower.

Alternative View –Bifurcation Required

62. Proponents of the Alternative View believe the host contract is a theoretical ARM product with a rate that during the floating-rate adjustment period (i.e., after fixed-rate period expires) resets every 6 months using either a forward-looking 6-month term SOFR rate or a 6-month Average SOFR in arrears rate.
63. As such, an embedded derivative feature exists that provides the potential for leverage in a hypothetical scenario occurring subsequent to expiration of the fixed-rate period where SOFR interest rates rose significantly followed by a sudden and significant decline in SOFR. The potential for leverage exists in such a scenario as the interest coupon for the hybrid instrument is based upon SOFR rates for the period preceding the current interest accrual period (i.e., interest rate payments are not based upon current market rates).
64. Consider the following hypothetical example where positive leverage could exist. This scenario illustrates how bifurcation could be required under the double-double test. Presume the rate of the host contract is based upon 6-month Average SOFR in arrears.
- After expiration of the fixed-rate period, presume the stated coupon of the hybrid instrument (actual ARM product) and initial rate of return of the host contract (theoretical ARM product) are the same at 3% (1% SOFR rate + 2% margin).
 - Subsequently, presume SOFR rates rose significantly such that the interest coupon on the hybrid instrument for a 6-month period is fixed at 7% (5% SOFR rate + 2% margin). The 5% SOFR rate is based upon a 30 or 90 day historical daily average of SOFR rates preceding the 6-month period.
 - Presume that suddenly and immediately on the first day of that same 6-month period in which the hybrid instrument coupon is 7%, daily SOFR rates declined to 0.5% and remained at that level for the remainder of the 6-month period.
 - The interest coupon on the hybrid instrument for that 6-month period would remain at 7%, while the interest coupon on the host contract would be 2.5% (6-month average SOFR rate of 0.5% + 2% margin).
 - The interest coupon on the hybrid instrument (7.0%) would be at least twice the initial rate of return of the host contract (3%) while at the same time twice the then current market rate on the host contract (2.5%).