

Response to the US ARRC Consultation

Regarding More Robust LIBOR Fallback Contract Language for New Issuances of LIBOR Floating Rate Notes

8th November 2018

Dear ARRC,

Mitsubishi UFJ Morgan Stanley Securities Co., Ltd. welcomes the opportunity to provide comments on the ARRC Consultation Regarding More Robust LIBOR Fallback Contract Language for New Issuances of LIBOR Floating Rate Notes published in September 2018.

Let us highlight our key recommendations:

- We encourage the ARRC and the ISDA to provide templates of IBOR fallback languages based on the same definitions so that the IBOR fallback methodologies will be consistent across financial products to minimize the emergence of basis risks at the event of IBOR discontinuance.
- Compounded Setting-in-Arrears Rates (“ARR”) based on overnight RFRs are economically natural, simple to risk manage, consistent with OISs, and are based on *the* alternative RFR, the most credible and robust benchmark. But the ARR may pose significant operational challenges for certain market participants and may potentially bring systemic risks by increasing settlement failures. On the other hand, Compounded Setting-in-Advance Rates (“ADR”) based on overnight RFR will make risk management complicated, and the Term RFR is not yet available and would be less robust.
- Therefore, instead of introducing a single waterfall mixed of both fixed-in-arrears and fixed-in-advance rates as the Unadjusted Replacement Benchmark, we recommend introducing two separate options of waterfalls, one comprising of fixed-in-arrears rates (the Compounded Setting-in-Arrears Rate with modifications proposed in Appendix 1 of our response to the ISDA Consultation), and another, fixed-in-advance rates (in the first step of the waterfall, the Term RFR, and in the second step, Compounded Setting-in-Advance Rate defined in Appendix 1 in this response to the ARRC Consultation). Market participants may select these two options depending on their capabilities and preferences.

Kind Regards,

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Outline: We first describe in Section A our general responses including our recommendations for the Trigger Events, Unadjusted Replacement Benchmark, and Replacement Benchmark Spread. Responses to specific questions in the Consultation are given in Section B. Appendix 1 discusses technical details of the Compounded Setting in Advance Rate proposed in the ISDA Consultation for IBOR Fallbacks for 2006 ISDA Definitions. The fallback languages for cash products and derivatives should be consistent each other to the maximum extent in order to minimize the emergence of basis risks and cash flow mismatches at the event of IBOR discontinuance. In order to ensure that our intentions are clear to the reader, our response to ISDA Consultation is attached.

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A. General Responses

(1) Summary of Our Response to the ISDA Consultation for IBOR Fallbacks for 2006 ISDA Definitions¹

In our response to the ISDA Consultation, we recommended adopting the Historical Median Approach without transition periods in order to minimize market manipulation opportunities and market disruption.

The Compounded Setting in Arrears Rate (“ARR”) proposed in the ISDA Consultation represents the economics of the risk-free rate over the term period, is consistent with the overnight indexed swap, and will keep valuation and risk management models simple. In addition, the use of O/N RFRs selected by risk free rate working groups satisfies the objectives of the interest rate benchmark reform to use credible and robust financial benchmarks anchored to actual transactions in the liquid and competitive market in order to minimize systemic risks².

We recommended adopting the *Modified ARR on Backward Shifted Calculation Periods*³ for all the cleared derivatives. The Modified ARR is, however, fixed-in-arrears, i.e., the payment amounts will be known only a few – or several – days prior to the payment settlements. It might be very difficult, or very costly, to adopt the Modified ARR for certain financial transactions and market participants, especially for some cash and loan products, due to operational difficulties in making payments in such short periods. Some financial products may need Adjusted RFRs fixed-in-advance.

It seems to be impossible to choose a single (waterfall) methodology of the Adjusted RFR satisfying all the criterion including representativeness and robustness of the benchmark, risk management simplicities, and operational easiness. In addition to preparing the *standard* fallback language for derivatives based on the Modified ARR which will be adopted in most cases including all the cleared derivatives, there are needs to prepare an *alternative* fallback language based on fixed-in-advance rates, which will be adopted into financial transactions only when the standard fallback methodology is too difficult, or too costly to implement.

In light of this view, for non-cleared derivatives, we recommended introducing two options to select the particular appropriate fallback rate to be used:

Table 1: Options of Adjusted RFR for Non-Cleared Derivatives

Standard Option	The Modified ARR Approach	
Alternative Option (for non-cleared only)	The waterfall of fixed-in-advance rates	Level 1: Term RFR based on the RFR OIS market
		Level 2: Compounded Setting in Advance Rate

(2) Consistencies between Cash Products and Derivatives

The fallback languages for cash products and derivatives should be consistent each other to the maximum extent in order to minimize the emergence of basis risks and cash flow mismatches at the event of IBOR discontinuance. When a derivative is used to exactly hedge cash flows of a non-derivative such as a bond or a loan, the consistency of IBOR fallback methodologies between the derivative and the non-derivative is

¹ Please see our response to the ISDA Consultation for IBOR Fallbacks for 2006 ISDA Definitions for detailed rationales.

² In its statement (*Interest rate benchmark reform – overnight risk-free rates and term rates*) in July 2018, the FSB stated that: “The FSB considers that the greater robustness of overnight RFRs compared with term rates makes overnight RFRs a better reference rate choice than term rates in markets where participants do not need forward-looking term rates.”

³ The Modified ARR on Backward Shifted Calculation Periods is defined in Appendix 1 in our response to the ISDA Consultation.

essential. For example, a derivative transaction between a dealer and a special purpose company (“SPC”) issuing a structured note has to have exactly the same cash flows as the structured note, otherwise the SPC will be in trouble due to any small cash flow mismatches of the bond and the derivative.

The ARRC Consultation proposes waterfalls for Unadjusted Replacement Benchmarks and Adjusted Benchmark Spread, and proposed varieties of definitions for Trigger Events, Unadjusted Replacement Benchmarks, and Adjusted Benchmark Spread, some of which are different from those proposed in the ISDA Consultation. The ISDA Consultation will be implemented as Supplement and Protocols to the 2006 ISDA Definitions which will be used as the *standard* fallback for derivatives, while we expect the ISDA to also provide templates to adopt the *alternative* fallback option as recommended by us. We encourage the ARRC and ISDA work together to provide fallback language templates for both fixed-in-arrears rates and fixed-in-advance rates so that both options can be easily used for cash and derivatives consistently.

(3) Trigger Events

We support including the pre-cessation triggers 4 (insufficient number of submissions), and 5 (not representative or prohibition on use) in the fallback language for FRNs.

The pre-cessation trigger 3 (failure to publish LIBOR for 5 business days) is also sensible, but we are not sure “5” business days is the right choice. For clarity, we recommend defining business days as days on which the relevant LIBOR is supposed to be published.

We suggest that the benchmark administrator clarify in their internal policies that the administrator will announce on the date when conditions for triggers 3 or 4 are satisfied that the administrator will cease to provide the benchmark permanently from the date when conditions for triggers 3 or 4 are satisfied, so that the trigger 1 is also triggered when triggers 3 or 4 are triggered.

In the ISDA and ARRC Consultations it was assumed that there may be a lag from the announcement of the discontinuation of an IBOR to the actual discontinuation of the IBOR. Market participants can prepare for the actual IBOR discontinuation in that lag period. We welcome such lag period in order to smoothly prepare for the actual discontinuation of IBORs. However, there could not be any such lag in the trigger 3, which is a concern for us. We suggest that the benchmark administrator agrees with panel banks that a panel bank has to notify the benchmark administrator of its withdrawal from submitting for a particular IBOR a certain period (such as 6 months) prior to the actual withdrawal so that the benchmark administrator can publicly announce the discontinuation of an IBOR prior to its actual discontinuation a certain period of time (such as 6 months) and trigger 3 and 4 will never be triggered in practice.

(4) Unadjusted Replacement Benchmark

For general properties of Spot Overnight Rate (“SOR”), Convexity-adjusted Overnight Rate (“COR”), Compounded Setting in Arrears Rate (“ARR”), Compounded Setting in Advance Rate (“ADR”), and the Term RFR, please refer Section B of our response to the ISDA Consultation.

The SOR, COR, and Spot SOFR in Step 3 in the FRN Replacement Benchmark Waterfall proposed in the ARRC Consultation will increase the fixing risks which cannot be hedged by RFR OISs or RFR Futures. The SOR, COR, and Spot SOFR should never be adopted.

A simple arithmetic average of SOFR will induce non-negligible convexity effect (see e.g., Beier, Fries, and Rott 2018), complicate risk management, and has no advantage compared to the compounded rates (either of the ARR or the ADR). Therefore, a simple arithmetic average of SOFR should never be adopted.

We recommend not anchoring the Term RFR to the futures market to avoid modelling complexities arising from convexity effects⁴ in futures themselves and yield curve interpolations.

The Modified ARR is the best approach from many aspects; it is economically natural, simple to risk manage, consistent with OISs, and based on the SOFR, *the* alternative RFR selected by the ARRC as the most appropriate and robust interest rate benchmark for USD. But the Modified ARR might be operationally difficult to be used as the fallback rates for some existing financial products referencing IBORs. When selecting an approach for Unadjusted Replacement Benchmark for an FRN, it is vital to ensure that the approach can be operationally achievable for all the relevant stakeholders. Otherwise, unnecessary risks could emerge, for example, increased risks of settlement failures. Therefore, we recommend introducing as the Unadjusted Replacement Benchmark two options of waterfalls, one comprising of fixed-in-arrears rates, and another one, fixed-in-advance rates.

Box 1: Recommendation on the Unadjusted Replacement Benchmark for FRN

We recommend introducing as the Unadjusted Replacement Benchmark two options of waterfalls, one comprising of fixed-in-arrears rates, and another one, fixed-in-advance rates.

Table 2: Waterfall of Fixed-in-Arrears Rates

Step 1	SOFR in Modified Compounded Setting in Arrears Rate (“Modified ARR”)
Step 2	Replacement rate recommended by Relevant Governmental Body in Modified ARR
Step 3	Replacement rate in ISDA Definitions at such time in Modified ARR

Table 3: Waterfall of Fixed-in-Advance Rates

Step 1	Term SOFR recommended by Relevant Governmental Body
Step 2	SOFR in Compounded Setting in Advance Rate (“ADR”)
Step 3	Replacement rate recommended by Relevant Governmental Body in ADR
Step 4	Replacement rate in ISDA Definitions at such time in ADR

An issuer of a new FRN can adopt the Waterfall of Fixed-in-Arrears Rates provided that the fixed-in-arrears rate is, or will be prior to the actual discontinuation of the USD LIBOR, operationally achievable for the issuer, holders of the FRN, and other stakeholders. Otherwise the issuer may want to adopt the Waterfall of Fixed-in-Advance Rates, accepting the less robustness of the Term SOFR compared to the SOFR and the risk management complexities of the ADR approach.

Assuming the SOFR will be available after the Benchmark Discontinuance Event, the Waterfall of Fixed-in-Arrears Rates coincides with the Standard Option for non-cleared derivatives in our response to the ISDA Consultation; the Waterfall of Fixed-in-Advance Rates coincides with the Alternative Option. Thus

⁴ For the convexity effect of RFR futures, please refer Mercurio, Fabio, A Simple Multi-Curve Model for Pricing SOFR Futures and Other Derivatives (August 3, 2018). Available at SSRN: <https://ssrn.com/abstract=3225872>

market participants can make the fallback methodology for FRNs and non-cleared derivatives consistent by selecting appropriate fallback options.

Since we are not sure which of the two options will be adopted more frequently for FRNs in practice, we do not call them by Standard Option nor Alternative Option, as opposed to that, for non-cleared derivatives, we called the (waterfall of) fixed-in-arrears rates as the Standard Option and the waterfall of fixed-in-advance rates the Alternative Option in our response to the ISDA Consultation.

(5) Replacement Benchmark Spread

Box 2: Recommendation on the Replacement Benchmark Spread for FRN

We recommend adopting the spread adjustment methodology applicable to fallbacks for derivatives under the ISDA definitions only. Further, we would like to request the ISDA to develop spread adjustment methodologies and to publish daily the calibrated spread adjustment for any Unadjusted Replacement Benchmark method to be selected by the ARRC, particularly including Modified ARR based on O/N RFR, ADR based on O/N RFR, and the Term RFR (once such rate becomes available)⁵. Provided that the Historical Mean/Median Approach is adopted as recommended by us to the ISDA, we recommend using the Replacement Benchmark Spread (or the Spread Adjustment in the ISDA Consultation terminology) for fallback rates based on Modified ARR based on O/N RFR as that based on the Term RFR.

In this paragraph, we assume that the Historical Mean/Median Approach is adopted as recommended by us. Please be reminded that, theoretically speaking, the Term RFR based on OIS⁶ is the market expectation of the ARR based on O/N RFR determined through the (expected to be) liquid and competitive RFR derivatives market. If the historical look-back period for calibrating the historical mean/median for fallback methodologies based on Modified ARR based on O/N RFR and Term RFR are different, the Replacement Benchmark Spread (or the Spread Adjustment) will diverge between those two fallback methodologies reflecting the difference of historical periods, potentially complicating the choice of options for Unadjusted Replacement Benchmark which is not preferable and not so meaningful. If the Term RFR is used as the Unadjusted Replacement Benchmark (or the Adjusted RFR in the ISDA Consultation terminology) and there is not sufficient historical data for the Term RFR to match its historical look-back period with Modified ARR based on O/N RFR, then we can consider either (1) to use the historical mean/median of the spread between the IBOR and the Modified ARR based on O/N RFR as the Replacement Benchmark Spread (or the Spread Adjustment) for Term RFR, or (2) to use the historical data of Modified ARR based on O/N RFR as a proxy for dates for which the historical data of Term RFR is not available. We prefer the first approach in order to make the Spread Adjustments exactly the same for the Modified ARR and the Term RFR.

⁵ Please be reminded that we already recommended to the ISDA to include these three rates (Modified ARR based on O/N RFR, ADR based on O/N RFR, and the Term RFR) in either of Standard Option or Alternative Option for non-cleared derivatives.

⁶ In contrast, Term RFR based on futures is not necessarily the market expectation of the ARR based on O/N RFR and may include convexity effects, the difference between futures prices and forward rates unless such convexity effects are reduced by the benchmark administrator. The estimation of convexity effects is highly model-dependent (such as interest rate volatility surface and correlations). Even if such convexity effect is reduced by benchmark administrator in the calculation process of the Term RFR based on futures, users of the Term RFR have to assess the materiality of the *remaining* convexity effects using their own valuation models and data, which cannot be necessarily effectively done by wide market participants and may lead to serious risk management difficulties in the industry.

B. Responses to Specific Questions

Question 1(a): Should fallback language for FRNs include any of the pre-cessation triggers (triggers 3, 4 and 5)? If so, which ones?

We support including the pre-cessation triggers 4 (insufficient number of submissions), and 5 (not representative or prohibition on use) in the fallback language for FRNs. The pre-cessation trigger 3 (failure to publish LIBOR for 5 business days) is also sensible, but we are not sure “5” business days is the right choice.

Question 1(b): Please indicate whether any concerns you have about these pre-cessation triggers relate to differences between these triggers and those for standard derivatives or relate specifically to the pre-cessation triggers themselves.

For certain types of derivatives including those between dealers and special purpose companies (“SPC”) issuing structured notes, the derivatives and the floating rate notes have to have exactly the same cash flows. For such non-cleared derivatives and cash products, we need flexibilities to adopt the same fallback language including trigger events and replacement benchmark methodologies to both derivatives and non-derivatives.

Question 1(c): If pre-cessation triggers are not included, what options would be available to market participants to manage the potential risks involved in continuing to reference a Benchmark whose regulator has publicly determined that it is not representative of the underlying market or a Benchmark permanently or indefinitely based on a number of submissions that the Benchmark’s administrator acknowledges to be insufficient to allow for production in a standard manner?

It is difficult to effectively manage such potential risks without explicit pre-cessation triggers.

Question 2: If the ARRC has recommended a forward-looking term rate, should that rate be the primary fallback for floating rate notes referencing LIBOR even though derivatives are expected to reference overnight versions of SOFR?

Probably no. A forward-looking term rate could be, but is not necessarily, the primary fallback for FRNs referencing LIBOR. Since the fallbacks for (majority of) derivatives are expected to reference O/N SOFR, if the Term SOFR is adopted as the fallback for FRNs, there will emerge basis risks between O/N SOFR and Term SOFR somewhere in the market. In order to keep consistencies and minimize the emergence of basis risks, we prefer to adopt O/N SOFR as fallbacks for FRNs wherever operationally achievable with minimum costs. Please refer Section A (4) also.

Question 3(a): Should Compounded SOFR be the second step in the waterfall? Would this preference be influenced by whether ISDA implements fallbacks referencing compounded SOFR or overnight SOFR?

Please refer Section A (4). Overnight SOFR should never be adopted.

Question 3(b): If you believe that Compounded SOFR should be included, which compounding period is preferable (“in arrears” or “in advance”)? Would this preference be influenced by whether ISDA implements fallbacks referencing compounded SOFR “in arrears” or “in advance”?

Please refer Section A (4).

Question 4(a): Would an overnight rate that remains in effect for the entire interest period be an acceptable option for investors, issuers and agents?

Definitely no, because of significantly increased fixing risks.

Question 4(b): Should the waterfall include Compounded SOFR (step 2) and spot SOFR (step 3) and/or a simple average of SOFR (not in the waterfall at this time)? If only one of these options is included, which is preferable? Would this preference be influenced by whether ISDA implements fallbacks referencing compounded SOFR or overnight SOFR?

Please refer Section A (4). The waterfall should include Compounded SOFR but should not include spot SOFR nor simple average of SOFR. If only one of these options is included, Compounded SOFR is preferable.

Question 5: In the future circumstance where there is no SOFR-based fallback rate, is the replacement rate determined by the Relevant Governmental Body the best alternative at this level of the waterfall?

Yes. But we assume that such circumstances where SOFR is not available would be very less likely. We do not have a strong opinion.

Question 6(a): In the future circumstance where there is no SOFR-based fallback rate and the Relevant Governmental Body has not recommended a replacement rate for FRNs, is the fallback for SOFR-linked derivatives set forth in the ISDA definitions the best alternative at this level of the waterfall?

Yes. But we assume that such circumstances where SOFR is not available would be very less likely. We do not have a strong opinion.

Question 6(b): Should this step in the waterfall refer expressly to OBFR and then the FOMC Target Rate rather than refer to the fallback rate for SOFR-linked derivatives in the ISDA definitions (which could change in the future)?

No. It would be better to make definitions consistent with ISDA definitions as much as possible.

Question 7: Should the issuer or its designee have the ability to over-ride the ISDA fallback for SOFR-linked derivatives in the ISDA definitions at this level of the waterfall if it determines that another rate that is an industry-accepted successor rate for FRNs exists at such time?

No. It would be better to make definitions consistent with ISDA definitions as much as possible. We expect that the ISDA definitions will be updated to reflect any industry-accepted successor rate for any financial products including both FRNs and derivatives.

Question 8: Do you believe that the ARRC should consider recommending a spread adjustment that could apply to cash products, including FRNs?

No. In order to make the spread adjustment methodology fully aligned with derivatives in the ISDA definitions, the ARRC should not create any spread adjustment methodologies by its own. But rather, the ARRC should co-work with the ISDA to ensure that the spread adjustment methodology selected for derivatives can be comfortably applied to cash products.

Question 9: Is a spread adjustment applicable to fallbacks for derivatives under the ISDA definitions appropriate as the second priority in the spread waterfall when the Unadjusted Replacement Rate is equivalent to the ISDA fallback rate?

Yes. The spread adjustment applicable to fallbacks for derivatives under the ISDA definitions should be the unique spread adjustment methodology adopted for FRNs if available.

Question 10: If the ARRC does not recommend a spread adjustment, should the issuer (or its designee) have the ability to determine the spread adjustment (or, if step 2 is applicable, over-ride the spread adjustment for derivatives fallbacks in the ISDA definitions) and select a spread adjustment that would result in a rate that is an industry-accepted successor rate in floating rate notes at such time?

No, assuming that the ISDA will provide the relevant spread adjustment. It would be better to make definitions consistent with ISDA definitions as much as possible.

Question 11: Whether as issuer or as calculation agent, would your institution be willing to (i) determine whether the proposed triggers have occurred, (ii) select screens where reference rates or spreads are to be found, (iii) make calculations of a rate or spread in the absence of published screen rates, (iv) interpolate term SOFR if there is a missing middle maturity and (v) make the decisions in step 6 of the Replacement Benchmark waterfall and step 3 of the Replacement Benchmark Spread waterfall?

We are comfortable with (i), (ii), (iii), and (iv), but not with (v).

We understand that it will make financial contracts more robust by providing some flexibility at the end of the waterfalls for the issuer or its designee to exercise discretion to make a determination with respect to the Replacement Benchmark. But, in practice, it will be very resource-demanding to exercise such discretions at the event of discontinuation of IBORs if there are no industry-agreed standards, considering the huge number of financial contracts. We believe that steps before the end of the waterfall proposed in the Consultation (or our recommendations described in Section A) are safe and sufficient as fallbacks, considering the great robustness of the SOFR. We would rather wish to eliminate possibilities in which we have to exercise our own discretions.

Question 12: Is there any provision in the proposal that would significantly impede FRN issuances? If so, please provide a specific and detailed explanation.

All the options for the Unadjusted Replacement Benchmarks have their own problems to *potentially* impede FRN issuances. We cannot say these are *significant* or not at this moment.

There is no guarantee that the Term SOFR will be available with great credibility and robustness before the actual discontinuation of LIBOR. Currently available Unadjusted Replacement Benchmarks are the Modified ARR and the ADR based on the SOFR, both of which may pose some problems, namely, the operational difficulties of the Modified ARR and the risk management complexities of the ADR. Some FRN issuers (and investors) may regard these problems less material than the risk of referencing USD LIBOR without clear fallback languages and may accept adopting the fallback languages in the proposal, but others may potentially stop, or refrain from, issuing and/or investing in FRNs with explicit fallback languages in the proposal till they become confident that they are ready to operate the Modified ARR or to accept risk management complexities of the ADR. We expect that the significance of these potential problems will be lessened by the collective industry efforts.

C. Appendix 1: Definitions of ADR

In this appendix, we propose definitions of the Compound Setting in Advance Rates (“ADR”) for interest rate swaps based on 2006 ISDA Definitions. Please first read Appendix 1 in our response to the ISDA Consultation.

Box 3: Definition of ADR on Backward Shifted Preceding Calculation Period [Recommended Definition]

The “Tenor” of an IBOR means 1 Business Day for O/N IBORs and S/N IBORs, 5 Business Days for 1 week IBORs and the respective calendar months for IBORs longer than or equal to 1 month, where Business Days are relevant Business Days for the IBOR (and not for the Swap Transaction).

The “Preceding Calculation Period” means, in respect of each Calculation Period X for a Swap Transaction and an IBOR, the Calculation Period next and preceding the Calculation Period X unless the Calculation Period X is the first Calculation Period of the Swap Transaction, in which case the period from, and including, the date the Tenor of the IBOR prior to the first date of the Calculation Period X , subject to adjustment in accordance with the Preceding Business Day Convention in the relevant Business Days for the IBOR, to, and excluding, the first date of the Calculation Period X .

“{CCY}-{RFRNAME}-{IBORNAME}-OIS-COMPOUND-SETTING-IN-ADVANCE-BACKWARD-SHIFTED” will be calculated by the standard OIS-COMPOUND rate formula over the N Universal Business Days Backward Shifted Preceding Calculation Period.

By selecting $N = 2$ for USD LIBOR, the USD-SOFR-USDLIBOR3M-OIS-COMPOUND-SETTING-IN-ADVANCE-BACKWARD-SHIFTED will be known 2 days prior to the first date of the Calculation Period, i.e., will be known on or prior to the publication date of the IBOR. Therefore, the USD-SOFR-3MLIBOR-OIS-COMPOUND-SETTING-IN-ADVANCE-BACKWARD-SHIFTED with $N=2$ should be operationally adoptable for any interest rate swaps. But $N = 0$ might probably be sufficient for most cases and the backward shift might not be needed.

In Box 3, we defined the Preceding Calculation Period by the preceding Calculation Period if that is available in the Swap Transaction terms. The benefit of this approach is the consistencies with standard OIS transactions and reduced fixing risks. For each overnight RFR from, and including, the date N business days prior to the date the Tenor of the IBOR prior to the Effective Date, to, but excluding, the date N business days prior to the first date of the last Calculation Period, there exists a unique Calculation Period for which the overnight RFR is used in the calculation of a Floating Rate only once. A potential drawback of Box 3 definition is the slightly complicated dependence of the ADR on Swap Confirmations. Instead, we can consider the Preceding Calculation Period Based on Reset Date:

Box 4: Definition of Preceding Calculation Period Based on Reset Date [Alternative Definition]

The “Preceding Calculation Period Based on Reset Date” means, in respect of each Reset Date, the period from, and including, the date the Tenor of the IBOR prior to the Reset Date, subject to adjustment in accordance with the Preceding Business Day Convention in the relevant Business Days for the IBOR, to, and excluding, the Reset Date.

“{CCY}-{RFRNAME}-{IBORNAME}-OIS-COMPOUND-SETTING-IN-ADVANCE-BACKWARD-SHIFTED-BASED-ON-RESET-DATE” will be calculated by the standard OIS-COMPOUND rate formula over the N Universal Business Days Backward Shifted Preceding Calculation Period Based on Reset Date.

In this alternative definition, the {CCY}-{RFRNAME}-{IBORNAME}-OIS-COMPOUND-SETTING-IN-ADVANCE-BACKWARD-SHIFTED-BASED-ON-RESET-DATE will be uniquely calculated for each Reset Date of

an IBOR. Some market participants may prefer the alternative definition for operational simplicity (as discussed in E (2) of our response to the ISDA Consultation), in compensation of increased fixing risks. But we prefer the Recommended Definition in Box 3 in order to avoid inconsistencies with standard OIS transactions and increased fixing risks of the Alternative Definition in Box 4.

For financial transactions in which Arrears Setting in the sense of 2006 ISDA Definitions is specified, the Reset Date of a Calculation Period is the date following the last date of the Calculation Period. Therefore, the Recommended Definition in Box 3 and the Alternative Definition in Box 4 will give quite different calculations. In the Recommended Definition in Box 3, the Reset Date will be ignored and the ADR will be calculated based on the period (approximately) ending the first date of the Calculation Period, so the mismatch between underlying period of the ADR and the originally intended IBOR will be twice the tenor of the IBOR. In the Alternative Definition in Box 2, the ADR will be calculated (approximately) over the Calculation Period (which will be very similar to the ARR), so the mismatch will be the tenor of the IBOR.

To make the settlement operations achievable, N need to be at least 2 in the Alternative Definition for financial transactions in which Setting in the sense of 2006 ISDA Definitions is specified.

**Response to the ISDA Consultation
Interbank Offered Rate (IBOR) Fallbacks for 2006 ISDA Definitions
Consultation on Certain Aspects of Fallbacks for Derivatives Referencing GBP LIBOR, CHF
LIBOR, JPY LIBOR, TIBOR, Euroyen TIBOR and BBSW**

12th October 2018 (revised on 9th November)

Dear ISDA,

Mitsubishi UFJ Morgan Stanley Securities Co., Ltd. welcomes the opportunity to provide comments on the ISDA Consultation paper on the IBOR Fallbacks for 2006 ISDA Definitions published in July 2018.

Let us highlight our key recommendations:

- We recommend adopting the Historical Median Approach without transition periods in order to minimize market manipulation opportunities and market disruption. Value transfer at the announcement of IBOR discontinuation will also be minimized to a great extent by the functioning market of IBOR-RFR basis swaps.
- The Compounded Setting in Arrears Rate (“ARR”) represents the economics of the risk-free rate over the term period, is consistent with the overnight indexed swap, and will keep valuation and risk management models simple. The ARR is, however, fixed-in-arrears and may not be sometimes operationally achievable in the definition proposed in the Consultation. We propose, using 2006 ISDA Definitions terminologies, a slightly modified version, the *Modified ARR on Backward Shifted Calculation Periods*, which will be operationally applicable to all the cleared derivatives and *most* of non-cleared derivatives.
- We recommend adopting the Modified ARR to all the cleared derivatives. For non-cleared derivatives, the Modified ARR should be adopted as the standard option unless the use of Modified ARR is operationally difficult or very costly, in which case parties may consider to adopt fixed-in-advance rates such as the Compounded Setting in Advance Rate or the Term RFR as an alternative option.

Kind Regards,

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Outline: We first describe general evaluations and our recommendations of approaches for the Spread Adjustment (Section A) and the Adjusted RFR (Section B). Responses to specific questions in the Consultation are given in Section C. Section D is a collection of additional minor comments. Finally, the Appendix 1 discusses technical details of the modifications needed to be incorporated to the Compounded Setting in Arrears Rate Approach so that it can be operationally applicable to all the cleared derivatives.

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A. General Evaluation of Spread Adjustment Approaches

(0) Introduction

The key objective of introducing the Spread Adjustment is to minimize the market disruptions and the value transfer at the time of announcement of IBOR discontinuation. Key advantages and disadvantage for approaches for calculating the Spread Adjustment are summarized in Table 1.

To assess the appropriateness of approaches for calculating the Spread Adjustment, we insist that it is reasonable to assume the following:

Assumption: Market participants, especially the IBOR-RFR basis swap traders, will act knowing the fact that a particular approach for calculating the Spread Adjustment is selected in the industry and fixings of IBOR-RFR basis after the IBOR discontinuation will be calculated by that approach and will not be anchored to the originally intended underlying market of IBOR anymore.

From this assumption, we will see that:

(1) the Forward Approach will incentivize IBOR-RFR basis swaps market participants to manipulate the IBOR-RFR basis swaps market and would potentially induce *unlimited* market disruptions prior to the announcement of IBOR discontinuation due to the increased volatility and the *self-referencing* property of the IBOR-RFR basis;

(2) The Historical Mean/Median Approach will converge the market expectations of the forward IBOR-RFR basis to the gradually-fixed historical mean/median prior to the discontinuation of IBORs and minimize value transfer at the time of announcement of IBOR discontinuation; and

(3) The Spot-spread Approach will leave the IBOR-RFR basis market participants in a situation in which the future of the IBOR-RFR basis is hardly predictable, potentially inducing market disruptions especially due to fixing risks of RFRs.

From these observations, we strongly recommend using the Historical Mean/Median as the approach for calculating the Spread Adjustment. We prefer the approaches for calculating the Spread Adjustment in the following order:

1. Historical Mean/Median Approach
2. Spot-spread Approach
3. Forward Approach

Box 1: Recommendation on the Spread Adjustment Approaches

We recommend adopting the Historical Median Approach without transition periods.

(1) Forward Approach

The Forward Approach may appear to be, at first sight, appealing because it will minimize the value transfer at the time of announcement of IBOR discontinuation. Indeed, theoretically speaking, the value transfer will ideally be exactly zero for linear products such as cleared interest rate swaps if exactly the same yield curve building methodologies (including interpolations, the choice of market instruments, and the relevant data) are employed in both calibration of the IBOR-RFR basis in the industry and the derivatives valuations at individual firms.

However, as explained in the following, the Forward Approach will incentivize IBOR-RFR basis swaps market players to manipulate the IBOR-RFR basis swaps market and would potentially (and highly likely) cause *unlimited* market disruptions prior to the announcement of IBOR discontinuation due to the increased volatility and the *self-referencing* property of the IBOR-RFR basis.

Market participants will act knowing the fact that IBOR-RFR basis fixings after the discontinuation of IBOR will be calculated by the market prices of IBOR-RFR basis swaps just prior to the announcement of discontinuation of IBOR and will no longer be anchored to the originally intended underlying market, i.e., the unsecured term interbank whole sale funding market and the (secured or un-secured) overnight funding market of RFRs. In other words, the IBOR-RFR basis swaps will become *self-referencing* in the sense that the IBOR-RFR basis swaps market will effectively become the underlying market of themselves through the Forward Approach.

The IBOR-RFR basis swaps market players will not price the IBOR-RFR basis swaps based on the future expectations of the originally intended underlying economics of interbank funding market anymore, but will be encouraged to pursue making profits from their existing open positions by moving the market consensus of the IBOR-RFR basis. If the collective risk position of IBOR-RFR basis of market participants having access to the IBOR-RFR basis swaps market is directional, IBOR-RFR basis may explode to generate unlimited profits to those participants and other general users of IBOR not having access to the IBOR-RFR basis swaps market would record unlimited losses due to such market manipulations. Selecting the Forward Approach will raise serious antitrust concerns and expose ISDA to the risk of litigation.

The Forward Approach brings a structural problem – the *self-referencing* property - to the IBOR-RFR basis market, gives market manipulation incentives and opportunities, and must never be adopted. The Forward Approach is the worst approach among the three approaches proposed in the Consultation. We are very strongly opposed to the Forward Approach.

(2) Historical Mean/Median Approach

The Historical Mean/Median Approach may appear not to be able to minimize the value transfer at the time of announcement of IBOR discontinuation. The historical average of IBOR-RFR basis in the past may not match the future expectations of the basis priced in the IBOR-RFR basis market today. The future fixings of the IBOR-RFR basis after the end of transition period (e.g., 1 year after the actual discontinuation of IBOR) will be constant without term structures but the market consensus of the forward IBOR-RFR basis does have a term structure today.

But the today's situation will soon be overwritten by the existence of the IBOR fallback provisions. As explained in the following, the Historical Mean/Median Approach will converge the market expectations of the forward IBOR-RFR basis to the gradually-fixed historical mean/median prior to the discontinuation of IBORs and minimize value transfer at the time of announcement of IBOR discontinuation.

Market participants will act knowing the fact that IBOR-RFR basis fixings after the discontinuation of IBOR will be calculated by, and anchored to, the long-term historical mean/median of the IBOR-RFR basis. Once the Historical Mean/Median approach is selected for calculating the Spread Adjustment, IBOR-RFR basis swap market players will start to price in that fact because such historical data will be publicly available.

In this paragraph, let us consider a concrete scenario for illustration purpose. In the end of 2018, the ISDA will announce that the Historical Mean/Median approach is selected for calculating the Spread Adjustment and the 5 years of historical period will be used to take the historical mean/median. A market participant may assume that the discontinuation of an IBOR will be publicly announced in 1st July 2021 and the actual permanent discontinuation of the IBOR will take place in 1st January 2022. Then the historical series of IBOR-RFR basis from 1st July 2016 to 30th June 2021 will be used for the calibration of the long-term historical mean/median, and 50% of the historical series is already available in public on 1st January 2019. An interim historical mean/median of the IBOR-RFR basis can be calculated by using those available data, i.e., the historical series from 1st July 2016 to 31st December 2018, and the market participant can price and transact new IBOR-RFR basis swaps taking into account of the privately-calculated interim historical mean/median, expecting that the true historical mean/median to be used after the actual discontinuation of IBOR will be close to the interim historical mean/median. The interim historical mean/median will be dynamically updated (or gradually “fixed”) until the announcement of the permanent discontinuation of IBORs reflecting the newly available historical series data.

Different market participants may have different views on when the permanent discontinuation of IBORs will be announced and will be taken in place, and may have different views on the level of the interim historical mean/median and hence the forward IBOR-RFR basis. But the IBOR-RFR basis swap market players will gradually form the market consensus of the interim historical mean/median as a proxy of the true, but yet-to-be calibrated, historical mean/median, and the forward IBOR-RFR basis after a certain point in the future implied from the IBOR-RFR basis swaps market will eventually converge to the market consensus of the interim historical mean/median. At the time the permanent discontinuation of the IBOR is announced, the market consensus of the interim historical mean/median is expected to be very close to the true historical mean/median calibrated to the historical time series on the period pre-defined in the IBOR Fallback provisions. The value transfer at the time of announcement of IBOR discontinuation will be minimized in the Historical Mean/Median Approach thanks to the clever market players in the functioning IBOR-RFR basis swaps market.

A possible drawback of the Historical Mean/Median approach is that the realized true historical mean/median might be currently different from the market expectations of the forward IBOR-RFR basis implied from the IBOR-RFR basis swaps market. Accordingly, users of IBORs may face P&Ls as the forward IBOR-RFR basis converges to the (interim) historical mean/median. But those P&Ls will be bounded by the difference between the historical mean/median and the current market expectations of the forward IBOR-RFR basis.

The existence of this bound is an advantage of the Historical Mean/Median approach compared to the Forward Approach, in which unlimited P&Ls could be induced by the *self-referencing* property. As we will see, in the Spot-spread Approach, the forward IBOR-RFR basis can hardly be predictable because the IBOR-RFR basis will be fixed based on the market data near the announcement date of the IBOR discontinuation. The Historical Mean/Median Approach will bring the stability to, and minimize market disruptions of, the IBOR-RFR basis swaps market to the largest extent among the three approaches.

The Historical Mean/Median Approach will minimize the value transfer and market disruptions, make the market manipulation impossible by its construction. For these reasons, the Historical Mean/Median Approach is the best approach for calculating the Spread Adjustment.

We prefer the median for it is robust against outliers.

We suggest using a historical look back period from a fixed date to the calibration date, instead of having a fixed term such as 5 years back from the calibration date. We do not have a strong opinion about the choice of the start date of the historical look back period, but it might be appropriate to use the historical data published after the ISDA selects the IBOR fallback approaches. The Advantage is that smaller market participants will have more time to understand the implications of the IBOR fallback methodologies before the historical mean/median will start to be gradually fixed. According to the updated FAQ of the Consultation, the ISDA expects to determine the approach to implement prior to the end of 2018. Hence we can choose 1st January 2019 or later as the start date of the historical look back period.

(3) Spot-spread Approach

The Spot-spread Approach will leave the IBOR-RFR basis market participants in a situation in which the future of the IBOR-RFR basis is hardly predictable in advance. The market participants cannot know where the forward IBOR-RFR basis should converge to and value transfer could not be avoided. More precisely speaking, as the expectation of the announcement of IBOR discontinuation rises, the forward IBOR-RFR basis will probably be marked to the spot-spread of the IBOR-RFR every day, resulting in fluctuating forward IBOR-RFR basis along the whole curve and hence fluctuating P&Ls. Even if IBORs are kept stable (possibly thanks to the Expert Judgement ironically), fixing risks of RFR fully anchored to actual transactions would create spikes in the spot IBOR-RFR basis and hence the forward. Specifically, the spikes by the turn of month/quarter/year effects would be amplified through the Spot-spread Approach.

A small number (e.g., 5) of fixings of IBOR-RFR basis will be used in the Spot-spread Approach, impacting the fixings of IBOR-RFR for the next 30 years or more. The incentives to manipulate the IBOR fixings will be greater than ever, especially if the date of announcement of discontinuation is known in advance or at least guessed relatively precisely by some IBOR panel banks. Given that IBORs are hardly anchored to actual transactions in the liquid and competitive market, there might be chances to manipulate the panel banks submissions directly or indirectly. The credibility and the transparency of the IBOR panel submissions may need to be extensively enhanced further.

The Spot-spread Approach can hardly make the forward IBOR-RFR basis stable and can hardly minimize value transfer due to its unpredictability. Market disruptions may be induced by the fixing risks especially in the market turmoil and IBOR panel banks are potentially incentivized to manipulate the spot IBOR fixings to be used as forward fixings for ever after. We do not recommend the Spot-spread Approach.

(4) Term Structure

After the fallback takes effect, an interest rate swap paying IBOR rates and receiving a fixed and constant rate K will become an interest rate swap paying Adjusted RFRs and Spread Adjustments S and receiving a fixed and constant rate K . If we assume that the Spread Adjustment does not have a term structure, i.e., the Spread Adjustment is constant and does not depend on Reset Dates, then the resulting swap will pay Adjusted RFRs and a fixed and constant rate S and receive a fixed and constant rate K , i.e., it will pay Adjusted RFRs and receive a fixed and constant rate $K-S$. If we further assume that the Adjusted RFR is the Compounded Setting in Arrears Rate which is the same formula used in the standard OIS transactions, then

the resulting swap is an OIS swap with the fixed rate $K-S$. In general, derivatives resulting from IBOR fallback applications are simple and consistent with derivatives referencing RFR if the Spread Adjustment does not have a term structure. This consistency will be particularly useful in the valuation of swaptions.

If the Spread Adjustment S has a term structure, then the resulting swap will pay Adjusted RFRs and receive a fixed rate $K-S$ with term structure. This will make the valuation and risk management of derivatives resulting from IBOR fallback applications complex. This is particularly the case for swaptions, because the underlying swap of an ordinarily traded swaption is a swap exchanging a floating rate and a fixed and constant rate, and market prices for swaptions with underlying swaps exchanging a floating rate and a fixed but time-dependent rate will not be easily available.

The Consultation proposes a one-year transitional period after the fallback takes effect in the Historical Mean/Median Approach to mitigate a cliff effect. The mitigation will have an impact only on short term cash flows in the transitional period but not on other payments after the transitional period up to 30 years or more, which have more important impacts on valuation. Those short term cash flows will have more sensitivities to the spot IBOR-RFR spread observed just prior to the IBOR discontinuation (or just prior to the announcement date of the IBOR discontinuation⁷). This will increase fixing risks and is not preferable.

There are clear disadvantages but no material advantages in introducing the transitional period. We recommend not introducing the transitional period in the Historical Mean/Median Approach, and instead using the historical mean/median from the first date the IBOR is not published.

⁷ There is a notable inconsistency in the Consultation as to how the Spread Adjustment is calculated in the transitional period of the Historical Mean/Median Approach. (1) The main text on Page 13 proposes to use *the spot IBOR-adjusted RFR spread on the last date the relevant IBOR is published*, while (2) the first formula on Page 29 uses the spot IBOR-adjusted RFR spread on the calibration date, which is the business day prior to the announcement date of the IBOR discontinuation. In the first definition, the Spread Adjustment will not be known until the last publication of the IBOR, and the merit of having a preparation period between the announcement and the actual discontinuation of IBOR will be partially lost. We strongly prefer the second definition in case the transitional period is introduced in the Historical Mean/Median approach, because the Spread Adjustment can be calibrated on the calibration date as intended. Figure 1 is based on the second definition.

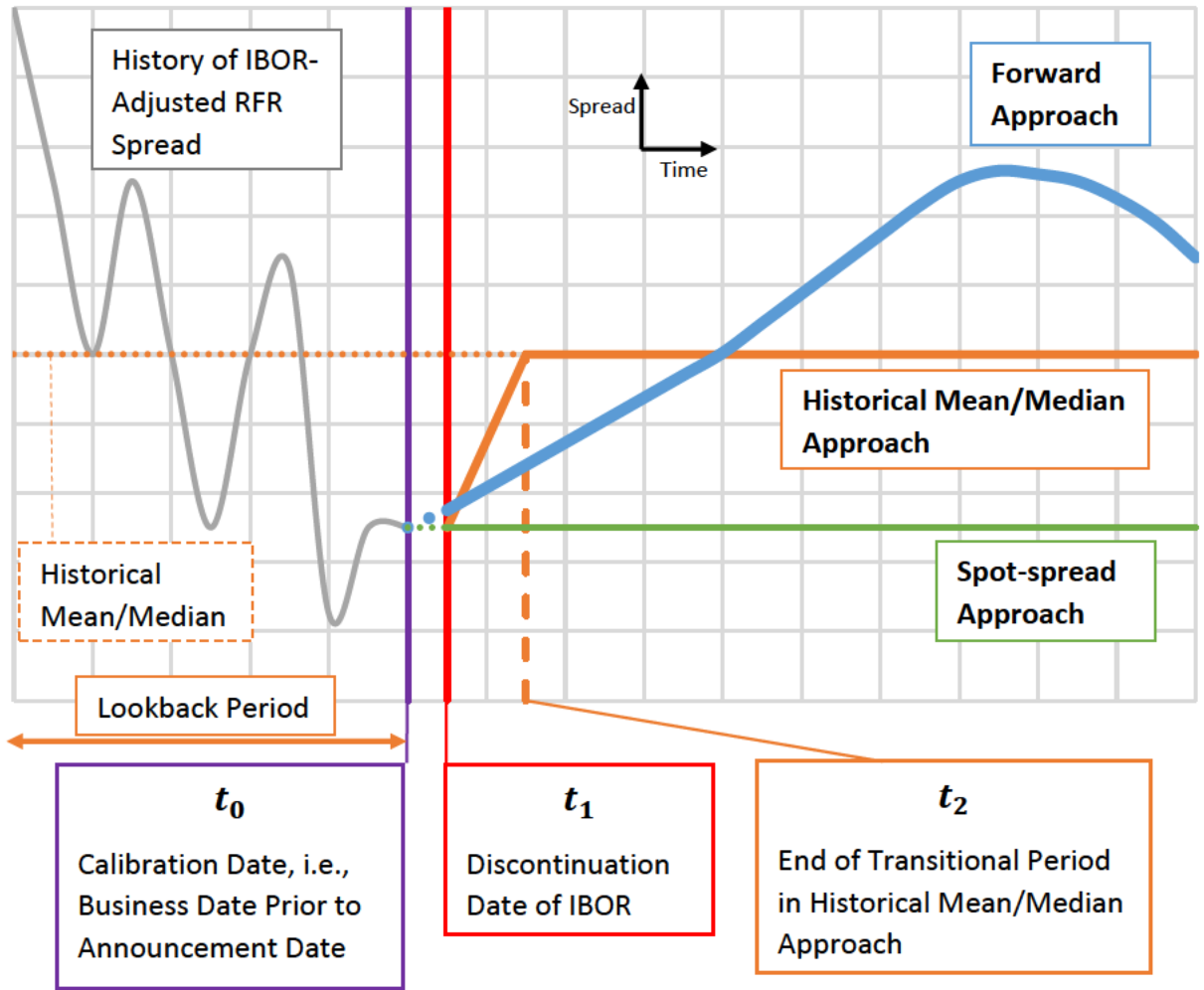


Figure 1: Graphical Comparison of Approaches for Spread Adjustment

Table 1: Advantages and disadvantages for the Spread Adjustment Approaches

	Forward	Historical Mean/Median	Spot-spread
Definition	Based on observed market prices for the forward IBOR-adjusted RFR spread in the Calibration Date.	Based on the average/median spot IBOR-adjusted RFR spread calculated over a significant, static lookback period such as 5Y or 10Y.	Based on spot IBOR-adjusted RFR spread fixing on the calibration date
(1) Data Availability	- Not ready. Require functioning markets and market data for both IBOR swaps and RFR OIS.	+ Ready + Require proxies of long histories especially for USD SOFR and EUR RFR. Fortunately, indicative SOFR and pre-ESTER are available from August 2014 and March 2017 respectively, which may be sufficient for calibration.	+ Ready
(2) Data Governance, Robustness	- The data should be anchored to actual transactions. An extensive governance with accuracy, credibility, and transparency needs to be established because the data will be used for the fixings of IBORs after the discontinuation of IBORs.	+ Improved governance on IBORs are established. RFRs are anchored to actual transactions in a large competitive market.	+ Improved governance on IBORs are established. RFRs are anchored to actual transactions in a large competitive market.
(3) Manipulation, Disruption	- Vulnerable to manipulation and disruption due to the structural problem that the IBOR-RFR basis after the discontinuation of IBOR will be fixed based on the market prices of IBOR-RFR basis swaps and will be totally not anchored to the underlying markets (i.e., the interbank unsecured funding). Basis market players will collectively decide the future fixings of the basis, and are incentivized to distort the market. Basis could become uncontrollably volatile to create unlimited P&Ls for market participants and end users having open risks to the basis.	+ Ameliorate market distortions and potential manipulation thanks to the long historical average. Need to define the lookback period appropriately. + Certain P&Ls of IBOR-referencing financial products may be inevitable as the forward IBOR-RFR basis converges to the the Historical Mean/Media prior to the announcement of the IBOR discontinuation. But any such P&Ls will be bounded by the difference between the current market consensus of the forward IBOR-RFR basis and the historical mean/median.	- The Spot-spread Approach would induce large value transfers and market disruptions in an unpredictable manner, especially if the fallback is triggered during market turmoil. Fixing risks of RFR will be extensively amplified through this approach. - Increased incentives to manipulate the IBOR fixing(s) which will impact the next 30Y or more.
(4) Value Transfer at the Time of Announcement of IBOR Discontinuation	+ Value transfer will be minimized because the Spread Adjustments will match the expected market price of forward IBOR-RFR basis just prior to the announcement of the IBOR discontinuation.	+ The Historical Mean/Median Approach will converge the market expectations of the forward IBOR-RFR basis to the gradually-fixed historical mean/median prior to the discontinuation of IBORs. Value transfer at the time of announcement of IBOR discontinuation will be minimized thanks to the clever players in the IBOR-RFR basis swaps market.	- The Spot-spread Approach will leave the IBOR-RFR basis market participants in a situation in which the future of the IBOR-RFR basis is hardly predictable. The basis could not converge in advance and value transfer could not be avoided.
(5) Operation, Methodology	- Require a vendor’s support to calculate and publish curves till the trigger event. - It may be very difficult to agree on methodologies (boot strapping, interpolation, etc.) to calculate forward IBOR-RFR basis from IBOR swap rates and RFR OIS rates. - Complicate swaptions valuations	+ Very simple.	+ Very simple.

B. General Evaluation of Adjusted RFR Approaches

(0) Summary of Adjusted RFR Approaches

The key objective of introducing the adjusted RFR is to account for the gap between a “term” rate (such as the IBOR) and an overnight rate (such as the overnight risk-free rate) so that the adjusted RFR will represent the economics of the risk-free rate over the term period. Key advantages and disadvantage for approaches for calculating the Adjusted RFR are summarized in Table 2.

- (1) The Compounded Setting in Arrears Rate (“ARR”) Approach represents the economics of the risk-free rate over the term period, is consistent with the overnight indexed swap, and will keep valuation and risk management models simple. The ARR Approach is fixed-in-arrears, i.e., payment amounts can be known only on or near - including both just before and just *after* - payment dates. Hence the ARR Approach is not operationally achievable if the formula proposed in the Consultation is used as it is. We propose slightly modifying the ARR Approach (the Modified ARR Approach, discussed in Appendix 1) to fix the rate a certain number of business days earlier so that it can be compatible with all the cleared derivatives.
- (2) The convexity effect will be present for other three approaches than the ARR Approach, complicating the valuation and risk management, and increasing risks which can hardly be hedged by standard derivatives products. These risk management complexities should be avoided for cleared derivatives. We recommend adopting the Modified ARR Approach for all the cleared derivatives.
- (3) The Spot Overnight Rate (“SOR”) and Convexity-adjusted Overnight Rate (“COR”) Approaches will increase the fixing risks which cannot be hedged by RFR OISs or RFR Futures. The SOR and COR Approaches should never be adopted.
- (4) The Compounded Setting in Advance Rate (“ADR”) Approach is based on a wrong, but adjacent, term period, and may probably have a relatively reduced convexity effect thanks to the formula proposed in the Consultation. The materiality of the remaining convexity effect needs to be analyzed but there is no theoretical research available in public as far as we are aware of.
- (5) The Term RFRs anchored to the RFR OIS market should be re-considered to be used as the Adjusted RFR provided such rate is publicly available, is sufficiently robust, is compliant with the IOSCO principles for financial benchmarks, and is recommended by regulators for limited use. We respect the FSB’s statement in July 2018; the use of Term RFRs has to be restricted because term RFRs will be less robust than the RFR. Term RFRs are operationally feasible where an IBOR is currently used because Term RFRs are fixed-in-advance and are free from the convexity effect. We believe that Term RFRs fit the role of Adjusted RFR in the IBOR fallback if adopted only to limited types of derivatives in which the use of ARR Approach is operationally difficult and significantly costly. Examples include derivatives used to provide IBOR-linked coupons for structured notes issued by financial institutions or for repackaged notes issued by special purpose companies (SPCs) where those notes can hardly rely on fallback rates with fixed-in-arrears property due to the increased operational difficulties and costs.

Though the Modified ARR approach can be used in most cases including all the cleared derivatives, it may not be suitable for limited particular types of non-cleared derivatives. We propose to adopt different methodologies for cleared and non-cleared derivatives.

Box 2: Recommendation on the Adjusted RFR Approaches

For all the cleared interest rate swaps, we recommend adopting the Compounded Setting in Arrears Rate (“ARR”) with some modifications (the Modified ARR Approach, see Appendix 1). The Modified ARR will be fixed a certain number of business days prior to the end of the term period.

For non-cleared derivatives, we recommend introducing options to select the particular appropriate fallback rate to be used:

Standard Option	The Modified ARR Approach	
Alternative Option (for non-cleared only)	The waterfall of fixed-in-advance rates	Level 1: Term RFR based on the RFR OIS market
		Level 2: Compounded Setting in Advance Rate

For non-cleared derivatives, the Modified ARR Approach is the Standard Option. Parties may, however, also consider to adopt the Alternative Option, the waterfall of fixed-in-advance rates, on a confirmation-by-confirmation basis or at a relationship level, only when both parties agree to do so, particularly because that the Modified ARR Approach is operationally difficult or very costly for the derivative(s) and/or any cash products hedged by the derivative(s). The first level of the waterfall is the Term RFR that is selected, endorsed or recommended by the relevant regulatory authorities for the relevant currency. If such Term RFR is not available, the second level of the waterfall, i.e., the ADR Approach, will be adopted.

The ISDA can publish the Supplement and Protocols based on the Standard Option. The Alternative Option can be adopted bilaterally by a template (Alternative Option Template) for relevant Confirmations or relationships. Supplement and Protocols will be overwritten by Alternative Option Template.

We suggest that the ISDA publish guidelines describing when the Alternative Option, the waterfall of fixed-in-advance rates, should be considered to be adopted so that the criteria not to use the Standard Option, the Modified ARR Approach, will be clarified, standardized, objective, and restricted to specific cases listed and agreed in the industry.

Comments on our recommendation above are given in Subsection B. (6), where we will also explore two alternative possibilities to avoid inconsistent applications of fallback approaches but find that the industry is not currently ready to adopt those possibilities.

(1) Compounded Setting in Arrears Rate (“ARR”) Approach

Among the four approaches proposed in the Consultation, only the Compounded Setting in Arrears Rate (“ARR”) Approach precisely represents the economics of the risk-free rate over the term period, and is the most economically natural choice. To see why the ARR Approach is the natural choice, we consider a basic, yet important question: Is there a simple strategy investing in the overnight RFR allowing for replicating the interest rate coupon paid by a bond in which the ARR Approach is adopted as the coupon formula? Indeed, investing the notional overnight at the overnight RFR and repeatedly re-investing the proceeds overnight at the overnight RFR will result in the rate calculated by the ARR Approach. In the sense of easily replicating a coupon as defined, the ARR Approach represents the natural coupon payment.

The ARR approach has been widely accepted in, and adopted for, the overnight indexed swaps (“OIS”) market (see the relevant Floating Rate Options in 2006 ISDA Definitions such as USD-SOFR-COMPOUND or JPY-TONA-OIS-COMPOUND). Since the ARR Approach precisely represents the economics of the risk-free rate over the term period, derivatives valuation and market risk characteristics will be kept

simple and consistent with IBORs to the greatest extent. For example, if IBORs of a standard interest rate swap are replaced by fallback rates using the ARR Approach, the swap will have interest rate delta risks but no volatility risks (vega risks) nor correlation risks. This risk management simplicity is the advantage of the ARR Approach and is a desirable property.

The disadvantage of the ARR Approach is that even for standardized interest rate swaps, the rate will be known only on or near - including both just before and just *after* - the end date of the Calculation Period if the formula proposed in the Consultation is used. This is the so-called fixed-in-arrears property of the ARR Approach, and the coupon payment may not be operationally feasible in many instances.

For cleared derivatives, the ARR Approach will become operationally feasible if we introduce some modifications such as lock up or backward shift. Let us call this modified version as the *Modified ARR Approach*. In the Modified ARR Approach, the overnight RFR published on a date D a specified number N of business days prior to the IBOR End Date or the Calculation Period End Date will be the last RFR used in the rate calculation. RFRs published on dates after the date D will not be used in the ARR calculation. The purpose of the modification is to give more time – N business days – to market participants to calculate, notify, prepare, and execute the floating rate payment so that the operational difficulties will be remedied. Strictly speaking, however, the modification will introduce risk management complexities (the convexity effect, see the next subsection), but as long as N is small (say, less than 10 business days), the convexity effect will be negligible in practice and does not harm the advantage – the risk management simplicity - of the ARR. Technical details of the Modified ARR will be discussed in Appendix 1.

For non-cleared derivatives, the Modified ARR Approach may still be operationally unachievable, difficult to apply, or very costly, for some products, some transaction schemes, some market participants, and some counterparty relationships. When a derivative is used to exactly hedge cash flows of a non-derivative such as a bond or a loan, the consistency of IBOR fallback methodologies between the derivative and the non-derivative is essential. For example, a derivative transaction between a dealer and a special purpose company (“SPC”) issuing a structured note has to have the same cash flows as the structured note, otherwise the SPC will be in trouble very soon due to any small cash flow mismatches of the bond and the derivative. In such cases, even if the Modified ARR Approach is operationally feasible for the derivative itself, operational difficulties of the non-derivative hedged by the derivative should also be taken into account when introducing the IBOR fallback provisions to the derivative.

(2) Convexity Effect and Clearing

The three approaches other than the (Modified) ARR Approach are fixed-in-advance - i.e., the rate is known in the beginning of the term period - and would overcome those operational difficulties in the (Modified) ARR Approach. But any modification to the natural formula will change the economics of the interest rate coupon, resulting in the so-called convexity effect. The convexity effect will change the market risk characteristics of existing transactions referencing IBORs, embed a sort of exotic optionality even into standardized interest rate swaps cleared by CCPs, and bring complex and hard-to-control risks to the financial market. Implications and materiality of the convexity effect need to be wholly and publicly assessed by the quant community, both by academics and practitioners and both from valuation and risk-management point of views.

The convexity effect has been known from 1990s, and the general valuation theory based on the numeraire change was formally formulated by Pelsser (1999). But the valuation of the convexity effect is heavily model-dependent. For example, it depends on the whole volatility surface including far-out-of-the-

money strikes and on correlations between different maturities of yield curves. There may not be any industry standards to value and risk-manage the convexity effect. Smaller market participants may not have facilities to value and risk-manage the convexity effect currently. The convexity effect can hardly be perfectly hedged (or replicated) by standard vanilla OTC derivatives such as interest rate swaps, caps, floors, and swaptions, and the hard-to-control risks may result in the increased minimum capital requirement for market risks. Interest rate swaps with the convexity effect are not so actively traded⁸ at the moment due to these complexities. There is no active inter-dealer market for the convexity effects and it is difficult to observe the consensus prices of the convexity effect. Without market prices, it is even unclear how to assess the accuracy of the valuation models and which market data to calibrate the model to. But, thanks to the low outstanding trading volume of swaps with convexity effects, the accuracy of the model for the convexity effect might have been an immaterial issue and less important in the industry until today.

320 trillions of U.S. dollars of, or 75% of, outstanding OTC interest rate derivatives are cleared in notional according to the 2017 H2 BIS survey. If the IBORs in those cleared derivatives were replaced by IBOR fall back rates with convexity effects, the convexity effect would inevitably become a material issue for the industry. Multiple methodologies for estimating convexity effects have been proposed in the literature so far, and the industry would have to establish a standard methodology so as to continue to centrally clear those swaps. For instance, CCPs would have to seriously take into account of the convexity effect in their valuation models, the initial margin models, and the default fund models. Implied volatilities and correlations are necessary to value the convexity effect, and the historical data is needed for risk management purpose, i.e., the VaR and ES models. Without public announcements by all the CCPs clearing interest rate swaps that they will commit to develop by the actual discontinuation of IBORs the valuation model, the initial margin model, and the default fund model which are fully compatible with the convexity effect with good precision and theoretical consistencies, the industry cannot accept Adjusted RFR Approaches containing the convexity effect. We doubt whether CCPs can do so in a timely manner. Even if that can be achieved, a clearing member might be reluctant to, or refuse to, participate in the default auction process to increase their exposure to the convexity effect, potentially dis-incentivizing the clearing member from being a clearing member.

Note that a CCP has to adopt the same IBOR Fallback approach to all of its counterparties (clearing members, affiliates, and customers/clients) otherwise the CCP will be exposed to market risks due to cash flow mismatches caused by the differences of IBOR Fallback approaches, which can never be accepted.

The risk management complexities that would be introduced by the convexity effect inherent in the three approaches other than the ARR Approach have to be avoided for cleared derivatives. We recommend using the Modified ARR Approach for all the cleared derivatives.

(3) Spot Overnight Rate (“SOR”) and Convexity-adjusted Overnight Rate (“COR”) Approaches

We are completely opposed to the Spot Overnight Rate (“SOR”) and Convexity-adjusted Overnight Rate (“COR”) Approaches. Overnight rates have sometimes spikes by the turn of month/quarter/year effects, and those spikes are in general significantly larger than IBORs because the overnight rates are anchored to actual transactions and the term length of the rates is minimal (i.e., one business day). The SOR and COR Approaches use a single RFR for each coupon payment and will hence increase the fixing risks. The fixing risks of single RFRs can hardly be risk-controlled or hedged using standard derivatives referencing RFR such as RFR overnight indexed swaps (“OIS”) or RFR futures in which averages of RFRs over term periods are

⁸ Far less than 0.1% in trade counts of outstanding OTC interest rate derivatives have the convexity effect in our firm.

used. To hedge the fixing risks of SOR and COR, market participants would need bespoke derivatives which are not currently available. There are no advantages to support the use of the SOR or COR.

(4) Compounded Setting in Advance Rate (“ADR”) Approach

The Compounded Setting in Advance Rate (“ADR”) Approach is based on a wrong, but adjacent, term period, and may probably have a relatively reduced convexity effect thanks to the formula proposed in the Consultation. Market participants have to assess the materiality of the remaining convexity effects by themselves and may have to take those into account of in their proprietary valuation and risk management systems. A public theoretical and numerical research on the ADR is necessary before selecting the ADR as the Adjusted RFR. But we are not aware of any such research.

(5) Term RFR

There is an approach dismissed in the Consultation: the Term RFR. The Term RFR - a.k.a. the RFR-Based Term Rate - is a RFR-derived forward-looking and fixed-in-advance term rate that could be based on transactions or executable quotes, in relatively active and liquid markets for derivatives linked to the RFRs, such as overnight indexed swaps or RFR futures markets. The limited use of Term RFR to derivatives market is proposed by the FSB in July 2018⁹: *“The FSB considers that the greater robustness of overnight RFRs compared with term rates makes overnight RFRs a better reference rate choice than term rates in markets where participants do not need forward-looking term rates. An overnight RFR may not, however, be the optimal rate in all the cases where term IBORs are currently used. If future use of term rates is relatively narrow compared with current use of IBORs, for example if it is concentrated largely in a segment of the cash rather than derivative markets, this more limited use would be compatible with financial stability.”*

A Term RFR will represent the economics of the risk-free rate over the term period relatively well provided that the rate is fixed based on prices in the RFR derivatives market formed by competitive forces of supply and demand and is anchored to observable actual transactions (or firm executable quotes, at least). Since the RFR and the Term RFR are different benchmarks, there will emerge basis swaps market between the two, i.e., basis swaps exchanging compounded RFRs plus spreads and Term RFRs. One may expect that the basis between the RFR and the Term RFR and its risks would be limited if the underlying market of the Term RFR is liquid and competitive, and if the benchmark calculation is based on actual transactions. But market prices include risk premiums charged to clients in addition to the economical expectation, and even if the expectation is 0, the market mid prices may sometimes diverge from 0 due to the imbalanced supply and demand. Long-dated basis swaps will be priced depending on the supply and demand in the market, and the basis may not necessarily converge to 0 depending on the net demand of converting cash flows linked to Term RFR to those linked to RFR by basis swaps in the industry. The emergence of basis risks between the Term RFR and RFR is unavoidable, and those are real risks in the context of accounting fair value measurement by exit prices. In addition, Term RFR will have higher fixing risks than compounded RFRs.

Term RFRs are fixed-in-advance and there will be no operational difficulties in using the Term RFR for derivatives, bonds, and loans. Term RFRs do not have any convexity effect if the underlying market is the overnight indexed swaps (“OISs”). RFR Futures has convexity effects itself and we recommend not using RFR Futures as the underlying market of Term RFRs due to the modelling difficulties.

⁹ FSB, *Interest rate benchmark reform – overnight risk-free rates and term rates*, July 2018

We understand that the Consultation discusses IBOR fallbacks that could be used in the absence of suitable Term RFRs and focuses on calculations based on overnight RFRs. We respect and support the FSB's statement; the use of Term RFRs has to be restricted because term RFRs will be less robust than the RFR. But Term RFRs are always operationally feasible where an IBOR is currently used because Term RFRs are fixed-in-advance. We believe that Term RFRs fit the role of Adjusted RFR in the IBOR fallback if adopted only to limited types of derivatives in which the use of ARR Approach is operationally difficult and significantly costly. Examples include derivatives used to provide IBOR-linked coupons for structured notes issued by financial institutions or for repackaged notes issued by special purpose companies (SPCs) where those notes can hardly rely on fallback rates with fixed-in-arrears property due to the increased operational difficulties and costs.

Once a Term RFR is established and recognized as a relatively robust interest rate benchmark, the Term RFR could be a better approach than the ADR Approach because Term RFRs are convexity free and do not induce valuation and risk management complexities.

Therefore, we recommend the ISDA re-considering the use of Term RFR based on RFR OIS market as IBOR fallbacks for limited types and counterparties relationships of non-cleared derivatives for which the ARR is practically difficult to apply from operational and cost point of views, provided such Term RFR is publicly available, is sufficiently robust, is compliant with the IOSCO principles for financial benchmarks, and is recommended by regulators for limited use. Let us stress though that the Term RFR will be less robust compared to the RFR and will introduce new basis risks between the RFR and the Term RFR, so the use of Term RFR should be avoided wherever possible.

(6) Toward Consistent Application of Fallback Approaches

In our recommendation, we proposed adopting the Modified ARR Approach for all the cleared derivatives and introducing options comprising of the Modified ARR Approach, Term RFR, and the ADR Approach for non-cleared derivatives. The obvious disadvantage is the fragmented adoption of different approaches to different derivatives transactions. The outcome would be the following:

- Suppose that IBOR risks are neutralized for a pair of transactions before the discontinuation of an IBOR. Once different approaches are adopted to those, there will emerge basis risks and value transfer in the event of public announcement of permanent discontinuation of the IBOR.
- Parties may dispute on the choice of options for Adjusted RFR for particular transactions, and the negotiation process would become complex, uncertain, and resource intensive unless the criteria not to use the Modified ARR Approach is clarified, standardized, objective, and restricted to specific cases listed and agreed in the industry.
- It will increase costs and complexities to update internal business procedures and systems across the firm from the front to middle and back offices to reflect multiple Adjusted RFR Approaches that could be applied on confirmation-by-confirmation basis.

Though it is in principle preferable to adopt a single common approach across all the transactions referencing IBORs including derivatives and non-derivatives, our recommendation to use multiple approaches for derivatives are inevitable conclusions based on two key major constraints. The first constraint is to keep simple the risk property of cleared derivatives since the outstanding OTC interest rate derivatives are huge in volume and risk management complexities in CCPs may pose systemic issues to the

financial market and have to be avoided. The second constraint is, following the FSB statement in July 2018, not to adopt Term RFR to all the derivatives including both cleared and non-cleared, since the Term RFR will be less robust compared to RFR. In the following, we contemplate whether either of these two constraints can be possibly removed.

The first constraint could possibly be resolved if the quant community can develop a standard methodology for calculating the present values and risks of standardized interest rate swaps in which IBORs are replaced by the ADR plus Spread Adjustment, the input data for the standard methodology including implied volatilities and correlations are publicly available for both valuation and risk management purposes, and the industry can accept and control the (possibly huge) convexity effect. It may be worth establishing a technical working group within the ISDA to develop such a standard methodology for the convexity effect of the ADR. Once the technical and theoretical issues are resolved, the ADR may be applied to all the financial products including derivatives and non-derivatives. The risk management of IBOR fallbacks will remain complex and market participants have to develop their own models to address the convexity effect for non-standard derivatives such as options and exotics, but we may possibly be able to find a way to live with that. We are very skeptical about this possibility. But one may say there is no disproof yet and it could be possible.

The second constraint can be resolved if a Term RFR is developed in the relevant currency before the discontinuation of an IBOR and the industry is allowed to use it as fallback rates of the IBOR for both cleared and non-cleared derivatives. The FSB stated in its statement in July 2018 that *“If major derivative markets that are currently reliant on IBORs at risk of discontinuance were to fall back to RFR-derived term rates rather than overnight RFRs, and these RFR-derived term rates did not have sufficient liquidity to support production of a benchmark robust across the range of market conditions, this would not be effective in addressing systemic risks.”* We fully agree with the FSB’s statement. We would like to, however, stress that every Adjusted RFR Approach proposed in the Consultation has issues in practical applications, notably the settlement operation difficulties and the complex risk property of the convexity effect. These issues will require significant re-builds of business procedures and system infrastructures for legacy transactions in a limited time frame, potentially bringing systemic risks to the financial market due to delay of preparations. If Term RFRs are adopted as the IBOR fallback rates to all the financial products, those issues will disappear *and* the sudden emergence of basis risks within the pool of legacy transactions can be avoided. Term RFR will have different issues such as the relatively weak robustness of the benchmark, the basis risks between RFRs and Term RFRs, the higher fixing risks compared to compounded RFRs, and the lack of historical data for the basis between RFRs and Term RFRs. But these issues may be relatively immaterial compared to the potential systemic risks caused by the Adjusted RFR proposed in the Consultation.

Furthermore, if the transition from IBOR to RFR progresses, new transactions will be mainly based on RFRs, the use of IBORs will be limited to the hedging purpose of legacy transactions, the outstanding IBOR exposures will shrink extensively compared to the current volume and the IBOR will not pose systemic risks anymore, then the use of Term RFR as fallback rate for all derivatives transactions will become acceptable.

The ISDA might want to continue dialogues with the FSB as to the use of Term RFR as IBOR fallback rates, to encourage public/private sector working groups in major currencies to develop the Term RFR at the latest by the end of 2020, and consider to use the Term RFR as the fallback rate for *all* the derivatives once such rate becomes available in 2021.

Box 3: Alternative Possibilities to Avoid Inconsistent Applications of Adjusted RFRs

1. Adopt the ADR Approach as IBOR fallbacks for all the derivatives provided theoretical complexities of the convexity effect of the ADR Approach are clarified, volatilities and correlations data are available for valuation and risk-management purposes, and the industry agrees to accept the resulting risks and risk management complexities both in cleared and non-cleared transactions; or
2. Adopt the Term RFR as IBOR fallbacks for all the derivatives provided that the Term RFR is publicly available, sufficiently robust, and compliant with the IOSCO principles for financial benchmarks, the outstanding IBOR exposure in the industry is considerably minimized, and the use of Term RFR as IBOR fallbacks to all the derivatives are accepted by regulators.

We do not recommend pursuing the first possibility (i.e., the adoption of ADR Approach to all the derivatives) for its increased risks and complexities.

Term IBORs will fall back to *Term* RFRs in the second possibility, and it might be seen as a natural choice. Though we have to keep using relatively less robust benchmarks and to bear some fixing risks of *Term* IBORs in legacy transactions, it will reduce the emergence of basis risks between legacy transactions, keep operations and risk management similar to the current ones, and reduce costs of preparation for the application of fallback rates considerably.

We are not recommending the second possibility, i.e., the use of *Term* RFR as fallback rates to *all* the derivatives to the ISDA *at the moment*. But *in the future* the ISDA might want to re-consider the second possibility if an IBOR survives rather longer, a *Term* RFR is developed and becomes relatively robust, and the outstanding volume of IBOR referencing financial products reduces extensively so that the use of *Term* RFR in all the legacy transactions poses no or little systemic risks. The ISDA might want to publicly state that it may re-consider the second possibility under the conditions stated above in order to incentivize voluntary transitions from IBOR to RFR in both new and legacy transactions.

None of the Adjusted RFR approaches proposed in the Consultation cannot be easily applied to all the non-cleared derivatives due to operational difficulties or complexities of risk management. Market participants will have to analyze and agree each other whether each derivative transaction is compatible with the Modified ARR Approach and otherwise they have to consider adopting the ADR Approach or the *Term* RFR, whether through the ISDA's standard documents (Supplement, Protocols or some Templates) published in the future or through bilateral re-papering of terms in the Confirmation(s) (by some Templates). This negotiation process will be highly resource intensive. It will be very useful if the ISDA publishes guidelines describing when the waterfall of fixed-in-advance rates should or can be considered to be adopted so that the criteria not to use the Modified ARR Approach is clarified, standardized, objective, and restricted to specific cases listed and agreed in the industry.

Finally, we would like to stress the importance of early voluntary transition; instead of trying to introduce fallback provisions, counterparties should utilize their resources to transition from IBORs to RFRs (or *Term* RFRs if such rate is available) by unwinding legacy derivatives transactions and reconstructing new ones referencing RFRs so that they can avoid the risk of using IBORs and potential market turmoil at the event of permanent discontinuation of IBORs, as early as possible.

Table 2: Advantages and Disadvantages for the Adjusted RFR Approaches.

	SOR	COR	ARR	ADR	Term RFR
	Spot Overnight Rate	Convexity-adjusted Overnight Rate	Compounded Setting in Arrears Rate	Compounded Setting in Advance Rate	RFR-derived forward-looking term rate
Definition	The single overnight RFR fixed on the date the relevant IBOR is fixed.	SOR with an adjustment to reduce the convexity effect.	Daily compounded overnight RFRs over the relevant IBOR calculation period.	RA (ARR in an earlier period) with an adjustment to reduce the convexity.	A new benchmark based on RFR OIS market. Currently Not Available
(1) Represent economics of:	- O/N rate at the start of the IBOR term. - Ignore tenor structure.	- O/N rate at the start of the IBOR term. - Ignore tenor structure.	+ Actual full daily rates in the relevant IBOR tenor.	+ Daily rates in a term period. - Based on the wrong period just before the relevant one.	+ The Term RFR represents the market expectation of the ARR.
(2) Setting in:	+ Advance.	+ Advance.	- Arrears. Operationally difficult for some non-cleared derivatives.	+ Advance.	+ Advance.
(3) Delta Risk Profile	+ The same as IBOR.	+ The same as IBOR.	- Gradual fixing in the relevant period.	- Gradual fixing in the period just before the relevant one.	+ The same as IBOR.
(4) Calculation Familiarity	+ Very simple.	- Complex formula.	+ Used in the market already.	- Very complex formula.	+ Very simple.
(5) OIS Consistency	- Different from OIS.	- Different from OIS.	+ The same as OIS.	- Different from OIS.	- Different from OIS.
(6) Volatility, Fixing Risk	- Fixing risks will be increased and hard to hedge by RFR Futures or OIS	- Fixing risks will be increased and hard to hedge by RFR Futures or OIS	+ Less volatile since the "average" is taken.	+ Less volatile since the "average" is taken.	+ Depends on the liquidity of the RFR OIS market. Expected to be less volatile than single O/N RFR. Some fixing risks remain.
(7) Valuation and Risk Management Simplicity	- The convexity effect will make the valuation and risk management complex even for standardized derivatives such as cleared interest rate swaps.	- Non-linear payment formula is used. - Convexity may be reduced by the formula somehow, which is not yet well analyzed by the quant community.	+ No issues. Clean.	- Non-linear payment formula is used. - Convexity may be reduced by the formula somehow, which is not yet well analyzed by the quant community.	+ No convexity. - Generate the basis market and risk between the RFR ARR and Term RFR.
(8) Clearing	- Valuation, IM, and Default Fund models have to be updated to cope with the convexity. Historical data of volatilities will be required. Clearing members may be reluctant to participate in the default auction.	- Valuation, IM, and Default Fund models have to be updated to cope with the convexity. Historical data of volatilities will be required. Clearing members may be reluctant to participate in the default auction.	+ No substantial theoretical and fundamental rebuilds of valuation, IM, and Clearing Fund models are required. OIS is already cleared.	- Valuation, IM, and Default Fund models have to be updated to cope with the convexity. Historical data of volatilities will be required. Clearing members may be reluctant to participate in the default auction.	- Valuation, IM, and Clearing Fund models have to be updated for the basis risk between the RFR ARR and Term RFR. Though the basis risk is expected to be relatively minor, historical data is not available.

C. Response to Specific Questions

Preferred Approach

Q1 • Please rank the combinations listed above with 1 as your preferred approach, 2 as your second preferred approach, and so forth.

1. Compounded Setting in Arrears Rate with Historical Mean/Median Approach
2. Compounded Setting in Advance Rate with Historical Mean/Median Approach
3. Compounded Setting in Advance Rate with Spot-Spread Approach
4. Compounded Setting in Arrears Rate with Forward Approach
5. Compounded Setting in Advance Rate with Forward Approach

Other combinations should not be adopted.

Please also see Box 1 and Box 2.

Q1-1 o Please explain your rankings. Please specifically comment on the characteristics of the combinations you ranked the highest that most influenced your decision.

Please see the Section A and B for details. Let us repeat the main reasons:

Historical Mean/Median Approach will converge the market expectations of the forward IBOR-RFR basis to the gradually-fixed historical mean/median prior to the discontinuation of IBORs because market participants will act knowing the fact that IBOR-RFR basis fixings after the discontinuation of IBOR will be calculated by, and anchored to, the long-term historical mean/median of the IBOR-RFR basis. The Historical Mean/Median Approach will minimize the value transfer and market disruptions, and make the market manipulation impossible by its construction

The Compounded Setting in Arrears Rate (“ARR”) Approach represents the economics of the risk-free rate over the term period, is consistent with the overnight indexed swap, and will keep valuation and risk management models simple. The ARR Approach is fixed-in-arrears, i.e., the payment amount can be known only on or around the payment date, and operationally difficult. A modified version of the ARR Approach (the Modified ARR Approach, discussed in Appendix 1) will be compatible with cleared derivatives. Other three approaches of Adjusted RFR have the convexity effect, complicating the valuation and risk management and increasing risks which can hardly be hedged. Those risk management complexities have to be avoided for cleared derivatives.

Q1-2 o If you are completely opposed to an approach to adjusted RFRs, please do not rank it but explain why you are completely opposed to it.

We are completely opposed to the Spot Overnight Rate (“SOR”) and Convexity-adjusted Overnight Rate (“COR”) Approaches. Overnight rates have sometimes spikes by the turn of month/quarter/year effects, and are in general more volatile than IBORs. The SOR and COR Approaches use a single RFR for each coupon payment and will hence increase fixing risks. Fixing risks of single RFRs can hardly be risk-controlled or hedged using the standard derivatives referencing RFR such as RFR overnight indexed swaps (“OIS”) or RFR futures in which averages of RFRs over term periods are used. To hedge the fixing risks of SOR and COR, market participants would need bespoke derivatives which are not currently available. There is no advantage to support the use of the SOR or COR.

Q1-3 o Indicate whether your preferences apply universally to GBP LIBOR/SONIA; JPY LIBOR/TONA; TIBOR/TONA; Euroyen TIBOR/TONA; CHF LIBOR/SARON and BBSW/RBA cash rate. Alternatively, provide a separate ranking for each IBOR that should be handled separately.

We prefer to apply the same approach universally to all the IBOR/RFR pairs listed above (i.e., GBP LIBOR/SONIA; JPY LIBOR/TONA; TIBOR/TONA; Euroyen TIBOR/TONA; CHF LIBOR/SARON and BBSW/RBA cash rate).

Q1-4 o If your preferences apply universally, please indicate whether you would also expect your preferences to apply to USD LIBOR/SOFR, EUR LIBOR/[the identified EUR RFR] and EURIBOR/[the identified EUR RFR].

We prefer to apply the same approach universally to all the IBOR/RFR pairs including USD LIBOR/SOFR, EUR LIBOR/ESTER and EURIBOR/ESTER.

Q1-5 o Please provide preliminary comments on your preferred approach for USD LIBOR/SOFR (regardless of whether your preference applies universally or to USD LIBOR/SOFR only). Indicate what, if any, additional information you need to confirm this as your preferred approach.

We prefer to apply “Compounded Setting in Arrears Rate with Historical Mean/Median Approach” to USD LIBOR/SOFR.

Historical Mean/Median Approach requires long histories of IBOR fixings and adjusted RFR fixings. Though the official publish of SOFR started from the beginning of April 2018, the Federal Reserve Bank of New York also published a time series of (1) the “indicative SOFR” from August 2014 and (2) the volume-weighted mean rate of the primary dealers’ overnight Treasury general collateral repo borrowing activity collected through its own survey (the “survey rate”) from February 1998. Though the indicative SOFR and the SOFR may not be exactly identical in their fixing methodologies, the indicative SOFR must be appropriate to be used as a proxy of the time series of SOFR between August 2014 and March 2018 for the purpose of calibrating the spread adjustment in the Historical Mean/Median Approach. There are some technical differences between the survey rate and the SOFR, but the survey rate provides insight into how a broad measure of repo market activity would have behaved over a significantly longer time horizon. We believe that the survey rate can also be considered to be used as a proxy of the time series of SOFR between February 1998 and August 2014 should we need such longer history of the adjusted RFR in the calibration of the spread adjustment in the Historical Mean/Median Approach.

As noted in the IBOR Fallbacks for 2006 ISDA Definitions FAQs updated in September 17th 2018, the Working Group on Euro Risk-Free Rates identified ESTER as the alternative risk-free rate for the euro area so that will be the fallback rate for EURIBOR and EUR LIBOR. We prefer to apply “Compounded Setting in Arrears Rate with Historical Mean/Median Approach” to both EUR EURIBOR/ESTER and EUR LIBOR/ESTER. Though the ECB will begin publishing ESTER at the latest by October 2019, the historical time series of pre-ESTER is available from 15th March 2017. That can be used to calibrate the Historical Mean/Median.

Q2 • Please indicate whether you would not be able to transact using definitions that incorporate fallbacks based on any of the approaches to adjusted RFRs or spread adjustments. If you would not be able to transact, please give specific examples of the types of derivatives for which the fallbacks would be problematic and explain why.

The Compounded Setting in Arrears Rate (“ARR”) cannot be used even for standard interest rate swaps cleared by CCPs. The rate will be known on or near the end date of the Calculation Period if the formula proposed in the Consultation is used. This is the so-called setting-in-arrears property of the ARR Approach, and the coupon payment may not be operationally feasible in some instances.

For cleared derivatives, the ARR Approach will become operationally feasible if we introduce some modification (lock up or backward shift). Let us call this as the *Modified ARR Approach*. In the Modified ARR Approach, the RFR on a date *D* a specified number *N* of business days prior to the IBOR end date (or Calculation Period end date) will be the last RFR used in the rate calculation. RFRs on dates after the date *D* will not be used in the ARR calculation. The purpose of the modification is to give more time – *N* business days – to market participants to calculate, notify, prepare, and execute the floating rate payment so that the operational difficulties will be remedied. Details of the Modified ARR will be discussed in Appendix 1.

Q3 Would it be problematic for market participants to use different approaches to calculate adjusted RFRs and spread adjustments in fallbacks across different currencies? Please explain why or why not, commenting specifically on the potential implications of using different approaches across different currencies.

There is no structural constraint that market participants cannot accept different approaches to calculate adjusted RFRs and spread adjustment in fallbacks across different currencies. However, that will significantly increase the complexities and costs of preparing for the IBOR fallbacks, potentially increasing systemic risks to the financial market.

Q4 • Please provide separate comments on the general appropriateness and effectiveness of each of the four approaches to adjusted RFRs and three methodologies for the spread adjustments. Please specifically comment on anticipated operational challenges, economic impacts, implications for hedging, feasibility of implementation and any other complexities. Indicate whether your comments apply to all contracts, new contracts only or legacy contracts only. With respect to any operational challenges, please explain how long it would take to overcome such challenges.

Please see Section A and Section B.

Q5 • Questions about specific methodologies for calculating the spread adjustment:

Q5-1 o Forward Approach

Q5-1-1 - Should the forward approach be based on data from the day prior to the trigger only or a number of days or months prior to the trigger? If the latter, how many days or months? Please specifically consider 5 trading days, 10 trading days, 1 month and 3 months but also indicate whether a different length is most appropriate and explain why.

The longer the better to minimize market manipulation opportunities. We can even consider the *historical average of forward approach* where the average of forward IBOR-Adjusted RFR basis is taken over a significantly long periods such as 5 years. But we are strongly opposed to the Forward Approach.

Q5-1-2 - What is the appropriate length of the forward spread curve? Please specifically consider 30 years, 40 years, 50 years and 60 years but also indicate whether a different length is more appropriate and explain why.

It depends on the reliability of the input data, i.e., the liquidity of IBOR swaps and RFR OIS.

Q5-1-3 - Would it be acceptable to use data for cleared transactions only when using the forward approach to calculate the spread adjustment? If so, how should the differential between central counterparties (CCPs) be addressed?

Yes it is acceptable to use data for cleared transactions only. Non-cleared interest rate swaps should be removed from the data source because the non-cleared interest rate swaps are more expensive to hold than cleared, and the prices of non-cleared will less likely represent the market expectation of the IBOR-Adjusted RFR in the future.

The volume weighted average of fixed rates of cleared interest rate swaps with fixed term maturities traded in a period across all the CCPs should be used. The differential between central counterparties (CCPs) will be taken into account through the volume weighted average. See Itozaki (2018) also for implications of CCP basis on IBOR fallbacks.

Q5-2 o Historical Mean/Median Approach

Q5-2-1 - What is the appropriate historical static lookback period? Please specifically consider 5 years and 10 years but also indicate whether a different time period is most appropriate and explain why.

We suggest using a historical look back period from a fixed date to the calibration date, instead of having a fixed term such as 5 years back from the calibration date. We do not have a strong opinion about the choice of the start date of the historical look back period, but it might be appropriate to use the historical data published after the ISDA selects the IBOR fallback approaches. The Advantage is that smaller market participants will have more time to understand the implications of the IBOR fallback methodologies before the historical mean/median will start to be gradually fixed.

According to the updated FAQ of the Consultation, the ISDA expects to determine the approach to implement prior to the end of 2018. Hence we can choose 1st January 2019 or later as the start date of the historical look back period.

Q5-2-2 - Should the calculation be based on the mean or the median spot spread between the IBOR and the adjusted RFR? Please explain why.

We prefer the median for it is robust against outliers.

Q5-3 o Spot-Spread Approach

Q5-3-1 - Should the spot-spread approach be based on data from the day prior to the trigger only or, alternatively, some number of days prior to the trigger? If the latter, how many days prior to the trigger should this be? Please specifically consider 5 trading days, 10 trading days and 1 month, but also indicate whether a different time period is most appropriate and explain why.

The longer the better to minimize fixing risks.

General

Q6 Q● How important or unimportant is it for the fallbacks to be approximately present-value neutral at the time of trigger? Please explain why.

It is very important that the fallbacks to be approximately present-value neutral at the time of trigger. Otherwise market participants will be reluctant to adopt the fallback provisions being afraid of potential losses, and delay resolving the risks of using IBORs in legacy transactions.

It is also important that expectations of value transfers at the time of trigger can be estimated prior to the trigger. Those expectations can be used internally for long-term business planning. In addition, for some derivatives and non-derivatives, dealers periodically provide to their clients present values of financial products so that clients can use those numbers internally or for accounting report purposes. Any changes of present values resulting from major changes to the calculation methodologies have to be notified in advance, from 1 month to 6 months depending on types of clients.

Furthermore, it is important that the uncertainties (i.e., risks) of value transfers at the time of trigger can be estimated prior to the trigger so that banks can measure, manage, and report them. Regulators might want to request banks to set aside additional capital for the risks of value transfers at the time of IBOR discontinuation in the Pillar 2 capital framework.

If either of the Historical Mean/Median Approach or the Spot-spread Approach is selected, the risks of value transfers can be estimated from the historical volatilities of the IBOR-RFR spread. If the Spot-spread Approach is selected, those risks can be estimated by the IBOR-RFR delta times the historical volatility of the IBOR-RFR spread. If the Historical Mean/Median Approach is selected, those risks will be minimized by the long term averaging.

If the Forward Approach is selected, it will be difficult to estimate the IBOR-RFR basis risks from the historical data because the basis market will transition to a new world and we cannot learn from the past. The IBOR-RFR basis swap market will become self-referencing in the sense that the basis after the IBOR discontinuation will be determined by the IBOR-RFR basis swap market itself and not anchored to the IBOR-RFR basis determined from the interbank funding market. Value transfer risks could become unlimited.

Q7 ● How important or unimportant is it for the fallback rates to be available in advance of the accrual period. Alternative, is setting in arrears acceptable? Please explain why or why not.

For all the cleared derivatives and most of non-cleared derivatives between major dealers, fixed-in-arrears rates can be adopted.

For some derivatives where it is assumed that the rate will be fixed-in-advance currently, it will be operationally difficult to adopt the fixed-in-arrears rate. This is especially the case for a derivative provided to an SPC issuing a repackage note where the note can hardly rely on fallback rates with fixed-in-arrears property due to the increased operational difficulties and costs. There are so many stakeholders involved in the repackage note business that it may be time- and resource- consuming to persuade all the stakeholders to adopt the Modified ARR Approach. We have a strong concern in this area, but that will have to be resolved bilaterally and should not affect the fallback methodology for cleared derivatives. The Modified ARR Approach should be adopted as the standard Adjusted RFR methodology especially for cleared derivatives.

Q8 • How important or unimportant is it for the fallback rates to be wholly (or mostly) convexity free? Please explain why or why not.

Please refer the Subsection B. (2) for detailed discussions.

The convexity effect will distort the risk properties of floating rate coupons, complicate the valuation and risk management, and is difficult to hedge by standard OTC derivatives including swaps, swaptions, caps and floors. Smaller market participants *and* CCPs might not be ready to cope with the convexity effect. The fallback rates should be wholly convexity free for cleared derivatives and most of non-cleared derivatives.

D. Other Comments

(1) Japanese Yen TIBOR and Euroyen TIBOR as Fallback for JPY LIBOR?

We are opposed to using Japanese Yen TIBOR and Euroyen TIBOR as the fallback for JPY LIBOR because Japanese Yen TIBOR and Euroyen TIBOR are less robust than TONA.

We acknowledge that JBA TIBOR Administration (“JBATA”) implemented the TIBOR reform in July 2017 and the credibility and transparency of the process for determining the JBA TIBOR (a collective term representing Japanese Yen TIBOR and Euroyen TIBOR) were extensively enhanced. But the JBA TIBOR still depends on the panel bank submissions which are not necessarily anchored to actual transaction data of underlying markets.

JBATA discloses how many percentages of panel bank submissions are based on one of the four levels of data. The 1st Level Data for Japanese Yen TIBOR is the observable unsecured call market including actual transactions, committed quotes, indicative quotes, linear interpolation of actual transactions, retroactive use of actual transactions, and linear interpolation of actual transactions and/or retroactively used actual transactions. It is not, however, disclosed whether the panel bank submissions are based on one of those data sources *within* the 1st Level Data, e.g., it is not disclosed whether the panel bank submissions are based on actual transactions or not. Users of TIBOR cannot evaluate the credibility of JBA TIBOR fully and the transparency of the determining process could be enhanced further.

Once the JPY LIBOR is replaced by the fallback rates using the TONA successfully, the robustness of existing transactions referencing JPY LIBOR will be significantly improved thanks to the strong robustness of TONA. If the JPY LIBOR were replaced by fallback rates using JBA TIBOR, the robustness would not be improved as TONA. We question the credibility, transparency, and future sustainability of JBA TIBOR in the longer term, and cannot accept the use of JBA TIBOR as the fallback rate for JPY LIBOR referenced in a huge number of our existing financial transactions.

LCH SwapClear does not currently clear the interest rate swaps referencing JBA TIBOR. This proves that there are less appetites by clearing members of LCH SwapClear to use and clear JBA TIBOR derivatives. We also question the willingness of clearing members of LCH SwapClear to participate in the default auction process of interest rate swaps referencing JBA TIBOR.

(2) Japanese Yen TIBOR as Fallback for Euroyen TIBOR

On 2nd October 2018, JBATA opened a consultation on "Approach for Integrating Japanese Yen TIBOR and Euroyen TIBOR". JBATA decided to start discussing the issue of integrating Japanese Yen TIBOR and Euroyen TIBOR. JBATA is requesting comments on how to proceed with the initiative to integrate

Japanese Yen TIBOR and Euroyen TIBOR by retaining Japanese Yen TIBOR and discontinuing Euroyen TIBOR. JBATA will develop proposed reforms during 2019 H1 and conduct the second consultation, and then determine and publish the specifics and timing of further reforms by the end of 2019.

Let us review the similarities and differences of Japanese Yen TIBOR and Euroyen TIBOR briefly. The 1st Level Data for Japanese Yen TIBOR is the unsecured call market and the 2nd Level is the Japan offshore market and the interbank NCD market. The 1st Level Data for Euroyen TIBOR is the Japan offshore market and the 2nd Level is the unsecured call market and the interbank NCD market. Hence, for both Japanese Yen TIBOR and Euroyen TIBOR, the union of 1st and 2nd Level Data is the unsecured call market, the Japan offshore market and the interbank NCD market. Japanese Yen TIBOR and Euroyen TIBOR are similar benchmarks except for the priorities in the waterfall methodology and the constitution of panel banks.

According to the periodic review by JBATA on March 2018, 62.60% of input data for 6M Euroyen TIBOR is the 2nd Level. We can say that 6M Euroyen TIBOR dynamics are very close to 6M Japanese Yen TIBOR. In contrast, there are clearly non-negligible basis risks between TONA and Japanese Yen TIBOR. If Euroyen TIBOR used to hedge Japanese Yen TIBOR were replaced by TONA, there would suddenly emerge large basis risks between TONA and Japanese Yen TIBOR, which should be avoided.

Given the strong similarities in the calculation methodologies for Japanese Yen TIBOR and Euroyen TIBOR, we suggest considering Japanese Yen TIBOR as the fallback for Euroyen TIBOR; the fallback rate for a Euroyen TIBOR would be the Japanese Yen TIBOR with the relevant tenor times 360/365 plus Spread Adjustment.

In principle, we recommend adopting the Historical Median Approach for the Spread Adjustment as discussed before. However, after the TIBOR reform in July 2017, we observed that the spot basis between the Euroyen TIBOR and Japanese Yen TIBOR widened and has been volatile, or instable sometimes, which might be possibly attributed to the fact that the JBA TIBOR might not be fully anchored to actual transactions and might not be so credible. Therefore, the historical data of the Euroyen TIBOR and Japanese Yen TIBOR might not be so reliable for the purpose of calibrating Spread Adjustment. Given the strong similarities of the two TIBORs, we suggest considering the 4th Approach, the Zero Spread Approach, for calculating the Spread Adjustment, in which zero will be used as the Spread Adjustment. If the Zero Spread Approach is adopted for the fallback for Euroyen TIBOR, then the fallback will be the Japanese Yen TIBOR with the relevant tenor times 360/365 (without any spread adjustment).

(3) Fallback for Swap Rate Benchmarks

Some derivatives and non-derivatives refer interest rate benchmarks representing the IBOR swap rate such as ICE Swap Rate published by the ICE Benchmark Administration and Tokyo Swap Reference Rate published by Refinitiv (f.k.a. Thomson Reuters). Those benchmarks are based on the market of swaps exchanging IBORs vs. fixed rates. As the market transitions from IBOR to RFR, those swap rate benchmarks have to transition from IBOR swaps to RFR swaps (i.e., RFR OISs). Fallback arrangements for IBOR swap rates will be useful.

To facilitate the transition, we first need to establish benchmarks based on RFR OISs with tenor 1Y or longer. Once such benchmarks become available, the fallback rate for the IBOR swap rate for the same currency and the maturity will be the sum of the corresponding RFR OIS rate and the constant Spread Adjustment for the relevant IBOR, provided that either of the Historical Mean/Median Approach without transitional period or the Spot-spread Approach are adopted as the fallback rate for the IBOR.

If the Forward Approach is chosen as the fallback rate for an IBOR, the fallback rate for the IBOR swap rate taking into account of the term structure of the Spread Adjustment can be calculated by bootstrapping the discounting curve from all the OIS swap rates in the same currency as the IBOR. An administrator will have to publish the fallback rate for the IBOR swap rate from the discontinuation of IBORs till all the financial transactions referencing the IBOR swap rates terminate. This is another potential complexity caused by the term structure in the Spread Adjustment.

Note that in case Euroyen TIBOR discontinues and Japanese Yen TIBOR is adopted as the fallback rate for Euroyen TIBOR (with any Spread Adjustment applicable), it will be natural to adopt the Japanese Yen TIBOR swap rate as the fallback rate for Euroyen TIBOR swap rate. However, benchmarks representing Japanese Yen TIBOR swap rates are not currently available. The industry might want to establish such benchmarks.

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E. Appendix 1: Modified ARR Approach

(1) Introduction

The ARR Approach uses all the overnight RFRs in the relevant *term period* to reflect the actual risk-free rate realized in the market. Even for standard interest rate swaps referencing IBORs, however, payment amounts under the ARR Approach will be known only on or near - including both just before and just *after* - payment dates. This is the so-called fixed-in-arrears property of the ARR Approach, and coupon payments may not be operationally deliverable in many instances.

The Calculation Date is the earliest date on which it is practicable to provide the notice that the Calculation Agent is required to give. A Floating Rate Option cannot be adopted for a derivative transaction if, for a payment of the derivative, the Calculation Date is later than the Payment Date because the payment amount is not known on the Payment Date. A Floating Rate Option can hardly be adopted if the Calculation Date coincides with the Payment Date. We assume that the Calculation Date has to be at least 1 business day prior to the Payment Date.

The Calculation Date in the ARR Approach will be the publish date of the last overnight RFR used. The Consultation is too vague to see whether the Calculation Date is prior to the Payment Date in the ARR Approach. *“The fallback could be to the relevant RFR observed over the relevant IBOR tenor and compounded daily during that period. [...] Let us start by defining key moments for an IBOR on a timeline. The date T will denote the start date of the IBOR accrual period. The time interval f is the length of the IBOR term, which could be overnight, 1w, 1m, 2m, 3m, 6m or 12m. The accrual end date is T+f, which is also the date on which the IBOR is naturally paid. The setting date for this IBOR is denoted by t which we will assume is two business days before the start date, that is $t = T - \text{bd}$. Note that for some currencies, such as GBP and AUD, the setting delay is 0bd rather than 2bd.”* This does not tell us the exact definition of the accrual end date; it is not clear when *the date on which the IBOR is naturally paid* is. We will later *define* the natural IBOR End Date and IBOR Period for the purpose of discussion.

Term periods on which we calculate the ARR can be based on either the IBOR Period or the relevant Calculation Period in swap Confirmations. In either case, for any standard interest rate swap, the ARR Approach will become operationally feasible, i.e., the Calculation Date will be prior to the Payment Date, if we introduce either of *lock up*¹⁰ or *backward shift*¹¹. In the lock up, the overnight RFR published on a number *N* of business days before the end date of the term period will substitute overnight RFRs published after that date. That overnight RFR will be used for *N+1* times for SONIA, TONA, RBA cash rate, SOFR, and ESTER¹². In the backward shift, the term period will be shifted by *N* business days backward and overnight RFRs in the backward shifted term period will be used for calculation.

In combination, there are four options we can potentially consider:

- (a) IBOR Period with *N* business days of lock up
- (b) IBOR Period with *N* business days of backward shift
- (c) Calculation Period with *N* business days of lock up

¹⁰ Lock up is equivalent to (1) specifying all the business days in the Calculation Period as Reset Dates and (2) specifying the Rate Cut-off Date as the *N+1* business days prior to the end date of the term period. Rate cut-off is used in LIBOR EFR basis swaps.

¹¹ European Investment Bank issued a SONIA bond (issue number: 2353/0100) using a variant of backward shift.

¹² SARON is published on the start date of the overnight period while SONIA, TONA, RBA cash rate, SOFR, and ESTER are published on the end date of the overnight period. To avoid unnecessary complexities, we will focus on the latter case in this Section.

(d) Calculation Period with N business days of backward shift

The purpose of these modifications is to give more time – N business days - to market participants so that they can calculate, notify, prepare, and execute the floating rate payment in an orderly manner. The minimum number of N to make the Calculation Date prior to the Payment Date will be different for “(a) and (b)”, and “(c) and (d)” because the end date of IBOR Period and Calculation Period are not necessarily the same due to adjustments by Business Day Convention. See Figure 2 for a concrete example.

(2) Dependence on Swap Confirmations and Vendor Calculation

In order to calculate a Modified ARR in (a) or (b), the relevant overnight RFRs used in the calculation can be selected based only on the IBOR Start Date. Modified ARRs in (a) or (b) are independent of swap Confirmations such as Calculation Periods and Payment Dates. Hence it will be relatively simpler for a third-party vendor to run the calculations and publish the Modified ARR in (a) or (b) because the vendor only needs to publish such rates for each IBOR Start Date.

Modified ARRs in (c) and (d) depend on Calculation Periods and the information of individual swap Confirmations are required. As such, the vendor needs to publish Modified ARRs for each pair of Calculation Period Start Date (the first date in the Calculation Period) and Calculation Period End Date (the calendar date following the last date in the Calculation Period). (c) and (d) are consistent with OIS and are achievable but are slightly more complex than (a) and (b).

(3) Consistencies with Standard OIS Transactions

In a standard OIS transaction, for each of the overnight RFRs from, and including, the Effective Date to, but excluding, the Termination Date, there will be a unique Calculation Period for which the overnight RFR is used in the calculation of the relevant Floating Rate only once. Other overnight RFRs will not be used.

Option (d) has a similar property as standard OIS transactions. In (d), in a standard interest rate swap referencing an IBOR, for each of the overnight RFRs from, and including, “the date N business days prior to the Effective Date” to, but excluding, “the date N business days prior to the Termination Date”, there exists a unique Calculation Period for which the overnight RFR is used in the calculation of the Floating Rate only once. Let us call this term the “ N Business Days Backward Shifted Term”. Other overnight RFRs will not be used. Option (d) is consistent with OIS swaps to the greatest extent possible

In contrast, in Options (a), (b), and (c), an overnight RFR in the N Business Days Shifted Term will be used in a variety of numbers of times. Other overnight RFRs will also be used in (a) and (b) in some cases.

Option	Potential numbers that an overnight RFR in Backward Shifted Term will be used
(a) IBOR Period with N business days of lock up	0, 1, $N+1$
(b) IBOR Period with N business days of backward shift	0, 1, 2
(c) Calculation Period with N business days of lock up	0, 1, $N+1$
(d) Calculation Period with N business days of backward shift	1

Table 3: Potential Numbers That an Overnight RFR in Backward Shifted Term Will Be Used

This will produce non-negligible inconsistencies between OIS swaps and Options (a), (b), and (c). For interest rate swaps in which the roll date is near the end of quarter or the beginning of quarter, some spikes of overnight RFRs occurring in turn of quarter will be either neglected or amplified. If one hedges an

interest rate swap referencing an IBOR which is replaced by fallback rates in Option (a), (b), or (c) by an OIS swap, some fixing risks will remain. Option (a), (b), and (c) will increase fixing risks and should be avoided if possible. We strongly suggest using backward shift ((b) or (d)) rather than lock up ((a) or (c)).

(4) Technical Details of Dates

In this subsection we try to define the Modified ARR Approach with the greatest clarity as much as we can. If the ARR Approach is selected as the Adjusted RFR, we advise the ISDA to run a complete review with major CCPs to ensure that the Modified ARR Approach is compatible with 100% of existing cleared interest rate swaps for both CCPs and clearing service users.

Please first refresh your memory of the following definitions by re-reading the 2006 ISDA Definitions: Business Day, Financial Centers, Certain Business Days, Effective Date, Termination Date, Payment Date, Period End Date, Business Day Convention, Calculation Period, Calculation Date, Reset Date, Arrears Setting, Delayed Payment, Early Payment, and Rate Cut-off.

An IBOR rate can be characterized by three dates, i.e., the fixing date on which the IBOR is published, the start date of the underlying deposit, and the end date of the same deposit. Let us call these by IBOR Fixing Date, IBOR Start Date¹³, and IBOR End Date, respectively. For JPY LIBOR 3M, the IBOR Start Date is two London business days after the IBOR Fixing Date, except if that date is not a Tokyo business date in which case it roll onto the next date which is a normal business day both in London and the principal financial center of the relevant currency, i.e., Tokyo.

There is no definitive definition of the IBOR End Date. In fact, according to the ICE Benchmark Administration, in the waterfall methodology expected to be implemented by 2019 Q1 by panel banks, eligible transactions for the Level 1 include those transactions starting from the IBOR Start Date and having durations in the respective ranges listed in the following table. Here, cd stands for calendar day(s) and bd, business day(s).

Tenor	From	To
1W	5bd	5bd
1M	25cd	35cd
2M	50cd	70cd
3M	80cd	100cd
6M	150cd	210cd
12M	330cd	390cd

Table 4: Duration of LIBOR Level 1 Eligible Trades

But for valuation purposes, it might be common in the quant community to assume that the IBOE End Date is the relevant tenor after the IBOR Start Date using the Modified Following¹⁴ rule with the calendar of the principal financial center of the relevant currency (and London for LIBOR). We assume this convention, and define IBOR Period to an IBOR by the period from, and including, the IBOR Start Date to, and excluding the IBOR End Date.

¹³ IBOR Start Date is called as the Value Date in the ICE LIBOR.

¹⁴ Following rule is used for 1W tenor.

For an overnight RFR, let us call the start date of the underlying funding the Start Date of the overnight RFR, and the end date of the underlying funding, the End Date of the overnight RFR. An overnight RFR on a date means that the overnight RFR whose Start Date is that particular date. SARON is published on the Start Date while SONIA, TONA, RBA cash rate, SOFR, and ESTER are published on the End Date.

Box 4: Definition of Modified ARR on Backward Shifted Calculation Periods (Option (d))

“Universal Business Day” means a TARGET Settlement Day, a New York Fed Business Day, a NYSE Business Day, and a day on which commercial banks and foreign exchange markets settle payments and are open for general business in the places listed below: {LIST OF MAJOR FINANCIAL CENTERS}.

“N Universal Business Days Backward Shifted Calculation Period” means, in respect of a Calculation Period for a Swap Transaction and a Party, the period from, and including, the date N Universal Business Days preceding the first date in the Calculation Period to, and excluding, the date N Universal Business Days preceding the calendar date following the last date in the Calculation Period.

{CCY}-{RFRNAME}-OIS-COMPOUND-BACKWARD-SHIFTED means that the rate for the Reset Date, calculated in accordance with the formula set forth below, will be the rate of return of a daily compounded interest investment.

“{CCY}-{RFRNAME}-OIS-COMPOUND-BACKWARD-SHIFTED” will be calculated as follows, and the resulting percentage will be rounded, if necessary:

$$\left[\prod_{i=1}^{d_0} \left(1 + \frac{\{RFRNAME\}_i \times n_i}{\{36X\}} \right) - 1 \right] \times \frac{\{36X\}}{d}$$

where:

“ d_0 ” is the number of {CCY-CITY} Banking Days in the relevant N Universal Business Days Backward Shifted Calculation Period;

“ i ” is a series of whole number from one to d_0 , each representing the relevant {CCY-CITY} Banking Days in chronological order from, and including the first {CCY-CITY} Banking Day in the relevant N Universal Business Days Backward Shifted Calculation Period;

$\{RFRNAME\}_i$, for any “ i ” in the relevant N Business Days Backward Shifted Calculation Period, is a reference data equal to the {RFRNAME} as published by {RFRNAME ADMINISTRATOR} on the {RFRNAME SCREEN} Page;

n_i is the number of calendar days in the relevant N Universal Business Days Backward Shifted Calculation Period on which the rate is $\{RFRNAME\}_i$, and

d is the number of calendar days in the relevant N Universal Business Days Backward Shifted Calculation Period.

Replace {CCY}, {RFRNAME}, {CCY-CITY}, {RFRNAME ADMINISTRATOR}, {RFRNAME SCREEN} and {36X} by relevant texts such as JPY, TONA, Tokyo, Bank of Japan, Reuters Screen TONAT, and 365.

We recommend adopting Option (d) so that the Modified ARR will be consistent with OIS transactions as much as possible. Other Options ((a), (b), and (c)) can be defined similarly if desired.

For Options (c) and (d), to make payment operations achievable, N have to be at least 2 taking into consideration of operational difficulties resulting from time-zone differences.

For Options (a) and (b), N should be chosen so that payment operations can be achievable for any standard interest rate swaps in which Arrears Setting, Delayed Payment, and Early Payment are not specified. As far as we know, N has to be at least 6. Please see the example below:

JPY Libor Fixing Date	Calculation Period Start Date	Calculation Period End Date = Payment Date	JPY Libor End Date
2027-05-04	2027-05-06	2027-11-01	2027-11-08

Table5: JPY LIBOR 6M IRS with May/Nov 1st Roll in 2027

For all the Options (a), (b), (c), and (d), we prefer that N is at most 10 so that the convexity effect can be minimized.

{LIST OF MAJOR FINANCIAL CENTERS} has to be chosen universally independent of Confirmations or Parties so that the same definition is adopted for all the interest rate swaps cleared by CCPs. It will be convenient if an administrator can publish an official list of Universal Business Days for IBOR fallbacks.

European Investment Bank issued a SONIA bond (issue number: 2353/0100) using a slightly different definition. Based on the normal definition of OIS-Compound, they backward-shifted SONIA by 5 London Banking Days but keep n_i . Hence some SONIA will be given wrong weights in the rate calculation, leading to inconsistencies with normal OIS-Compound. For example, n_i for a SONIA from a Monday to Tuesday could become 3 or more. Our definition is better aligned with OIS transactions.

Let us consider an interest rate swap with a stub period (e.g., 120 calendar days) at the end and the floating rate amount for the stub period is defined by the interpolation of IBORs (e.g., 3 months and 6 months). The Modified ARR with Backward Shifted Calculation Periods will be based on the 120 calendar days of the relevant Calculation Period, while the Spread Adjustment can be calculated by the interpolation of 3 months Spread Adjustment and 6 months Spread Adjustment, in which the interpolation methodology defined in the original Confirmation can be used.

Lastly, we would like to note that the Modified ARR on Backward Shifted Calculation Periods can be also used for new derivatives transactions including, but not limited to, overnight indexed swaps, basis swaps, and cross currency swaps. The obvious benefit is that there will be no need of the payment lags; each Payment Date will coincide with its corresponding Period End Date (or the Termination Date in the case of the last payment). This will make it possible to exactly match cash flow dates of interest rate swaps based on compounded O/N RFR with bonds, potentially increasing the demand for asset swaps based on O/N RFR. For cross currency swaps, the alignment of payment dates of both legs (different currencies) is essential to reduce the settlement risks of principals (i.e., the Herstatt risk). If the Modified ARR on Backward Shifted Calculation Periods is used for cross currency swaps in one or both legs, Payment Dates of both legs will naturally coincide with the Period End Dates (or the Termination Date in the case of the last payment) and such settlement risks will be minimized. In addition, since the Universal Business Day is independent of Swap Transactions and interest rate benchmarks, an OIS and a cross currency swap with the same Calculation Periods will have the same Floating Rate Amounts of O/N RFR, which is convenient.

