

Report on Bloomberg/ISDA IBOR Fallback Rate Adjustments Rule Book

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PREPARED BY

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I. Executive Summary

1. The IBOR Fallback Rate Adjustments Rule Book (“Rule Book”) discusses the implementation of the calculation of Rate Adjustments and resulting Fallback Rates across various IBORs. The primary objective of this report is to assess whether the implementation of the calculations and the definitions of the different terms and concepts discussed in the Rule Book are consistent with the information provided by ISDA to market participants in a series of consultations (“ISDA Consultations”), and the majority preferences of market participants in a series of reports prepared for and published by ISDA (“Brattle Reports”).
2. The Fallback Rate in the Rule Book is defined with respect to an IBOR and a tenor. For each Rate Record Day t , the Fallback Rate is the sum of the “Adjusted Reference Rate” and the “Spread Adjustment” as defined in the Rule Book. The Adjusted Reference Rate calculation presented in the Rule Book is based on a compounded setting in arrears rate. The Spread Adjustment presented in the Rule Book is calculated for each relevant IBOR-tenor based on the median of a set of historical differences between the IBOR for that tenor and the Adjusted Reference Rate that corresponds to that tenor over a five year period.
3. Overall, Brattle’s review of the Rule Book finds that the implementation of the calculations of the Fallback Rates presented in the Rulebook is consistent with the information provided to market participants and the results of the ISDA Consultations.¹ The implementation of the calculations of the Fallback Rates is also consistent with the calculations in an Excel model prepared by Brattle and published by ISDA, as part of its consultation process to help market participants understand the implications of the different parameter options and to illustrate the calculations of fallback rates.

¹ Based on recent communication with Bloomberg and ISDA, Bloomberg will be making small corrections to the Spread Adjustment section (and corresponding definition updates) in a forthcoming update of the Rule Book. Although this report addresses the Rule Book version as published on April 22, 2020, a review of the forthcoming corrections does not change the overall findings that the Rule Book is consistent with information provided to market participants and the results of the ISDA Consultations. See footnote 27 in Section III.C.

II. Introduction

4. The publication of the Rule Book by ISDA and Bloomberg (dated April 22, 2020) follows a series of public consultations conducted by ISDA over the last two years:

- i. an initial market-wide consultation published on July 12, 2018 (“2018 Consultation”), which focused on technical issues related to fallbacks for derivative contracts that reference GBP LIBOR, CHF LIBOR, JPY LIBOR, TIBOR, Euroyen TIBOR, and BBSW;
- ii. a supplemental market-wide consultation published on May 16, 2019 (“Supplemental Consultation”), which focused on these same issues related to fallbacks for derivative contracts that reference USD LIBOR, CDOR, HIBOR, and certain aspects of fallbacks for derivatives that reference SOR;
- iii. a market-wide consultation published on September 18, 2019 (“Final Parameters Consultation”) which focused on final parameters of spread and term adjustments for fallbacks in derivatives contracts referencing the IBORs covered by the first two consultations; and
- iv. a supplemental market-wide consultation, published on December 18, 2019, on spread and term adjustments, including final parameters for those adjustments, for fallbacks in derivatives referencing EUR LIBOR and EURIBOR, as well as other less widely used interbank offered rates (“Euro Consultation”).²

5. The results of the 2018 Consultation, the Supplemental Consultation, the Final Parameters Consultation, and the Euro Consultation were presented by The Brattle Group (“Brattle”) in separate reports (“Brattle Reports”) prepared for and published by ISDA (2018

² In addition, ISDA published two consultations on pre-cessation issues for LIBOR and certain IBORs. One was published on May 16, 2019 (“2019 Pre-Cessation Consultation”) and the other was published on February 24, 2020 (“2020 Pre-Cessation Consultation”).

Consultation Report, Supplemental Consultation Report, Final Parameters Consultation Report, and Euro Consultation Report).^{3, 4}

6. The primary objective of this report is to assess whether the implementation of the calculations and the definitions of the different terms and concepts discussed in the Rule Book are consistent with the information provided by ISDA to market participants in the series of consultations and the majority preferences of market participants, as summarized in the Brattle Reports. The Rule Book discusses the implementation of the calculation of Rate Adjustments which includes fallback rates across various IBORs.

7. The Rule Book is comprised of seven sections.⁵ The first section is an introduction, the second section provides an overview of the “Rate Adjustments”, the third section contains the definitions for terms and concepts used in the Rule Book (i.e., the glossary of the Rule Book), the fourth section sets out the calculations of the Rate Adjustments, the fifth section sets out general rules, the sixth section details the backtest assumptions, and the last section contains a disclaimer by Bloomberg. This report focuses on section 4 of the Rule Book, and includes a review of the related terms and definitions included in the Rule Book for the purpose of explaining the calculations of the Rate Adjustments.

³ 2018 Consultation Report, December 20, 2018, <http://assets.isda.org/media/04d213b6/db0b0fd7-pdf/>.

Supplemental Consultation Report, September 18, 2019, <https://www.isda.org/a/0LPTE/2019.09.18-Anonymized-ISDA-Supplemental-Consultation-Report.pdf>.

Final Parameters Consultation Report, November 15, 2019, <https://www.isda.org/a/935TE/2019.11.15-ISDA-Final-Parameters-Consultation-Report.pdf>.

Euro Consultation Report, March 5, 2020, <http://assets.isda.org/media/96f5c002/c9c0e040-pdf/>.

⁴ In addition, Brattle prepared two reports on pre-cessation issues for LIBOR and certain IBORs. The first report was published on October 21, 2019 (“2019 Pre-Cessation Report”) and the second report was published on May 14, 2020 (“2020 Pre-Cessation Report”).

<http://assets.isda.org/media/e0b1bac2/04397355-pdf/>

<https://www.isda.org/a/cuQTE/2020.05.14-Pre-cessation-Re-Consultation-Report-FINAL.pdf>

⁵ The Rule Book includes an Appendix with several tables providing information on fallback rates, IBORs, IBOR tenors and reference rates.

8. Further, as part of the publication of the Final Parameters Consultation, ISDA published an Excel model prepared by Brattle to help market participants understand the implications of the different parameter options and to illustrate the calculations of the fallback rates for the benefit of market participants.⁶ This report also draws on Brattle’s experience developing the Excel model and addresses general consistency between the calculations in the Excel model and those in the Rule Book.

III. Review of the Rate Adjustment Calculations and Discussion of the Rule Book Implementation

9. In the 2018 Consultation, ISDA explained that, after consultation with industry participants, regulators and the Financial Stability Board (FSB) Official Sector Steering Group (OSSG), the fallback rate for a given IBOR will be based on a specified overnight risk-free rate (RFR). However, the RFRs are overnight rates while the relevant IBORs are for various tenors. To move from a tenor IBOR to an overnight RFR, certain adjustments need to be applied to the RFRs to be compatible to the corresponding relevant IBORs.⁷ In addition, the RFRs are risk-free or nearly risk-free rates, whereas the relevant IBORs incorporate a bank credit risk premium, a liquidity premium and other factors. As a result, a spread adjustment that serves as a proxy for these factors needs to be applied to the adjusted RFRs.⁸

10. The 2018 Consultation proposed a number of alternatives for the adjusted RFRs and spread adjustments to the adjusted RFRs. ISDA emphasized that the proposed approaches for the adjusted RFRs were identified based on a number of criteria, including “(1) simplicity and ease of calculating; (2) data requirements; and (3) similarity with the structure of overnight

⁶ Final Parameters Consultation, September 18, 2019, p. 10. As part of the Euro Consultation, Brattle published an updated excel model with functionality for EUR LIBOR and EURIBOR, <https://www.isda.org/a/cayTE/Excel-Model-Instructions.pdf>.

⁷ 2018 Consultation, July 12, 2018, p. 8.

⁸ 2018 Consultation, July 12, 2018, p. 11.

index swaps that reference the RFRs.”⁹ The proposed approaches for the spread adjustment to the RFRs were also based on a number of criteria, including “(1) eliminating or minimizing value transfer at the time the fallback is applied; (2) eliminating or minimizing any potential for manipulation; and (3) eliminating or mitigating against the impact of market disruption at the time the fallback is applied.”¹⁰

11. Following the series of ISDA Consultations with market participants, ISDA is developing fallbacks for inclusion in its standard definitions based on the “compounded setting in arrears rate” and the “historical median approach” to the spread adjustment.¹¹ The calculations of the compounded setting in arrears rate and the historical median spread were initially outlined in Annex A of the 2018 Consultation. Market participants voted for the implementation of the compounded setting in arrears rate primarily for its compatibility with the OIS swap market and its ability to reflect the daily interest rate movements during the relevant period (i.e., the relevant IBOR tenor).¹² In response to the 2018 Consultation, the majority of respondents chose the historical mean/median approach citing that this approach is robust and simple, resistant to market distortions, and would reduce the potential for market manipulation.¹³ In the Final Parameters Consultation, when asked to choose between the median approach over a five-year lookback period and the trimmed mean approach over a ten-

⁹ 2018 Consultation, July 12, 2018, p. 8.

¹⁰ 2018 Consultation, July 12, 2018, p. 12.

¹¹ ISDA Statement Regarding Results of December 2019 Supplemental Consultation, February 24, 2020, <https://www.isda.org/a/MioTE/Statement-Regarding-Results-of-December-2019-Supplemental-Consultation.pdf>.

¹² 2018 Consultation Report, December 20, 2018, ¶8 (“[I]n almost 90 percent of respondent rankings, the compounded setting in arrears rate was selected as the top preference for the adjusted RFR. Proponents of this approach highlighted as advantages its compatibility with the OIS swap market and its ability to reflect the daily interest rate movements during the relevant period.”).

¹³ 2018 Consultation Report, December 20, 2018, ¶9 (“In almost 70 percent of respondent rankings, the historical mean/median approach to the spread adjustment was selected as the top preference. Proponents of this approach highlighted several advantages, including that: (i) it is robust and simple; (ii) it would reduce the potential for manipulation; and (iii) it is resistant to market distortions.”).

year lookback period, the majority of respondents preferred a calculation of a spread adjustment based on a historical median over a five-year lookback period.¹⁴

12. This section discusses the review of the calculations of the “Fallback Rate” as specified in section 4 of the Rule Book. As mentioned above, the purpose of this report is to assess whether the calculations outlined in the Rule Book are consistent with the results of the ISDA Consultations and with the illustrative implementation of the calculations prepared by Brattle in the Excel model that was published by ISDA for the benefit of market participants.

A. Calculation of the Fallback Rate as Presented in the Rule Book

13. The calculation of the fallback rate is presented in section 4.1 of the Rule Book and is shown in Figure 1.

Figure 1: Calculation of Fallback Rate

The Fallback Rate, FR , with respect to an IBOR, each Tenor f and each Rate Record Day t on and following the Fallback Rate Base Date, shall be calculated by the Adjustment Services Vendor in accordance with the following formula, and rounded to the nearest Rounding Precision (breaking ties by rounding half away from zero):

$$FR_{f,t} = ARR_{f,t} + SA_{f,t}$$

Where:

$FR_{f,t}$ means the Fallback Rate for Tenor f on Rate Record Day t ;

$ARR_{f,t}$ means the Adjusted Reference Rate for Tenor f on Rate Record Day t ; and

$SA_{f,t}$ means the Spread Adjustment for Tenor f on Rate Record Day t .

14. The Fallback Rate is defined with respect to an IBOR and a tenor (“IBOR-tenor”). The Fallback Rate for an IBOR-tenor is estimated for each “Rate Record Day” t , which is defined as “day of the week other than Saturday or Sunday”. For each Rate Record Day t , the Fallback Rate is the sum of the “Adjusted Reference Rate” and the Spread Adjustment for Tenor f . For example, the Fallback Rate for the 3-month USD LIBOR on June 5, 2020, would be the sum of the Adjusted Reference Rate based on SOFR for 3-months on June 5, 2020, plus the

¹⁴ Final Parameters Consultation Report, November 15, 2019, ¶3 (“A majority, consisting of approximately 61% of all respondents, preferred a calculation of a spread adjustment based on a historical median over a five-year lookback period (Option I).”).

contemporaneous Spread Adjustment based on the median difference between the 3-month USD LIBOR and the Adjusted Reference Rate based on SOFR for corresponding 3-month periods. The median is estimated using data over a five-year period ending approximately three months (i.e., the IBOR tenor) and two days prior to June 5, 2020, or March 3, 2020 in this example (the Median Period as defined in the Rule Book is discussed in Section III.C below). The Spread Adjustment will continue to change until the Spread Adjustment Fixing Date and becomes fixed from that day onward (it is not expected that the Fallback Rates will be used in contracts until on or after the Spread Adjustment Fixing Date).¹⁵ The next two subsections discuss the calculations of the Adjusted Reference Rate and the Spread Adjustment.

B. Calculation of the Adjusted Reference Rate as Presented in the Rule Book

15. The calculation of the Adjusted Reference Rate is presented in section 4.2 of the Rule Book and is shown below in Figure 2. This subsection discusses the calculations in Figure 2 in the context of the results to the ISDA Consultations, followed by a discussion on whether the calculations in Figure 2 are consistent with the implementation of the Excel model prepared by Brattle and published on ISDA’s website during the ISDA Consultations as an illustration of calculations for the adjusted RFRs.

¹⁵ “Fact Sheet, IBOR Fallbacks”, p.11, ISDA, Bloomberg, Linklaters, Version 1.0, June 29, 2020 (“Users should be aware that prior to the Spread Adjustment becoming fixed upon the Spread Adjustment Fixing Date, neither the Spread Adjustment nor IBOR Fallback should be used as a primary reference rate within a financial instrument or financial contract (or other ‘use’ as defined in the BMR) other than as a contractual fallback. Use of Bloomberg’s calculations to the contrary is expressly prohibited”).

Figure 2: Calculation of Adjusted Reference Rate

The Adjusted Reference Rate, *ARR*, with respect to an IBOR, each Tenor *f* and each Rate Record Day *t* on and following the Adjusted Reference Rate Base Date, shall be calculated by the Adjustment Services Vendor in accordance with the following formula, and rounded to the nearest Rounding Precision (breaking ties by rounding half away from zero):

$$ARR_{f,t} = \frac{DayCount_t}{DayCount_{RR}} \times \frac{1}{\delta_{S_{f,t},E_{f,t}}} \times \left[\prod_{u \in AP_{f,t}} (1 + \delta_{u,u+1} \times RFR_u) - 1 \right]$$

Where:

ARR_{f,t} means the Adjusted Reference Rate for Tenor *f* on Rate Record Day *t*;

DayCount_t means, with respect to the IBOR, the Day Count;

DayCount_{RR} means, with respect to the Reference Rate, the Day Count;

S_{f,t} means, with respect to Tenor *f* and Rate Record Day *t*, the Accrual Start Date;

E_{f,t} means, with respect to Tenor *f* and Rate Record Day *t*, the Accrual End Date;

δ_{S_{f,t},E_{f,t}} means, with respect to Accrual Start Date *S_{f,t}* and Accrual End Date *E_{f,t}*, the day count fraction calculated in accordance with the following formula:

$$\delta_{S_{f,t},E_{f,t}} = \frac{Days(S_{f,t}, E_{f,t})}{DayCount_{RR}}$$

Where:

Days(S_{f,t}, E_{f,t}) means the number of calendar days from and including Accrual Start Date *S_{f,t}* to and excluding Accrual End Date *E_{f,t}*;

AP_{f,t} means the set of Reference Rate Business Days occurring in the period from and including the Accrual Start Date *S_{f,t}*, to and excluding the Accrual End Date *E_{f,t}*;

u means a Reference Rate Business Day;

u + 1 means the Reference Rate Business Day immediately succeeding Reference Rate Business Day *u*;

δ_{u,u+1} means, with respect to Reference Rate Business Days *u* and *u + 1*, the day count fraction calculated in accordance with the following formula:

$$\delta_{u,u+1} = \frac{Days(u, u + 1)}{DayCount_{RR}}$$

Where:

Days(u, u + 1) means the number of calendar days from and including Reference Rate Business Day *u* to and excluding Reference Rate Business Day *u + 1*; and

RFR_u means the Value of the Reference Rate on Reference Rate Business Day *u*.

1. Comparison of the Rule Book Implementation against the Results to the ISDA Consultations

16. The Adjusted Reference Rate calculation presented in the Rule Book is based on a compounded setting in arrears rate and is consistent with the general formulas, the description of methodology, and the results of the ISDA Consultations. Specifically, the result of the two

initial ISDA consultations (the 2018 Consultation and the Supplemental Consultation) was that a majority of respondents (86 out of 142 respondents to the 2018 Consultation and 78 out of 85 respondents to the Supplemental Consultation) agreed with the implementation of the “compounded setting in arrears rate with the historical mean/median approach”.¹⁶

17. The Adjusted Reference Rate is calculated with respect to an IBOR, for each tenor f and each Rate Record Day t . The Adjusted Reference Rate is a function of the relevant risk-free rate RFR_u . The notion u refers to a Reference Rate Business Day, i.e., a day when the reference rate is published. RFR_u is thus the reference rate published on Reference Rate Business Day u . Since RFR_u is typically published as an annualized rate, the calculation first converts this annualized rate into a daily rate, as expressed in the term $\delta_{u,u+1} \times RFR_u$. $\delta_{u,u+1}$ represents the “day count fraction” and is calculated as the number of calendar days from Reference Rate Business Day u (inclusive) to the next business day (exclusive), divided by the reference rate “Day Count” (defined as either 360 or 365 days for the relevant reference rate, see below). This term is included to convert annual rates to daily while at the same time adjusting for reference rate non-business days. The daily rate $\delta_{u,u+1} \times RFR_u$ is then compounded over the set of Reference Rate Business Days in the accrual period.

18. The compounded rate is multiplied by the ratio of the IBOR Day Count ($DayCount_i$) over the Reference Rate Day Count ($DayCount_{RR}$), and then divided by the day count fraction for the relevant accrual period. This step in the calculation effectively converts the compounded rate into an annualized rate. The division by the day count fraction for the relevant accrual period re-annualizes the compounded rate and is calculated as the number of calendar days from the Accrual Start Date (inclusive) to the Accrual End Date (exclusive) divided by the Reference Rate Day Count. Day Count represents the number of days in a calendar year, which generally may differ for some IBORs and reference rates. For example, BBSW, CDOR, Sterling LIBOR, HIBOR, and Yen TIBOR follow a 365 day count convention,

¹⁶ 2018 Consultation Report, December 20, 2018, ¶7 (“A majority (86 of the 142) of respondent ranking preferences were in favor of the **compounded setting in arrears rate with the historical mean/median approach to the spread adjustment...**”). Supplemental Consultation Report, September 18, 2019, Table 1.

while the other IBORs follow a 360 day count convention. The IBORs and Reference Rates listed in Tables 2 and 4 of the Rule Book Appendix all follow either a 360 or a 365 day count convention, therefore the ratio of IBOR Day Count over the Reference Rate Day Count will either be one, or very close to one.¹⁷ For example, Euroyen TIBOR follows a 360 day count convention, while the TONA Reference Rate follows a 365 day count convention. So when calculating the adjusted reference rate for Euroyen TIBOR, the ratio of the IBOR Day Count over the Reference Rate Day Count would be 360/365, or 0.99. Yen TIBOR follows a 365 day count convention and also uses TONA as the Reference Rate, therefore the ratio of the IBOR Day Count over the Reference Rate Day Count would be 365/365, or 1, when calculating the Adjusted Reference Rate for Yen TIBOR.

19. The calculations of the Adjusted Reference Rate presented in the Rule Book and explained above are consistent with the specification of the compounded setting in arrears rate in the 2018 Consultation. The only difference is the inclusion of the term $(\text{DayCount}_I/\text{DayCount}_{RR})$, which was not explicitly included in the formula in the 2018 Consultation. To annualize the compounded risk-free rate, the 2018 Consultation specified that the compounded rate is divided by the day count fraction for the relevant accrual period. However, the 2018 Consultation did not explicitly state which day count convention should be used (IBOR or Reference Rate) in calculating the day count fraction (i.e., what should be the denominator of the fraction). The inclusion of the term $(\text{DayCount}_I/\text{DayCount}_{RR})$ in the Rule Book is such that the Adjusted Reference Rate is annualized on the basis of the IBOR Day Count, as opposed to on the basis of the Reference Rate Day Count. The inclusion of the $(\text{DayCount}_I/\text{DayCount}_{RR})$ term is consistent with the formula for the compound setting in arrears rate in the 2018 Consultation, as it is reasonable that the day count of the Reference Rate used in the calculation of the Fallback Rate would be based on the same day count convention as the corresponding IBOR.

¹⁷ Based on the day counts presented in Tables 2 and 4 of the Rule Book Appendix, and the fallback rates presented in Table 1 of the appendix, the minimum ratio would be 360/365, or .99, and the maximum ratio would be 365/365 (and 360/360), or 1. The ratio will only take a value other than 1 when calculating the Fallback Rate for Euroyen TIBOR.

20. Table 1 of the Rulebook presents a mapping of IBORs to the corresponding Reference Rates that would be used as inputs for the Adjusted Reference Rate calculation. The mapping in Table 1 is consistent with the tables presented by ISDA in the 2018 Consultation, the Supplemental Consultation, the Final Parameters Consultation and the Euro Consultation.

21. Section 6 of the Rule Book sets out the historical values for SOFR as a fallback for USD LIBOR and the historical values for €STR as a fallback for EUR LIBOR and EURIBOR. In particular, this section explains that SOFR was first published on April 2, 2018, and €STR was first published on October 2, 2019. Where SOFR or €STR is required for the calculations of the Adjusted Reference Rate prior to these dates, a proxy for historical values is needed. The Rule Book uses indicative SOFR as a fallback for USD LIBOR.¹⁸ This is consistent with the results published in the Supplemental Consultation Report, which indicated that 60% of respondents agreed with the use of the indicative/proxy data, an additional 20% expressed “a preference for potentially relying on indicative data but not on proxy data,” and only three respondents did not agree with the use of the indicative (and proxy) data.¹⁹ The Rule Book uses pre-€STR for the period prior to September 30, 2019 (inclusive), and the value of EONIA minus 8.5 basis points for the period from January 4, 1999 to March 14, 2017 (inclusive), as a fallback for EUR LIBOR, which is consistent with the results of the Euro Consultation. In response to the Euro Consultation, 74% of respondents agreed that preliminary (pre-€STR) data would be appropriate for the spread adjustment calculations,²⁰ and almost 80% of respondents agreed

¹⁸ The Federal Reserve Bank of New York began publishing indicative SOFR on or around August 22, 2014. If earlier data are required for calculations, the Rule Book specifies that the Historical Overnight Treasury GC Repo Primary Dealer Survey Rate be used. This is consistent with the results of the Supplemental Consultation.

¹⁹ Supplemental Consultation Report, September 18, 2019, ¶¶42, 53, 58 (“The majority (approximately 60% or 50 out of 85) of respondents agreed with the use of the indicative and/or proxy data for several reasons.” “A number of respondents (approximately 20%) expressed a preference for potentially relying on indicative data but not on proxy data.” “Only three respondents did not agree with the use of the indicative or proxy data”).

²⁰ Euro Consultation Report, March 5, 2020, ¶6 (“74% of respondents stated that if €STR data for periods prior to October 2, 2019 were to be required for the calculation of fallback rates, it would be acceptable to use pre-€STR data”).

with using daily values of EONIA minus a fixed spread of 8.5 basis points for the dates prior to when pre-€STR became available.²¹

22. According to the Final Parameters Consultation Report, “[a] large majority (approximately 70%) of respondents supported an adjustment to the interest accrual period for the RFR to avoid making payments on the same date that a rate becomes known.”²² The Rule Book uses an “Offset Lag” of two (Reference Rate Business Days) to define the accrual period for a given Rate Record Date (which the Rule Book defines as each day of the week other than Saturday or Sunday). The use of the Offset Lag is consistent with a two-day backward-shift adjustment to the calculation of the Adjusted Reference Rate, which a majority of respondents to the Final Parameters Consultation selected.²³ However, the use of an Offset Lag does not guarantee that the Adjusted Reference Rate will be available in time (i.e., two days prior to the IBOR payment date). In this case, ISDA’s planned updates of its 2006 ISDA Definitions to implement the new Fallback Rates will allow for using the most recent available “Original IBOR Rate Record Day”.^{24, 25}

²¹ Euro Consultation Report, March 5, 2020, ¶6 (“79% of respondents stated that daily values of EONIA minus a fixed spread of 8.5 basis points would be an appropriate proxy for €STR for periods prior to March 15, 2017. In each case, only seven out of the 57 respondents were opposed to using one of the alternative (earlier) data and only one respondent opposed using both pre-€STR and EONIA.”).

²² Final Parameters Consultation Report, November 15, 2019, ¶13 (“A large majority (approximately 70%) of respondents supported an adjustment to the interest accrual period for the RFR to avoid making payments on the same date that a rate becomes known. Respondents cited that an adjustment was required for operational issues to help avoid payment and settlement disruptions, and to allow sufficient settlement time for transactions between counterparties located in different geographic zones.”).

²³ Final Parameters Consultation Report, November 15, 2019, ¶59 (“[a] clear majority of respondents (56%), supported a two-Banking Day backward-shift adjustment, as opposed to a two-day Banking Day lockout (approximately 1%) or some other adjustment (approximately 21%).”).

²⁴ See “Fact Sheet, IBOR Fallbacks”, p. 4, ISDA, Bloomberg, Linklaters, Version 1.0, June 29, 2020.

²⁵ Based on the Rule Book definition, an Adjusted Reference Rate is calculated for every Rate Record Day (each day of the week other than Saturday or Sunday). A Rate Record Day could be a day on which the original IBOR was not published. When this happens, the rate published for the most recent Rate Record Day would be used, i.e., Original IBOR Rate Record Day would become equivalent to Rate Record Day.

23. The use of the most recent available Original IBOR Rate Reference Day may result in a longer backward shift (than two days) if required (potentially due to holiday calendars), and is consistent with the preferences of the market participants for a backward shift and would operationally allow the calculation of the Adjusted Reference Rate under such circumstances.

24. According to the Final Parameters Consultation Report, “[t]here was no majority in respondents’ preferences as to whether it would be problematic to use the calculation period instead of the IBOR period.”²⁶ The formula in the Rule Book relies on Reference Rate Business Days for the calculation of the Adjusted Reference Rate.

2. Comparison of the Rulebook Implementation against Brattle’s Excel Model

25. The calculation methodology as described in the Rule Book is also consistent with the methodology implemented by Brattle in the Excel model and published by ISDA on its website. Even though Brattle’s Excel model did not explicitly have the term $(\text{DayCount}_I/\text{DayCount}_{RR})$, the model used the IBOR Day Count to calculate the day count fraction of the relevant accrual period (as opposed to the Reference Rate Day Count). As a result, the formula in the Rule Book should effectively yield the same results as the illustrative implementation in the Excel model.

C. Calculation of Spread Adjustment

26. The calculation of the Spread Adjustment to the Adjusted Reference Rate in the Rule Book is shown below in Figure 3.²⁷ This section first addresses the calculations in Figure 3 in the context of the results to the ISDA Consultations, and then discusses whether the calculations in Figure 3 are consistent with the Excel model.

²⁶ Final Parameters Consultation Report, November 15, 2019, ¶16 (“There was no majority in respondents’ preferences as to whether it would be problematic to use the calculation period instead of the IBOR period.”).

²⁷ Based on recent communication with Bloomberg and ISDA, Bloomberg will be making small corrections to the Spread Adjustment section (and corresponding definition updates) in a forthcoming update of the Rule Book. The updates will make it explicit that the Spread Adjustment Fixing date is the date on which the corresponding Spread Adjustment for an IBOR tenor is last calculated. Another correction will reflect a change in notation in the interpolation formula to correct a typo where t was used instead of u as the subscript of IBOR Maturity Dates. These small corrections do not change the overall comments in this report.

Figure 3: Calculation of Spread Adjustment

The Spread Adjustment, SA , with respect to an IBOR, each Tenor f and each Rate Record Day t on and following the Spread Adjustment Base Date, shall be calculated by the Adjustment Services Vendor in accordance with the following formula, and rounded to the nearest Rounding Precision (breaking ties by rounding half away from zero):

If Rate Record Day t is prior to the Spread Adjustment Fixing Date:

$$SA_{f,t} = \text{Median}(\{u \in MP_{f,t} \mid L_{f,u} - ARR_{f,u}\})$$

Otherwise:

$$SA_{f,t} = SA_{f,t-1}$$

Where:

$SA_{f,t}$ means the Spread Adjustment for Tenor f on Rate Record Day t ;

$SA_{f,t-1}$ means the Spread Adjustment for Tenor f on the Rate Record Day immediately preceding Rate Record Day t ;

$MP_{f,t}$ means, with respect to Tenor f and Rate Record Day t , the Median Period;

u means a Median Period Day in the median period $MP_{f,t}$;

$L_{f,u}$ means, with respect to Tenor f , the Value of the IBOR on Median Period Day u if u is prior to the Tenor Cessation Trigger Date, otherwise the interpolated value calculated in accordance with the following formula:

$$L_{f,u} = \frac{L_{f_0,t} \times \text{Days}(IM_{f,t}, IM_{f_1,t}) + L_{f_1,t} \times \text{Days}(IM_{f_0,t}, IM_{f,t})}{\text{Days}(IM_{f_0,t}, IM_{f_1,t})}$$

Where:

f_0 and f_1 mean, with respect to Tenor f and Median Period Day u , the Lower Interpolation Tenor and Upper Interpolation Tenor, respectively;

$IM_{f,t}$, $IM_{f_0,t}$, and $IM_{f_1,t}$ mean, with respect to Median Period Day u , the IBOR Maturity Dates for Tenors f , f_0 and f_1 , respectively;

$\text{Days}(IM_{f,t}, IM_{f_1,t})$, $\text{Days}(IM_{f_0,t}, IM_{f,t})$ and $\text{Days}(IM_{f_0,t}, IM_{f_1,t})$ mean the number of calendar days from and including IBOR Maturity Dates $IM_{f,t}$, $IM_{f_0,t}$ and $IM_{f_0,t}$ to and excluding IBOR Maturity Dates $IM_{f_1,t}$, $IM_{f,t}$ and $IM_{f_1,t}$, respectively; and

$ARR_{f,u}$ means the Value of the Adjusted Reference Rate on Median Period Day u .

1. Comparison of the Rulebook Implementation against the Final Parameters Consultation

27. The Spread Adjustment above is calculated for each relevant IBOR-tenor based on a set of historical differences between the IBOR for that tenor and the corresponding Adjusted Reference Rate (the “spread”). The Spread Adjustment is the median of the spread over a

“Median Period.” The calculation of a median spread adjustment requires a specification of the “Median Period,” the timing of the components used in the calculations, as well as any other special treatments to the underlying data. These aspects are discussed below in connection with the results of the prior ISDA Consultation.

28. First, according to the Rule Book, the Median Period is a five-year static look back period with a pre-defined “Median Period End Date.” This is consistent with the results of the Final Parameters Consultation Report, in which a majority (approximately 61% of all respondents) favored a calculation of a spread adjustment based on a historical median over a five-year lookback period.²⁸ The Final Parameters Consultation also stated that “...the historical data used [for the spread adjustment calculation] will not include the most recent published IBOR data. This is because data for the relevant RFR may not be available for the entire relevant period if that period extends beyond the date on which the fallback trigger event occurs. This also will ensure that any data for the relevant RFR after the fallback trigger event has occurred would not be affected by knowledge in the market of the fallback trigger event. Thus, for example, if the tenor referenced for the relevant IBOR is 3-months, then the last IBOR publication used as a data point for the purposes of calculating the spread will be for a date at least three months before the fallback trigger event occurs.”²⁹ This is consistent with how the Rule Book defines the Median Period, as explained below.

29. With respect to an IBOR, Tenor of length f and Rate Record Day t , the Rule Book defines the five-year Median Period as ending two “Reference Rate Business Days” (defined in Table 4 Appendix A of the rule book) prior to $(t - f)$.³⁰ The Median Period only includes “Median Period Days” (defined in the Rule Book to be days that are both IBOR Business Days

²⁸ Final Parameters Consultation Report, November 15, 2019, ¶3 (“A majority, consisting of approximately 61% of all respondents, preferred a calculation of a spread adjustment based on a historical median over a five-year lookback period (Option 1).”).

²⁹ Final Parameters Consultation, September 18, 2019, p. 4.

³⁰ This is our interpretation of the definition in the Rule Book: “‘Median Period End Date’ means, with respect to an IBOR, Tenor and Rate Record Day, the day occurring 2 (two) Reference Rate Business Days immediately prior to the date that is the Tenor period immediately prior to the Rate Record Day.”

and Rate Record Days) for which the Accrual End Date of the Adjusted Reference Rate for each day is at least 2 (two) Reference Rate Business Days earlier than such Rate Record Day.” This statement means the spread adjustment calculation is based on data that is at least two days prior to the date that the spread adjustment is published. Based on recent communication with ISDA and Bloomberg, the two day gap is part of the proposed implementation to ensure that there is no delay in waiting for the risk-free rate data required for the calculation of the Adjusted Reference Rate (given that the IBORs and risk-free rates can be published at different times of the day). This is consistent with the objective of the ISDA Consultations to rely on data that were available prior to an announcement that an IBOR will be discontinued (trigger event) (see paragraph 28).

30. Second, the Final Parameters Consultation specified that “[t]he long-run spread adjustment will be calculated as of the business day[] before the fallback trigger event occurs based on historical data as of that point in time (i.e., on the business day before the public statement is made or the formal publication of information which constitutes a fallback trigger event), but it will not be relevant until the fallback itself applies,”³¹ and that “[o]nce calculated, the long-run spread adjustment will be set (i.e., it will not be dynamic or reflect any changes in the interbank market prices once the fallback trigger event occurs).”³² The formula in the Rule Book calculates the Spread Adjustment for every Rate Record Day (defined as weekdays, i.e., not Sundays or Saturdays) prior to the Spread Adjustment Fixing Date.³³ The Spread

³¹ Final Parameters Consultation, September 18, 2019, p. 4.

³² Final Parameters Consultation, September 18, 2019, p. 4.

³³ Based on recent communication with Bloomberg and ISDA, Bloomberg will be making small corrections to the Spread Adjustment section (and corresponding definition updates) and the changes mean that the Spread Adjustment for an IBOR will be calculated on the announcement date (of the contemporaneous or future cessation, as applicable based on the terms of the announcement), rather than the Rate Record Day prior. In addition, the Spread Adjustment Date definition will also be updated in the case of a Tenor-specific cessation. We understand that the main driver of these changes is to resolve uncertainty related to the timing of the announcement on the announcement date. For practical purposes, the lag of two Reference Rate Business Dates ensures that all data used in the calculations of the final fixed value of the Spread Adjustment would be known in advance of the announcement. These expected updates to the Rule Book

Adjustment Fixing Date is “the earlier of the IBOR Cessation Trigger Date, and[] the first date on or after the Tenor Cessation Trigger Date for which there is either no Live Tenor that is shorter than such Tenor or there is no Live Tenor that is longer than such Tenor.” For any Rate Record Day on and after the Spread Adjustment Fixing Date, the Spread Adjustment is fixed, consistent with the wording in the Final Parameters Consultation. A discussion of the definition of the Spread Adjustment Fixing Date follows in more detail below.

31. Third, the results from the Final Parameters Consultation were such that: a majority of respondents (71%) did not prefer to include a transitional period in the calculation of the spread adjustment³⁴; more respondents preferred that outliers *not* be excluded from the calculation of the spread adjustment than respondents who preferred to exclude outliers (49% versus 32%), and 19% of respondents did not provide a preference³⁵; and lastly a majority of respondents (79%) found no compelling reason to exclude negative spreads from the calculation of the spread adjustment.³⁶ The calculation in the Rule Book as specified above does not mention or feature a treatment of transitional period, outliers, or negative spreads, and therefore is consistent with the Final Parameters Consultation.

32. The formula of the Spread Adjustment calculations in the Rule Book, while using different notations, is also consistent with the formula specified in the 2018 Consultation. However, the Rule Book defines the Spread Adjustment as specific to an IBOR-tenor combination. The ISDA Consultations generally discussed fallback trigger events as being specific to an IBOR, but not specific to individual tenors of a given IBOR. A review of the

do not alter the overall observation made in this report regarding the consistency between the Rule Book and the prior ISDA Consultations.

³⁴ Final Parameters Consultation Report, November 15, 2019, ¶8 (“A clear majority of approximately 71% of respondents did not prefer to include a transitional period in the calculations of the spread adjustment.”).

³⁵ Final Parameters Consultation Report, November 15, 2019, ¶9 (“Approximately 49% of respondents preferred that outliers not be excluded in the calculation of the spread adjustment and 19% did not provide a preference.”).

³⁶ Final Parameters Consultation Report, November 15, 2019, ¶11 (“An overwhelming majority of respondents (79%) found no compelling reason to exclude any negative spreads from the calculation of the spread adjustment.”).

definition of the Spread Adjustment Fixing Date reveals that it allows an IBOR-tenor to be published through interpolating shorter and longer live tenors. This interpolation would enable the continued publishing of an IBOR-tenor even if it becomes unavailable from the regular submission process. Further, the interpolation could also enable a single Spread Adjustment Fixing Date across all tenors of an IBOR.³⁷ In addition, the Rule Book includes a calculation formula for the interpolation of IBOR values should that be required. Although this calculation was not explicitly presented in the 2018 Consultation, it provides clarity about the interpolation calculation and is consistent with the objective of continuing to publish an IBOR-tenor if shorter and longer live tenors are available. Pursuant to the 2006 ISDA Definitions, including the updates to implement the Fallback Rates, contracts will reference the interpolated rates instead of the Fallback Rates. Therefore the inputs to the spread adjustment will be consistent with the rates referenced in contracts.

2. Comparison of the Rulebook Implementation against Brattle's Excel Model

33. The calculations of the Spread Adjustment to the Adjusted Reference Rate are consistent with the Brattle implementation, except that the Brattle Excel model specifies that the lookback period is dependent on the Spot Lag. In the Brattle Excel model, the lookback period ends on (Rate Record Date t – tenor f – Spot Lag), where the Spot Lag can take value of zero or two days. The Rule Book uses two Reference Rate Business Days fixed across all IBORs. That is, the Median Period as defined in the Rule Book ends on (Rate Record Date t – tenor f – 2 Reference Rate Business Days), subject to the requirement for Median Period Days discussed in paragraph 29. Given that the Median Period is five years, this difference is immaterial to the underlying calculations and results.

³⁷ For example, if a tenor of an IBOR becomes unavailable, the Rule Book provides that the IBOR rates for this tenor can be interpolated until there is no longer an IBOR with a shorter tenor or an IBOR with a longer tenor (or both). As a result, the Spread Adjustment Fixing Date for particular tenor of an IBOR could then be based on the IBOR cessation date, rather than the specific IBOR-tenor cessation date.

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