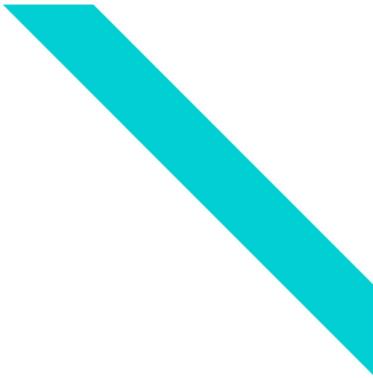


# TOKYO SWAP RATE

## CONSULTATION

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# 1. Responding to this consultation

## Introduction

Refinitiv is committed to transparency when reviewing benchmark methodologies or considering material changes to its benchmarks. To that end, Refinitiv is seeking feedback from interested parties on key features of the recently introduced Tokyo Swap Rate prototypes (see section 6 for RICs to access them). Refinitiv invites comments on all proposals put forward in this paper and in particular on the specific questions summarised in the appendix. Please structure your comments to:

- Respond to the questions stated
- Contain a clear rationale that includes evidence to support the views expressed
- Describe any alternative choices that Refinitiv should consider

## Submission of responses

Please email your comments to [index\\_queries@refinitiv.com](mailto:index_queries@refinitiv.com) with 'Tokyo Swap Rate consultation' in the subject by no later than 17:00 UK time on October 1, 2021. Please note that comments submitted after this deadline or submitted via other means may not be processed.

## Handling of responses

All responses to this consultation will be treated as confidential and will not be made public. A summary of key points on an anonymised basis may be made available by Refinitiv as appropriate.

# 2. Executive summary

Refinitiv, a London Stock Exchange Group business, is a leading calculator and administrator of benchmarks and indices. Refinitiv benchmark products include the WM/Refinitiv FX benchmarks, convertible bond indices and commodity indices. Within the interest rate asset class, Refinitiv administers products such as the Canadian Dollar Offered Rate (CDOR) and the Saudi Arabian Interbank Offered Rate (SAIBOR). In January 2021, [Refinitiv Term SONIA](#), a family of GBP term rates based on OIS, was released as a regulated benchmark and in March 2021, the Alternative Reference Rates Committee (ARRC) [announced](#) that Refinitiv had been selected to publish its recommended spread adjustments and spread adjusted rates for USD cash products. Refinitiv administers benchmarks either directly under the IOSCO Principles for Financial Benchmarks or via its authorised subsidiary, Refinitiv Benchmark Services (UK) Limited (RBSL), under the UK Benchmark Regulation.

Refinitiv calculates and administers the Tokyo Swap Rate (TSR), a Japanese Yen (JPY) interest rate swap (IRS) benchmark family comprising benchmarks rates with tenors from 1 year to 40 years. Production Tokyo Swap Rate benchmarks are determined using input data from a panel of banks and input data is supplied for swaps cleared by the Japan Securities Clearing Corporation (JSCC). Tokyo Swap Rate is published at 10:30 and 15:30 Tokyo time, on each business day in Japan.

On 5 March 2021, the UK Financial Conduct Authority (FCA, the regulator of LIBOR) announced that most LIBOR benchmarks, including all Japanese Yen LIBOR settings, would cease to be published in their current form immediately after 31 December 2021. JPY IRS that reference JPY LIBOR continue to be traded following the announcement but it is widely expected that liquidity will migrate from JPY LIBOR IRS to JPY TONA OIS.

Following industry [consultation](#) and [feedback](#), Refinitiv recently released prototype Tokyo Swap Rate (for swaps referencing TONA) and Tokyo Swap Rate Fallback settings.

The purpose of this consultation paper is to collect feedback on the methodology and publication of the rates in order to identify any opportunities to align the rates more closely with the needs of market participants prior to migrating the new settings to production status.

### 3. Prototype Tokyo Swap Rate (for swaps referencing TONA) and Tokyo Swap Rate Fallback methodology

The prototype Tokyo Swap Rate (for swaps referencing TONA) sources streaming executable bid and offer quotes from the Tradeweb dealer-to-client electronic trading platform in JSCC centrally cleared, spot starting JPY TONA Overnight Index Swaps (OIS). Data is sourced during a 20 minute collection window between 09:50-10:10 (Tokyo time) for the morning settings and 14:40-15:00 (Tokyo time) for the afternoon settings. During these windows the streaming quotes from each dealer are sampled every 30 seconds at undisclosed times. Each time the data is sampled (a “snap”) the quotes are subject to minimum volume and maximum bid-offer spread checks. Each snap of the individual dealer quotes that does not pass the volume and spread checks will be disregarded and excluded from the calculation.

For each tenor, those dealer snaps that pass the checks the mid is calculated and the final published rate for each tenor is the median of those mid rates. Subject to sufficient volumes and tight bid-offer spreads there can be up to 40 snaps per dealer for each of the morning and afternoon collection windows.

The prototype Tokyo Swap Rate Fallback is calculated using the prototype Tokyo Swap Rate (for swaps referencing TONA) (*TONA TSR*) and the 6-month JPY LIBOR ISDA spread adjustment (*ISDA 6M Spread*) calculated by Bloomberg using the formula immediately below.

$$TSR \text{ Fallback} = 2 \times \left[ \sqrt{1 + TONA \text{ TSR}} - 1 \right] + ISDA \text{ 6M Spread} \times \frac{365}{360}$$

### 4. Proposed Tokyo Swap Rate (for swaps referencing TONA) methodology changes for production rates

For the production Tokyo Swap Rate (for swaps referencing TONA), Refinitiv propose to introduce a waterfall methodology.

The first level of the waterfall will remain unchanged from the prototype Tokyo Swap Rate (for swaps referencing TONA) methodology. Added to this will be up to two further levels, pending final analysis and feedback from this consultation paper, in order to ensure the rate is robust and can be published during periods of low liquidity.

At launch, Refinitiv propose if there are insufficient valid level 1 snaps level 2 of the waterfall should be used.

The second level of the waterfall would be calculated using the same JSCC centrally cleared, spot starting JPY TONA OIS instruments sourced from two major interdealer brokers who provide indicative rates. These interdealer broker rates will be supplemented by the remaining unused Tradeweb level 1 dealer executable quotes that pass the spread and volume checks.

Indicative interdealer broker rates for level 2 will be collected during the same 20 minute collection window as used in level 1. During this collection window the indicative rates from each broker will be sampled every 30 seconds at undisclosed times and the mid rates calculated. There can be up to 80 mid rates across the two datasets. The remaining unused valid level 1 mid rates will also be added. For each tenor, the median of the mid rates across the brokers and unused valid level 1 snaps will be calculated and subject to insufficient valid mids in level 1, this would be used as the final rate. If level 2 fail, “no fix” will be published.

Preliminary analysis comparing the prototype (level 1 of the proposed methodology) with the proposed level 2 sources. The processing of level 2 data was not identical to the description above and some simplifying assumptions were made. Nevertheless, Refinitiv identified a high level of consistency between the rate calculated using the prototype and level 2. The average absolute difference across all days analysed and for all tenors was in the region of less than 0.1bps. Refinitiv considers this difference to be small and does not believe switching from level 1 to level 2 would materially impact the rate.

Post-production launch Refinitiv propose enhancing the second level of the waterfall methodology and introducing a third level of the waterfall – again subject to supporting analysis and feedback from the consultation paper.

Refinitiv propose to add Tradeweb composite rates to level two of the methodology. Tradeweb composite rates differ from the individual streaming executable bid and offer quotes used in level 1 (and to a lesser extent in level 2) as they combine multiple

dealer rates together and can reflect a different profile of dealers. These rates are not executable. Tradeweb composite rates will be sourced during the same window as used in levels 1 and 2 and the data will be snapped at the same time. This will introduce a further 40 mid rates from which the median will be calculated.

If level 1 and level 2 fail Refinitiv propose introducing a third level as a post-production launch enhancement. If Tokyo Swap Rate can't be calculated using level 1 and level 2 for an individual tenor but the tenors immediately adjacent on either side can be generated using levels 1 or 2 the tenor could be calculated by first calculating the delta of the two adjacent tenors between yesterday and today's rates. A linear interpolation of these deltas based on tenors could be applied to yesterday's rate of the tenor that failed calculation using levels 1 and 2 of the methodology.

If all levels fail, "no fix" will be published.

Refinitiv has not conducted analysis on the impact of incorporating Tradeweb composite data into level 2 or a comparison of the proposed level 3 to the prototype but would do so before any implementation of these proposals to ensure consistency.

## 5. Methodology discussion topics

### Q1: Tokyo Swap Rate (for swaps referencing TONA) 35-year tenor

Tokyo Swap Rate (as presented on Eikon page <17143> and other RICs), which measures the fixed leg of a swap referencing 6M JPY LIBOR is published in 18 tenors between 1 to 40 years. The prototype Tokyo Swap Rate (for swaps referencing TONA) is published in 17 tenors i.e. there is no 35-year rate. This is because the Tradeweb platform does not currently support a 35 year JSCC centrally cleared, spot starting JPY TONA OIS. Refinitiv propose to exclude the 35-year tenor until Tradeweb add the 35 year JSCC centrally cleared, spot starting JPY TONA OIS. If and when Tradeweb have sufficient liquidity on the 35 year JSCC centrally cleared, spot starting JPY TONA OIS Refinitiv will add the new tenor to the benchmark.

**Do you agree with the proposed approach or should Refinitiv include the 35 year tenor at launch using interdealer broker data only? If and when 35 year JSCC centrally cleared, spot starting JPY TONA OIS is available on Tradeweb with sufficient liquidity do you agree that this should automatically be incorporated into the calculation without prior consultation?**

### Q2: Use of unused level 1 dealer executable quotes in level 2

In the event that there is insufficient data to use Level 1 of the waterfall, in the production Tokyo Swap Rate (for swaps referencing TONA) Refinitiv plan to incorporate the available unused level 1 dealer executable quotes that pass the spread and volume checks into level 2 of the methodology. This approach ensures that where available and useful executable quotes are incorporated into the published rate and not disregarded.

**Do you agree with Refinitiv's proposed approach of incorporating the remaining unused level 1 dealer executable quotes into level 2 of the methodology?**

### Q3: Introduction of waterfall methodology in staged approach

Subject to supporting analysis and industry feedback Refinitiv propose to initially introduce the waterfall methodology for the production Tokyo Swap Rate in two stages. Firstly, at launch Refinitiv propose to include a second level based on any unused valid level 1 data and two interdealer brokers. Secondly, post launch Refinitiv propose to enhance level 2 by adding Tradeweb composite rates and introduce a level 3. This two-step approach allows Refinitiv enhance the robustness of the benchmark.

**Are you supportive of the proposed approach?**

**Do you agree with the introduction of the 'daily delta' approach based on adjacent tenors for level 3?**

In the event Refinitiv introduce a third level of the waterfall, individual tenors could be calculated using a combination of adjacent tenors (where available) and the previous days' rates (as detailed in section 4 above).

- **Refinitiv propose only to apply level 3 where the calculation of delta is based upon rates calculated using levels 1 or 2 of the waterfall. Do you agree?**

- **If the previous day's rate for the tenor in question was calculated using level 3 is it acceptable to calculate today's rate using level 3? Should there be a limit on how many days level 3 can be used for a particular tenor consecutively?**
- **Should there be a flag to denote where level 3 has been used in the calculation of the rate?**

#### **Q4: "No fix" publication**

Under the methodology for the existing production Tokyo Swap Rate settings, if a valid benchmark cannot be calculated the previous day's rate will be re-published. This rule applies for up to three consecutive business days. After this a "No fix" will be published. For the Tokyo Swap Rate (for swaps referencing TONA) settings Refinitiv do not propose to follow the same 3-day rule. A "no fix" will be published if a valid rate can't be calculated on the publication date.

**Do you agree?**

#### **Q5: Collection window**

The period during which rates are collected for the calculation of Tokyo Swap Rate (for swaps referencing TONA) needs to balance accuracy and reliability. A shorter collection window provides a more accurate reflection of the prevailing market rate at a point in time and reduces the likelihood of an economic event leading to a change in the market rate during the collection window. A longer collection window reduces the likelihood that the rate could be manipulated or influenced by short term temporary market movements. Following industry feedback Refinitiv has concluded that a 20-minute collection window (9:50-10:10 for the morning settings and 14:40-15:00 for the afternoon settings) provides the optimum balance and is consistent with the collection window used in [Refinitiv Term SONIA](#), the GBP forward-looking LIBOR alternative.

**Do you believe an alternative collection window could further improve the rate? If so, please provide details of the time window and rationale.**

## 6. Display discussion topics

#### **Q6: Decimal places**

Refinitiv publish the existing production Tokyo Swap Rate settings as percentages and to 3 decimal places i.e. to 0.1bps (e.g. 0.519% is published as "0.519"). The 6-month JPY LIBOR ISDA spread adjustment is published in percentage form to 5 decimal places. For the prototype Tokyo Swap Rate Fallback implementation, the 5 decimal 6-month JPY LIBOR ISDA spread adjustment is pro-rated by 365/360 and then added to the (adjusted) 3 decimal prototype Tokyo Swap Rate (for swaps referencing TONA) and the result is then rounded to 3 decimal places. The published 3 decimal prototype Tokyo Swap Rate (for swaps referencing TONA) has been used in the calculation of the Fallback so that users have sufficient information to replicate the calculation.

**Should the rates continue to be published to 3 decimal places (and the Tokyo Swap Rate Fallback continue to be derived from the 3 decimal Tokyo Swap Rate (for swaps referencing TONA)) or should either or both of the rates be published to 5 decimal places?**

#### **Q7: Naming convention**

Historically, Refinitiv has referred to this rate as "Tokyo Swap Reference Rate" and "Tokyo Swap Rate" interchangeably. Going forward the production rate will be administered by Refinitiv Benchmark Services (UK) Limited (RBSL) in compliance with the UK Benchmark Regulation. Given the rate will be a regulated benchmark is no longer seems appropriate to refer to it as a reference rate. Going forward Refinitiv propose to refer to the family of benchmarks as "Tokyo Swap Rate". The three versions that will continue to be published beyond the end of the year will be referred to as:

- Tokyo Swap Rate (for swaps referencing TONA)
- Tokyo Swap Rate (for swaps referencing TIBOR®)
- Tokyo Swap Rate Fallback

**Do you have any concerns with the proposed naming convention?**

**Q8: Publication identifiers**

Refinitiv plan to publish the new Tokyo Swap Rate settings using the RIC identifiers immediately below, including the tiles specified in the top row. We do not plan on publishing the Tokyo Swap Rate (for swaps referencing TONA) or Tokyo Swap Rate Fallback settings on pages.

**Do agree that publication of the new settings on the RICs and tiles below is sufficient?**

Tenor	Tokyo Swap Rate AM (for swaps referencing TONA)	Tokyo Swap Rate PM (for swaps referencing TONA)	Tokyo Swap Rate Fallback AM	Tokyo Swap Rate Fallback PM
All tenors	JPTSRTO=RFTB		JPTSRLF=RFTB	
All tenors	JPTSRTOA=RFTB	JPTSRTOP=RFTB	JPTSRLFA=RFTB	JPTSRLFP=RFTB
1-Year	JPTSRTOA1Y=RFTB	JPTSRTOP1Y=RFTB	JPTSRLFA1Y=RFTB	JPTSRLFP1Y=RFTB
18-Months	JPTSRTOA18M=RFTB	JPTSRTOP18M=RFTB	JPTSRLFA18M=RFTB	JPTSRLFP18M=RFTB
2-Years	JPTSRTOA2Y=RFTB	JPTSRTOP2Y=RFTB	JPTSRLFA2Y=RFTB	JPTSRLFP2Y=RFTB
3-Years	JPTSRTOA3Y=RFTB	JPTSRTOP3Y=RFTB	JPTSRLFA3Y=RFTB	JPTSRLFP3Y=RFTB
4-Years	JPTSRTOA4Y=RFTB	JPTSRTOP4Y=RFTB	JPTSRLFA4Y=RFTB	JPTSRLFP4Y=RFTB
5-Years	JPTSRTOA5Y=RFTB	JPTSRTOP5Y=RFTB	JPTSRLFA5Y=RFTB	JPTSRLFP5Y=RFTB
6-Years	JPTSRTOA6Y=RFTB	JPTSRTOP6Y=RFTB	JPTSRLFA6Y=RFTB	JPTSRLFP6Y=RFTB
7-Years	JPTSRTOA7Y=RFTB	JPTSRTOP7Y=RFTB	JPTSRLFA7Y=RFTB	JPTSRLFP7Y=RFTB
8-Years	JPTSRTOA8Y=RFTB	JPTSRTOP8Y=RFTB	JPTSRLFA8Y=RFTB	JPTSRLFP8Y=RFTB
9-Years	JPTSRTOA9Y=RFTB	JPTSRTOP9Y=RFTB	JPTSRLFA9Y=RFTB	JPTSRLFP9Y=RFTB
10-Years	JPTSRTOA10Y=RFTB	JPTSRTOP10Y=RFTB	JPTSRLFA10Y=RFTB	JPTSRLFP10Y=RFTB
12-Years	JPTSRTOA12Y=RFTB	JPTSRTOP12Y=RFTB	JPTSRLFA12Y=RFTB	JPTSRLFP12Y=RFTB
15-Years	JPTSRTOA15Y=RFTB	JPTSRTOP15Y=RFTB	JPTSRLFA15Y=RFTB	JPTSRLFP15Y=RFTB
20-Years	JPTSRTOA20Y=RFTB	JPTSRTOP20Y=RFTB	JPTSRLFA20Y=RFTB	JPTSRLFP20Y=RFTB
25-Years	JPTSRTOA25Y=RFTB	JPTSRTOP25Y=RFTB	JPTSRLFA25Y=RFTB	JPTSRLFP25Y=RFTB
30-Years	JPTSRTOA30Y=RFTB	JPTSRTOP30Y=RFTB	JPTSRLFA30Y=RFTB	JPTSRLFP30Y=RFTB
40-Years	JPTSRTOA40Y=RFTB	JPTSRTOP40Y=RFTB	JPTSRLFA40Y=RFTB	JPTSRLFP40Y=RFTB

## Appendix. Prototype Tokyo Swap Rate (for swaps referencing TONA) historical performance

Refinitiv has calculated a short history for the 17 tenors of the Tokyo Swap Rate (for swaps referencing TONA) prototype (see Figures 1 and 2 below).

**Figure 1: Prototype Tokyo Swap Rate (for swaps referencing TONA) – morning**

AM	12M	18M	02Y	03Y	04Y	05Y	06Y	07Y	08Y	09Y	10Y	12Y	15Y	20Y	25Y	30Y	40Y
16/08/2021	-0.048	-0.055	-0.060	-0.071	-0.075	-0.076	-0.072	-0.062	-0.047	-0.029	-0.009	0.033	0.105	0.218	0.313	0.384	0.424
17/08/2021	-0.048	-0.054	-0.060	-0.069	-0.073	-0.073	-0.068	-0.059	-0.044	-0.026	-0.006	0.034	0.107	0.220	0.315	0.389	0.428
18/08/2021	-0.049	-0.054	-0.060	-0.069	-0.074	-0.074	-0.070	-0.061	-0.046	-0.029	-0.009	0.032	0.104	0.216	0.311	0.384	0.425
19/08/2021	-0.049	-0.054	-0.060	-0.068	-0.074	-0.074	-0.069	-0.060	-0.046	-0.029	-0.009	0.032	0.105	0.219	0.314	0.386	0.428
20/08/2021	-0.049	-0.054	-0.060	-0.070	-0.075	-0.076	-0.073	-0.064	-0.050	-0.033	-0.013	0.028	0.100	0.214	0.309	0.381	0.423
23/08/2021	-0.049	-0.055	-0.061	-0.070	-0.075	-0.077	-0.073	-0.065	-0.051	-0.035	-0.015	0.025	0.096	0.209	0.303	0.374	0.416
24/08/2021	-0.049	-0.054	-0.060	-0.069	-0.075	-0.076	-0.073	-0.065	-0.051	-0.035	-0.015	0.025	0.098	0.210	0.304	0.375	0.416
25/08/2021	-0.048	-0.054	-0.059	-0.066	-0.071	-0.071	-0.068	-0.059	-0.045	-0.028	-0.008	0.033	0.105	0.218	0.311	0.384	0.425
26/08/2021	-0.047	-0.052	-0.056	-0.064	-0.068	-0.066	-0.061	-0.051	-0.036	-0.018	0.004	0.044	0.117	0.231	0.326	0.398	0.439
27/08/2021	-0.048	-0.053	-0.058	-0.065	-0.070	-0.070	-0.065	-0.055	-0.040	-0.022	-0.002	0.039	0.112	0.226	0.319	0.390	0.432
30/08/2021	-0.049	-0.054	-0.058	-0.067	-0.072	-0.072	-0.068	-0.059	-0.044	-0.026	-0.006	0.035	0.108	0.221	0.315	0.386	0.427
31/08/2021	-0.049	-0.055	-0.060	-0.069	-0.074	-0.075	-0.070	-0.062	-0.047	-0.029	-0.010	0.033	0.105	0.219	0.311	0.383	0.425
01/09/2021	-0.049	-0.053	-0.058	-0.064	-0.068	-0.066	-0.060	-0.049	-0.034	-0.015	0.006	0.049	0.125	0.241	0.335	0.406	0.448
02/09/2021	-0.048	-0.054	-0.059	-0.065	-0.069	-0.068	-0.061	-0.051	-0.036	-0.018	0.004	0.046	0.121	0.236	0.329	0.398	0.441
03/09/2021	-0.045	-0.051	-0.056	-0.062	-0.066	-0.065	-0.059	-0.048	-0.033	-0.014	0.008	0.050	0.125	0.240	0.331	0.399	0.441

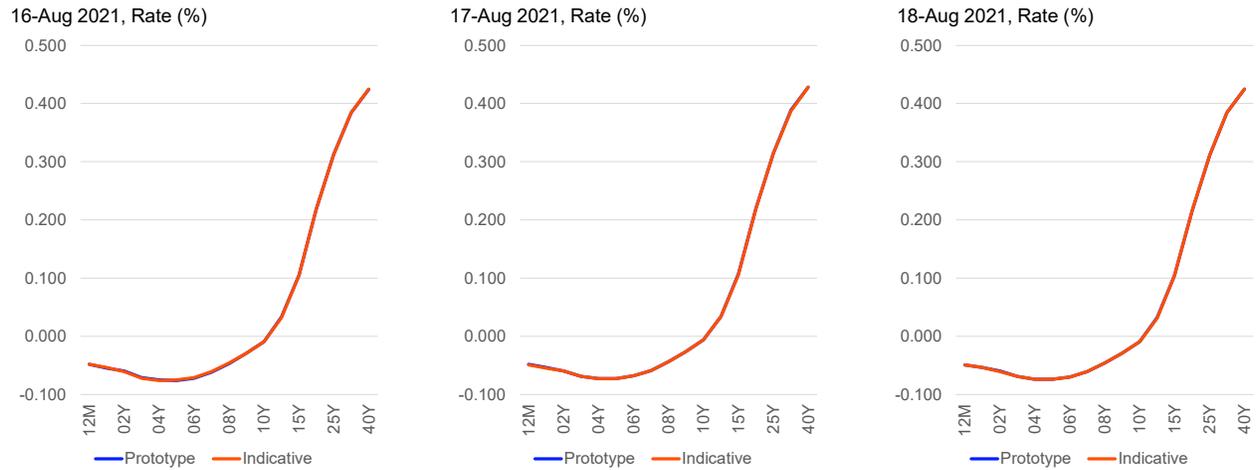
**Figure 2: Prototype Tokyo Swap Rate (for swaps referencing TONA) – afternoon**

PM	12M	18M	02Y	03Y	04Y	05Y	06Y	07Y	08Y	09Y	10Y	12Y	15Y	20Y	25Y	30Y	40Y
16/08/2021	-0.049	-0.056	-0.061	-0.071	-0.076	-0.076	-0.071	-0.063	-0.048	-0.030	-0.010	0.031	0.104	0.216	0.312	0.385	0.425
17/08/2021	-0.049	-0.054	-0.061	-0.070	-0.075	-0.075	-0.070	-0.061	-0.046	-0.029	-0.009	0.032	0.104	0.218	0.313	0.385	0.426
18/08/2021	-0.049	-0.054	-0.060	-0.069	-0.074	-0.073	-0.069	-0.060	-0.045	-0.028	-0.008	0.033	0.105	0.219	0.314	0.386	0.426
19/08/2021	-0.049	-0.054	-0.059	-0.067	-0.071	-0.072	-0.067	-0.059	-0.044	-0.026	-0.006	0.035	0.108	0.222	0.317	0.389	0.430
20/08/2021	-0.050	-0.054	-0.061	-0.071	-0.078	-0.079	-0.076	-0.069	-0.055	-0.039	-0.019	0.021	0.093	0.205	0.300	0.371	0.413
23/08/2021	-0.049	-0.054	-0.060	-0.069	-0.075	-0.076	-0.072	-0.065	-0.051	-0.034	-0.014	0.026	0.099	0.212	0.306	0.378	0.419
24/08/2021	-0.048	-0.054	-0.059	-0.068	-0.073	-0.074	-0.070	-0.062	-0.049	-0.031	-0.011	0.029	0.101	0.214	0.308	0.379	0.420
25/08/2021	-0.048	-0.054	-0.059	-0.066	-0.071	-0.071	-0.068	-0.059	-0.044	-0.026	-0.006	0.034	0.106	0.219	0.313	0.384	0.425
26/08/2021	-0.048	-0.053	-0.059	-0.067	-0.072	-0.072	-0.067	-0.059	-0.045	-0.027	-0.007	0.034	0.105	0.218	0.311	0.383	0.423
27/08/2021	-0.048	-0.053	-0.056	-0.064	-0.069	-0.069	-0.064	-0.054	-0.039	-0.021	-0.001	0.040	0.113	0.226	0.320	0.391	0.432
30/08/2021	-0.049	-0.054	-0.059	-0.067	-0.072	-0.072	-0.068	-0.059	-0.044	-0.026	-0.006	0.035	0.108	0.221	0.315	0.386	0.426
31/08/2021	-0.048	-0.054	-0.059	-0.066	-0.071	-0.071	-0.066	-0.056	-0.042	-0.024	-0.004	0.038	0.111	0.225	0.319	0.389	0.430
01/09/2021	-0.048	-0.053	-0.057	-0.064	-0.068	-0.066	-0.060	-0.049	-0.034	-0.015	0.006	0.049	0.124	0.239	0.331	0.401	0.443
02/09/2021	-0.045	-0.050	-0.055	-0.062	-0.065	-0.064	-0.058	-0.048	-0.033	-0.014	0.008	0.050	0.125	0.240	0.331	0.400	0.442
03/09/2021	-0.044	-0.049	-0.053	-0.058	-0.060	-0.058	-0.050	-0.039	-0.023	-0.004	0.018	0.062	0.138	0.255	0.347	0.416	0.457

Refinitiv has compared the prototype Tokyo Swap Rate (for swaps referencing TONA) with the existing <JPYS=> indicative rates that were published by Refinitiv earlier in the year. The values from both rates are very similar. Figures 3 and 4 show charts comparing the two rates for three illustrative days (16<sup>th</sup> to 18<sup>th</sup> August 2021). The red and blue lines are practically on top of each other highlighting very little difference in the two rates. Figures 5 and 6 show a more detailed comparison of the prototype and indicative rates for 17 tenors. These tables show the absolute difference between the prototype and indicative rates. For most tenors the absolute difference is 0.1bps (0.001%) or less.

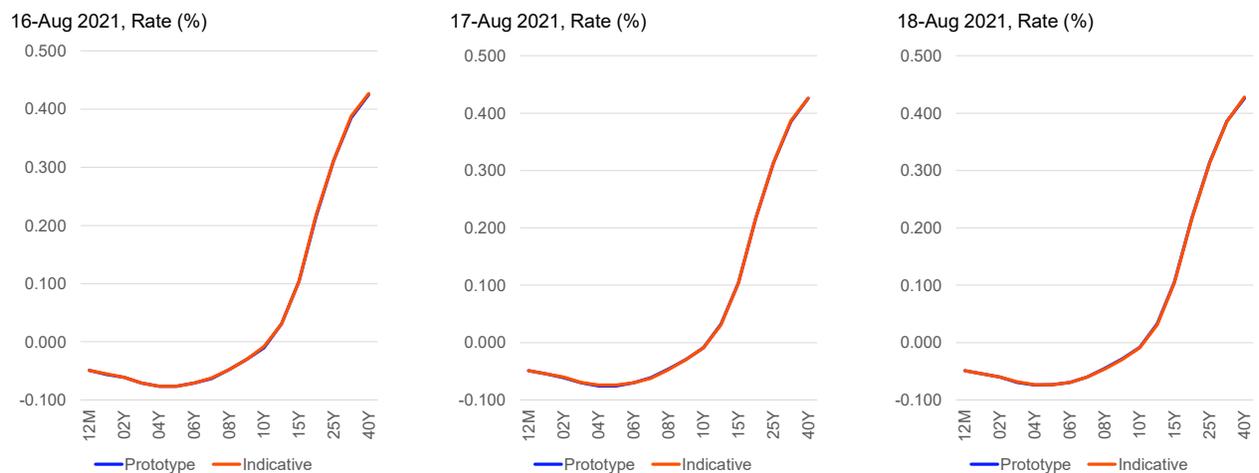
**Figure 3: Comparison of Tokyo Swap Rate (for swaps referencing TONA) prototype vs indicative – AM tenors**

**Comparison of Tokyo Swap Rate (for swaps referencing TONA) prototype vs. indicative - AM tenors**



**Figure 4: Comparison of Tokyo Swap Rate (for swaps referencing TONA) prototype vs indicative – PM tenors**

**Comparison of Tokyo Swap Rate (for swaps referencing TONA) prototype vs. indicative - PM tenors**



**Figure 5: Absolute difference (in percentage points) between Tokyo Swap Rate (for swaps referencing TONA) prototype and indicative versions by tenor and date – AM settings**

AM	12M	18M	02Y	03Y	04Y	05Y	06Y	07Y	08Y	09Y	10Y	12Y	15Y	20Y	25Y	30Y	40Y
16/08/2021	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001
17/08/2021	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.002	0.000
18/08/2021	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
19/08/2021	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001
20/08/2021	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
23/08/2021	0.000	0.001	0.000	0.002	0.001	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.000
24/08/2021	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
25/08/2021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000
26/08/2021	0.000	0.001	0.002	0.001	0.000	0.001	0.002	0.002	0.002	0.001	0.003	0.002	0.002	0.001	0.001	0.001	0.002
27/08/2021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.000	0.001	0.002
30/08/2021	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001
31/08/2021	0.000	0.000	0.001	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000
01/09/2021	0.001	0.001	0.000	0.001	0.001	0.002	0.002	0.001	0.001	0.000	0.001	0.001	0.000	0.000	0.001	0.001	0.001
02/09/2021	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
03/09/2021	0.000	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.002	0.001	0.000	0.001	0.001	0.000	0.000	0.000
Average	0.000	0.001	0.000	0.001	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001

**Figure 6: Absolute difference (in percentage points) between Tokyo Swap Rate (for swaps referencing TONA) prototype and Indicative versions by tenor and date – PM settings**

PM	12M	18M	02Y	03Y	04Y	05Y	06Y	07Y	08Y	09Y	10Y	12Y	15Y	20Y	25Y	30Y	40Y
16/08/2021	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.002
17/08/2021	0.000	0.000	0.001	0.002	0.003	0.003	0.004	0.003	0.004	0.003	0.004	0.005	0.005	0.006	0.006	0.007	0.007
18/08/2021	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
19/08/2021	0.001	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001
20/08/2021	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.000
23/08/2021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24/08/2021	0.000	0.001	0.000	0.001	0.001	0.001	0.001	0.002	0.001	0.000	0.001	0.002	0.001	0.002	0.003	0.000	0.002
25/08/2021	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
26/08/2021	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002
27/08/2021	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.002	0.001	0.001	0.002	0.003
30/08/2021	0.002	0.000	0.001	0.001	0.002	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.000	0.001	0.000	0.001	0.002
31/08/2021	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.002	0.002
01/09/2021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.003
02/09/2021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
03/09/2021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Average	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.002	0.002

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