

Q&A regarding Post LIBOR

Hideto Takata /Totan Research Fellow

Since this summer, we have received numerous inquiries about post-LIBOR. We would like to take this opportunity to introduce a selection of questions and answers.

Q1. "What is TL Spread?"

Q2. "How will existing TL Spread be changed in Post-LIBOR?"

Q3. "What is convention for 6-month ZTIBOR vs TONA Basis?"

Q4. How to obtain historical data for "6-month ZTIBOR vs TONA Basis"

Q5. "Is Day-Count Adjustment required to calculate 6-month ZTIBOR swap from TONA swap and 6-month ZTIBOR vs TONA basis?"

[Appendix Q] In switching from USD/YEN basis with exchange of 3-month US-Japan LIBOR to SOFR/TONA basis, the negative range of the basis has been widened. What is the reason? What are the implications?

A1. "What is TL Spread?"

TL spread refers to TIBOR/Yen LIBOR spread, which is usually a basis swap that exchanges 6-month ZTIBOR and 6-month Yen LIBOR. 6-month Yen LIBOR is added to the spread ($\pm\alpha$).

$$\text{TL Spread} = \frac{\text{6-month ZTIBOR}}{\text{Day-Count : Act/360}} \text{ vs } \frac{\text{6-month Yen LIBOR} \pm \alpha}{\text{Day-Count : Act/360}} \quad \text{Day-Count : Act/360}$$

Day-Count for 6-month ZTIBOR and for 6-month JPY LIBOR is Act/360. Day-Count for " $\pm\alpha$ " is Act/360, which is same as 6-month Yen LIBOR with spread added.

A2. Existing TL spread is converted to "ZTIBOR vs TONA Basis" in Post-LIBOR.

Fallback rate for 6-month Yen LIBOR is calculated by converting the compounded TONA (Act/365) in 6-month to Act/360 and adding Spread Adjustment¹ (+0.05809%). Note that since Day-Count for TONA is Act/365, in order to use it as a fallback rate for Yen LIBOR, Day-Count adjustment (Act/365→Act/360) for compounded TONA should be made.

$$\text{Fallback Rate for 6-month Yen LIBOR} = \frac{\text{Compounded TONA in 6-month} \times 360/365}{\text{Day-Count : Act/360}} + \frac{0.05809\%}{\text{Day-Count : Act/360}}$$

¹ Spread Adjustment for 6-month Yen LIBOR was fixed at "+0.05809%" due to the fallback trigger on March 5, 2021.

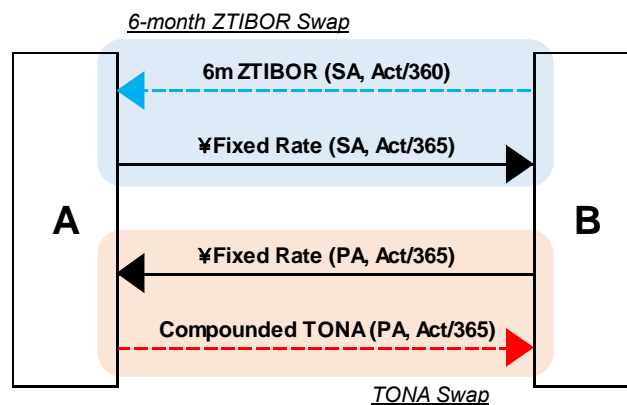
As a result, in post-LIBOR, existing "TL spreads" will be converted into the following form ("ZTIBOR vs TONA Basis").

$$\begin{aligned} \text{TL Spread} &= \text{6-month ZTIBOR vs Fallback Rate for 6-month Yen LIBOR } \pm\alpha \\ &= \frac{\text{6-month ZTIBOR}}{(\text{Act}/360)} \text{ vs } \frac{\text{Compounded TONA in 6-month} \times 360/365}{(\text{Act}/365 \rightarrow \text{Act}/360)} + \frac{0.05809\%}{(\text{Act}/360)} \pm\alpha \end{aligned}$$

A3-1. 6-month ZTIBOR vs TONA Basis *in the past* was processed with "2 tickets".

6-month ZTIBOR vs TONA basis traded in the past in the form of "6-month ZTIBOR vs Compounded TONA $\pm\alpha$ " was not approved for clearing by JSCC, so it was processed by two transactions (2 tickets), "6-month ZTIBOR swap" and "TONA swap". It seems to be very hard to understand for market participants outside the interbank market, and among the inquiries we received this time, the most common one was about this basis swap convention.

The figure below shows the cash flow of trading "6-month ZTIBOR vs TONA Basis" and processing it with 2 tickets.

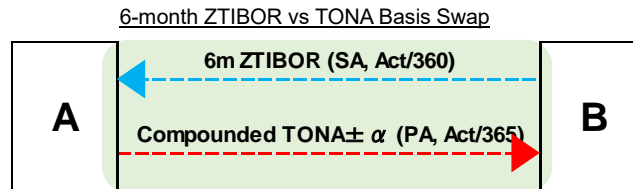


The upper half (Light Blue area) is "ZTIBOR swap" of 6-month ZTIBOR vs Yen Fixed rate (SA, Act/365). The lower half (Light Red area) is "TONA swap" of Compounded TONA (PA, Act/365) vs Yen Fixed rate (PA, Act/365). 6-month ZTIBOR (Blue Dashed line) and Compounded TONA (Red Dashed line), which are Floating rates, are Flat (: No Spread Adjustment), and Fixed interest rates for ZTIBOR swap and TONA swap are determined so that the difference between Fixed interest rates for ZTIBOR swap and TONA swap is equal to " $\pm\alpha$ " of 6-month ZTIBOR vs TONA basis $\pm\alpha$.

Although the payment frequency of Fixed interest rate for ZTIBOR swaps (SA: twice a year) does not match the one of Fixed interest rate for TONA swaps (PA: once a year), we ignore the difference in the cash flow of Fixed interest rate based on the market consensus that there is no much difference in theory.

A3-2. 6-month ZTIBOR vs TONA basis can be processed as "1 ticket" *from now on*.

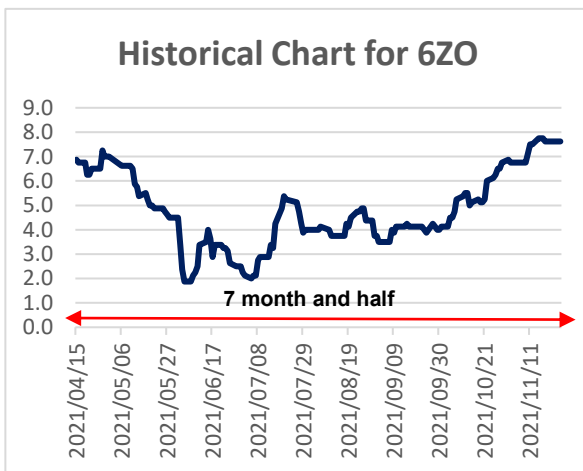
It has been announced that DTIBOR vs TONA basis and ZTIBOR vs TONA basis will be subject to JSCC clearing after December 6, 2021. Therefore, 6-month ZTIBOR vs TONA basis, which used to be traded in 2 tickets as shown in the figure above, can now be traded in 1 ticket (in the form of 6-month ZTIBOR vs Compounded TONA $\pm\alpha$) as shown in the figure below.



In other words, until now, Fixed interest rates for ZTIBOR swap and TONA swap were determined so that the difference between Fixed interest rates for ZTIBOR swap and TONA swap was equal to the spread ($\pm\alpha$) of "6-month ZTIBOR vs Compounded TONA $\pm\alpha$ ". From now on, the spread ($\pm\alpha$) will be simply added to Compounded TONA against 6-month ZTIBOR Flat.

In the case of 6-month ZTIBOR vs TONA basis transaction, the payment frequency of ZTIBOR (SA: twice a year) does not match the one of compounded TONA (PA: once a year) at the moment. However, if the parties (A and B) can agree, the payment frequency of compounded TONA on newly traded 6-month ZTIBOR vs TONA basis transactions may be changed to twice a year in the future.

A4. Historical data of "6-month ZTIBOR vs TONA Basis" calculated by synthesis.



The data distribution for 6-month ZTIBOR vs TONA basis has started on April 15, 2021 by Totan ICAP. In the meantime, we received an inquiry asking if historical data for the past several years for this product is available.

In fact, 6-month ZTIBOR vs TONA basis (commonly known as "6ZO") can be calculated by synthesizing TL spread and J-Los (Japanese Libor OIS Spread) as shown below.

$$\begin{aligned}
 \text{6-month ZTIBOR vs TONA Basis (:6ZO)} &= \text{6 month ZTIBOR vs Compounded TONA } \pm\alpha \\
 &\quad (\text{Act/360}) \quad \quad \quad (\text{Act/365}) \quad \quad \quad (\text{Act/365}) \\
 &= \text{TL Spread } \times \frac{365}{360} + \text{J-Los}
 \end{aligned}$$

Because Day-Count of " $\pm\alpha$ " for 6-month ZTIBOR vs 6-month Yen LIBOR is Act/360, convert from Act/360 to Act/365. Day-Count of " $\pm\alpha$ " for 6-month Yen LIBOR vs Compounded TONA is Act/365.

“TL Spread” refers to basis swaps traded in the form of 6-month ZTIBOR vs 6-month Yen LIBOR $\pm\alpha$



(Act/360). “J-Los” refers to basis swaps traded in the form of 6-month Yen LIBOR vs Compounded TONA $\pm\alpha$ (Act/365). Day-Count adjusted TL spread (from Act/360 to Act/365) plus J-Los becomes 6ZO (6-month ZTIBOR vs TONA basis)².

This means that if you can get the historical rates for TL Spread and J-Los, you can make the historical data for synthetic 6ZO (6-month ZTIBOR vs TONA basis). With the data we have, we can go back to February 28, 2011.

A5. No Day-Count adjustment is required to calculate 6-month ZTIBOR swap from TONA swap and 6ZO (6-month ZTIBOR vs TONA basis)

In domestic Lending, there are cases where 6-month ZTIBOR swap rate is used as interest rate benchmark for Lending. Until now, Day-Count adjustment was required to calculate 6-month ZTIBOR swap rate from 6-month Yen LIBOR swap rate and TL spread. In post-LIBOR, we consider the inquiry, "Do I also need to make Day-Count adjustments when calculating TONA swaps and 6ZO to 6-month ZTIBOR swaps?"

Day-Count for the spread part " $\pm\alpha$ " is same as the one of interest rate benchmark where the spread is added to. By understanding this, Day-Count adjustments can be made smoothly.

As shown below, 6-month ZTIBOR swap was previously calculated by adding Day-Count adjusted TL spread to 6-month Yen LIBOR swap.

$$\frac{\text{6-month ZTIBOR Swap}}{\text{Yen Fixed Rate vs 6m ZTIBOR (SA, Act/365)} \quad (\text{Act/360})} = \frac{\text{6-month Yen LIBOR Swap}}{\text{Yen Fixed Rate vs 6m Yen LIBOR (SA, Act/365)} \quad (\text{Act/360})} + \frac{\text{TL Spread} \times 365/360}{\text{6m ZTIBOR vs 6m Yen LIBOR} \pm \alpha \quad (\text{Act/360}) \quad (\text{Act/360}) \quad (\text{Act/360})}$$

² 6-month ZTIBOR vs TONA basis (:6ZO) refers to 6-month ZTIBOR (Act/360) vs compounded TONA (Act/365) $\pm\alpha$. Since the difference between 6-month ZTIBOR (Act/360) and Compounded TONA (Act/365) is $\pm\alpha$, it can be rewritten as **6ZO = 6-month ZTIBORx365/360 - Compounded TONA**. Meanwhile, **Synthetic 6ZO = TL spread x365/360 + J-Los**.
 Synthetic 6ZO = (6-month ZTIBOR – 6-month Yen LIBOR) x365/360 + (6-month Yen LIBORx365/360 – Compounded TONA)
 = 6-month ZTIBOR x365/360 – 6-month Yen LIBOR x365/360 + 6-month Yen LIBORx365/360 – Compounded TONA
 = 6-month ZTIBOR x365/360 – Compounded TONA
6ZO = Synthetic 6ZO, so 6ZO can be synthesized from TL spread and J-Los.

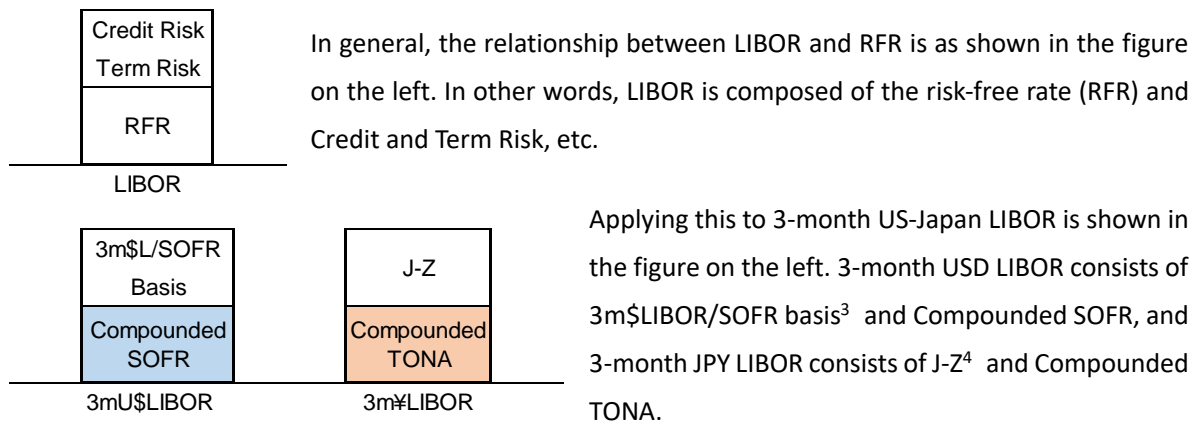
TL spread is the spread ($\pm\alpha$) added to 6-month Yen LIBOR (Act/360). Since Day-Count for 6-month ZTIBOR swap and Yen LIBOR swap is Act/365, Day-Count adjustment (Act/360 \rightarrow Act/365) was required to be made.

On the other hand, in post-LIBOR, 6-month ZTIBOR swap is calculated by adding 6ZO (6-month ZTIBOR vs TONA basis) to TONA swap as shown below.

$$\begin{array}{l} \text{6-month ZTIBOR Swap} \\ \text{Yen Fixed Rate vs 6m ZTIBOR} \\ \text{(SA, Act/365) (Act/360)} \end{array} = \begin{array}{l} \text{TONA Swap} \\ \text{Yen Fixed Rate vs Compounded TONA} \\ \text{(PA, Act/365) (PA, Act/365)} \end{array} + \begin{array}{l} \text{6ZO} \\ \text{6m ZTIBOR vs Compounded TONA} \\ \text{(Act/360) (Act/365)} \end{array} \pm \alpha \text{ (Act/365)}$$

6ZO is the spread ($\pm\alpha$) added to Compounded TONA (Act/365). Since Day-Count for 6-month ZTIBOR swap and TONA swap is same at Act/365, no Day-Count adjustment is required.

[Appendix A] In switching from USD/YEN basis with exchange of 3-month US- Japan LIBOR (hereinafter referred to as USD/YEN basis) to SOFR/TONA basis, the negative range of the basis has been widened. What is the reason? What are the implications?



And there is a relationship between USD/YEN basis and SOFR/TONA basis, as shown below.

$$\begin{aligned} \text{SOFR/TONA Basis} &= \frac{\text{Compounded SOFR}}{\text{(Act/360)}} \text{ vs } \frac{\text{Compounded TONA} \pm \alpha}{\text{(Act/365)}} \\ &= \frac{\text{USD/YEN Basis}}{\text{3mUSLIBOR vs 3mYLIBOR} \pm \alpha} - \frac{\text{3m\$L/SOFR Basis}}{\text{3mUSLIBOR vs Compounded SOFR} \pm \gamma} \times \frac{365}{360} + \frac{\text{J-Z}}{\text{3mYLIBOR vs Compounded TONA} \pm \beta} \end{aligned}$$

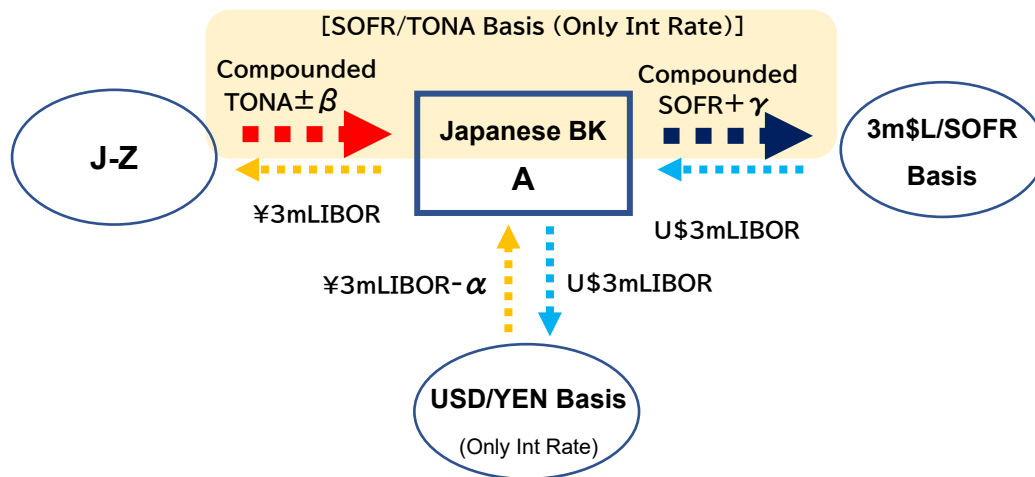
SOFR/TONA basis can be thought of as USD/YEN basis, which represents pure "USD supply and

³ 3m\$LIBOR/SOFR Basis: Basis swaps traded in the form of 3-month USD LIBOR vs Compounded SOFR $\pm\alpha$.

⁴ J-Z: Basis swaps traded in the form of 3-month Yen LIBOR vs Compounded TONA $\pm\alpha$.

demand," plus "Credit and Term Risk" included in 3-month US-Japan LIBOR.⁵

The following diagram illustrates the flow of Japanese bank A funding USD (investing Yen) in USD/YEN basis and then converting 3-month US-Japan LIBOR into the US-Japan RFRs, Compounded SOFR and Compounded TONA. This will give you an idea of the relationship between "USD/YEN basis", "SOFR/TONA basis", "3m\$LIBOR/SOFR basis", and "J-Z".



Japanese Bank A receives 3-month Yen LIBOR through USD/YEN basis and pays 3-month Yen LIBOR through J-Z basis. Instead, Bank A receives Compounded TONA through J-Z basis. On the other hand, 3-month USD LIBOR that Bank A pay through USDJPY basis is received through 3m\$LIBOR/SOFR basis. Instead, Bank A pay Compounded SOFR through 3m\$LIBOR/SOFR basis.

With this series of operations, in addition to the original USD/YEN basis (¥3mLIBOR-α: received but negative, so actually paid), Credit and Term Risk of 3-month USD (Compounded SOFR+γ: the cost of converting U\$3mLIBOR to Compounded SOFR) and Credit and Term Risk of 3-month JPY (Compounded TONA+β: the cost of converting ¥3mLIBOR to Compounded TONA) are added. Currently, Credit and Term Risk of 3-month USD is plus 15bp to plus 25bp, depending on the tenor, and Credit and Term Risk of the 3-month Yen is minus 0.5bp to plus 0.75bp, so Credit and Term Risk of 3-month USD, plus 15bp to plus 25bp, is added to the original USD/YEN basis.

In switching from USD/YEN basis to SOFR/TONA basis, the negative value of the basis is widened by the margin of Credit and Term Risk, but the real cost remains the same.

The end.

⁵ USD/YEN basis is expressed as 3m¥LIBOR ±α, and 3m\$/SOFR Basis is as Compounded SOFR ±α. To be precise, it is inappropriate to add or subtract the interest rates of different currencies, but we believe it is necessary and sufficient to derive a rough estimate of USD/YEN basis ↔ SOFR/TONA basis.

To Clients of the Tokyo Tanshi Co., Ltd.

If you wish to make transactions based on the information provided on this document, please make sure to pay attention to the following matters:

- ◇ In making transactions, clients are required to pay commission fees* for each transaction, as may be mutually agreed between the clients and the Tokyo Tanshi Co., Ltd. (hereinafter referred to as Tokyo Tanshi), in addition to the product purchase value. Certain transactions involving unlisted securities and bonds (government bonds, commercial papers, etc.) include commission fees in the purchase total or are free of charges.

* Commission fees are determined between the clients and Tokyo Tanshi according to market conditions of the time and transaction details, and thus cannot be stated in advance.

- ◇ Transactions may give rise to losses caused by the ups and downs of market values of financial products due to fluctuations in interest rates, etc. Thus, risks exist that losses may exceed the initial margin deposits depending on the transaction details.
- ◇ For accounting and tax processes of the financial products, clients should fully confirm in advance with experts such as audit firms, etc.

Upon entering into an actual transaction, please make sure to carefully read the relevant pre-contract documents and any other related documents, and execute at your own judgement and responsibility.

Registered Financial Institutions, Director of Kanto Local Finance Bureau, No. 524

Member of Japan Securities Dealers Association

This document has been prepared for the information purpose only, and the final decision of the transaction should be made at your own discretion. The information contained in this document has been prepared based on reliable sources, but we do not guarantee its accuracy or reliability. No part of this document may be reproduced, quoted, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the copyright holder.