OPINION

Baek, In Seok

The Global Benchmark Rate Regime in the Post-LIBOR Era and its Implications for Korea

With the cessation of LIBOR calculation, benchmark rate reforms in major countries have been completed, marking the beginning of the post-LIBOR era. Depending on their circumstances, major economies are either using a combination of the existing benchmark, the inter-bank offered rate (IBOR), and the new benchmark, the risk-free reference rate (RFR), or they have entirely transitioned to RFRs following the discontinuation of IBOR calculation. The overarching principle of benchmark rate reforms promoted by the Financial Stability Board (FSB) and global regulatory authorities lies in the adoption of RFRs as the key reference rate for interest rate derivatives transactions. As a result, RFRs have been established as the key reference rate for derivatives transactions in the global financial market.

Korea has improved the calculation of CD rates and is now publishing the Korea overnight financing repo rate (KOFR) as the RFR. In 2024, the public and private sectors have initiated efforts to transition to the KOFR-centered benchmark rate regime. Although the CD rate's reliability has improved due to changes in the calculation method, it still faces the persistent structural limitation of sluggish underlying transactions. Therefore, it is desirable to change the key reference rate for interest rate derivatives transactions from the CD rate to KOFR to align with global standards. To this end, institutional environments should be created to boost KOFR-based derivatives transactions. Given that KOFR is expected to play a crucial role in the Korean financial market, efforts should support enhancing interest rate stability.

With the cessation of USD LIBOR calculation in June 2023, the London Interbank Offered Rate (LIBOR), which had dominated the global financial market since the 1980s, has faded

* All opinions expressed in this paper represent the author's personal views and thus should not be interpreted as Korea Capital Market Institute's official position.

* Ph.D., Senior Research Fellow, Macro-Financial Analysis Department, Tel: 82-2-3771-0633, E-mail: bis@kcmi.re.kr

into history. Interest rate benchmarks play a central role in the functioning of the financial market, serving as reference rates for various financial transactions, while significantly affecting financial stability and consumer protection. The discontinuation of LIBOR calculation marked the completion of benchmark rate reforms that major countries had been conducting since 2012, heralding the beginning of the post-LIBOR era. In Korea, efforts are underway to improve the calculation of the existing benchmark, the CD rate, and to facilitate the use of a risk-free benchmark, the Korea Overnight Financing Repo Rate (KOFR). Against this backdrop, this article provides an overview of the global benchmark rate regime in the post-LIBOR era and explores implications for the benchmark rate reform in Korea.[1)]

The global benchmark interest rate regime in the post-LIBOR era

LIBOR, which represents for unsecured borrowing costs of large banks, was introduced in the late 1960s to serve as a reference rate for syndicated loans and floating-rate bonds. From the mid-1980s, LIBOR was adopted as a reference rate for interest rate swaps, and the growth of the derivatives market during that period prompted the widespread use of LIBOR in the entire financial market. With the introduction of EURIBOR and TIBOR in the 1990s, the Inter-Bank Offered Rates (IBOR) regime was established. The IBOR benchmark rate has played a pivotal role in the global financial market, serving as a reference rate for a range of financial translations centered around interest rate derivatives. However, as widely known, the revelation of rate manipulation in 2012 sparked benchmark rate reforms in major countries under the coordination of the Financial Stability Board (FSB).[2)]

Benchmark rate reforms can be categorized into two main areas: the calculation of benchmark rates and their application to financial transactions. First, benchmark calculation involves measuring the economic substance represented by benchmark rates (e.g., IBORs are referenced for unsecured borrowing costs of banks). Following the revelation of IBOR manipulation, which undermined the reliability of benchmark rates, global regulatory authorities established international standards for benchmark rates[3)] and introduced regulations on their calculation and administration. Since the manipulation was possible

1) Gratitude is extended to Dr. Jindong Kim of Hana Bank for providing valuable advice for this article

2) Financial Stability Board (FSB), 2014, *Reforming major interest rate benchmarks.*

3) International Organization of Securities Commissions (IOSCO), 2013, *Principles for financial benchmarks.*

because the rate was not based on actual transactions, the methodology for calculating IBORs has been refined to reduce reliance on expert judgment and to ensure that it is based on actual transactions as much as possible.

In addition, following the 2008 global financial crisis, secured borrowings by financial institutions have increased and the use of collateral and central clearing for derivatives transactions have become mandatory, resulting in a growing need for risk-free reference rates. In response, major countries have developed near risk-free reference rates (RFRs) to measure the risk-free borrowing costs for financial institutions. RFRs have been selected as overnight repo rates or unsecured rates, based on the highest volume of actual transactions, in the short-term money market for each country (each currency). RFRs and IBORs vary in several aspects. Most notably, IBORs include the credit risk of banks, while RFRs exhibit the characteristic of risk-free rates in financial transactions. Consequently, the IBOR regime has transitioned to a dual benchmark regime comprised of IBOR+ (improved IBOR) and RFRs.

Second, the use of benchmark rates involves selecting and applying a benchmark rate as the reference rate that determines the payoff of financial transactions. The appropriateness for a benchmark rate for a financial transaction can be assessed based on whether the benchmark rate is appropriate for the purpose of the financial transaction. As financial institutions engage in transactions to manage specific risks, the suitability of a reference rate for a financial transaction depends on the extent to which the risk measured by the reference rate corresponds to the risk that the financial transaction aims to manage. For instance, when banks wish to share the risk of unsecured borrowing costs with borrowers through lending, IBORs serve as an appropriate reference rate for loans.

The previous IBOR regime uniformly applied IBORs without considering the characteristics of benchmarks and their suitability for financial transactions. However, the FSB has recommended that either RFRs or IBORs be applied to each financial transaction based on appropriateness. While IBORs can still be applied to spot transactions such as loans and bonds, the FSB has advocated for the use of RFRs as the standard reference rate for interest rate derivatives, citing the following reasons.

First, interest rate derivatives constitute the largest portion of IBOR-referencing financial transactions, making them more susceptible to manipulation compared to other transactions. To enhance financial stability and consumer protection, it is desirable to adopt RFRs as

reference rates for interest rate derivatives, given that RFRs are derived from a large volume of actual transactions and are inherently resistant to manipulation. Second, as interest rate derivatives primarily aim to hedge against fluctuations in risk-free, market-wide interest rates, RFRs are more appropriate than IBORs, which reflect the credit risk of banks, as the reference rate. Prior to the 2008 global financial crisis, major banks' credit risk was perceived to be minimal and thus, IBORs were commonly treated as risk-free rates, facilitating the management of market rate risk through interest rate derivatives transactions using IBORs as the reference rate. However, the financial crisis underscored banks' credit risk, significantly widening the gap between IBORs and risk-free rates. Consequently, IBORs became less suitable for interest rate derivatives in terms of risk management.

The transition from IBORs to RFRs as the reference rate for interest rate derivatives has been the central principle and objective of global benchmark rate reforms over the past decade. This transition has garnered widespread consensus among financial institutions involved in benchmark rate reforms. However, the FSB has stipulated that IBORs should continue to be used as the reference rate for derivatives transactions in instances where IBORs are applied to spot translations such as loans and bonds, necessitating effective risk management.

Major countries, in line with the multiple rates principle, have improved their IBOR calculation methods and have been working to apply RFRs as the reference rate for derivatives transactions. With the confirmation of the cessation of LIBOR calculation, the US, UK, and Switzerland, which previously relied solely on LIBOR as their benchmark, have changed their benchmark rate reforms to substitute LIBOR with RFRs across all LIBOR-referencing financial transactions. This transition to using only RFRs as the reference rate following the end of IBOR calculation is referred to as the RFR regime. Conversely, the Euro area and Japan, which previously used their own IBORs, have adopted a multiple-benchmark regime incorporating both RFRs and IBOR+. Other countries have opted for either the RFR regime or the multiple-benchmark regime, depending on their specific circumstances. Below is an overview of the adoption status of RFRs and IBOR+ for major financial transactions.

As global benchmark rate reforms focus on applying RFRs to derivatives transactions, RFRs have increasingly assumed a prominent role in the interest rate derivatives market. The FSB has recommended that even countries adopting a multiple-benchmark regime expand the use of RFRs in their derivatives market.[4)] Following the cessation of LIBOR calculation in

4) Financial Stability Board (FSB), 2022, *Progress report on LIBOR and other benchmark transition issues.*

the US, UK, and Switzerland, RFRs have become the standard reference rate for derivatives transactions. Table 1 below illustrates the proportion of global interest rate derivatives transactions referencing RFRs. The UK and Switzerland have fully switched to using RFRs as the reference rate for all interest rate derivatives transactions. In the US, more than 70% of derivatives transactions now use RFRs. The US has a lower share of RFR-referencing derivatives transactions compared to the UK or Switzerland because derivatives referencing the federal funds rate also coexist in the US market.

Table 1. Proportion of RFR-referencing interest rate derivatives transactions by currency

(Unit: %)

	US Dollar	British Pound Sterling	Swiss Franc	Euro	Japanese Yen	Australian Dollar
Q4 2022	59.9	99.8	100	20.2	96.3	34.0
Q4 2023	72.3	99.8	100	30.7	99.0	34.7

Note: Based on exchange-traded and cleared over-the-counter interest rate derivatives transactions for Q4 2023
Source: ISDA

It is also noteworthy that in countries with a multiple-benchmark regime incorporating both IBOR+ and RFRs, there has been a significant increase in the proportion of RFR-referencing derivatives transactions. In Japan, the majority of interest rate derivatives transactions now utilize RFRs as the reference rate. In the Euro area and Australia, where IBOR-referencing transactions previously dominated the market, RFRs and IBOR+ now coexist as primary reference rates in the derivatives market following the adoption of RFRs. In these regions, IBOR+ is widely used for loans and bonds, leading to sustained demand for derivatives transactions hedging based on IBOR+. Similarly, in Japan, IBOR+ serves as the reference rate for loans and bonds, with some derivatives transactions utilizing IBOR+ for risk management purposes.

Since around 2020, RFRs have become the standard reference rate for floating rate notes (FRNs) in the US, UK, and Switzerland. As shown in Table 2, the Euro area, Japan, and Australia, which continue to use IBOR+, still apply IBOR+ as the key reference rate to FRNs. Notably, in the Euro area and Japan, RFRs have started to be utilized as the reference rate in the FRN market.

Table 2. Proportion of reference rates for FRNs in major currencies (by issuing amount)

(Unit: %)

Reference rate	US Dollar	British Pound Sterling	Swiss Franc	Euro	Japanese Yen	Australian Dollar
RFR	96.2	100	83.7	14.0	16.4	0.6
IBOR+				85.4	61.5	99.4
Other	3.8		16.3	0.6	22.1	

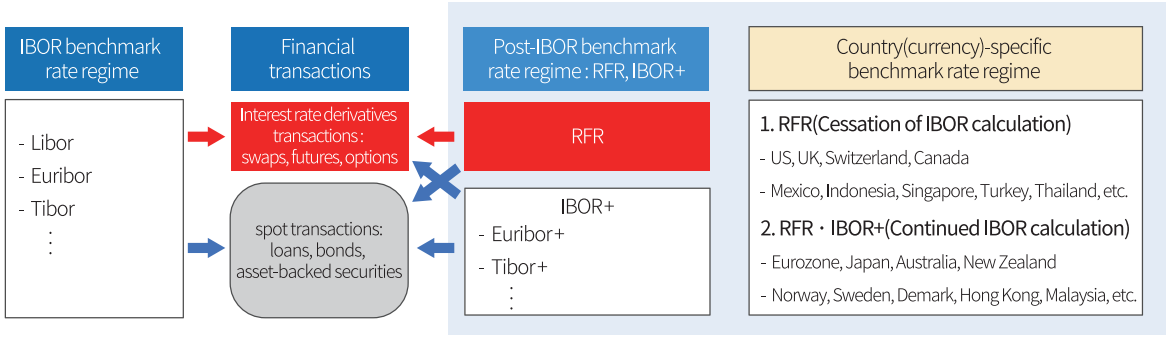
Note: Based on FRN issuance data for Q4 2023 by currency on Bloomberg

Source: Bloomberg

As for loans, country-specific institutional and historical characteristics play a crucial role in selecting the reference rate. The application of RFRs to loans varies by country. In the US, UK, and Switzerland, RFRs are considered to have been successfully established. However, it should be noted that the introduction of RFR-based loans in these countries often involves the reference rate transition for existing LIBOR-based loans. Additionally, lending based on other reference rates, such as central bank policy rates, is also prevalent in these countries. In the Euro area and Japan, IBOR+ continues to serve as a key reference rate for lending.

The evolution of the global benchmark regime observed thus far can be summarized in Figure 1.

Figure 1. Comparison of benchmark rate regimes before and after benchmark reforms



Source: Korea Capital Market Institute

Implications for the benchmark rate reform in Korea

In Korea, the Act on the Management of Financial Benchmarks (the “Financial Benchmark Act”) has been enacted to impose stricter regulations on benchmark calculation and disclosure.

In addition, the calculation method of the CD rate, which is equivalent to Korea's IBOR, has been improved to introduce the CD+ rate, and KOFR has been selected as its RFR. The CD rate and KOFR are designated and managed as critical benchmarks under the Financial Benchmark Act, with the Korea Financial Investment Association (KOFIA) responsible for calculating the CD rate and the Korea Securities Depository (KSD) for calculating KOFR. In 2023, the Benchmark Rate and Short-Term Money Market Council (the "Council") was launched as a public-private partnership to guide the transition of Korea's benchmark rate regime toward the KOFR-centered regime, and significant efforts have been focused on implementing KOFR as the reference rate in 2024.[5)]

Although the specific direction for the benchmark reform will be determined by the Council, it is worth examining some key issues. The CD rate is highly utilized in financial transactions. According to data from the Financial Supervisory Service, the volume of financial transactions using CD rates as a reference rate reached KRW 7,400 trillion as of the third quarter of 2023, with approximately KRW 7,000 trillion attributed to interest rate derivatives transactions. The CD rate in Korea is used as a reference rate for Korean won interest rate swaps among overseas financial institutions. As of June 15, 2024, the volume of CD rate-based interest rate swaps, cleared by the leading clearing house, LCH, amounts to KRW 5,200 trillion.

The KOFIA, responsible for calculating CD rates, has enhanced its calculation method to raise the reliability and robustness of the CD rate to the level of IBOR+ in major countries. Since October 2023, the improved CD+ rate has been derived using this updated method. Given that the CD+ rate calculation is strictly regulated in Korea by the Financial Benchmark Act, the likelihood of benchmark manipulation and calculation errors is not higher than that of IBOR+ adopted by major countries. In Korea, CD issuers (banks) and rate submitters (securities firms) are separate entities, which lowers the structural incentives for manipulating CD rates, unlike the situation with IBOR+ in major countries.

CD rates have historically been perceived as having limited price discovery due to their rigidity. However, as shown in Table 3, recent improvements in the calculation method have mitigated some of this rigidity. It is necessary to closely monitor future developments following these enhancements. Despite this improvement, there remains a structural issue of sluggish CD issuance, which underpins transactions, and thus, the robustness of the rate has not been

5) Financial Services Commission, March 29, 2024, The Benchmark Rate and Short-Term Money Market Council, press release.

sufficiently guaranteed. The current situation calls for a shift in the existing regime in which CD rates are widely used for various financial transactions.

Table 3. Proportion of business days with unchanged CD rates in Korea

(Unit: %)

	2018	2019	2020	2021	2022	2023	2024
5 business days	95	75	82	61	62	46	21
10 business days	95	69	70	43	47	35	10

Note: The figures represent the proportion of unchanged CD rates publicly released by the KOFIA for five and ten business days.
Source: Korea Financial Investment Association

As declared by the Council, it is necessary to apply KOFR as the key reference rate to interest rate derivatives transactions in order to align with global benchmark rate reforms. To this end, a key priority is to facilitate KOFR-based interest rate derivatives, specifically KOFR-OIS (Overnight Index Swap). KOFR-OIS functions as a financial instrument for managing KOFR-related risks and is a requirement for the smooth execution of various KOFR-based financial transactions, including loans and bonds, potentially paving the foundation for the KOFR ecosystem going forward.

Stimulating the KOFR-OIS market is also crucial for enhancing financial stability and protecting financial consumers. As collateral exchanges and central clearing for derivatives transactions have expanded following the global financial crisis, many countries have replaced the IBOR yield curve with the risk-free OIS yield curve as the discount rate for valuing IBOR-based derivatives transactions. Unlike these countries, Korea lacks an OIS market, leading to the ongoing use of the CD-IRS (Interest Rate Swap) yield curve for valuing various derivatives transactions including CD-IRS transactions. The current approach may result in valuation errors[6] that could negatively affect financial stability and consumer protection through various channels, such as the distortion in financial institutions' profit and loss assessments, errors in market risk measurement, and misrepresentation of economic gains and losses in financial statements. Hence, it is necessary to boost the KOFR-OIS market to normalize the valuation method for derivatives transactions in Korea.

6) In derivatives transactions, cash or high-quality collateral is exchanged, effectively eliminating counterparty credit risk in cash flow exchanges. Therefore, it is appropriate to use the RFR yield curve (KOFR-IOS yield curve), rather than the CD-IRS yield curve which reflects bank credit risk, as the discount rate for calculating the present value of derivatives contracts.

The introduction of the KOFR-OIS market represents a shift from CD rates to KOFR as a reference rate for interest rate swap transactions. Although voluntary trading could be activated among financial institutions participating in the Council, it is difficult to adopt a new benchmark within the established benchmark rate ecosystem due to liquidity externalities. Recognizing this issue, Darrell Duffie from Stanford University and Jeremy C. Stein from Harvard University, prominent professors who guided global benchmark rate reforms, have emphasized the necessity for authorities to encourage financial institutions to adopt RFRs through public initiatives.[7)]

Therefore, the regulatory framework aimed at stimulating KOFR-IOS should be established in Korea. First, it is imperative to facilitate the use of the KOFR-OIS yield curve for the valuation of derivatives. Second, the importance of KOFR-OIS should be underscored by creating KOFR positions into financial institutions' operations. This can be achieved by designing KOFR-based fallbacks[8)] for CD rate-referencing financial transactions. In the short term, fallbacks for interest rate derivatives transactions should be established, and in the long term, fallbacks should be set for other financial transactions such as loans and bonds. Third, it is worth considering transitioning to KOFR as the reference rate for cross-currency interest rate swaps (CRS). CRS involves exchanging cash flows between different currencies. Most major countries have adopted their respective RFR as the reference rate for CRS. Even the Euro area and Japan, which maintain IBORs, apply their own RFRs to CRS. However, in the case of CRS in Korea, the reference rate for the US dollar has been changed to the US RFR, SOFR, while the fixed rate remains the reference rate for the Korean won in CRS. In the global financial market, the difference in premiums between currencies is called the currency basis, which captures risk premiums by currency and serves as a key element of CRS. Therefore, it is desirable to use KOFR, the RFR for the Korean won, in domestic CRS involving major currencies to facilitate price discovery for the currency basis. Adopting KOFR as the reference rate for CRS will spur demand for hedging through KOFR-OIS by financial institutions, thereby significantly boosting the KOFR-OIS market.

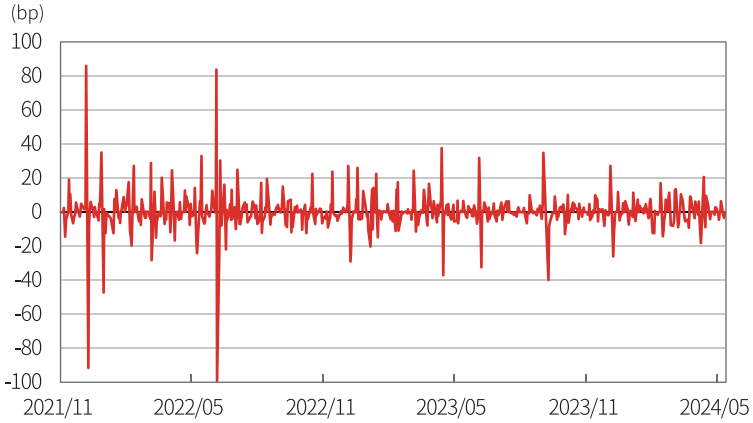
As RFRs grow in importance, countries are working to manage RFR volatility. In the Korean financial market, where KOFR is expected to play a pivotal role, continuous efforts are needed

7) Duffie, D., Stein, J. C., 2015, Reforming LIBOR and other financial market benchmarks, *Journal of Economic Perspectives* 29(2), 191-212.

8) Fallbacks refer to the alternative reference rate that could be applied in financial transactions where CD rates are used as the benchmark rate, in case the calculation of CD rates permanently ceases.

to mitigate interest rate fluctuations. As KOFR, like the call rate, is a risk-free rate that excludes other risks, it is desirable from both a monetary policy perspective and the utilization of KOFR to maintain stability and consistency with the Bank of Korea (BOK)'s policy rate. Figure 2 depicts the changes in KOFR, with its daily volatility reaching 11 basis points since the initial calculation of KOFR. Assessing the appropriateness of volatility in absolute terms has its limitations, but it is worth considering the underlying reasons for the relatively high level of volatility. Typically, both domestic and overseas RFRs and overnight rates in the short-term money market tend to exhibit periodic rate jumps on specific days, particularly around regulatory rate reporting dates. An analysis reveals that the US SOFR also experienced end-of-month and end-of-quarter effects until 2019. However, following the introduction of the Fed's Standing Repo Facility (SRF), such rate jumps disappeared from 2021 onwards, leading to notable improvements in rate stability.[9)]

Figure 2. Daily changes in KOFR



Note: Daily changes in spreads between KOFR and the BOK's benchmark rate (compiled from November 26, 2021 to June 5, 2024)

Source: Korea Securities Depository

Compared to RFRs in major countries, KOFR is characterized by a higher frequency of events that can trigger rate jumps. Market participants in Korea attribute this to various technical factors prevalent in the domestic short-term money market, which trigger rate jumps more frequently than in major countries.[10)] These factors occasionally interact with banks' reserve status, amplifying volatility. As a result, daily changes of 10 basis points or more in KOFR

9) Brace, A., Gellert, K., Schlogl, E., 2023, SOFR term structure dynamics-Discontinuous short rates and stochastic volatility forward rates, *Journal of Futures Markets 44(6), 936-985.*

10) Similar characteristics are observed in the call market.

have occurred on 15% of all business days since November 26, 2021. While interest rate fluctuations driven by these factors may not reflect economic supply and demand changes in financial institutions, they can affect the valuation of KOFR-based derivatives transactions. This introduces potential inconveniences for financial institutions seeking to utilize KOFR, which requires caution. In this context, it is worth looking forward to the effects of the BOK's expansion of eligible institutions for open market operations.[11)]

Conclusion

With global benchmark rate reforms, the scope for the use of RFRs in the global financial market has become greater than initially expected. Despite the improved reliability of CD rates, the Korean benchmark rate regime should be further enhanced to align with international standards. A primary objective in this regard is to facilitate KOFR-based derivatives transactions. Benchmark rate improvements require sustained, concerted efforts led by the Council, rather than relying solely on individual financial institutions. The public sector should create an institutional environment to encourage financial institutions to engage in KOFR-based derivative transactions, while taking into account the varying capacities of institutions to adopt KOFR.

11) Bank of Korea, January 25, 2024, Bank of Korea expands eligible institutions for open market operations and implements regulatory improvements, press release.