Topical Presentation: Global Reference Rate Reforms and the FX Market

GFXC MEETING

HOSTED BY THE BANQUE DE FRANCE

29-30 NOVEMBER 2018

Session Agenda

Part 1: Developments in Global Reference Rate Reform

- Update from FSB Official Sector Steering Group - Nov 2018
- Update on ARRC Reforms

Part 2: Relevance to the FX Market

- Implications for FX markets: Illustration - Cross currency basis swaps
- Questions for discussion

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Developments in Global Reference Rate Reform: The Need for Reform

“ [Interest rate] benchmarks are at the heart of the plumbing of the financial system. They are widely referenced in financial contracts. Corporate borrowing rates are often priced as a spread to an interest rate benchmark. Many derivative contracts are based on them, as are most asset-backed securities. In light of the issues around the London Inter-Bank Offered Rate (LIBOR) and other benchmarks that have arisen over the past decade, there has been an ongoing global reform effort to improve the functioning of interest rate benchmarks.”

Guy Debelle (Deputy Governor of the Reserve Bank of Australia), September 8, 2017 speech

“…Reference rates are vital to the efficient market functioning. They facilitate trading in standardized contracts, which lowers transaction costs and increases market liquidity. Robust reference rates can also reduce information asymmetries and the risk of misconduct by providing transparent, independent pricing.”

William C. Dudley (Former President of the Federal Reserve Bank of New York), May 24, 2018 at Bank of England Markets Forum 2018

“In our view it is not only potentially unsustainable, but also undesirable, for market participants to rely indefinitely on reference rates that do not have active underlying markets to support them. As well as an inherently greater vulnerability to manipulation when rates are based on judgements rather than the real price of term funding, there are a host of questions about whether and how such reference rates can respond to stressed market conditions…I and my colleagues have therefore spoken to all the current panel banks about agreeing voluntarily to sustain LIBOR for a four to five year period, i.e. until end-2021.”

Andrew Bailey (Chief Executive of the FCA), July 27, 2017 at Bloomberg London

“The focus now is on transition. Market participants in every sector and market that use LIBOR now need to come together to identify and resolve issues, change business practices, and adopt alternative benchmarks...”

Mark Carney, May 24, 2018 at Bank of England Markets Forum 2018

FSB OSSG Progress Report: Reforming Major Interest Rate Benchmarks (Nov 2018)

Covers progress made in –

- Strengthening of IBORs
- Identification of and transition to alternative reference rates
- Enhancing contractual robustness

Strengthening of IBORs

- Work to strengthen IBORs have continued – methodologies, regulatory and supervision frameworks
- For LIBOR, which could case once office sector support is withdrawn at end-2021, transition is necessary

Identification of and transition to alternative reference rates (i.e. risk free rates or RFRs)

- Approach towards RFRs have diverged across jurisdictions
- GBP/USD/CHF: Transition away from LIBOR necessary, to RFRs
- EUR: RFR transition may take longer; continue to support EURIBOR reform
- Other currencies (AUD/CAD/JPY/SGD): multiple rate approach adopted

FSB OSSG Progress Report: Reforming Major Interest Rate Benchmarks (Nov 2018)

Enhancing contractual robustness

- To address risk of discontinuation of major interest rate benchmarks
- Scope includes derivatives and cash products (e.g. loans, bonds, mortgages)
- ISDA and ARRC consultations on contractual fallbacks, and ISDA Benchmark Supplement

Substantial work remains…particularly transition planning and implementation challenges

- Continued engagement needed between authorities and market participants
- Approaches would differ across markets
- Areas of focus include -
  - Development of products referencing RFRs
  - Development of standards/protocols for RFRs
  - Transitioning of cross-currency basis market to new RFR benchmarks
  - Development of RFR-derived term rates
  - Conversion of legacy contracts

Replacing LIBOR: Overview of RFRs

Risk-Free Rates Identified in LIBOR Currency Areas

	ARRC selected SOFR. Produced by NY Fed since April 2018 (secured)
	RFRWG selected SONIA. BoE has reformed Sonia, produced since April 2018 (unsecured)
	ECB WG selected ESTER. ECB to produce in H2 2019 (unsecured)
	BOJ Study Group selected TONAR (unsecured)
	Working Group selected SARON, administered by SIX (secured)

* See Annex for links to committee websites

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Briefing on the Alternative Reference Rates Committee ("ARRC")

- **ARRC Formation:** In November 2014, the Federal Reserve Board ("FRB") created the Alternative Reference Rates Committee ("ARRC") to:
  1. **Identify a set of possible alternative reference rates** that comply with IOSCO Principles for Financial Benchmarks
  2. **Select one of these possible rates**; and
  3. **Identify an adoption plan** with means to facilitate the acceptance and use of the alternative rate

- **Membership:** Initially over-the-counter derivative dealers (all GSIBs represented), major clearing houses (LCH, CME), ISDA, and domestic supervisors
  – Expanded in 2018 to include a broad array of market participants, including asset managers, cash market participants across loans, bonds, securitizations, as well as their industry associations

- **Selection of Rate:** Secured Overnight Financing Rate ("SOFR"), which is an overnight U.S. Treasury repo rate, selected in June 2017; publication of SOFR commenced on April 3, 2018

- **Outreach Efforts:**
  – Public consultation and interim report on two proposed alternative rates and preliminary implementation plans (May 2016) [(1)]
  – Roundtable events (June 2016, July 2018)
  – Solicitation of interest in joining a buy-side advisory group (August 2016)
  – Roundtable to solicit input on the development of the "paced transition" adoption plan (November 2017)
  – Second report released summarizing the decision to select SOFR and Paced Transition Plan (March 2018) [(2)]
  – Guiding Principles for Fallback Language in new Cash product contracts released (July 2018)
  – LIBOR fallback market consultations for Floating Rate Notes and Syndicated Loans (comments due end of November 2018)

1. Interim Report webpage: https://www.newyorkfed.org/medialibrary/microsites/arrc/files/2016/arrc-interim-report-and-consultation.pdf?la=en
2. Second Report webpage: https://www.newyorkfed.org/medialibrary/Microsites/arrc/files/2018/ARRC-Second-report

ARRC "Paced Transition" Timeline for the U.S. Derivatives Market

ARRC Paced Transition Timeline

Jul-Dec 2018	Jan-Mar 2019	Jan-Mar 2020*	Apr-Jun 2021	YE 2021
Develop infrastructure for futures/OIS trading in SOFR Trading begins in futures and/or bilateral uncleared OIS referencing SOFR	Market readiness to trade cleared OIS referencing SOFR in current PAI environment	Ability to trade cleared contracts based on either SOFR and current EFFR discount curves	CCPs no longer accept new swap contracts for clearing with EFFR as PAI and discounting unless risk-reducing for legacy contracts	Creation of a term reference rate based on SOFR-derivatives markets provided liquidity has developed sufficiently to produce a robust rate

*Clearing timeline moved up to 2018

Source: ARRC Second Report on Transition from LIBOR, March 2018

ARRC Frequently Asked Questions

Why does the market need a new benchmark rate?

LIBOR is increasingly based on the expert judgment of panel banks due to the declining amount of unsecured, wholesale borrowings by banks since the financial crisis. For this reason, LIBOR is increasingly less of a robust, transactions-based market interest rate as envisioned by international standards for benchmarks.

What other rates were considered for replacing USD LIBOR?

The ARRC considered a comprehensive list of potential alternatives, including other term unsecured rates, overnight unsecured rates such as the Effective Federal Funds Rate (EFFR) and the Overnight Bank Funding Rate (OBFR), other secured repo rates, Treasury bill and bond rates, and overnight index swap rates linked to EFFR.

Will there be a "term SOFR"?

Once the initial steps of the ARRC's Paced Transition Plan are successfully accomplished, which is expected in 2021, and liquid derivative markets referencing SOFR have developed, the final step in the Paced Transition Plan calls the creation of a forward-looking term rate based on SOFR-linked derivative markets.

Who administers and produces SOFR and how is the rate production process reviewed?

The New York Fed is the administrator and producer of SOFR. The New York Fed publishes SOFR on a daily basis on its website at approximately 8:00 a.m. eastern time. An internal New York Fed Oversight Committee periodically reviews the rate production process. The Oversight Committee consists of members from across the New York Fed organizational structure who are not involved in the daily production of SOFR.

Is SOFR meant to co-exist with LIBOR, or is it meant to replace LIBOR?

The ARRC's focus is to encourage voluntary adoption of SOFR, rather than to mandate a transition away from USD LIBOR. SOFR, therefore, will co-exist with USD LIBOR as long as USD LIBOR is published, offering market participants an alternative reference rate for new transactions.

Who will be impacted by this transition to SOFR?

Due to the broad use of USD LIBOR as a reference rate, all financial market participants including retail customers, corporations, issuers, investors, asset managers, service providers of financial products, and large financial institutions are impacted by the risks associated with USD LIBOR.

Source: ARRC Frequently Asked Questions, September 2018

What sort of financial products are expected to reference SOFR?

SOFR is suitable to be used across a broad range of financial products, including but not limited to, derivatives (listed, cleared, and bilateral-OTC), and many variable rate cash products that have historically referenced LIBOR.

What is "fallback language"?

"Fallback language" refers to the legal provisions in a contract that apply if the underlying reference rate in the product (e.g. LIBOR) is discontinued or unavailable.

What should market participants do to strengthen fallback language in derivatives?

ISDA is in the process of updating the definitions of USD LIBOR and other key benchmarks tied to interbank funding markets used in derivatives contracts to include new fallbacks (SOFR with certain contemplated adjustments for USD LIBOR) in the event of a permanent discontinuation of the relevant benchmark. ISDA also plans to publish a multilateral protocol to assist market participants in including the amended definitions (i.e., the definitions with fallbacks for benchmark cessations) in legacy swap contracts.

What should market participants do to strengthen fallbacks in cash products?

Although the timing and method of implementing new fallbacks in cash products will vary with the product type, the ARRC plans to consult on standardized fallback language available for voluntary adoption for a variety of cash products by the end of 2018.

How do we know SOFR is here to stay?

The overnight U.S. Treasury repo market that SOFR is based on is the largest rates market at a given maturity in the world, and SOFR encompasses the widest coverage of the market available, which will allow it to evolve with the market. The ARRC concluded that SOFR is superior to USD LIBOR, and other alternative reference rates considered by the ARRC. The coordination with a broad range of financial market participants, and commitments from the private-sector (including the financial services industry) will ensure the availability, adoption, and transition to SOFR in a smooth and timely manner.

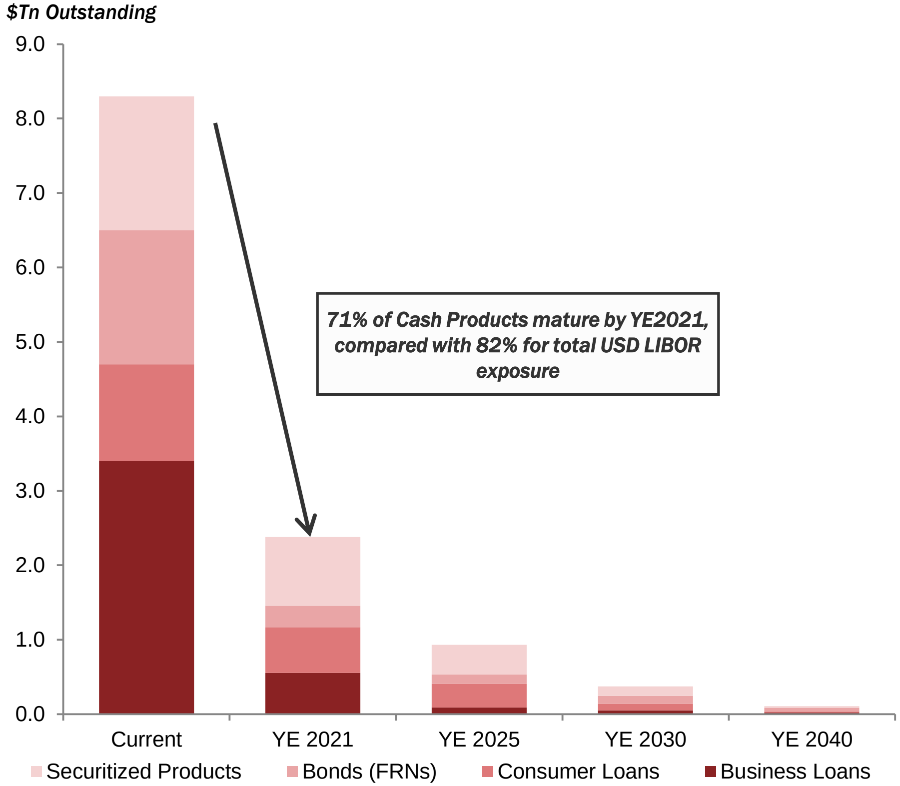
Challenges in the Derivatives and Cash Markets

Transition Challenges in the Derivatives Market

- **ISDA IBOR Fallback WG.** Considering different methodologies for fallbacks to central bank committee "risk free rates" + spread in the event of a permanent cessation of an IBOR
  - ISDA has conducted a broad survey of the market to develop consensus for one of several options for Sterling LIBOR, JPY LIBOR & several other interest rate benchmarks
    - US & Europe to be the subject of a separate consultation
  - Purpose is to adjust for the fundamental difference between the "risk free rates" (overnight rates) and LIBOR (which is a forward looking rate that takes into account credit risk)
  - *Preliminary results of the survey were released this week*:
    - Adjusted Risk Free Rate: Compounded Setting in Arrears
    - Spread Adjustment: Historical Mean Approach
    - ISDA hopes to publish aggregated and anonymized results by end of December 2018;; and preliminary feedback that results may be appropriate for USD LIBOR, EURIBOR & EUR LIBOR
- **Implementation of Fallback.** ISDA definitions to include fallback for new IBOR trades to "risk free rate" plus spread and a protocol to amend legacy IBOR transactions
- **Term Rate Challenge.** The Official Sector Steering Group (OSSG) has communicated that the derivatives market should transition to overnight rates and not wait for forward looking term rates derived from the "risk free rates"
- **Regulatory Challenges.** The ARRC Regulatory WG is seeking regulatory relief both for (a) voluntary conversion of grandfathered IBOR swaps to "risk free rate" swaps and (b) amendment of IBOR swaps to incorporate the new ISDA IBOR fallback provisions, under Title VII of Dodd Frank (e.g., applicability of uncleared margin rules, mandatory clearing and trade reporting)

Transition Challenges in the Cash Market

Cash Market Roll-Down Over Time



Source: "Second Report," Alternative Reference Rates Committee, March 2018
1. Securitized Products include MBS & CMOs, CLOs, ABS and CDOs

Typical Contract Language Varies Across Cash Products

	Fallback Rate	Consent Required
Business Loans	• Obtain bank quotes → Alternative Base Rate – Prime Rate – EFFR plus fixed spread	• **Bilateral Loans:** Agreement between borrower and lender • **Syndicated Loans:** Unanimous consent
Bonds (FRNs)	• Obtain bank quotes → Fixed Rate at last published LIBOR set	• Unanimous consent among bondholders
Securitized Products (1)	• **Agency MBS and CMO:** Issuer selection • **Non-agency MBS and ABS:** Bank poll → Fixed Rate at last published LIBOR set • **CLO:** Final LIBOR set	• **Agency MBS and CMO:** Unanimous consent • **Non-agency MBS and ABS:** Unanimous consent • **CLO:** Unanimous consent (typically called after 1-2 years)
Mortgages / Consumer Loans	• Alternative Base Rate plus / (minus) spread – Spread component undefined	• Chosen by noteholder

ARRC Market Consultations - Introduction

- ***Purpose of ARRC Market Consultations.***
  - Solicit feedback from market participants on proposed LIBOR fallback provisions to be included in **new** USD LIBOR floating rate notes ("FRNs") and syndicated loans.
  - Comments due by November 26, 2018

- ***Proposed fallbacks have 3 key components:***
  - Observable triggers that invoke the transition from LIBOR to the new replacement rate
  - A successor rate waterfall
  - A spread adjustment mechanic
    - Purpose of spread is to address the differences between LIBOR (which is a forward looking term rate with a credit risk component) and SOFR (or the other replacement rates listed further down the waterfall, which are overnight rates)

- ***ARRC members participated in the development of the proposed LIBOR fallbacks:***
  - FRN – a single proposal which defines the events that commence the LIBOR transition and a specific waterfall of replacement rates and spread adjustments
  - Syndicated loans - two different proposals:
    - Hardwired Approach - similar to FRNs, or
    - Amendment Approach – amendment mechanism allowing the borrower and administrative agent to select a replacement rate giving due consideration to market convention and recommendation by a relevant governmental authority, subject to a 5 business day negative consent of majority lenders.

ARRC Market Consultations - Trigger Events

- ***LIBOR Cessation Triggers:***
  - Public statement by benchmark administrator (ICE) that it has ceased or will cease to provide LIBOR
  - Public statement by regulator of ICE (FCA), central bank (Federal Reserve) or a resolution authority that the benchmark administrator has ceased or will cease to provide LIBOR

ISDA Triggers

- ***Proposed Additional Pre-Cessation Triggers:***
  - Failure by the benchmark administrator to publish LIBOR for five consecutive business days (and such failure is not due to a temporary disruption)
  - Public statement by the benchmark administrator that it has invoked or will invoke (permanently or indefinitely) its insufficient submissions policy
  - Public statement by regulator of the benchmark administrator announcing that LIBOR is no longer representative or may no longer be used.

- ***Opt-In Trigger for Loans:***
  - Both the Syndicated Loans Amendment Approach and Hardwired Approach allow parties to determine that a trigger has occurred if new (or amended) syndicated loans are being executed utilizing a new benchmark rate to replace LIBOR.

ARRC Market Consultations - Replacement Rate Waterfall

Proposed replacement rate waterfall for FRNs and Syndicated Loans:

<table>
<tr><th>FRN Replacement Benchmark Waterfall</th><th>Syndicated Loan Hardwired Approach Waterfall</th><th>Syndicated Loan Amendment Approach</th></tr>
<tr><td>Step 1: Term SOFR recommended by Relevant Governmental Body[1] + Spread</td><td>✓</td><td rowspan="6">The Administrative Agent and Borrower may amend the agreement to replace LIBOR with an alternative benchmark rate (which may include term SOFR) plus spread, giving due consideration to any convention for similar USD-denominated syndicated credit facilities or any selection by the Relevant Governmental Body with respect to such facilities.</td></tr>
<tr><td>Step 2: Compounded SOFR + Spread</td><td>✓</td></tr>
<tr><td>Step 3: Spot SOFR + Spread</td><td>✓[3]</td></tr>
<tr><td>Step 4: Replacement rate recommended by Relevant Governmental Body + Spread</td><td>N/A</td></tr>
<tr><td>Step 5: Replacement rate in ISDA Definitions at such time + Spread[2]</td><td>N/A</td></tr>
<tr><td>Step 6: Replacement rate determined to be an FRN industry accepted rate by issuer (or its designee) + Spread</td><td>N/A</td></tr>
</table>

[1] Relevant Governmental Body means the Fed, N.Y. Fed, or a committee officially endorsed or convened by the Fed or N.Y. Fed, such as the ARRC.

[2] If the replacement rate can't be determined in Steps 1-4 and the issuer (or its designee) determines that Step 5 is not an industry-accepted successor rate for FRNs, then Step 6 applies.

[3] If the Administrative Agent determines that Steps 1-3 cannot be determined, then the Administrative Agent and Borrower shall establish an alternative rate of interest that gives due consideration to any prevailing market convention for syndicated loans in the U.S. or any selection by the Relevant Governmental Body.

ARRC Market Consultations - Spread Adjustments

Proposed spread adjustments for FRNs and Syndicated Loans:

FRN Replacement Benchmark Spread Waterfall	Syndicated Loan Hardwired Approach Spread Waterfall	Syndicated Loan Amendment Approach Spread Adjustment
Step 1: Spread recommended by Relevant Governmental Body	✓	The spread adjustment, or method for calculation of the spread adjustment, agreed by the Administrative Agent and Borrower, giving due consideration to any convention for similar USD-denominated syndicated credit facilities or any selection by the Relevant Governmental Body with respect to such facilities.
Step 2: Spread used for LIBOR fallback in ISDA definitions, provided that the FRN replacement benchmark[1] is equivalent to the ISDA fallback rate[2]	✓[4]	
Step 3: Spread determined by issuer (or its designee) to produce a FRN industry accepted replacement rate[3]	N/A	

[1] The FRN replacement benchmark means the ***unadjusted*** benchmark listed in the replacement rate waterfall (not taking into account any spread adjustment).
[2] If the issuer (or its designee) determines that Step 2 does not produce an industry accepted successor rate for FRNs, then Step 3 applies.
[3] Issuer (or its designee) to modify the ISDA spread adjustment, if available.
[4] The Hardwired Approach does not include a requirement that the replacement benchmark is equivalent to the ISDA fallback rate.

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Relevance to the Global FX Market: Mechanics

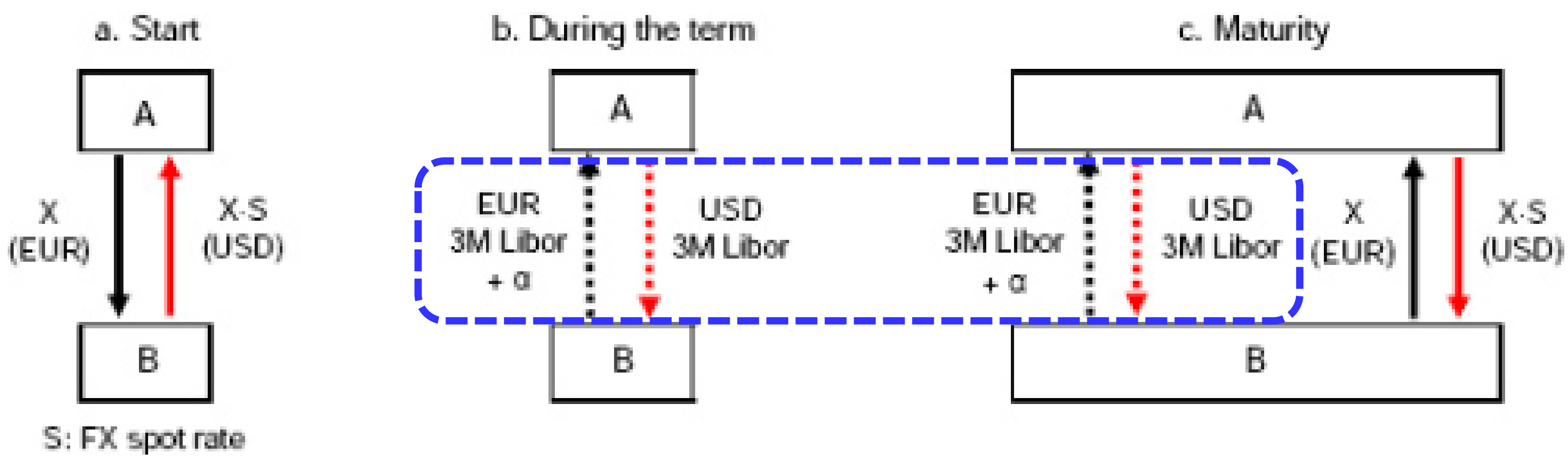
1. Interest rates factor into pricing of certain FX Products

2. Interest rates factor into contractual terms for certain FX Products

3. FX products could be an intersection where two different interest rate benchmarks will meet in a single instrument

Implications for FX markets

An illustration: Cross currency basis swaps



Intersection of 2 IBORs – Some observations

- Market convention/operational issues to be sorted out due to differing benchmark publication timings
- Secured vs. unsecured reference benchmark
- Overnight versus term rates
- Differences in the timing of benchmark reform could complicate transition efforts

Questions for discussion

1. What are the possible implications on the FX market?
2. What are the FX products that could be impacted e.g. cross currency basis swaps?
3. What is the state of industry preparedness? What are the indicators to monitor?
4. What role should the various stakeholders play in the transition?

Annex

Developments in Global Reference Rate Reform: Reform Efforts

- US: Alternative Reference Rates Committee
- UK: Working Group on Sterling Risk-Free Reference Rates
- Switzerland: The National Working Group on Swiss Reference Rates
- Japan: Study Group on Risk Free Reference Rates
- Euro Area: Working Group on Risk-Free Reference Rates for the Euro Area

Developments in Global Reference Rate Reform: Reform Efforts

Currency	Interest rate benchmark	Alternative reference rate (candidates)	Type of alternative reference rate	Remarks	Key milestones
AUD	BBSW	RBA Cash Rate	Unsecured	Multiple-rate approach has been adopted	
BRL	DI rate	Selic	Secured	Multiple-rate approach has been adopted	
CAD	CDOR	Enhanced CORRA	Secured	Multiple-rate approach has been adopted Term RFR to be developed in 2019	White paper on enhanced CORRA is to be published in Q1 2019.
CHF	LIBOR	SARON	Secured	Transition is necessary. Compounded SARON is recommended. A forward-looking term rate seems not feasible.[101]	The FCA has said it will not use its powers to maintain LIBOR beyond end-2021.
EUR	LIBOR	ESTER or Euribor	Unsecured	EUR LIBOR is not in scope of the working group on euro RFR owing to its limited market usage as compared to Euribor. Possible alternatives could be ESTER or the reformed Euribor.	The FCA has said it will not use its powers to maintain LIBOR beyond end-2021.
EUR	Euribor	ESTER	Unsecured	Term RFR under consideration, meanwhile Euribor is being reformed to meet BMR requirements.	A phase-in to a new hybrid methodology for Euribor is expected in the course of 2019.
EUR	EONIA	ESTER	Unsecured	A possible recommendation on a specific path for transition is planned around end-2018.	Usage of EONIA is to be prohibited for new contracts at the end of the BMR's transitional period, i.e. from 1 January 2020.

Developments in Global Reference Rate Reform: Reform Efforts

Currency	Interest rate benchmark	Alternative reference rate (candidates)	Type of alternative reference rate	Remarks	Key milestones
GBP	LIBOR	SONIA	Unsecured	Transition is necessary Public consultation on term SONIA reference rates released.	See RFRWG provisional timeline[102] The FCA has said it will not use its powers to maintain LIBOR beyond end-2021.
HKD	HIBOR	To be determined[103]		Multiple-rate approach not precluded	TMA market consultation by early 2019
JPY	LIBOR	TONA or TIBOR	Unsecured	Transition is necessary Term RFR planned to be discussed	The Committee will hold public consultation and a forum before publishing deliverables by late 2019. The FCA has said it will not use its powers to maintain LIBOR beyond end-2021.
JPY	TIBOR	TONA	Unsecured	Multiple-rate approach has been adopted	The Committee will hold public consultation and a forum before publishing deliverables by late 2019. JBATA will develop reforms during the first half of 2019 and conduct the second consultation on integration of Japanese Yen TIBOR and Euroyen TIBOR.
JPY	Euroyen TIBOR	TONA	Unsecured	Multiple-rate approach has been adopted	

Developments in Global Reference Rate Reform: Reform Efforts

Currency	Interest rate benchmark	Alternative reference rate (candidates)	Type of alternative reference rate	Remarks	Key milestones
SGD	SIBOR	N/A	N/A	Rate not used in SGD derivatives	Enhanced methodology to be implemented after transitional testing in H2 2019.
SGD	SOR	To be determined	To be determined	SOR is a transaction-based rate	To review the appropriate USD funding rate for SOR computation, taking into consideration the transition of USD LIBOR to SOFR.
USD	LIBOR	SOFR	Secured	Transition is necessary Aiming to create a forward-looking term reference rate, potentially based on futures, OIS, or actionable market quotes.	ARRC's Paced Transition Plan contains milestones out to 2021.[104] The FCA has said it will not use its powers to maintain LIBOR beyond end-2021. Guiding principles for fallback contract language for cash products released (in July 2018).
ZAR	Jibar	To be determined (Reformed Jibar for existing derivative contracts. Choice of ZARibor and SASFR for new derivative contracts.)	Reformed Jibar : unsecured ZARibor: unsecured- SASFR: secured	Multiple-rate approach recommended Treasury bill curve and GC repo market potential platforms for term RFRs	Recently formed MPG will map project plans once benchmark rates have been finalised in Q2 2019.