Philadelphia AFP

Global IBOR transition to alternative risk-free rates

August 27, 2018

Building a better working world

Agenda

Topic	Presenter	Time
IBOR background and transition progress	Roy Choudhury	45 minutes
Q&A		15 minutes

IBOR background and transition progress

IBOR definition, use and scope

Interbank offered rates (IBORs) impact hundreds of trillions of dollars worth of financial instruments across the globe.

IBOR definition

IBORs are average rates at which certain banks can borrow in the interbank market and range in tenors from overnight to 12 months. The rates include a spread reflecting the credit risk involved in lending money to banks.

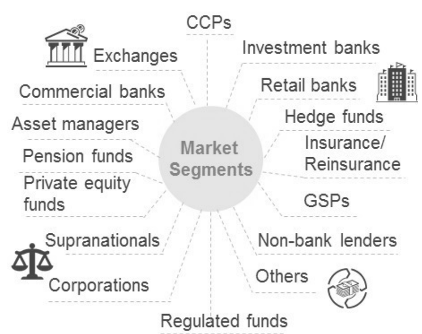
LIBOR (London interbank offered rate): the IBOR for the London interbank market

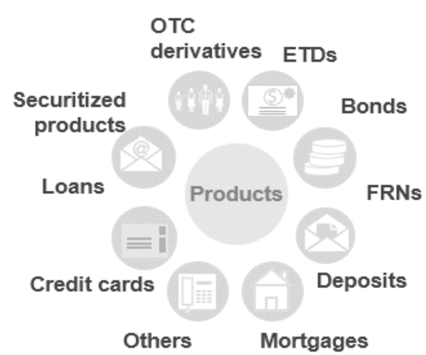
TIBOR (Tokyo interbank offered rate): the rate offered in the Japan interbank market

EURIBOR (euro interbank offered rate): the rate offered in the euro interbank market

IBOR uses

IBORs are used by a broad range of market participants in a wide array of product types.





Broad market footprint

- **USD LIBOR and EURIBOR.** Together they represent **approximately 80% (>$370t)** of the total IBOR market exposure.
- **Derivatives (over the counter (OTC) derivatives and exchange-traded derivatives (ETDs)).** OTC derivatives and ETDs represent **more than $300t (80%)** of products referencing IBORs.
- **Syndicated loans. 97%** of the $3.4t of syndicated loans in the US market reference USD LIBOR**. 90%** of the $535b of syndicated loans reference EURIBOR.
- **Floating rate notes (FRNs). 84%** of the $1.5t of FRNs in the US market reference USD LIBOR**. 70%** of the $2.6t of FRNs in the euro market reference EURIBOR.
- **Business loans. 30%-50%** of the $2.9t of business loans in the US market reference USD LIBOR**. 60%** of the $5.8t of business loans in the euro market reference EURIBOR.
- **Tenor.** The **3-month** tenor by volume is the most widely referenced rate in all currencies (followed by the **6-month** tenor).

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IBOR reform background

Reasons for transition

Drivers

The global regulatory community initiated IBOR reform to reinstate confidence in the reliability and robustness of benchmark rates. The effort to reform IBORs is driven by the following factors:

- **Charges of attempted manipulation** and false reporting
- **Systemic risk** due to the uncertainty surrounding the durability of IBORs
- **Decline in the liquidity** within the interbank unsecured funding markets
- **Reluctance** from LIBOR and EURIBOR panel banks **to submit quotes**

Background

- Wheatley review of LIBOR
- G20 asked the Financial Stability Board (FSB) to reform major interest rate benchmarks
- The Official Sector Steering Group (OSSG) was established
- International Organization of Securities Commissions (IOSCO) principles published
- The Market Participants Group (MPG) was established

- The outcome of these reviews was a recommendation to enhance existing IBORs and promote the development and adoption of alternative nearly risk-free reference rates (RFRs).
- Working groups[1] have convened across several jurisdictions to better understand challenges and propose alternative RFRs.
- Based on the proposals, market participants have begun mobilizing programs to assess the impacts to their organizations.

Publication of LIBOR past 2021 is not guaranteed

[1]Trade associations: ISDA, AFME, ICMA, SIFMA and SIFMA AMG

Regulatory call to action

Global regulators are playing an active role in communicating the urgency for a faster transition away from IBORs. In meetings and speeches around the world, regulators pressed institutions to limit new business referencing LIBOR and to develop plans to mitigate reduce dependencies on LIBOR commensurate with a firms exposures and risks.

Thoughts from regulatory bodies

"I hope it is already clear that the discontinuation of LIBOR should not be considered a remote probability 'black swan' event. Firms should treat it is as something that will happen and which they must be prepared for.

"Firms that we supervise will need to be able to demonstrate to FCA supervisors and their PRA counterparts that they have plans in place to mitigate the risk and to reduce dependencies on LIBOR."

- FCA: Andrew Bailey, July 12, 2018[1]

"The discontinuation of LIBOR is not a possibility. It is a certainty. We must anticipate it, we must accommodate it and we must adapt to it."

- CFTC: J. Christopher Giancarlo, July 12, 2018[2]

"The transition away from LIBOR represents a significant risk event for firms of all sizes, and they should actively manage this transition through their existing frameworks for identification, management, and mitigation of risk. Supervisors should continue to support this objective by ensuring that all firms are aware of the transition and that LIBOR-related issues are being addressed in a way that is commensurate with a firm's exposures and risks."

- FRB NY: William Dudley, May 24, 2018[3]

"For market participants transitioning to RFRs, much work lies ahead. Each firm must develop its own individual implementation plan including assessing its exposures tied to LIBOR-based products and determining how to amend legacy contracts to reflect an alternative RFR."

- CFTC: Brian Quintenz, July 12, 2018[4]

"It is important that we find ways to make it as easy as possible to use SOFR because the risks to LIBOR are, at this stage, quite considerable."

- FRB: Randal Quarles, July 19, 2018[5]

[1] Source: Interest rate benchmark reform – transition to a world without LIBOR
[2] Source: Opening Statement of Chairman J. Christopher Giancarlo before the Market Risk Advisory Committee Meeting, Washington, D.C.
[3] Source: The Transition to a Robust Reference Rate Regime
[4] Source: Opening Statement of Commissioner Brian Quintenz before the CFTC Market Risk Advisory Committee Meeting
[5] Source: Opening statement of Vice Chairman for Supervision Randal Quarles at the ARRC roundtable

Alternative RFR identification

Working groups in each jurisdiction have recommended robust, alternative RFRs to transition away from existing IBORs, with the exception of Europe. The RFR benchmarks are overnight, whereas the current use of IBORs is largely in term rates.

Jurisdiction	UK	US	EU	Switzerland	Japan
IBORs	GBP LIBOR	USD LIBOR	EURIBOR, Euro LIBOR	CHF LIBOR	JPY LIBOR, JPY TIBOR, EUROYENTIBOR
Working Group	Working Group on Sterling Risk-Free Reference Rates	Alternative Reference Rates Committee	Working Group on Euro Risk-Free Rates	The National Working Group on Swiss franc Reference Rate	Study Group on Risk-Free Reference Rates
Alternative RFR	Reformed Sterling overnight index average (SONIA)	Secured overnight financing rate (SOFR)	Euro short-term rate (ESTER)[2]	Swiss average rate overnight (SARON)	Tokyo overnight average rate (TONA)
Description	o Unsecured o Fully transaction-based o Encompasses a robust underlying market o Overnight, nearly risk-free reference rate o Includes a volume-weighted trimmed mean o Subgroups on term rates, SONIA futures, pension funds	o Secured o Fully transaction-based o Robust underlying market o Overnight, nearly risk-free reference rate that correlates closely with other money market rates o Subgroups on cash products (loans, Collateralized Loan Obligations (CLOS), FRNs, mtgs, other) outreach	o The Working Group on Euro Risk-Free Rates has not selected an alternative RFR, but is expected to do so by October 2018 o EONIA is not considered viable in its current form	o Secured o Became the reference interbank overnight repo on August 25, 2009 o Secured rate that reflects interest paid on interbank overnight repo o Subgroups on loan and deposit markets and capital markets and derivatives	o Unsecured, transaction-based benchmark for the robust uncollateralized overnight call rate market o The Bank of Japan calculates and publishes the rate on a daily basis using information provided by money market brokers known as Tanshi o As an average, weighted by the volume of transactions corresponding to the rate
Rate administrator	Bank of England	Federal Reserve Bank of New York	TBC	SIX Swiss Exchange	Bank of Japan
Transition plan published	No[1]	Yes	No	No	No

[1] The Working Group's preference for a potential plan has been indicated, but a plan has not been published (Source: Bank of England Official Website).
[2] The ESTER has been identified but is not yet approved.

Overview of the Paced Transition plan

The US Alternative Reference Rates Committee (ARRC) has proposed an initial transition timeline and strategy referred to as the Paced Transition. Institutions impacted by the transition from US LIBOR to SOFR will need to plan ahead for changes to their processes and infrastructure.

The Paced Transition strategy aims to:

1. Minimize disruptions to existing contracts
2. Create a robust source of demand for hedging in the SOFR

This plan envisions gradually moving price alignment interest and eventually discounting from the effective federal funds rate to the new rate chosen by the ARRC (SOFR).[1]

Challenges to consider before adoption of plan

- Basis risks between the SOFR and EFFR, and the SOFR and LIBOR
- No mechanism to close legacy contracts for CCPs in the event of a member default[2]
- Expedited regulatory approvals for CCPs that seek to clear new OTCD products referencing the SOFR might be needed
- Clearing requirement uncertainty for IRS products referencing the SOFR

Successful implementation of this plan requires a critical mass of liquidity in futures contracts and/or OTC derivatives contracts that reference SOFR, which can be achieved by a significant amount of voluntary trading by ARRC member banks and other market participants.

The Paced Transition timeline

2018

- Trading infrastructure established - **H2**
- Trading begins in SOFR futures and/or bilateral, uncleared OIS (reference SOFR) - **end of '18**

2019

- Trading begins in cleared OIS that reference SOFR in the EFFR price aligned interest (PAI) and discounting environment - **Q1**

2020

- PAI CCPs offer new cleared derivatives that pay PAI based on SOFR and begin discounting based on SOFR (in both cases, instead of EFFR) - **Q1**

2021

- CCPs no longer accept new swap contracts for clearing with EFFR PAI and discounting - **Q2**
- Creation of a term reference rate based on SOFR derivatives markets - **end of '21**

In July 2017, the Chief Executive of the FCA, Andrew Bailey, delivered a speech confirming the full support for LIBOR submissions until the end of 2021. However, the FCA does not think markets can rely on IBOR continuing to be available indefinitely.[3]

1. A full transition strategy that would move a more significant portion of the derivatives markets away from LIBOR to SOFR has not yet been planned.
2. Source: ARRC October 2017 Minutes (https://www.newyorkfed.org/medialibrary/microsites/arrc/files/2017/October-31-2017-ARRC-minutes.pdf)
3. Source: https://www.fca.org.uk/news/speeches/the-future-of-libor

What is SOFR?

In June 2017, the ARRC endorsed SOFR, a broad Treasury repo financing rate, as the preferred alternative RFR to the USD LIBOR.

- The SOFR is based on overnight repurchase agreement transactions on US Treasury securities (Treasury repo) with significant average daily trading volumes.

- The concept behind why the SOFR was chosen as the preferred alternative RFR to the USD LIBOR is that the SOFR:
  - Is fully transaction-based and encompasses a robust underlying market and robust underlying data
  - Is an overnight, secured, nearly risk-free reference rate that correlates closely with other money market rates
  - Covers multiple repo market segments, allowing for future market evolution
  - Complies with standards such as the IOSCO Principles

- The SOFR is financially distinct but correlated with both the USD LIBOR and the daily effective funds rate. Given that the SOFR is a secured rate backed by government securities, it does not take into account credit risk, as was the case with USD LIBOR.

- There are two key design features that distinguish SOFR from USD LIBOR that drive SOFR-LIBOR basis and that will lead to transition valuation and risk management challenges:
  - **The first** is, because of the collateralized nature of SOFR, it does not include a bank credit spread premium that exists in LIBOR rates.
  - **The second** is term structure. USD LIBOR includes daily fixings for multiple terms, including O/N, 1M, 2M, 3M, 6M and 12M tenors, whereas SOFR currently only has an O/N tenor.

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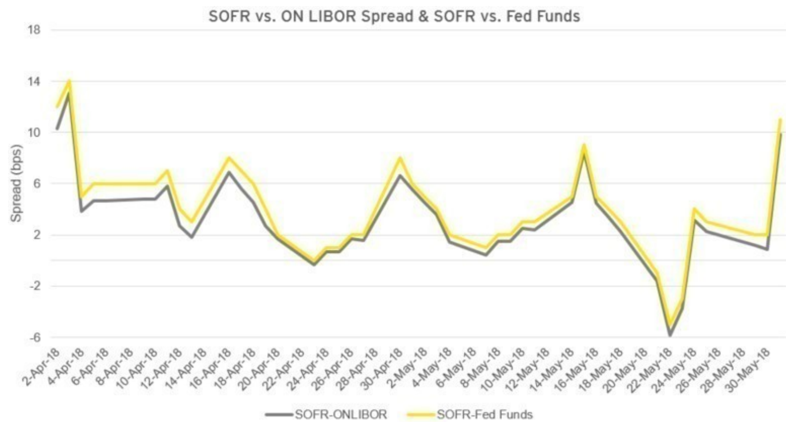
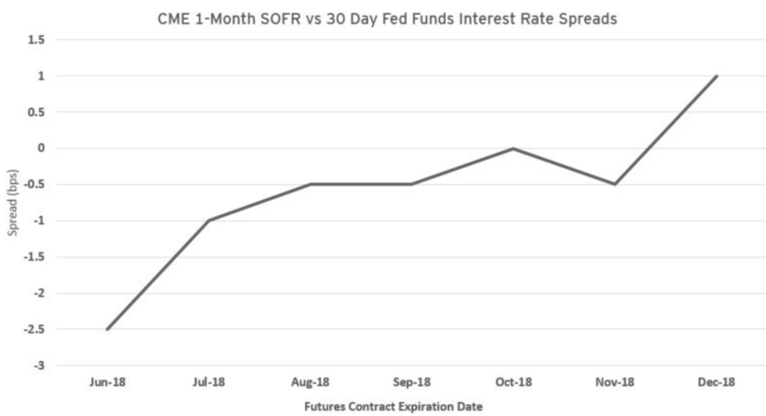
SOFR-LIBOR and SOFR-EFFR basis

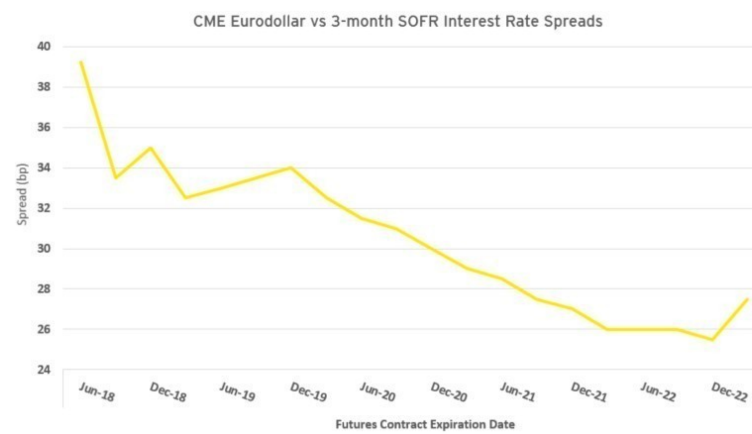
The launch of SOFR futures and basis contacts offers important information to the market-implied SOFR-LIBOR and SOFR-fed funds basis.



Summary statistic	SOFR	ON LIBOR	Fed Funds
Average (%)	1.7360	1.7046	1.6963
Median (%)	1.7300	1.7044	1.7000
Standard deviation (%)	0.0357	0.0028	0.0053



Summary statistic	1-month SOFR	30-day Fed Funds
Average (%)	2.0214	2.0157
Median (%)	1.9700	1.9650
Standard deviation (%)	0.1176	0.1260



Summary statistic	3-month SOFR	CME Eurodollar
Average (%)	2.6195	2.9239
Median (%)	2.7275	3.0025
Standard deviation (%)	0.2310	0.2030

Notable market-led developments

Infrastructure providers are now clearing products referencing SOFR and SONIA. SOFR-based debt is being issued. Trade associations have undertaken various initiatives to enhance the robustness of fallback language and increase market awareness and education.

CME	May 2018: Sept. 2018 (Est.):	▸ Launched one-month and three-month SOFR futures contracts ▸ Delayed the launch of cleared swaps to offer SOFR PAI and discounting
CurveGlobal	April 2018:	▸ Launched a three-month SONIA futures contract
ICE/IBA	May 2018: June 2018: Q3 2018:	▸ Gradually transitioning from the current LIBOR methodology to the waterfall methodology ▸ Issued a panel bank survey "ICE LIBOR Key Currency and Tenor Publication Post 2021" ▸ Launched a one-month SONIA futures contract in December 2017, and is expected to launch a three-month SONIA futures contract in June 2018
LCH	July 2018 (Est.):	▸ Launched its clearing of OIS and basis swaps referencing SOFR
ISDA	April 2018: May 2018: July 2018:	▸ Published supplement 20 (to the 2006 ISDA Definitions) for SONIA ▸ Published supplement 57 (to the 2006 ISDA Definitions) for SOFR ▸ Issued industry-wide consultation on several technical aspects of fallbacks for derivatives
LMA	May 2018:	▸ Published revised "Replacement of Screen Rate" clause to provide further flexibility in syndicated loan contracts
AFME	April 2018:	▸ Produced Benchmark Rate Modification Language for securitization contracts
Trade associations[1]	Feb. 2018: June 2018:	▸ Published the 2018 Global IBOR Transition Roadmap ▸ Published the 2018 Global IBOR Transition Report
Cash issuances	July 2018: Aug. 2018:	▸ Fannie Mae issued three tranches of floating rate notes referencing SOFR ▸ The World Bank issued a two year SOFR-priced bond

[1]The collective trade associations include ISDA, SIFMA, SIFMA AMG, ICMA, AFME.

IBOR fallbacks for 2006 ISDA definitions

Consultation on approach

The International Swaps and Derivatives Association (ISDA) consultation of fallbacks for derivatives contracts was issued in July 2018 and sets out options for adjustments that would apply to the fallback rate in the event an IBOR is permanently discontinued.

Benchmarks in scope:[1]

GBP LIBOR, JPY LIBOR, TIBOR, Euroyen TIBOR and BBSW

Consultation will run for 3 months until Oct. 2018 → ISDA determines style of approach → ISDA and independent third-party vendor build → ISDA publishes final approach for review & comment → ISDA publishes Supplement & Protocol

Adjustment A: term to overnight rate	Adjustment B: credit premium
Option 1: Spot overnight rate, sets on the date that is one or two business days prior to the beginning of the relevant IBOR tenor	**Option 1: Forward approach**, based on observed market prices for the forward spread between the IBOR and ARR. This requires both a forward IBOR and ARR curve to be published (out to 30-60 years) and for future dates beyond the last point on the curve the spread will remain static at the last date on the curve
Option 2: Convexity-adjusted overnight rate, similar to spot approach but adjusts for the difference between interest at the spot overnight rate vs. the realized rate of interest by daily compounding of the ARR over the IBOR's term	**Option 2: Historical mean/median approach**, based on the mean or median spot spread between the IBOR and the ARR over a 5 or 10 year historical lookback period going into effect after a one-year transitional period after the fallback rate takes effect
Option 3: Compounded setting in arrears rate, daily compounded ARR observed over the IBOR tenor period taking into account actual daily interest rate movements during the relevant period	**Option 3: Spot-spread approach**, based on the average of the daily spot spread between the IBOR and the ARR over a shorter specified number of days (1 week, 2 weeks, 1 month) with no transitional period after the fallback rate takes effect
Option 4: Compound setting in advance rate, mathematically the same as the arrears approach but set at the beginning of the IBOR tenor period	

New derivative transactions entered on or after the date of the Supplement will automatically include amended floating rate option fallback language.

Legacy derivative transactions entered before the date of the Supplement can be amended to include the same amended floating rate fallback language only if both parties voluntarily adhere to the Protocol.

[1] ISDA will launch supplemental consultations covering USD LIBOR, EUR LIBOR and EURIBOR but requests preliminary feedback for these benchmarks.

Business and implementation risks

There are several business, operational, reputational and regulatory risks that need to be managed as part of the transition.

	Risk	Description
Business	1 *New business*	May forgo new business opportunities as a result of changes in product offerings and re-engagement with clients
Business	2 *Market share*	Possible reduction of market share if not ready to support alternative RFR cash and derivative products
Business	3 *Pricing*	Uncertainty in pricing variation and potential value transfer
Business	4 *Hedging*	Ineffective internal strategy resulting in additional/unexpected basis within tenors and across currencies
Operational	5 *IBOR footprint*	Lack of visibility into real-time IBOR footprint across the enterprise for internal reporting and external requests
Operational	6 *Prioritization/duplication*	Scarce resources vs. competing internal priorities, potentially creating duplication of work
Operational	7 *Compressed timelines*	Insufficient time for required downstream testing and process verification
Operational	8 *Model approval*	Model enhancements and updates may require additional second-line testing and review of models
Operational	9 *Product offerings*	Failure to support new products or existing products referencing alternative RFRs
Reputational	10 *Readiness to respond*	Inability to respond to regulatory, peer, client and/or industry signals for transition
Reputational	11 *Commitments*	Commitment to serving as active members of industry working groups
Reputational	12 *Inconsistent messaging*	Clients who have multiple touch points with the organization could receive divergent information
Regulatory	13 *Exam readiness*	Increased regulatory focus and anticipated inquiry/exam
Regulatory	14 *CCAR*	Incorporation of potential IBOR cessation event into 2019 scenario and required trending assumptions in 9Q
Regulatory	15 *Capital distribution*	Lack of understanding of the capital and stress-testing impact under different rate environments

Key transition challenges

Organizations must assess their firm-wide exposure to fully understand the implications of the transition challenges across all business lines and functions.

IBORs may not continue post-2021	As new alternative RFRs are being identified across jurisdictions and products based on the emergence of new rates, organizations should prepare for a dual-rate environment in the short term and plan for the possible cessation of IBORs.
Reputational and litigation risk	The transition poses a high potential for reputational and litigation risk if the transition negatively impacts clients. Organizations should make sure they have necessary representation from Legal as part of their IBOR transition program to help monitor this risk.
Market adoption and liquidity of alternative RFRs	Market adoption and liquidity in derivatives referencing alternative RFRs is needed to support the transition. As the transition timing for cash products is uncertain, organizations should prepare for the introduction of an additional basis market to hedge their exposures.
Lack of identified alternative RFRs	The lack of identified alternative RFRs in certain currencies creates additional uncertainty. Organizations should prioritize transition efforts towards their largest exposures, but still monitor and prepare to transition for all currencies.
Inconsistent transition dates	Inconsistent transition dates create additional complexities for cross-currency transactions. Organizations should continue to push for a globally harmonized transition but prepare for the increased cross-currency basis risk and to respond to client inquiries related to deals/products that reference multiple currencies.
Select alternative RFRs may not contain a credit premium	As it is a primary focus of industry groups to drive consensus on the credit spread for each alternative RFR, organizations should develop their internal view on how the credit spread should be calculated (e.g., forward, historical mean, spot). Organizations should also run an internal impact analysis under different scenarios and begin to review their cost of funds as new products emerge.
Absence of term rate	There is a view that term rates may be required to facilitate a transition for cash products. Organizations should engage in industry groups to monitor the development of term rates for alternative RFRs.
Renegotiation of client contracts	Legacy contracts that reference IBORs may need to be renegotiated to protect against the cessation of IBORs. Organizations should begin identifying contracts that would need to get renegotiated and actively engage in industry working groups to drive consensus on enhanced fallback language.
Systems, data and processes	Systems, data and processes often reference IBORs. Organizations should conduct an enterprise-wide assessment on systems, data and processes to understand where IBORs and other benchmark rates are stored for downstream processing, embedded in code and/or are key components of processes.
Models referencing IBORs	Models referencing IBORs will need to be enhanced, documented and reviewed. Organizations should inventory all models that use IBORs as an input and/or use historical IBOR data as a parameter and plan sufficient time for these models to be updated and validated.

Short-term industry priorities

Key priorities for 2018 and 2019

Although a degree of uncertainty still exists in the marketplace, organizations are focused on the following near-term priorities to prepare for the transition.

Enterprise mobilization of IBOR transition initiative

- Executive sponsor designation
- IBOR transition program lead
- Key stakeholders across business lines and enterprise functions
- Global governance framework
- Work stream definition
- High-level road map
- Inventory of risks and issues
- Internal education
- External education and communication

Assess impact of IBOR transition across all core business lines and enterprise functions:

- Products and financial instruments
- Legal contracts
- Business processes, data and systems
- Financial and risk models

Repeatable capability to report on IBOR exposures on an ongoing basis including regulatory data requests

Business and IT infrastructure readiness to trade SOFR futures and SOFR swaps

Business case based on impact assessment – outlining cost and resource estimates and financial and balance sheet impacts

Readiness for on-site IBOR examination by regulators

2019

Continue to advocate and socialize determinations made with respect to potential publication of IBORs beyond 2021

Product readiness across new ARR products and existing products referring ARRs, including to trade SOFR-based swaps, loans and other products referencing ARRs

Develop hedging strategy to mitigate basis risk between ARRs and IBORs

Develop business strategy to advance new opportunities related to ARRs

Coordinate transition readiness plan(s) across all core business lines and enterprise functions, including:

- Industry-led progress
- Pre-execution and execution activities
- Transition timelines
- Transition dependencies
- Costs/budgets

Establish a communication plan detailing client outreach strategy to ensure a coordinated and transparent transition

Begin migration to SOFR-based PAI and discounting environment for cleared derivatives

Continued IBOR readiness examination and monitoring by regulators

2020

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SEC disclosures

Item 1A: Risk factors

Some SEC filers have started disclosing the risk of IBOR transition in Item 1A: Risk factors. Financial institutions will need to evaluate the IBOR transition risk on their organizations. The following are two examples of these risk disclosures from Form 10-K:

Example 1: BNY Mellon Form 10-K Item 1A

Changes in the method pursuant to which the LIBOR and other benchmark rates are determined could adversely impact our business and results of operations.

Our floating-rate funding, certain hedging transactions and certain of the products that we offer, such as floating-rate loans, financing transactions and derivatives in connection with our trading activities, determine the applicable interest rate or payment amount by reference to a benchmark rate, such as the London Interbank Offered Rate ("LIBOR"), or to an index, currency, basket or other financial metric. In the event any such benchmark or other referenced financial metric is significantly changed or discontinued (for example, if LIBOR is discontinued), there may be uncertainty as to the calculation of the applicable interest rate or payment amount, depending on the terms of the governing instrument. In addition, such changes could affect our exposure to fluctuations in interest rates (for example, if the discontinuation of LIBOR adversely affects the availability or cost of floating-rate funding), result in our hedges being ineffective or otherwise result in losses, additional costs or lower revenues.

Example 2: JP Morgan Chase Form 10-K Item 1A

Regulation and reform of benchmarks could have adverse consequences on securities and other instruments that are linked to those benchmarks.

Interest rate, equity, foreign exchange rate and other types of indices which are deemed to be "benchmarks" are the subject of recent international, national and other regulatory guidance and proposals for reform. Some of these reforms are already effective while others are still to be implemented. These reforms may cause benchmarks to perform differently than in the past, or to disappear entirely, or have other consequences which cannot be fully anticipated.

Any of the international, national or other proposals for reform or the general increased regulatory scrutiny of benchmarks could also increase the costs and risks of administering or otherwise participating in the setting of benchmarks and complying with any such regulations or requirements. Such factors may have the effect of discouraging market participants from continuing to administer or contribute to certain benchmarks, trigger changes in the rules or methodologies used in certain benchmarks or lead to the disappearance of certain benchmarks.

On July 27, 2017, the Chief Executive of the U.K. Financial Conduct Authority (the "FCA"), which regulates the London interbank offered rate ("LIBOR"), announced that the FCA will no longer persuade or compel banks to submit rates for the calculation of the LIBOR benchmark after 2021. This announcement indicates that the continuation of LIBOR on the current basis cannot and will not be guaranteed after 2021, and it appears likely that LIBOR will be discontinued or modified by 2021.

Any of the these developments, and any future initiatives to regulate, reform or change the manner of administration of benchmarks, could result in adverse consequences to the return on, value of and market for securities and other and other instruments whose returns are linked to any such benchmark, including those issued by JPMorgan Chase or its subsidiaries.

Q&A

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