Liquidity Solutions

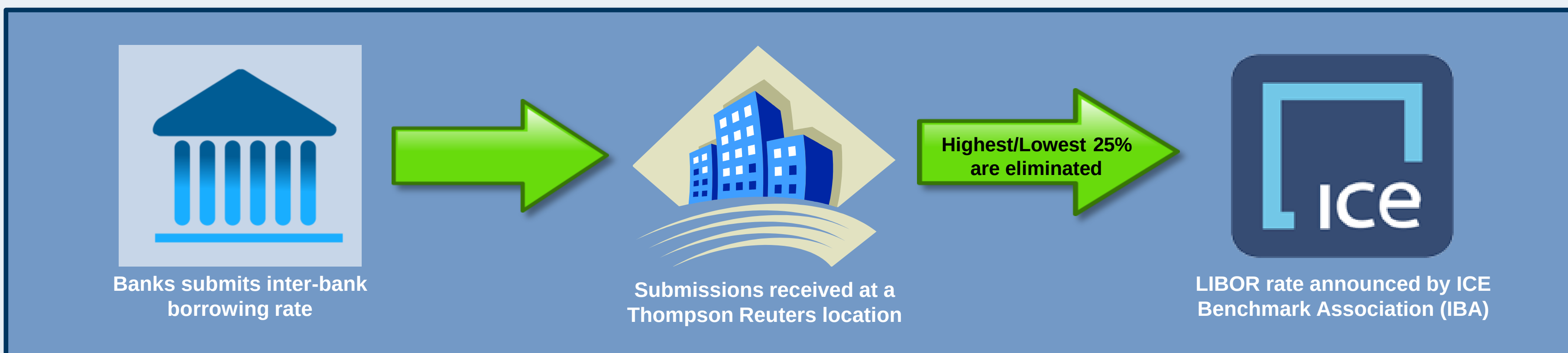
LIBOR Transition

2018

LIBOR
Overview

Review of LIBOR: London Interbank Offered Rate

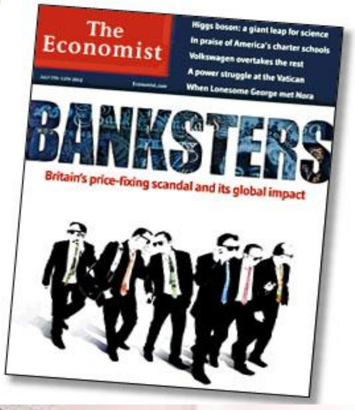
- Since January 1, 1986, LIBOR has been the “official” interest rate at which banks can borrow short-term funds without posting collateral in the interbank market
- LIBOR is used as the base / benchmark for many debt instruments (mortgages, corporate loans, government bonds, credit cards, student loans, etc.)
- How it works…Banks would answer the following question daily:
  - "At what rate could you borrow funds, were you to do so by asking for and then accepting interbank offers in a reasonable market size just prior to 11 am?"

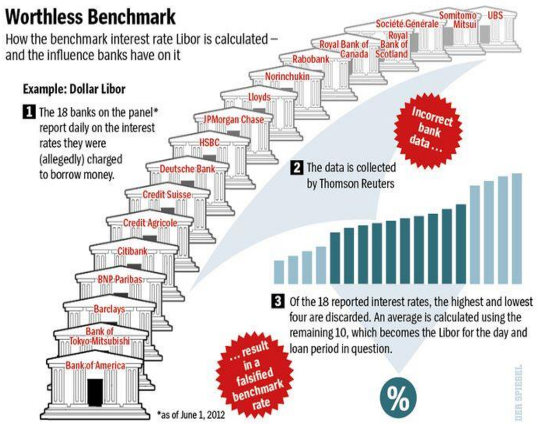


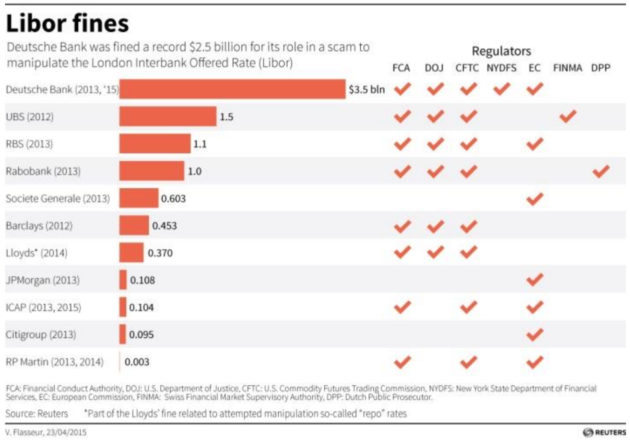
What happened?

LIBOR Downfall

- LIBOR Fallout: Manipulation by banks falsely inflating/deflating rates to profit from trades in 2012
- June 2012 - Barclays Bank settled charges that it manipulated the LIBOR and EURIBOR rates for its own benefit during the period of January 2005 and July 2008
- In 2014, the Board of Governors of the Federal Reserve System and the Federal Reserve Bank of New York convened the Alternative Reference Rates Committee (ARRC).
- "The ARRC was created to identify best practices for alternative reference rates, identify best practices for contract robustness, develop an adoption plan and create an implementation plan."
- The focus of the ARRC was to provide alternatives to LIBOR as well as develop a plan for users to voluntary adopt their recommended rate rather than mandate a transition away from LIBOR.







Source: Federal Reserve Board

The UK Financial Conduct Authority (FCA), LIBOR’s regulator, reported LIBOR will be phased out…

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“UK and European legislation does give us the power to compel banks to contribute to LIBOR where necessary. We will use those powers if we need – though we would much prefer not to have to do so. The nature of the powers will change once LIBOR is designated as a critical benchmark under the European Benchmark Regulation, and our consultation launched on 12 June set out our thinking on how we would use our powers in the light of the requirements in that Regulation, were it necessary. But we do not think it right to ask, or to require, that panel banks continue to submit expert judgements indefinitely. Indeed, the powers available to us under European Benchmark Regulation, do not allow us to compel indefinitely.”

Andrew Baily, Chief Executive of the FCA; 7/27/17

Source: FCA https://www.fca.org.uk/news/speeches/the-future-of-libor

LIBOR Replacement

Additional Rates

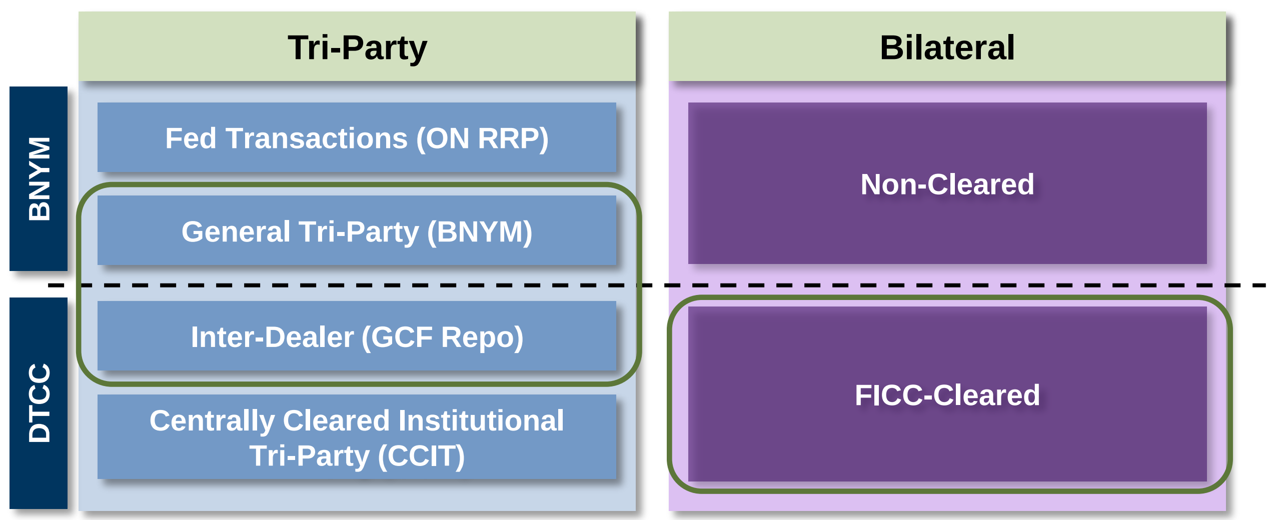
LIBOR Replacement	Other Rates
Secured Overnight Financing Rate (SOFR): Broad General Collateral Rate (BGCR) + FICC Cleared bi-lateral repo transactions (with specials stripped out) ***SOFR = LIBOR replacement (alternative) rate***	• Beginning on April 3, 2018, around 8:00 am, the Fed will begin to publish SOFR and two other new rates. • They are: – Tri-Party General Collateral Rate (TGCR): All UST repo activity traded within the non-GCF Tri-Party repo market – (BGCR): TGCR plus GCF activity

- In June 2017, the ARRC announced a broad Treasury repo financing rate, SOFR, as its recommended alternative to USD LIBOR.
- The ARRC considered a comprehensive list of potential alternatives, including other term unsecured rates, overnight unsecured rates such as the effective fed funds rate (EFFR) and overnight bank funding rate (OBFR), secured repo rates, Treasury bill and bond rates, and overnight index swap (OIS) rates linked to EFFR.
- The ARRC made its final choice of SOFR after incorporating feedback from the members of the Advisory Group.
- SOFR is based on actual transaction data, has a wide range of coverage and is a good representation of general funding conditions in the overnight Treasury repo market.

Source: Federal Reserve Board

What is SOFR?

- SOFR: Secured Overnight Financing Rate which will be published daily
- Intended to bring great transparency to market participants
- Characteristics of the SOFR
  - Fully transaction-based
  - Encompasses a robust underlying market
  - Overnight, nearly risk-free reference rate that correlates closely with other money market rates
  - Covers multiple repo market segments allowing for future market evolution
- Bank of New York Mellon (BNYM) and the Depository Trust and Clearing Corporation (DTCC) to provide transaction-level data
- How it works…



Source: Federal Reserve

SOFR “continued”

- Expected publication time of 8:00 a.m. ET based on the prior day’s trading activity
- Robust production platforms
- Dedicated staff with experience in reference rate production
- Resilient back-up processes
- Geographic dispersion among staff and platforms involved in data collection, administration, and publication
- Daily survey of primary dealers’ overnight repo borrowing will act as a potential contingency data source
- Extensive oversight
  - Regular review by oversight bodies
  - Comprehensive Ethics and Conflicts of Interest policies for staff

Source: Federal Reserve

LIBOR to SOFR

Transition Plan

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- Infrastructure for futures and/or OIS trading in the new rate is put in place by ARRC members.

  Anticipated completion: 2018 Q2

- Trading begins in futures and/or bilateral, uncleared, OIS that reference SOFR.

  Anticipated completion: by end 2018

- Trading begins in cleared OIS that reference SOFR in the current (EFFR) PAI and discounting environment.

  Anticipated completion: 2019 Q1

- CCPs begin allowing market participants a choice between clearing new or modified swap contracts (swaps paying floating legs benchmarked to EFFR, LIBOR, and SOFR) into the current PAI/discounting environment or one that uses SOFR for PAI and discounting.

  Anticipated completion: 2020 Q1

- CCPs no longer accept new swap contracts for clearing with EFFR as PAI and discounting except for the purpose of closing out or reducing outstanding risk in legacy contracts that use EFFR as PAI and discount rate. Existing contracts using EFFR as PAI and the discount rate continue to exist in the same pool, but would roll off over time as they mature or are closed out.

  Anticipated completion: 2021 Q2

- Creation of a term reference rate based on SOFR-derivatives markets once liquidity has developed sufficiently to produce a robust rate.

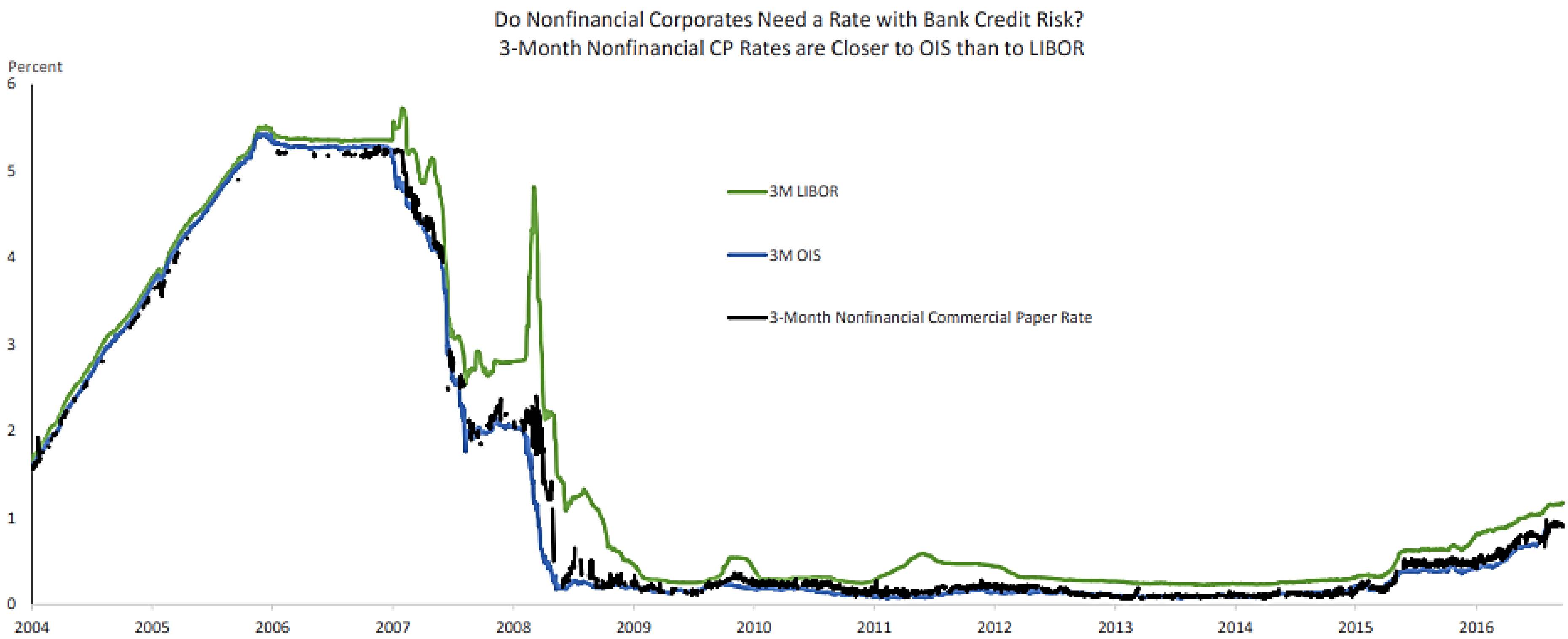
  Anticipated completion: by end of 2021

Source: Federal Reserve

LIBOR vs. SOFR Correlation

LIBOR has lower correlation to nonfinancial corporate funding costs

- Nonfinancial corporates have used LIBOR, an unsecured funding rate, to help hedge nonfinancial corporates' own cost of unsecured funding
- However, LIBOR has not historically been that well correlated with measures of nonfinancial corporate funding costs, while OIS rates have been typically more correlated.



Source: Board of Governors of the Federal Reserve (Nonfinancial Commercial Paper Rates), Bloomberg, ICE Benchmarks administration

Alternative Rates

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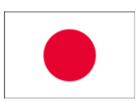
Overview of Preferred Alternative Rates

Currency Libor	Preferred Alternative Rate	Administrator	Nature	Data / Transactions Source	O/N Rate Available	Term Rate Available[7]	Working Group
	• SOFR[1]	• Federal Reserve Bank of New York	• Secured	• Tri-party repo, FICC GCF repo, FICC bilateral treasury repo	✗ Target 2018	✗ Planned 2021	• Alternative Reference Rated Committee (ARRC)
	• Reformed SONIA[2]	• Wholesale Markets Brokers' Association (WMBA) Transitioning to Bank of England	• Unsecured	• Unsecured overnight sterling transactions negotiated bilaterally and brokered in London by WMBA	✓	✗ Under Consideration	• Working Group on Sterling Risk-Free Rates
	• SARON[3]	• SIX Exchange	• Secured	• CHF repo transactions in the interbank market[6]	✓	✗ Under Consideration	• National Working Group on Swiss Frac Reference Rates
	• TONAR[4]	• Bank of Japan	• Unsecured	• Data provided by money market brokers	✓	✗ Under Consideration	• Study Group on Risk-Free Reference Rates
	• Under Discussion[5]	• European Central Bank	• TBD	• TBD	–	–	• Newly established

Source: Working Group; Oliver Wyman analysis

1 Secured Overnight Financing Rate.
2 Sterling Overnight Index Average; Reformed SONIA will not be available until April 208.
3 Swiss Average Rate Overnight.
4 Tokyo Overnight Average Rate.
5 EMMI concluded in February 2018 that EONIA's compliance with European Regulation by January 2020 "cannot be warranted."
6 As well as indicative quotes posted on SIX Repo trading platform.
7 As of February 2018.

USD Timeline

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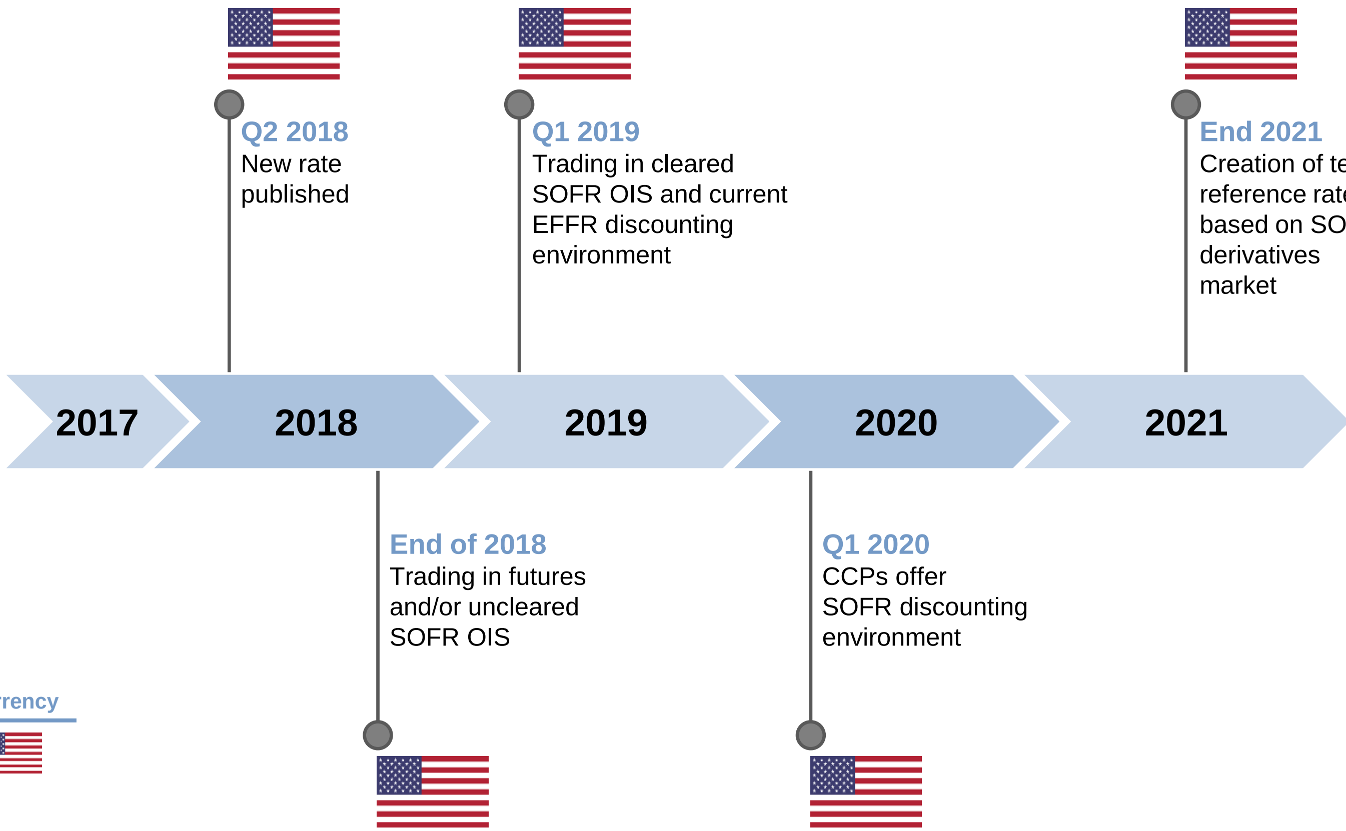

Currency

Progress Status

Managed Transition at Risk

- Replacement rate does not currently exist – expected Q2 2018
- Limited visibility on nature and behavior of replacement rate
- Timelines published but nor allowed for management transition

Source: Oliver Wyman

What's Next?

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Impact Assessment and Programme Structuring

- Prepare inventory
- Transition impact assessment including:
  - Economic
  - Client
  - Technical
  - Contracts
  - Balance sheet
  - Accounting and tax
  - Processes and systems
- Development response and structure programme
- Formalize central PMO and governance

Contracts and Terms

- Contacts gathering
- Product language analysis
- Legal frameworks design
- New business contract updates
- Disclosures
- Existing contract amendments (opportunistic)
- Existing contract amendments (strategic)
- New business contract design
- Negotiations strategy

Communication and Industry Engagement

- Understand customer need
- Discuss with regulators and authorities
- Develop coordinated external communications plan
- Coordinate on internal communication and education
- Engagement and input into industry forums
- Ongoing waves of communication as transition develops

Cash Product Strategy

- Detailed transition planning (e.g., by product, by customer)
- Client communication
- Manage economic impacts
- Client negotiations
- New product and services design
- New rate business (when available) phase in
- Existing contract update / conversion

Derivatives Product Strategy

- Detailed transition planning (e.g., by product, by counterparty)
- Client communication
- Manage economic impacts
- Client negotiations
- New product and services design
- New rate trading (when available) phase in
- Existing contract update / conversion

Firm Infrastructure

- Detailed transition planning
- Risk models update / development
- Accounting
- Tax
- Operational processes
- Controls updates
- Data management
- Systems update / development
- Systems migration as required

Source: Oliver Wyman

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Appendix

ARRC 2.0 Working Groups

- Market Structures
- Regulatory Issues
- Legal
- Floating Rate Notes
- Mortgages and Other Consumer Loans
- Business Loans
- Securitizations
- Term Rate

Source: Federal Reserve

ARRC Members

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Institutions	Agencies
AXA	Board of Governors of the Federal Reserve System
Bank of America	Consumer Financial Protection Bureau
BlackRock	Federal Deposit Insurance Corporation
Citigroup	Federal Housing Finance Agency
CME Group	Federal Reserve Bank of New York
Deutsche Bank	Office of Financial Research
Federal National Mortgage Association	Office of the Comptroller of the Currency
Federal Home Loan Mortgage Corporation	U.S. Commodity Futures Trading Commission
GE Capital	U.S. Securities and Exchange Commission
Goldman Sachs	U.S. Treasury Department
Government Finance Officers Association	
HSBC	
Intercontinental Exchange	
International Swaps and Derivatives Association	
JP Morgan Chace & Co.	
LCH Clearnet	
MetLife	
Morgan Stanley	
National Association of Corporate Treasurers	
Pacific Investment Management Company	
TD Bank	
The Federal Home Loan Bank of New York	
The Independent Community Bankers of America	
The Loan Syndications and Trading Association	
The Securities Industry and Financial Markets Association	
Wells Fargo	
World Bank Group	

Source: Federal Reserve, https://www.newyorkfed.org/medialibrary/Microsites/arrc/files/2018/ARRC-March-7-2018-press-release.pdf

Timeline for Other Currencies

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2017 | **2018** | **2019** | **2020** | **2021**

Dec. 2016
Announced TONAR as JPY Relevant risk-free rate

April 2017
SONIA recommended as alternative

Sep. 2017
ESMA announces the launch of a "new working group on a risk-free reference rate" for the Euro area

On same day, ECB announced that it will start providing an overnight unsecured index before 2020

April 2017
First activity observable in the bilateral SARON swap market

Dec. 2017
Discontinuation of TOIS fixing

Feb. 2018
EMMI concludes that EONIA's compliance with European Benchmark regulation cannot be warranted

April 2018
BoE-designed reform effective

Currency

Progress Status

Managed Transition at Risk
- O/N rate available by no current public commitment on timelines

Managed Transition at Risk
- O/N rate available but limited OIS liquidity
- No current public commitment on timelines

Critical Lack of Visibility
- No current public commitment on timelines

Critical Lack of Visibility
- Working group newly established
- Preferred alternative rate still under discussion
- However volumes referenced relatively low

Source: Oliver Wyman

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