The Working Group on
Sterling Risk-Free Reference Rates

Treasury Management System Providers Workshop

23 January 2020

Agenda

1. Welcome and competition law reminder
2. FCA presentation on RFR transition
3. Presentation on structure of the UK Working Group and of the Infrastructure Sub-Group
4. Presentation on loan specific deliverables and challenges
5. Workshop session on impact to TMS providers and their customers

Presentation on RFR transition

Toby Williams (FCA)

LIBOR Basics

- 5 currencies (USD, GBP, EUR, CHF and JPY)
- Administrator of LIBOR is ICE Benchmark Administration (IBA)
    - Owned by the US exchange group ICE
- Wholesale borrowing/funding levels are being measured (>10 million*)
- 7 tenors for each currency
    - Tenors = Overnight (O/N), 1 Week, 1 month, 2 months, 3 months, 6 months and 1 year
- 20 contributing panel banks in total
    - USD and GBP have 16, EUR has 15, JPY has 12 and CHF 11
- Submitting banks use a 3 level waterfall to submit rates every day
    - 1. Actual transactions (USD has the most underlying transactions followed by GBP and EUR and then JPY and CHF with very few)
    - 2. “Informed submissions” (a recent historic transaction adjusted by relevant markets)
    - 3. Expert Judgement
- Libor is the trimmed average of these submissions
- FCA agreement from panel banks that they will submit until end 2021

* ¥1 billion in the case of JPY, 10 million for other currencies

Risk Free Rate Basics

- RFR = Risk Free Rates (or more accurately **near** Risk Free Rates)
- Overnight (O/N) = a loan from today until the next business day
- SONIA chosen as RFR for GBP
  - Calculated by the BoE
  - Unsecured
  - The transactions underlying SONIA is around £40 billion in daily volumes
- SOFR chosen RFR for USD
  - Calculated by FRBNY
  - Secured
  - The transactions underlying SOFR regularly exceed $800 billion in daily volumes

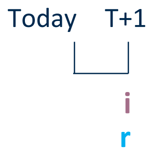
Differences between LIBOR, SONIA and compounded SONIA

LIBOR is the expectation of the interest rate (R) at the beginning of the interest period. Interest (i) is payable at the end of the period. It’s known as a forward looking rate.

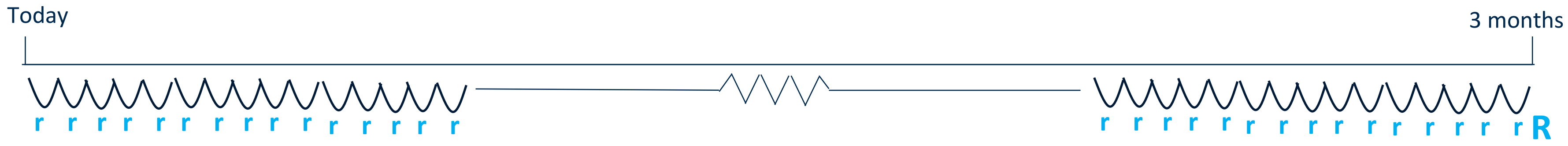
As LIBOR is a trimmed average of panel banks expectation of a rate at which they can borrow over the interest period, the rate contains a term bank **credit element**.

Differences between LIBOR, SONIA and compounded SONIA

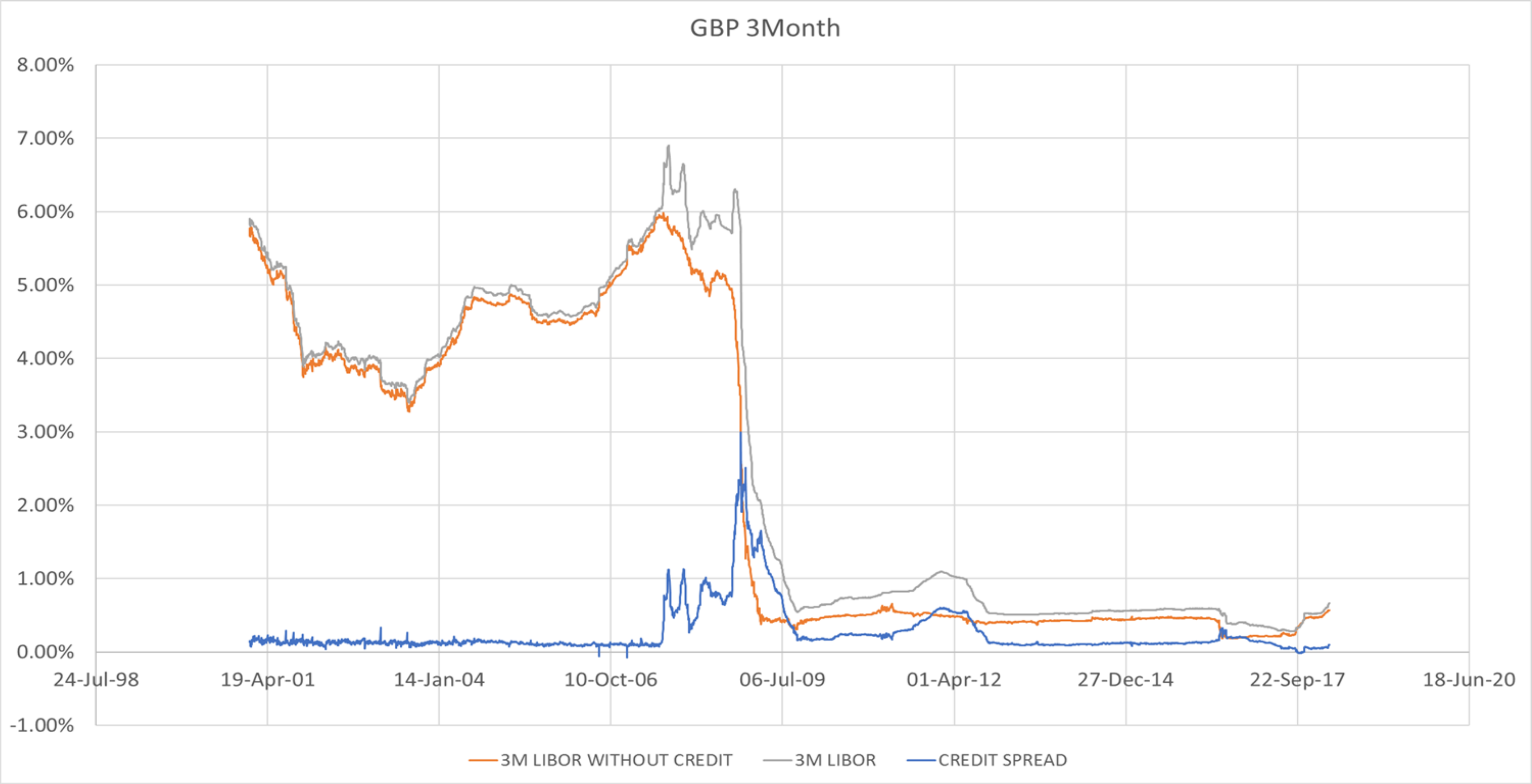
SONIA is the actual interest rate (r) traded in the market for O/N unsecured money markets. There is effectively NO credit component on this rate



Compounded SONIA is the interest rate calculated from cumulative Principal+i for every O/N period during the overall interest period. R is not known until the end of the period. And is thus known as a "backward looking rate". There is effectively NO credit component on this rate



Compounded SONIA is the rate used in contracts rather than **O/N SONIA**



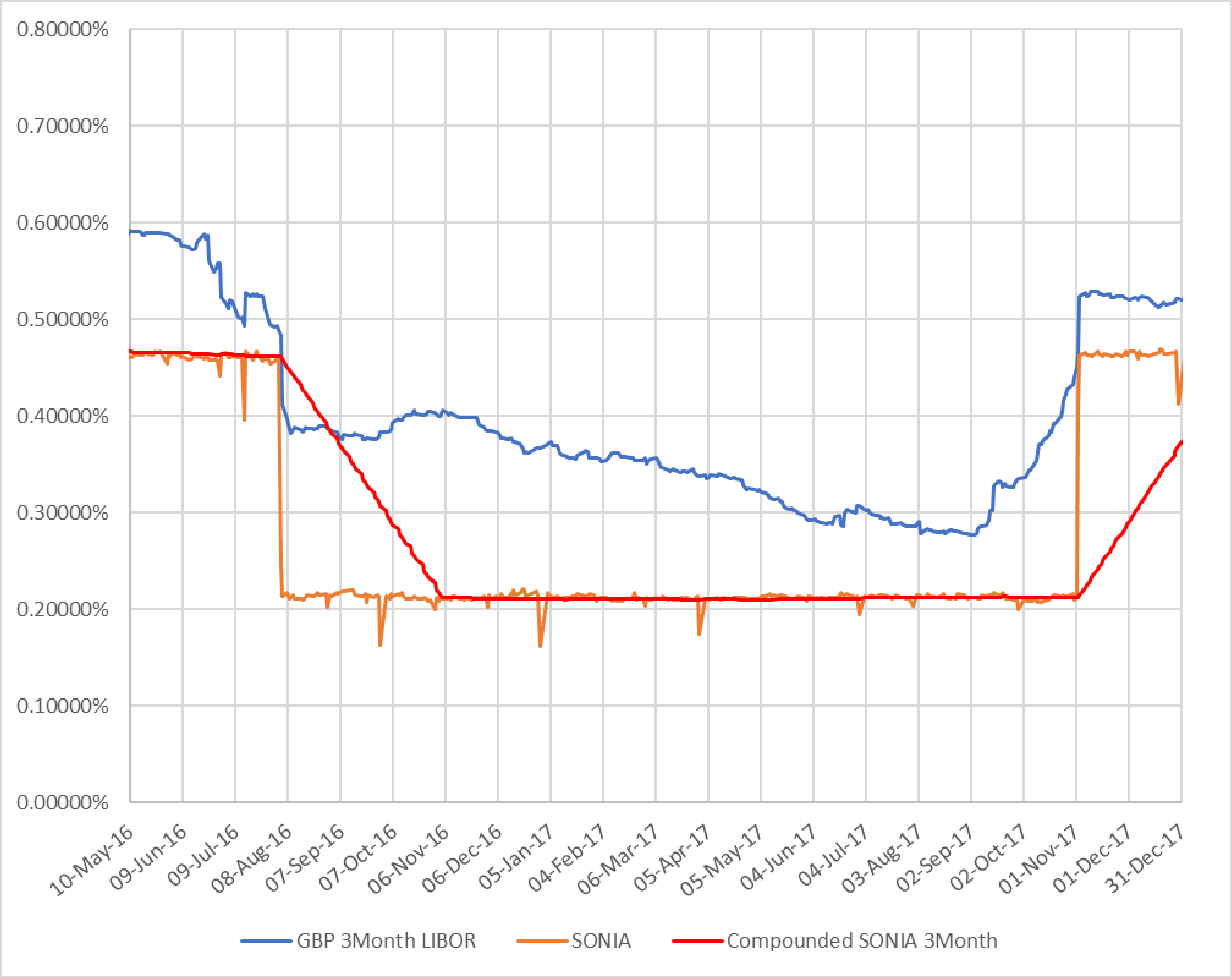
*Spread will also be influenced by liquidity and supply and demand conditions

Source: FCA calculations & IBA

Differences between LIBOR, SONIA and compounded SONIA

	GBP LIBOR	SONIA	Compounded SONIA
Forward/Backward looking	Forward	N/A	Backward
Interest known when?	Start	N/A	End
Credit component included	Yes	No	No
Underlying Market	Small (e.g. 3 months GBP has on average ~$150 million underlying it every day)	Large (~£40 billion underlying each day)	Very large (e.g. 3 months compounded SONIA has >3 trillion of O/N trades underlying it)

SONIA and compounded SONIA can't directly replace GBP LIBOR in contracts because of credit component <u>and</u> the change in when the rate is known (i.e. start versus end)



Source: FCA calculations, IBA

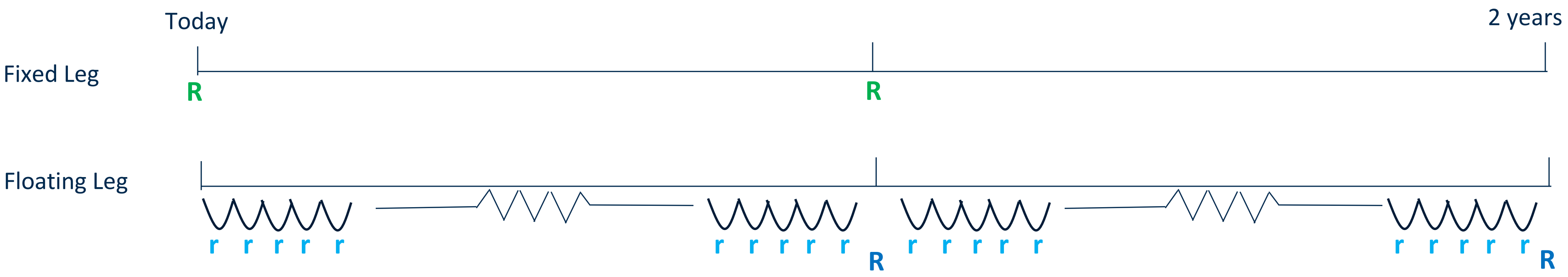
Pros & Cons of compounded SONIA (over GBP LIBOR)

Pros	Cons
No credit component (doesn't expose borrower to movements in bank credit risk)	Rate not known at start of period
Stable rate, especially when smoothed through compounding/averaging	Not a direct replacement for LIBOR due to differences in tenor and properties
Robust due to volume of transactions	Some technology / system upgrades required
Well developed swap market already	Legacy issue (LIBOR linked contracts that already exist that mature beyond end 2021)
Well developed bond market already	

What is an overnight index swap?

- An overnight index swap (OIS) is simply an interest rate swap with a floating leg of compounded O/N rates rather than LIBOR, in GBP this would be O/N SONIA

- For example a 2 year OIS (with O/N SONIA as the floating leg) would look like this:



- Again the Fixed Rate agreed at the time of trading will reflect the expectation of the floating rates (SONIA) over the life of the OIS

- There is already a flourishing SONIA OIS market > £4 trillion GBP traded most months

SONIA Term Rate in development

- The idea is that Term SONIA Reference Rates (TSRR):
    - Will become available in 1, 3 and 6 months from February 2020 in ‘beta’ form
    - Will be based upon executable OIS prices provided to multi-lateral facilities (MTFs)
    - Will not be available for use in contracts until later in the year, after a period of testing
- 4 Administrators have stepped forward to create term rates
- **The use cases of a TSRR will be limited, the Working Group has produced a paper laying out these cases**

Market Update

Swaps

- In the last six months of 2019, SONIA OIS accounted for around 50% of cleared swaps by notional traded
- Over £4 trillion of SONIA OIS traded during most months
    - January 2020 has set new daily records for SONIA OIS trading volume
- First SONIA swaptions have been traded between banks

Bonds

- From a standing start we now have over 100 issuances totalling over £50bn, with standardised conventions.
- Over £4bn of legacy stock converted to SONIA via consent solicitation process so far (including securitisations)

Loans

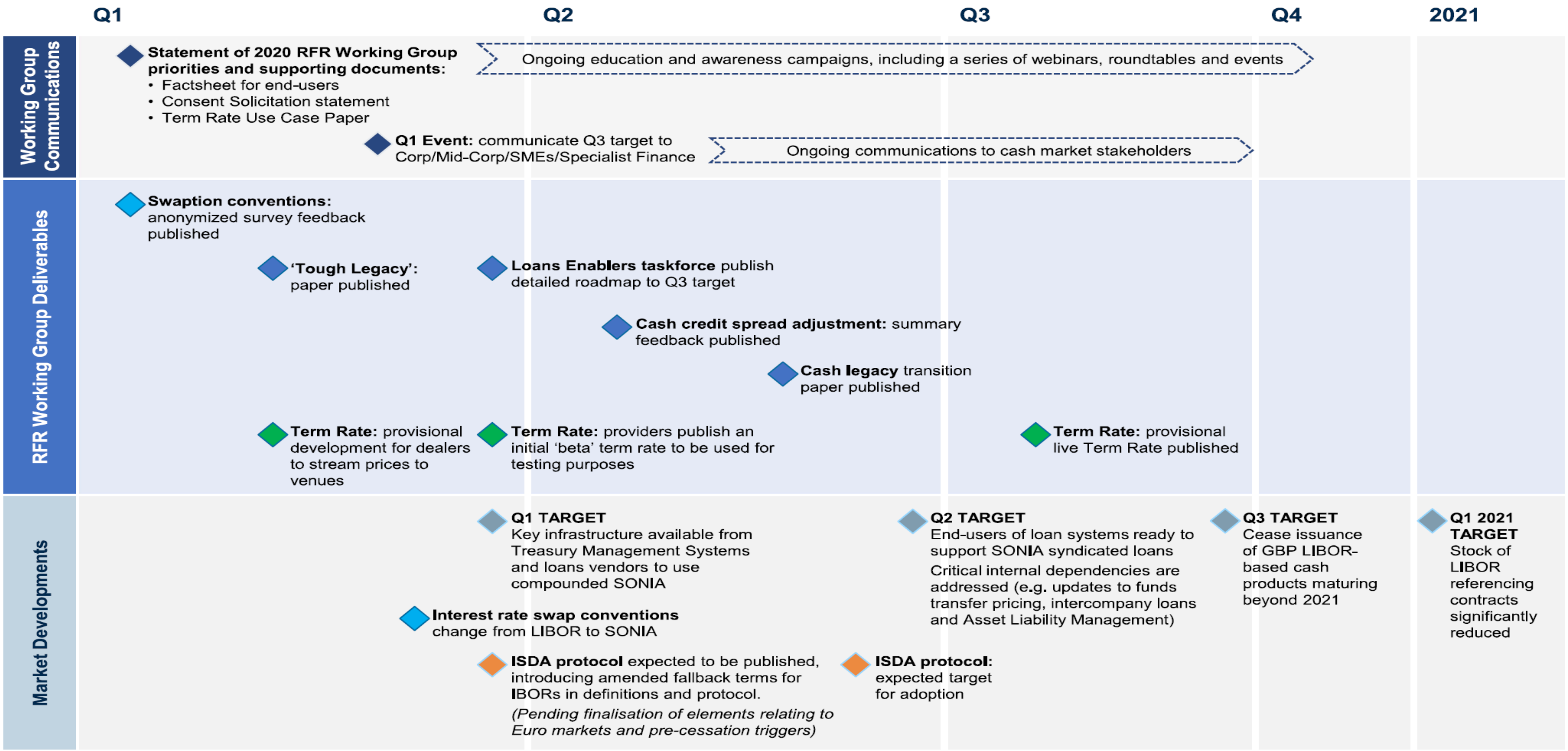
- A handful of SONIA loans and the first conversion of a LIBOR loan to SONIA announced
- Main UK lenders are working on offering SONIA lending pilot programmes
- Discussions are underway on at least one club deal in the SONIA market

RFR Working Group

- The Bank of England provides a [page on their website for LIBOR transition]
- The RFR Working Group has listed 5 priorities for 2020:
    1. Cease issuance of GBP LIBOR-based cash products maturing beyond 2021 by end Q3 2020
        - ➢ *this is the headline target for infrastructure providers to focus on*
    1. Take steps throughout 2020 to promote & enable widespread use of SONIA compounded in arrears
    2. Take steps to enable a further shift of volumes from GBP LIBOR to SONIA in derivative markets
    3. Establish a clear framework to manage transition of legacy LIBOR products, to significantly reduce the stock of GBP LIBOR referencing contracts by Q1 2021
    4. Provide market input on issues around "tough legacy"

UK RFR Working Group Roadmap | 2020

Communications
Convention developments
Working Group deliverables
Term rate developments
Key market targets
ISDA developments



Updated January 2020

Why your support is vital

- Integration and update of systems is a key step towards the Working Group's headline target – this is where your engagement is appreciated
- As compounded SONIA is backwards looking, treasury management systems that have been used for LIBOR can be incompatible
- Both financial institutions and corporates rely on systems to book, hold and issue instruments that would reference O/N rates
- You will hear from your users on this subject, and this will increase over time – the client need for this is substantial and real

Presentation on structure of the UK Working Group and of the Infrastructure Sub-Group

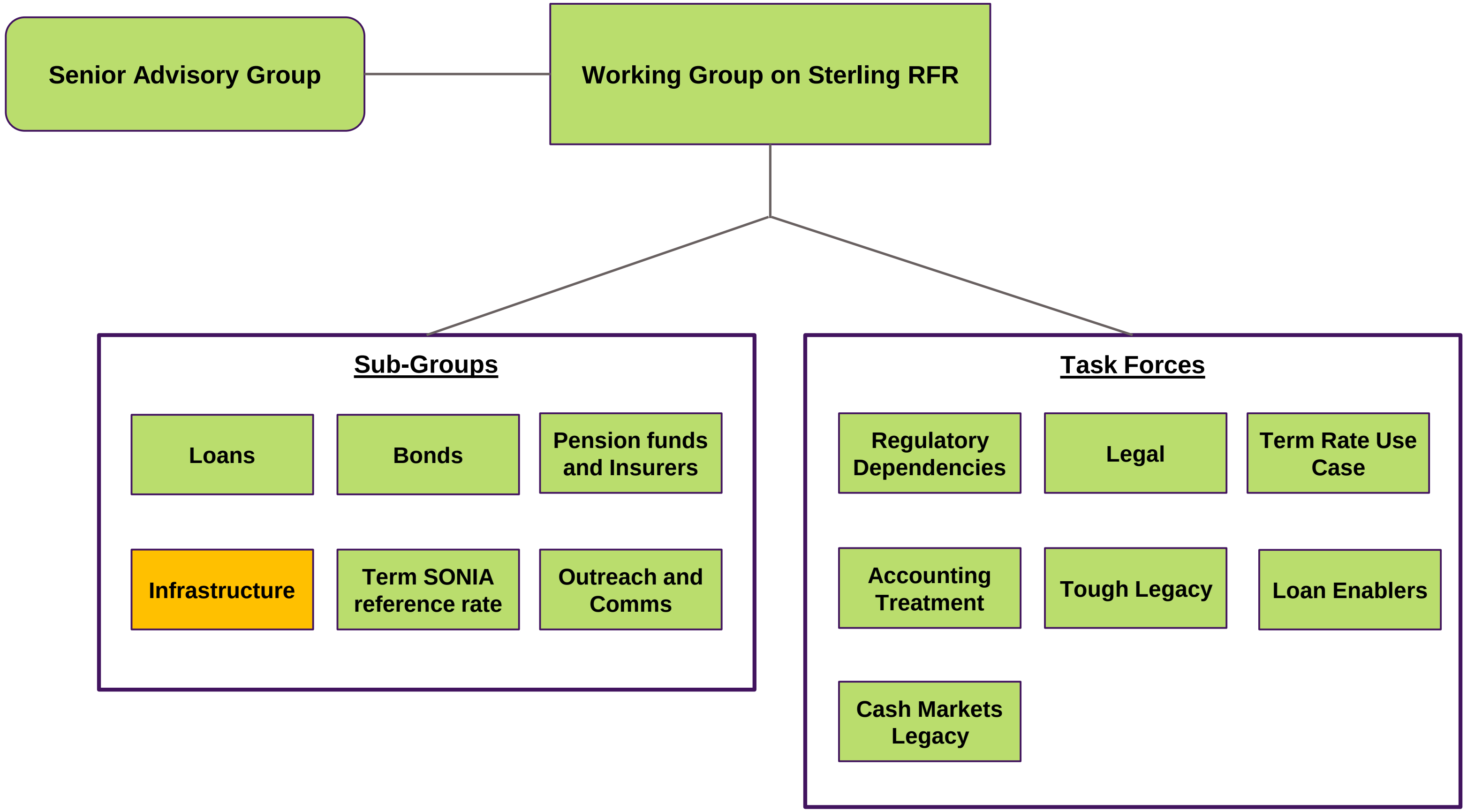
Oliver Cooke (NatWest Markets)

The Working Group on Sterling Risk-Free Reference Rates

The Working Group was set up by the Bank of England in 2015 to recommend a near risk-free reference rate (RFR) and promote its adoption as an alternative to sterling Libor. The Working Group has recommended SONIA as its preferred RFR.

The Group's overall objective is to catalyse a broad-based transition to SONIA by end-2021 across sterling bond, loan and derivative markets.

Place of the Infrastructure Sub-Group within the structure



What is happening internationally?

National Authorities have convened market-led groups. In addition to the Working Group on Sterling Risk-Free Reference Rates for GBP, there are also working groups set up for USD, EUR, CHF, JPY . These groups include a wide and diverse range of market participants, including banks, corporates, asset managers, insurers, trade associations and infrastructure firms.

Jurisdiction	Working Group	Alternative Ref Rate	Rate Name	Administrator	Collateralisation	Publication Date	Description
	Working Group on Sterling Risk-Free Reference Rates	SONIA	Sterling Overnight Index Average	Bank of England	Unsecured	Reformed 23/04/2018 Legacy 31/03/1997	Unsecured rate that covers overnight wholesale deposit transactions
	Alternative Reference Rates Committee	SOFR	Secured Overnight Financing Rate	Federal Reserve Bank of New York	Secured	02/04/2018	Secured rate that covers multiple overnight repo market segments
	The National Working Group on CHF Reference Rates	SARON	Swiss Average Rate Overnight	SIX exchange	Secured	22/09/2009	Secured rate that reflects interest paid on interbank overnight repo
	Study Group on Risk-Free Reference Rates	TONAR	Tokyo Overnight Average Rate	Bank of Japan	Unsecured	30/12/1992	Unsecured rate that captures overnight call rate market
	Working Group on Risk-Free Reference Rates for the Euro Area	ESTER	European Short Term Euro Rate	European Central Bank	Unsecured	October 2019	Unsecured rate that captures overnight wholesale deposit transactions

The Infrastructure Working Group

As noted on the earlier slide, the Group's overall objective is to catalyse a broad-based transition to SONIA by end-2021 across sterling bond, loan and derivative markets.
The Infrastructure Working Group will focus on developing solutions for infrastructure matters relating to transitioning to the SONIA reference rates.

Our aims are laid out in our Terms of Reference which are on the Bank of England website.

"Overall, the sub-group will

catalyse the necessary development by technology, infrastructure and service firms

so that the necessary facilities, infrastructure and tools are available to market participants to enable the adoption of risk free rates"

What is our Priority List?

Our priorities are published on the Bank of England website here:
https://www.bankofengland.co.uk/markets/transition-to-sterling-risk-free-rates-from-libor
Noting these were updated in August 2019 to include our engagement

UK Working Group on Risk-Free Reference Rates – Market Infrastructure Sub-Group

Priority List (updated August 2019)

*Below is **the updated** priority list with regard to infrastructure developments for the RFR transition in UK markets agreed by the Working Group on Risk-Free Reference Rates 'RFRWG'. This document does not constitute an exhaustive or final list and will be updated on a regular basis with amendments and additional information to reflect ongoing progress on plans for benchmark transition, and further work from the infrastructure sub-group and the RFRWG.*

To provide feedback and comments, please contact RFR.Secretariat@bankofengland.gsi.gov.uk

<u>Key</u>:

- High priority item with planning and analysis still to be commenced in certain areas
- Medium priority item with more planning, analysis and delivery required
- Low priority item with some planning, analysis and delivery required

What have we done so far?

Examples:

January 2019 – Calculator Recommendation

UK Working Group on Risk-Free Reference Rates - Infrastructure and Systems Work Stream

Calculator Recommendation

Below is a provisional recommendation with regard to infrastructure developments for the RFR transition in UK markets agreed by the Working Group on Risk-Free Reference Rates 'RFRWG'. This document does not constitute an exhaustive specification and may be updated following consultation with infrastructure providers and market participants to reflect ongoing progress on plans for benchmark transition, and further work from the infrastructure sub-group and the RFRWG.
To provide feedback and comments, please contact RFR.Secretariat@bankofengland.gsi.gov.uk

We recommend that a calculator is built to support the adoption of SONIA based instrument. We suggest that firms do their own analysis however we would expect that the calculator might have the following features:

- Calculate the rate for any term between any dates for any SONIA based instrument.
- Support manual input of the parameters and manual retrieval of a calculated rate
- Support automated input of the parameters and automated retrieval of calculated rate via an API
- Support a standard convention/s for calculation of a rate for all instrument types *(subject to an industry consultation one whether a single standard is achievable/desired) For example, currently under the 2006 ISDA there are 2 methods for compounding over the counter interest rate derivative cash flows, namely, Compounding and Flat Compounding. The third method is Non ISDA standard definition and treats Floating Interest as compounded but Spread as simple interest.*
- Provide support for unadjusted calculation period dates which occurs on rare occasions e.g. maturity on a Saturday
- Be made available to all

August 2019 – Working Paper on Loans Processing

Working Paper on Loans Processing

The Working Group on Sterling Risk-Free Reference Rates

On behalf of the Working Group on Sterling Risk-Free Reference Rates (RFRs) - Market Infrastructure Sub-Group

Topic from the Priority List

3c. Loans Processing "Ability for Back Office (settlement, servicing) and accounting systems to calculate accruals, P/L, and settlement values."

Objectives

This document aims to highlight potential courses of action for the broad range of market participants and vendors to aid in the operational processing of loans referencing alternative risk free rates. It focuses on potential enhancements to loans systems for vendors and proprietary system owners to help accelerate the adoption of system updates to support use of SONIA. This is a working paper and may be updated to account for future developments. To provide any feedback or comments, please contact RFR.Secretariat@bankofengland.gsi.gov.uk.

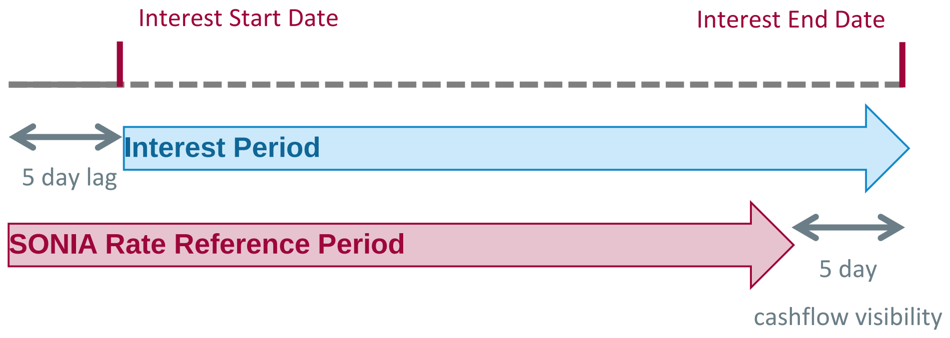
Presentation on loan specific deliverables and challenges

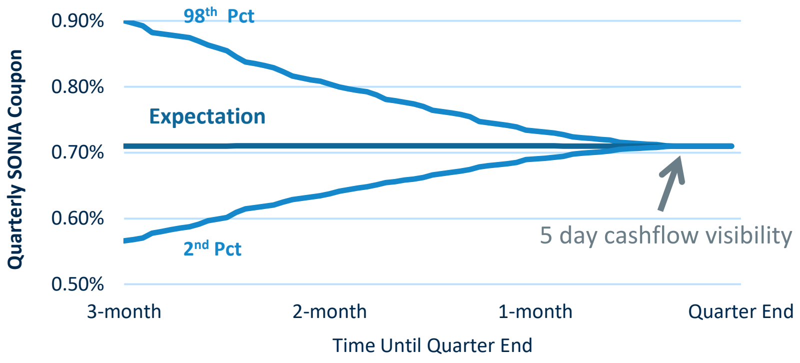
Doug Laurie (Barclays)

Loans- Overview

- For LIBOR based currencies, the expectation is that the majority of the loans market to refinance to use compounded overnight RFR's, with future term rates uncertain and likely to be limited to smaller clients overtime.
- Though other IBOR's, such as EURIBOR will remain beyond 2021, clients may choose to use the equivalent overnight rate such as €STR to tap into what is expected to be the most liquid market or to standardise their multi currency loan across currencies.
- We have seen a number of pilot trades, mainly focused around SONIA and we expect this to grow through 2020 ahead of the end Q3 target for no new GBP Libor issuance.
- The implementation has additional challenges for the syndicated loan market, as borrowers typically will need their full syndicate to be ready to support either new RFR deals or to amend existing deals to RFR.
- Loan vendors have either developed or are in the process of creating RFR capability. Full market readiness is not expected until the 2nd half of 2020, as many banks have a 3-12 month effort to upgrade their core loan platforms.

Loans- Backward Looking Interest Calculations

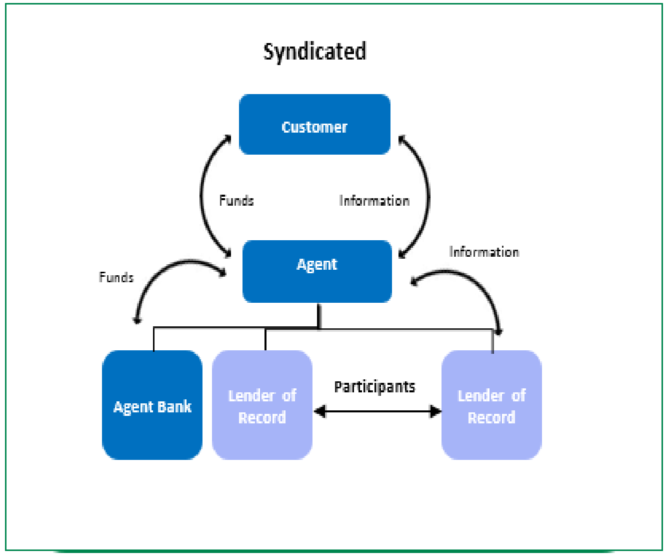




- LIBOR is a forward-looking rate i.e. the interest payment due at the end of an interest period is known fully at the beginning of the interest period.
- Typically, interest periods match the tenor of the LIBOR rate. For example, the 3m LIBOR is used for a 3 month interest period.
- SONIA is calculated based on the rates paid on eligible overnight unsecured deposit transactions with the SONIA rate for a given day being published the following day.
- SONIA-linked bonds/ loans have typically made use of a ‘lag’ mechanism, in which the interest observation period lags the SONIA rate reference period by 5 London banking days. This means that the final interest payment is known 5 days before it is due to be paid.
- Though interest will not be known upfront at the start of the interest period, borrowers should be able to estimate interest to high degree of accuracy, and this will become more accurate as you move through the period.

Loans- Interest Calculation

- Unlike the FRN market, the loan syndication market does not have a central clearing house or guaranteed settlement dates and relies on Agent banks to distribute interest from the borrower to the syndicate.
- Historically Agent banks have distributed interest on a pro rata, lender of actuals basis, where each lender receives the actual interest owned for the period they held the loan, whereas the FRN market works on a lender of record basis, with any interest on trading adjusted as part of the trade settlement.
- The standard FSB formula for compounding interest, does not work well for the syndicated loan market, in terms of managing intra interest period events such as pre-payments of secondary trading events, as it assumes interest will only be truly calculated at the end of the period and therefore nets the impact on any intra period activity to the whole period rather than reflecting per day what actually happened.
- Two proposed solutions have been proposed, with a market preference to the compound the rate methodology
  - Compound the Rate
  - Compound the Balance



Loans- Interest calculation- Compound the Rate vs Balance

Compound the Rate

- In this method interest amount is calculated daily by compounding the daily published SONIA using the below formula.
  - $Cumulative\ Compounded\ Sonia_{d_b}(CCS_{d_b}) = \prod_{i=1}^{d_b}\left(\frac{sonia_i \times n_i}{365} + 1\right) - 1$
  - $Non\ Cumulative\ Compounded\ Sonia_{d_b}(NCCS_{d_b}) = (CCS_{d_b} - CCS_{d_b - 1}) \times \frac{365}{n_i}$

Compound the Balance

- In this method interest is calculated daily on the outstanding Principal plus accumulated unpaid interest balance.
- $Daily\ Interest = \left(\frac{[Principal + Total\ Unpaid\ Interest] \times sonia_i \times n_i}{365}\right)$

Differences in the Methodology

- In this method interest amount is calculated daily by compounding the daily published SONIA using the below formula.

	Compound Rate	Compound Balance
Borrower	No Difference.	No Difference.
Agent	Lenders' share of interest can be calculated on [1]pro-rata basis.	[2]Lenders' share of interest can be calculated independently for each lender.
Lender	Seller stops accruing interest post settlement of the sell trade. Buyer starts accruing interest on compounded SONIA as of the date of settlement of trade.	Seller continues to accrue interest on unpaid interest post settlement of sell trade and until interest payment. Buyer starts compounding from the date of settlement of trade.
Trading	Buyer needs to be provided with the start date of loan/s to calculate compounded SONIA as of date of settlement of the trade.	Buyer needs to be provided with unpaid interest amount as of the date of settlement (if interest needs to be distributed to lenders on pro-rata basis).

[1]lenders' interest amount is calculated as a percentage(%) of the borrower's interest amount. Percentage(%) is calculated by dividing (a) lender's commitment in a facility by (b) total commitment of the facility.

[2]lenders' interest amount can be calculated on pro-rata basis as well but will be very complicated and requires both manual input and system calculation of unpaid interest. As a result, it is recommended to calculate interest independently for this method.

Loans- Interest calculation- Compound the Rate vs Balance

			Rate Compounded Method			Balance Compounded Method				
Start Date	End Date	No. days (n_i)	Principal + Unpaid Interest on Prepayment	Annualised Non Cumulative Compounded RFR (Round Everyday)	Daily RFR Interest	Principal	Daily SONIA	Accumulated Unpaid RFR Interest	Daily RFR Interest2	Rate vs Balance Method
Mon, 15-Apr	Tue, 16-Apr	1	100,000,000	0.70790	1,939.45	100,000,000	0.7079		1,939.45	0.00
Tue, 16-Apr	Wed, 17-Apr	1	100,000,000	0.70721	1,937.56	100,000,000	0.7072	1,939.45	1,937.57	0.01
Wed, 17-Apr	Thu, 18-Apr	1	100,000,000	0.70813	1,940.08	100,000,000	0.7081	3,877.02	1,940.08	0.00
Thu, 18-Apr	Tue, 23-Apr	5	100,000,000	0.70754	9,692.33	100,000,000	0.7075	5,817.10	9,692.34	0.01
Tue, 23-Apr	Wed, 24-Apr	1	100,000,000	0.70751	1,938.38	100,000,000	0.7074	15,509.44	1,938.38	0.00
Wed, 24-Apr	Thu, 25-Apr	1	100,000,000	0.70832	1,940.60	100,000,000	0.7082	17,447.82	1,940.61	0.01
Thu, 25-Apr	Fri, 26-Apr	1	100,000,000	0.70824	1,940.38	100,000,000	0.7081	19,388.43	1,940.38	0.00
Fri, 26-Apr	Mon, 29-Apr	3	100,000,000	0.70855	5,823.70	100,000,000	0.7084	21,328.81	5,823.71	0.01
Mon, 29-Apr	Tue, 30-Apr	1	100,000,000	0.70889	1,942.16	100,000,000	0.7087	27,152.52	1,942.17	0.01
		15			29,094.64				29,094.69	0.05

Loans- Other Interest Variables

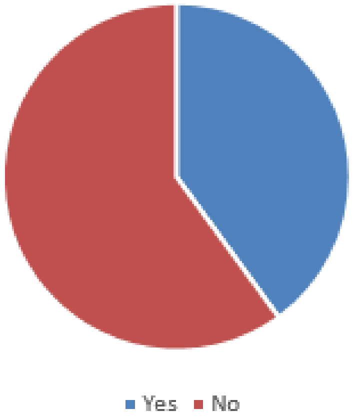
- **<u>Simple Averaging:</u>** Though SONIA Compound in Arrears has been used for FRN/ Loan transactions so far, some clients/ markets may opt to use Simple averaging which calculates interest using the daily published SONIA on the outstanding principal balance.
  - This does not directly compensate lenders for offering an overnight rate but only being paid monthly or quarterly
  - In a low interest rate environment the interest calculations between the two approaches are small, but if interest rates rise this amount can increase, so lenders may choose to adjust margin to reflect this
  - $Daily\ Interest = \left(\frac{Principal \times sonia_i \times n_i}{365}\right)$
- **<u>Observational Shift:</u>** Some currencies/ contracts may apply a observational shift on top of the lag to reflect the correct weightage for the applicable rate used rather than the calendar days as per the standard lag methodology

Rate published (T-4)	Rate For (T-5)	Start Date	End Date	Daily RFR	No. days	No. days with Observation Shift
Tue, 09-Apr-19	Mon, 08-Apr-19	Mon,15-Apr	Tue,16-Apr	0.70790	1	1
Wed, 10-Apr-19	Tue, 09-Apr-19	Tue,16-Apr	Wed,17-Apr	0.70720	1	1
Thu, 11-Apr-19	Wed, 10-Apr-19	Wed,17-Apr	Thu,18-Apr	0.70810	1	1
Fri, 12-Apr-19	Thu, 11-Apr-19	Thu,18-Apr	Tue,23-Apr	0.70750	5	1
Mon, 15-Apr-19	Fri, 12-Apr-19	Tue,23-Apr	Wed,24-Apr	0.70740	1	3
Tue, 16-Apr-19	Mon, 15-Apr-19	Wed,24-Apr	Thu,25-Apr	0.70820	1	1
Wed, 17-Apr-19	Tue, 16-Apr-19	Thu,25-Apr	Fri,26-Apr	0.70810	1	1
Thu, 18-Apr-19	Wed, 17-Apr-19	Fri,26-Apr	Mon,29-Apr	0.70840	3	1
Tue, 23-Apr-19	Thu, 18-Apr-19	Mon,29-Apr	Tue,30-Apr	0.70870	1	5

Q&A

On a scale of 1 to 10 how well do you understand the Libor transition? (1 = not at all, 10 = extremely well)?

Are you being informed by the latest developments from industry bodies and the RFR working groups?



Is there any access to information that you require, such as education materials? Or anything you need to help you understand the Libor transition?

- appetite for more regular updates
- timely information on market conventions as they are finalised

Question for the room: Is everyone aware of/signed up to the RFR newsletter?

All respondents performed impact assessment. It's clear that changes to systems may be needed in a variety of areas, covering everything from functionality for new products, to pricing and curve methodologies, risk management and accounting functionality.
Some already implemented governance frameworks to help manage this.

Did you identify and market infrastructure changes needed?
Examples: CCPs, Markitwire

Product development timelines: Timescales for clients to upgrade systems vary between 3 months to a year.

What "blockers" could there be?
Examples include finalising features needed for different clients and the need to prioritise resources.

Client engagement: Clear that many of you have already engaged clients on this issue, including through educational materials etc.

How to contact us

If you have any questions or would like further information, please contact the Bank of England at RFR.Secretariat@bankofengland.co.uk and/or the FCA at benchmarkspolicy@fca.org.uk or the Infrastructure Sub-Group directly

Homepage of The Working Group on Sterling Risk-Free Reference Rates:
https://www.bankofengland.co.uk/markets/transition-to-sterling-risk-free-rates-from-libor