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The $350 trillion problem

Too big to solve?

Financial markets are sitting on a time bomb. In just over three years' time, the rate that underpins $350 trillion of financial contracts could disappear. Whether by choice or by regulatory force, transition away from discredited Libor rates is something market participants can no longer ignore.

The UK's Financial Conduct Authority said in July 2017 that it would not compel panel banks to submit quotes to the range of Libor currencies after 2021. On the one hand, that offers some reputational respite to banks that submit daily quotes to a tainted benchmark, and whose widespread manipulation has cost them a collective $9 billion in fines. On the other, Libor underpins everything from over-the-counter interest rate swaps to personal loans and mortgages. It is the rate that financial markets revolve around and are modelled on. It is so deeply entrenched in the financial system that Libor could simply be too big to fail.

Libor's owner, ICE Benchmark Administration, is scrambling to restore the rate's credibility by correcting perceived flaws in the calculation methodology. But there is no magic cure. In many currencies and tenors, transactions that underpin Libor simply don't exist.

For example, in one Libor currency/tenor combination for which a rate is produced each business day, the dozen panel banks submitting rate information executed just 15 transactions between them for an entire year.

The post-crisis shift away from unsecured bank funding means Libor has become a measure of 'expert judgement' – in many cases it is little more than guesswork. And that doesn't sit easily alongside new benchmark regulation introduced by the European Union at the start of this year.

Regulators have upped the rhetoric in recent months, urging a market-led transition before they are forced to take action in case the benchmark ceases to exist. Regulators could also rule Libor non-compliant with the new rules, meaning it could not be used for new trades.

Trade groups including the International Swaps and Derivatives Association, the Securities Industry and Financial Markets Association and the Loan Market Association are leading efforts to create fallback language that would smooth the transition for legacy contracts to alternative risk-free rates (RFRs) – or at least prevent a catastrophe – in the event that Libor is discontinued.

In the US, that alternative is the secured overnight financing rate (SOFR), a Federal Reserve-backed benchmark underpinned by $700 billion in overnight repurchase agreement transactions each day – more than 1,000 times the volume backing three-month dollar Libor.

In the UK, the Bank of England-led working group on sterling RFFs has selected a reformed version of Sonia – a rate underpinned by almost £40 billion of daily transaction volume.

Eurozone efforts trail a long way behind. In September, the European Central Bank confirmed the euro short-term rate (Ester) as a replacement for Eonia – an overnight funding rate used for euro swaps discounting, which, thanks to the benchmark regulation, will be barred for use in new contracts from 2020. Publication of the new rate will not begin until as late as October 2019, leaving just three months to build a functioning curve. As for Euribor, the success of its reform efforts won't be known until later this year.

New products to aid transition are gaining traction in some markets. Listed futures linked to SOFR and Sonia are off to a flying start – at least compared with the notoriously low success rate for most futures launches. In swaps markets, the transition is being supported by new clearing services. London's LCH SwapClear has expanded its Sonia swaps clearing to longer-dated tenors, while Chicago-based CME is preparing to add SOFR swaps clearing before year-end.

But while regulators are calling on banks to transition to RFRs, they are also introducing higher capital charges for illiquid trades as part of the forthcoming Fundamental Review of the Trading Book (FRTB). That means it would be costly for banks to transition to alternative RFRs before sufficient liquidity emerges.

The scale of the issue has hardly been played down. At $350 trillion, the world's most important number is more than four times gross world product. But that may just be the tip of the iceberg when it comes to solving the problem.

Helen Bartholomew
Editor-at-large, *Risk.net*

Helen Bartholomew, **Editor-at-large, *Risk.net***
helen.bartholomew@infopro-digital.com

Joanna Edwards
Senior Director, Marketing Solutions
joanna.edwards@infopro-digital.com

Stuart Willes, **Commercial Editorial Manager**
stuart.willes@infopro-digital.com

Alex Hurrell, **Commercial Subeditor**
alex.hurrell@infopro-digital.com

Antony Chambers, **Publisher, *Risk.net***
antony.chambers@infopro-digital.com

Phil Harding, **Content Editor**
phil.harding@infopro-digital.com

Sales
Rob Alexander
rob.alexander@infopro-digital.com
Shayna Cichon
shayna.cichon@@infopro-digital.com
Esha Khanna
esha.khanna@infopro-digital.com
Nadia Pittorru
nadia.pittorru@infopro-digital.com

Ben Wood, **Group Publishing Director**
ben.wood@infopro-digital.com

Ben Cornish, **Senior Production Executive**
ben.cornish@infopro-digital.com

Infopro Digital (UK)
Haymarket House, 28–29 Haymarket
London SW1Y 4RX
Tel: +44 (0)20 7316 9000

Infopro Digital (US)
55 Broad Street, 22nd Floor
New York, NY 10004-2501
Tel: +1 646 736 1888

Infopro Digital (Asia-Pacific)
Unit 1704-05, Berkshire House
Taikoo Place, 25 Westlands Road
Hong Kong, SAR China
Tel: +852 3411 4888

Cover image zodebala/Getty

Published by Infopro Digital
© Infopro Digital Risk (IP) Limited, 2018

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Libor reform threatens risk modelling under FRTB

A dearth of liquid products and historic data threatens banks with capital hit under new market risk rules. By Nazneen Sherif, **with editing by** Alex Krohn

Need to know

- A clash between benchmark reform and incoming market risk rules threatens to hike capital charges for banks.
- As liquidity in Libor contracts dries up, new derivatives contracts referencing risk-free rates will need time to establish themselves.
- Illiquid trades attract additional capital charges under the FRTB framework, which requires a minimum number of trade observations to deem a risk factor modellable.
- The lack of historical data for the new risk-free rates will also hamper the calculation of stressed expected shortfall, used under the internal models approach.
- Some are calling for a carve-out in FRTB that will exempt trades affected by benchmark regulation.

Rule-makers responsible for two major global reforms to the derivatives market – an overhaul of financial benchmarks and a new market risk rulebook – are based in the same building in Basel, Switzerland.

Not that you would know it.

Dissonance between these two initiatives is threatening to undermine banks' efforts to model risk factors and may ultimately result in sizable capital hikes.

As the phase-out of discredited benchmark Libor gathers pace, a process that started in 2013 at the behest of the Group of 20's Financial Stability Board, fewer swaps will reference the rate. Liquidity in trades referencing the new risk-free rates – such as secured overnight funding rate (SOFR) in the US – will take time to develop. Meanwhile the Basel Committee for Banking Supervision's Fundamental Review of the Trading Book (FRTB) will require banks to power their risk models using liquid trades, or face capital consequences. Here lies the conflict.

"I don't believe it is in anyone's interest for the transition to risk-free rates (RFR's) to impact FRTB like this," says Daniel Mayer, a London-based partner at Deloitte.

Under FRTB, due for roll-out in 2022, banks can use internal models to calculate capital only if risk factors pass a minimum threshold on number of observations. Any risks that fail to clear this bar are deemed non-modellable risk factors, or NMRFs, and attract capital add-ons.

Past industry studies have shown the NMRF rules alone could account for up to 30% of total capital requirements under the internal models approach. The second – and apparently lesser known – impact comes from the lack of data needed to calibrate a bank's expected shortfall numbers to a past stressed period, a key requirement for banks wishing to use their own models for capital calculations. Failing this part of FRTB will relegate banks to the standardised approach and force them to hold higher capital.

"So potentially we switch to risk-free rates and then there is no data going back to 2007. Therefore you can't use internal models," says Mayer.

In response, dealers have approached local regulators to seek a carve-out in FRTB that would exempt trades specifically affected by benchmark regulation. A former risk manager at a European bank says: "Management is now starting to engage with local regulators to try and translate what quants are saying. In the coming weeks or months, we will hopefully get some sort of steer from the regulators."

One regulatory expert at a second European bank says another solution is to reduce the NMRF threshold based on how new a product or risk factor is – also known as 'pro-rating' the modellability criterion.

"Industry is hoping Basel will pro-rate observations for modellability criteria to avoid similar issues, for example with newly created equities," the regulatory expert says.

But the push for regulatory relief is not universal. In fact, two senior bankers admit they had not even considered the issue.

"I haven't really thought about this, but it sounds like I should," confesses a London-based risk manager at a large dealer.

One source close to a European regulator says banks and their lobbyists have not formally raised the impact of benchmark reform on FRTB with European regulators. Industry meetings have briefly touched on the issue, but it has not been flagged for in-depth discussion, nor has any detailed impact analysis been carried out.

The regulatory source is optimistic that the current push to recalibrate the FRTB framework to lessen its capital impact will address outstanding concerns over modellability of risk factors affected by benchmark reform.

"Discussions are taking place on the overall calibration because it is clear that if there is insufficient liquidity in these benchmarks, a less punitive treatment under the standardised approach will significantly moderate the impact," the source says.

> "So potentially we switch to risk-free rates and then there is no data going back to 2007. Therefore you can't use internal models"
>
> Daniel Mayer, Deloitte

Disconnected initiatives

All major jurisdictions across the globe have started their own reform processes to wean banks away from Libor-based rates and introduce new RFRs as replacements for existing benchmarks. In July last year, the UK's Financial Conduct Authority announced that a voluntary agreement for banks to support the Libor family of interest rates would conclude at the end of 2021, raising the possibility that the benchmarks will stop being published after that point.

This deadline comes earlier for the eurozone's reference rate. The EU Benchmarks Regulation will apply from 2020, from which point dealers will no longer be allowed to reference Eonia, the existing reference rate for more than €1 trillion of interest rate derivatives.

In finding a replacement, authorities in the region have drawn up a shortlist of three. The industry favourite is Ester, the euro short-term rate. The European Central Bank intends to start publishing the rate by October 2019.

The US has picked its new rate, SOFR, as its Libor replacement. The UK has gone for a reformed version of Sonia, while Switzerland selected the Swiss average overnight rate, or Saron.

The industry hopes to shift a large proportion of existing Libor swaps to the new RFRs over the next few years, although the mechanism for doing so has yet to be determined. A rump of trades, though, are likely to remain on Libor – for instance if a client refuses to move. For that situation, the industry has been working on fallback provisions that would allow a contract to change its reference rate to point to an RFR in certain circumstances, such as if the rate stopped being produced. The new rate would be based on the RFR plus a spread to take into account the bank credit risk embedded in Libor.

But while dealers move across their back-books to the new RFRs, it will take a while for liquidity to develop in the new products. According to official US swap data, there have only been 14 over-the-counter trades referencing SOFR since the rate started being published in April.

At the same time, market participants have also raised the possibility of a so-called "zombie Libor" scenario whereby the number of contributors in the Libor panel drops significantly but not enough for regulators to kill off the rate or for contracts to trigger proposed fallback clauses that would automatically convert remaining Libor swaps to the new RFRs.

In this case, legacy trades could carry on referencing a rate that is considered illiquid for some time.

Points of observation

Under the rules governing NMRFs, a bank is permitted to include a risk factor in its internal model if it has at least 24 so-called real price observations of the value of the risk factor over the previous 12 months, with no more than a one-month gap between any two observations. The definition of price observations includes transacted prices and certain committed quotes.

Risk factors that do not meet these criteria are deemed non-modellable and attract a capital add-on.

The Basel Committee proposed revisions to the FRTB framework in March 2018 in response to industry concerns that the original rules agreed in 2016 were too punitive. The go-live date of the regulation was also extended to the start of 2022 from 2019.

Some dealers say the extended deadline will provide enough time for liquidity to develop for swaps linked to the new RFRs, but how long any zombie Libor scenario may last is uncertain and could contribute to higher capital charges for legacy Libor-based trades.

"Any issues may just go away by the time the FRTB is live, unless any Libor products survive – those would be the ones with the issues since they would have no transactions," says a risk manager at a US bank.

The former risk manager at the first European bank estimates that for his rates desk, up to 40% of risk factors will become non-modellable because of Libor reform alone, assuming Libor trades become illiquid and it takes time for liquidity to develop for new RFR-based trades.

Some argue the ultimate capital impact will depend on how much leeway Basel gives banks to use proxy observations in lieu of direct trades under the NMRF framework. For instance, in the absence of data for Eonia trades, banks could use a proxy, such as Ester plus or minus a spread. Proxies are counted towards the total number of observations required for the NMRF regime under certain conditions.

Recently, dealers expressed concern that an amendment to the framework in Annex D within the March proposals could increase the scope of the NMRF rules, making it punitive to use proxies for risk factors.

In the document, Basel gave the green light to data pooling initiatives that gather data from different vendors to meet the 24-observation hurdle under the NMRF rules, but the regulator also stated that the use of proxy data "must be limited".

If banks do choose to use a proxy, Principle 7 of Annex D states they must either incorporate the risk factor into the profit and loss (P&L) attribution test, one of the two key tests that determine whether a bank is allowed to use internal models, or else capitalise the basis between the proxy and the actual risk factor as an NMRF. So the capital treatment would depend on the volatility of the basis rather than the individual rate itself.

Dealers argue the former requirement would make it impossible to pass the P&L attribution test which is sensitive to the accuracy of the time series data used, and therefore would require them to rely on the latter. That could mean the basis between the proxy and the actual risk factor would end up being capitalised under the NMRF rules.

For eurozone banks, the basis between Eonia and Ester is not volatile – at least for now.

"At the moment the spread seems to be stable at 9 basis points," says one senior trader at a third European bank. "This means it will be possible to define Eonia based on Ester and avoid an NMRF charge."

However, banks are not clear on how Principle 7 will eventually be applied by regulators. For instance, if a bank can explain why a certain proxy is a good representation of a risk factor, it may not need to capitalise the basis.

"There can be a blurred line between enhancements that make data more representative and using a proxy. If we say for all practical purposes it's the same risk factor, and we can use the same historic time series data, then you don't necessarily end up with a non-modellable charge, if that can actually explain your risk. But there is a question over whether Annex D says you can't do that," says Deloitte's Mayer.

Lack of history

Users calculate the NMRF charge based on a historical stress scenario, so in the case of capitalising the basis between Libor and a new RFR, sufficient historical data would be required for the calculation. However, new RFRs are unlikely to have sufficient history going back to a period of stress.

"Given that the basis gap between the new factor and the proxy may well fail to satisfy the modellability criteria, depending on how recently the factor was set up relative to the go-live date for example, there are doubts over how to compute the stress for the basis in the expected shortfall application of NMRFs," says the regulatory expert at the second European bank.

Since the capital is calculated using the basis rather than the value of the proxy itself, which will be RFR plus or minus a spread, some argue that the impact is likely to be limited since the basis will be smaller in value and less volatile. However, as liquidity at different Libor tenors falls and trades become non-modellable, the charges could add up.

"There is a potential cliff effect as more tenors become non-modellable. Say, at the moment, only 50 years is non-modellable, then soon five years is non-modellable, you might have more exposure and you could have a large NMRF charge," says Mayer.

A second unintended consequence of benchmark reform on the FRTB hinges on the calculation of the internal model-based capital itself. In the FRTB internal models approach, capital is calculated based on an expected shortfall model calibrated to a period of stress.

This measure must replicate an expected shortfall charge that would be generated on the bank's current portfolio if the relevant risk factors were experiencing a severe period of stress over a 12-month period based on a reduced set of risk factors that can explain a minimum of 75% of the variation of the full expected shortfall model. The reduced risk factor set is subject to supervisory approval and data quality requirements.

The stressed expected shortfall is then scaled up by multiplying it by a ratio based on expected shortfall calculated using current data. The numerator of the ratio is the current expected shortfall calculated using the full set of risk factors. The denominator is the current expected shortfall measure computed using the reduced set of factors.



"I don't believe it is in anyone's interest for the transition to risk-free rates to impact FRTB like this"

Daniel Mayer, Deloitte

For the newer RFRs, the lack of a stressed history means the rate is ineligible to be included in the reduced set of risk factors, meaning it would be difficult to pass the 75% test. In turn, this would prevent a bank from using internal models for swaps referencing those rates, relegating the bank to the standardised approach with its steeper capital requirements. Problems could occur when dealers start to move Libor swaps to reference the RFRs via direct transition or the fallback clauses, and as RFR swap books swell with new trades.

Annex D within Basel's recent proposals states that "where banks do not sufficiently justify the use of current market data for products whose characteristics have changed since the stress period, the bank must omit the risk factor for the stressed period". This could apply to Libor swaps that remain on the books, as by 2022 some aspects such as volatility may differ significantly from previous years. This would likely affect small banks too – for instance, a retail bank with a limited trading book.

If the industry wishes to avoid these potential consequences, they may need to step up their lobbying efforts with regulators. As Deloitte's Mayer says: "Maybe banks will need to turn the volume up to get regulators to pay attention." ■

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>> Further reading on www.risk.net

- Dealers seek FRTB carve-out for Libor transition
  see page 10
- Banks fear more trades will be caught in NMRF trap
  www.risk.net/5636151

Dealers seek FRTB carve-out for Libor transition

Swaps could be judged non-modellable – and hit with capital add-on – as liquidity tails off in Libor. By Nazneen Sherif

Banks are planning to ask regulators for capital relief during attempts to move roughly $370 trillion in swaps notional away from Libor to new interest rate benchmarks.

Under incoming market risk capital rules – the Fundamental Review of the Trading Book (FRTB) – banks that model their own requirements will face a capital add-on for all risk factors not backed by a minimum level of trading. Studies have estimated these less liquid portions of the portfolio could account for 30% of the total capital charge, but banks fear the Libor replacement project will drag far more trades in, as liquidity tails off in Libor swaps, and slowly builds in replacement benchmarks.

"It seems to be two disconnected initiatives, for want of a better word. You have people who have their heads buried in interbank offered rate (Ibor) replacement work and people who are focused on the FRTB, but I don't think many people are looking at the overlap of the two," says a market risk head at one European bank.

Three market risk sources say the industry is now building a case for a carve-out request from the FRTB capital requirements while the market is transitioning to new benchmark rates. Discussions are said to be in their early stages.

"On the FRTB side you need to have an intermediate carve-out and then settle on a final methodology once the Ibors discussions are on a firmer footing. Depending on how the Ibor conversations work out, there may be another set of changes that have to be implemented in the FRTB to allow for this transition phase," says the head of market risk.

"Management is now starting to engage with local regulators to try and translate what quants are saying to regulators. I think probably in the coming weeks or months, we will hopefully get some sort of steer from the regulators."

Some dealers expect the request to get a sympathetic hearing, given the high profile of the interest rate benchmark reform efforts. Over the past year, UK and US regulators have made increasingly forceful calls for the industry to retire Libor and switch to more stable alternatives. They have also recognised the stakes for the market. Speaking to *Risk.net* last year, Federal Reserve chairman Jerome Powell emphasised the "big stability risk" if market participants were not able to transition smoothly to new benchmarks.

"This FRTB issue is an interesting aside, but it will not be allowed to stop the project. If necessary an exception will be made. It is perhaps a good example of one of the main flaws in the current FRTB rules – and this will surely be improved before the FRTB go-live," says a risk manager at one global bank.

Observable obstacles

While FRTB still needs to be finalised – and is scheduled to go into force in 2022 – a number of jurisdictions are at the same time trying to wean the industry off Libor by creating new swap markets from scratch over the next few years.

In July last year, the UK Financial Conduct Authority announced a voluntary agreement for banks to support the Libor family of interest rates would conclude at the end of 2021, raising the possibility that the benchmarks will stop being published after that point. Regulators in various jurisdictions have either already selected a new risk-free rate (RFR) as a replacement benchmark, or are in the process of doing so. The new RFRs will be used both for new positions and as a rate to move legacy trades onto.



The US has picked a brand-new rate as its Libor replacement – the secured overnight funding rate (SOFR). The UK has selected a reformed version of Sonia, while Switzerland selected the Swiss average overnight rate.

Europe is yet to choose an RFR for euro-denominated trades, but results of a consultation asking the industry for its preferred rate, released on August 13, found 88% of respondents preferred the European Central Bank's unsecured euro short-term rate over its two secured rivals.

Given the first SOFR-based swaps were only traded and cleared at LCH on July 17, market participants worry it will take some time for there to be sufficient trades referencing the benchmarks for banks to avoid capital penalties for illiquid trades.

Under the FRTB, a bank is permitted to include a risk factor – such as sensitivity to a specific interest rate – in its internal model for capital calculation if it can point to at least 24 so-called real price observations of the value of the risk factor over the previous 12 months, with no more than a one-month gap between any two observations. Failing this, the risk factor would be deemed non-modellable and attract an additional capital charge.

"If the new rates aren't formed from observable underlying transactions, then theoretically they would be classed as non-modellable risk factors, and subject to an additional stress-based add-on," says one risk manager at a US bank.

The definition of price observations includes transacted prices and certain committed quotes. It's unclear how much leeway banks will be given to use proxies – for instance, whether they can set their own tenor buckets to catch multiple trades, or whether these will be regulator set. Data-pooling schemes may also be able to help banks get over the 24-transaction barrier.

Industry studies have shown the NMRF framework can contribute as much as 30% of total capital under the internal models approach. ■

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A weird idea for weird times

As pressure builds in the search for a new rate, some non-EU banks are looking at ways of keeping the existing one alive.

By Lukas Becker

There are few things more intrinsically European than Eonia. It is the benchmark overnight rate for overnight loans in euros; the 28 banks still contributing to it are European, and most are from eurozone countries. By anyone's standards, that is true-blue, circle-of-stars European.

So the idea of an offshore Eonia swap market, constructed for the benefit entirely of non-European banks, initially sounds weird.

It's an idea being discussed – quietly – because the euro swaps market finds itself in a situation that is equally weird.

The backstory is that Eonia is used to discount cash-collateralised, Euribor-referencing swaps, and that it appears to be doomed after the group charged with overhauling the rate threw in the towel. There aren't enough overnight interbank loans to make Eonia meaningful, so the reference rate will probably not satisfy the terms of the EU's new rules on benchmarks, the European Money Markets Institute warned in February.

If they are correct, it means Eonia can no longer be used in new trades after the rules take effect from the end of next year, including the Euribor-Eonia basis swaps used by banks to hedge the risk that the two rates will diverge. In addition, with no new trades being executed, there will be no Eonia curve to use when discounting existing trades.

A replacement risk-free-rate (RFR) is in the works, but there are three current contenders and the perceived frontrunner – the European Central Bank's euro short-term rate, or Ester – will not be published until sometime next year. That doesn't leave much time to build a liquid curve.

The euro RFR working group has already warned of potential valuation disruption and risks to market function due to the truncated timetable, introducing a new subgroup at its latest meeting to deal with issues raised by the transition. But many are still concerned there isn't enough time to build sufficient liquidity in the new RFR by the deadline.

Traders that have not been following the issue are shocked when they learn about the implications.

"That's crazy," splutters one London-based rates trader who has been close to other benchmark reform discussions. "That can't be the plan."

He's right, in a sense – there was no plan to leave euro swaps dealers without a key rate and hedging instruments, but that is the situation they face.

Or, to be more precise, it's the situation they face if they are subject to the EU's Benchmarks Regulation. And this is where the notion of offshore Eonia comes in.

In theory, the reference rate doesn't have to die – it just can't be used by European banks. If the benchmark still existed, other banks could potentially continue trading swaps against it among themselves, creating a curve which could be used for discounting purposes, and could even trade new Eonia-Euribor basis swaps to hedge their books.

One large non-EU bank which is looking into the issue says that while the offshore liquidity pool may be missing 90% of its current participants, it would only be used as a short-term bridge, until the market in the new euro RFR finds its feet. A second industry source confirms the idea has been floated.

A benchmarks expert at one EU bank isn't surprised. He suggests European regulators may have "shot themselves in the foot", creating an unlevel playing field for their banks, which would be unable to value and hedge their euro swaps in the same way as their non-EU rivals.

It remains a long shot – traders at other non-EU banks say they haven't come across the idea, and it's not obvious the Eonia panel banks would continue producing a rate they couldn't use – but that's not the point. The fact it is being discussed at all says a lot about where the market sits right now: desperate times call for desperate measures, they say, and offshore Eonia is the most desperate measure yet. ■

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Race for a new risk-free rate

Unsecured fixing from the European Central Bank faces off against two repo-based rates, as 2020 benchmark deadline looms large.
By Nazneen Sherif, with editing by Alex Krohn

In the US, they have SOFR. In the UK, they have Sonia. In Switzerland, they have Saron.

In the eurozone, they haven't yet decided.

Less than two years before European banks must switch to a new benchmark for pricing billions of euros of interbank loans and derivatives, authorities are still pondering which risk-free rate (RFR) to choose as the official fixing.

The European Central Bank (ECB) has whittled down prospective candidates to a shortlist of three. The favourite among many is the rate devised by the ECB itself to measure unsecured overnight borrowing costs for euro-area banks, known as Ester. Also in the running are two repo-based rates overseen by private firms.

All three rates aim to satisfy tough benchmark rules introduced by the European Union in January, with which the markets must fully comply by the end of 2019.

The deadline is tight enough to prompt some market participants to call for an extension to the rules to allow more time for the transition process. Nothing less than the stability of the eurozone's financial system is at stake, they argue.

"The role of regulators and the role of the European Commission is market stability," says a regulatory expert at a European bank. "They have a duty to respect this. Europe needs to be reasonable, and I think they will be reasonable and introduce a delay to the application of the EU Benchmarks Regulation."

Need to know

- Europe's financial markets will need to shift from the existing RFR, Eonia, once new benchmark regulation takes full effect.
- In selecting a replacement, the ECB has given the markets a choice of three: two repo-based rates and an as-yet unpublished rate based on unsecured lending.
- There are questions over whether a repo-based rate would accurately reflect how banks lend to each other since the financial crisis.
- But the new unsecured rate may not go live until just a few months before Eonia ceases.
- This would create headaches for participants needing a term structure for the new rate.

All this upheaval stems from the rigging of Libor, the London-based rate for interbank lending. Evidence of widespread manipulation of the benchmark by banks caused global authorities to recommend ditching the rate in favour of a new type of benchmark – one that was reflective of real trades rather than flimsy estimates of lending rates. In the EU, lawmakers developed the Benchmarks Regulation, imposing a higher bar for index validity.

Europe's current RFR, Eonia, suffered a blow to its credibility in February when its administrator, Brussels-based banking association EMMI, admitted the rate might not meet the compliance hurdle for the Benchmarks Regulation from 2020. EMMI subsequently abandoned its efforts to strengthen the benchmark.

Repo the benefits

Some argue a secured rate is more representative of how financial institutions have been funding themselves post-crisis, as secured lending makes up a larger proportion of financing transactions in Europe (figure 1).

"Nowadays 80% of lending and borrowing is secured," says a spokesperson for Stoxx. "Before the financial crisis that picture was completely different. If you want a reliable and representative reflection of eurozone funding and an RFR that's as close to risk-free as possible, that's the way to go."

But others disagree that a repo benchmark is right for Europe, arguing the ECB's quantitative easing programme has distorted the picture of bank funding in Europe.

> "The role of the European Commission is market stability. I think they will be reasonable and introduce a delay to the application of the EU Benchmarks Regulation"
>
> Regulatory expert at a European bank

With Eonia facing extinction, the ECB issued a consultation paper on its replacement in June.

Of the three candidates proposed in the paper, two are secured rates based on repo lending – the widespread short-term funding method used by banks to exchange cash for liquid securities such as Treasuries. They are the General Collateral Pooling Deferred rate, published by index provider Stoxx; and the RepoFunds rate published by Nex Data.

GC Pooling Deferred is based on the interbank rate for all euro one-day repo transactions in two GC Pooling baskets, featuring securities from central banks, central governments, regional and local governments, and supranationals as collateral.

The RepoFunds rate includes specific collateral of sovereign government bonds in the euro area and traded on the BrokerTec or MTS electronic platforms.

The third rate is an unsecured rate dubbed Ester, or euro short-term rate, based on transactions reported by banks in accordance with the ECB's money market statistical reporting regime. Data comes from a sample of EU reporting agents covering a range of money markets. While Ester does not yet exist as a rate, the ECB has promised to start publishing it by October 2019, barely weeks before Europe is due to switch to its new RFR.

By hoovering up vast quantities of government bonds, collateral has become expensive. Consequently, repo rates are much lower than they would be otherwise, and well below the deposit facility rate, for instance.

"The repo rate may not reflect the most accurate funding conditions in Europe because there is scarcity of collateral," says the rates strategist at a second European bank. "In the US, money market reform has led to a big shift from unsecured to secured. So it makes a lot of sense to select a secured rate in dollar. But in euros the money market is quite different; you don't have as much repo funding compared. It's not the same."

Others see an advantage in the link between the ECB's quantitative easing programme and repo activity. When volumes of bonds bought back by central banks is high, repo rates are low, and vice versa. The spokesperson for Stoxx says this negative correlation makes the rate a substitute for central bank liquidity.

The spokesperson adds that the GC Pooling Deferred rate has a high correlation to Eonia and Ester and the smallest spread to Eonia compared to the other candidates and therefore would cause less disruption during the transition to the rate.

A disadvantage of the rate is its low volumes. The rates strategist points out that the GC Pooling Deferred rate has an average daily volume of €7 billion ($8.2 billion) year-to-date, compared with €4.6 billion for Eonia – "so it doesn't seem to really help with providing a more robust interest rate".

ECB data shows that, between August 2016 and January 2018, the GC Pooling Deferred rate had a daily volume of €8.9 billion. Over the same period, RepoFunds daily volume was €200.6 billion. By comparison, Ester daily volume was €29.8 billion.

Perhaps swayed by the greater volumes in RepoFunds, some banks are understood to be negotiating interest rate swaps on the Nex-administered rate.

Kevin Taylor, a London-based managing director at Nex Data, says: "A number of banks are looking to put trades on the index in the near future."

Although it is not clear whether the motivation behind the trades is in anticipation of RepoFunds being picked as the RFR in Europe, the activity would still give market participants more time to start building a term structure for RepoFunds than, say, for Ester.

A repo-based rate in Europe will have to overcome concerns that the bond market underlying repo transactions in the region is fragmented.

"When we trade government bonds in Europe, we are trading different types of collateral," says a head of rates at a third European bank. "Multiple issuers are issuing different types of debts which are rated differently, which don't always settle through the same CCP or settlement system. It's more complicated in Europe than maybe in the US or the UK to think about the repo market being a simple financing trade against government bonds."

Some, however, do not see this fragmentation as an issue, as it might encourage convergence in the European bond market.

A rates executive at a global exchange says: "I think the long-term view is that you will have Europe represented by a basket of government bonds, and for that reason a government bond repo basket is perfect. That would mean you could quote swaps both in US dollar and euro in reference to underlying repo hedges for the swaps."

Pole position

Despite the increase in secured lending in interbank markets, most market participants believe the unsecured rate, Ester, is most likely to be selected as the EU's official RFR, primarily because it is more reflective of the way banks fund themselves.

"Ester is a good candidate because it is representative of the rate where banks could do their funding in Europe and this would be close to the central bank rate," says the regulatory expert. "When you look at the spreads between Eonia and Ester, there is no reason for this spread to move dramatically because the underlying is the same. One rate is where banks are lending and the other rate will be where a lot of banks in Europe are borrowing money."

The fact that Ester is run by a central bank is an added advantage because it would reassure participants over how the rate is structured and managed, the regulatory expert adds: "If you want to look at market stability it is important that this benchmark is here and will evolve in the future with proper governance and we think it is a good thing it is managed by the ECB."

Some dealers are wary of private institutions administering an RFR – which is the case for the repo rates – as commercial imperatives might affect the rate's governance.

"It's a bit of a no-show really in terms of competing against a regulator," says one source close to the industry working group in charge of selecting the rate. "But there's also nervousness in certain parts in having a for-profit organisation administering the RFR, and then effectively being guided by the profit motives of that organisation, as something that the rest of the market depends upon."

Unease over a for-profit company administering an index did not prevent UK financial authorities from awarding the contract to run Libor, the discredited benchmark, to US firm Ice in 2014. The previous administrator was a UK banking association. Ice has undertaken various reforms of the benchmark in an attempt to shore up its credibility.

The major drawback of Ester cited by market participants is the ECB's decision to start publishing the rate by October 2019. In particular, those that need a term rate would struggle if the rate only existed for a few months prior.

"Starting in October 2019 is actually much worse than it sounds," says the rates executive at the exchange. "People are struggling over the question of how to develop term."

For many European bankers, ensuring a smooth transition away from Eonia is a much more pressing matter than the transition away from Libor. The EU's Benchmark Regulation gives participants barely 18 months to complete their transition. Libor is due to last until at least the end of 2021, at which point banks will be free to cease submitting quotes to the Libor panel under a voluntary agreement.

"For us European banks, the first issue we have is Eonia. Libor fallback is between two and five years later," says the regulatory expert. "Everyone in Europe has Eonia exposure. We want to have a clean transition. Today, it is better to spend time on Eonia transition than Libor. The biggest risk we have is Eonia."

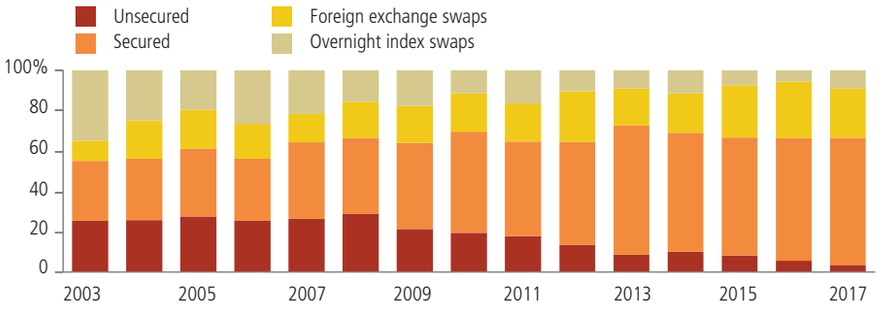
A spokesperson for the ECB explains the lengthy lead-time for Ester: "We need time to fine-tune, set up the organisation behind it."

The spokesperson adds: "We're already on a tight schedule."

Ester's forerunner

In advance of the likely publication date for Ester, the ECB has committed to publishing data on so-called "pre-Ester", which will serve as an indication of where Ester might be (figure 2). The ECB stresses the rate is for illustrative purposes only.

1 Evolution of money market turnover in the euro area



Note: Q2 2003–Q2 2017; market turnover in percentages. The sample includes the constant panel of 38 banks reporting in the EMMS until Q2 2015 and in the MMSR from Q3 2016 onwards.

Source: EMMS, MMSR and ECB calculations

€29.8 billion

Ester daily volume between August 2016 and January 2018, according to ECB data.

Pre-Ester is calculated using the same methods as Ester. However there is a difference between the two rates. Pre-Ester includes rate revisions such as cancellations, corrections and amendments submitted by reporting agents. Ester makes no such allowances for these revisions, and is based only on data received by the submission deadline of 7am CET each morning.

This means market participants cannot place too much faith in pre-Ester to help them form a view on the term structure of Ester until the rate is officially published by the ECB. As a result, some dealers are pushing for publication of the rate sooner.

"What people are working towards is a far more accelerated timeline of the ECB providing Ester, says the source close to the benchmark working group. "I think a lot of market participants say if Eonia is not going to exist you need to start publishing this rate and have it nailed down by the end of the year."

In the minutes of the July 11 meeting of the working group, regulators at the ECB confirmed that "pending the outcome of internal systems and procedures testing, the ECB would also assess whether, and to what extent, the start date and timing [of the publication of Ester] could be accelerated".

One solution being considered by dealers is defining Ester based on a spread to Eonia-at-end-2019, the point at which the regulation goes live. Since an Eonia curve will exist at that point out to 50 years, market participants can use that curve until they gather more term data on Ester.

"Because we already have an existing market up to 50 years in Eonia, by construction we would create a market in Ester," says the regulatory expert. "This has been proposed to the working groups and now we need to look at the legal aspect and all the other aspects. But this option is something a lot of participants are looking at."



Kevin Taylor, Nex Data

For instance, the latest data published by the ECB for pre-Ester shows that on average Ester could be expected to remain 8–9 basis points below Eonia. This means one could use an Eonia curve minus, say, 8bp.

"First, if you still continue to position Eonia as Ester plus a spread then you don't need to do any transition," says the regulatory expert. "Second thing is if you do it this way you could buy some time for deciding to change the yield curve for discounting."

One key question is whether dealers would be allowed to reference a rate that is built directly from Eonia, which will not be compliant with the regulation from 2020. And even if the practice was allowed, there is doubt over whether market participants would want to trade in this way, given Eonia's likely demise.

"If you quote a price and if you are not willing to trade, it doesn't matter how you mark your curve. So it needs to be supplemented with somebody willing to take on the trade," says a CVA head at a regional European bank.

The regulatory expert adds: "The best solution is for the ECB to take over Eonia and say, 'We now set Eonia at Ester plus 8bp.' If it is done by the ECB, the legal risk is much lower."

An alternative to a fixed relationship between Eonia and Ester would be for dealers to develop a basis market between the two rates. That way, dealers would be comfortable quoting Eonia as a spread to Ester at different tenors, as the spread will be determined by this basis.

"Market participants need to develop a view on the basis between the two and if that can form then you can generate a full term structure of Ester based on the current Eonia curve and those marks on the basis," the head of CVA says.

Then there is the issue of whether market participants would be prepared to trade on a new curve constructed this way.

"It needs to be followed up by people willing to enter into a Ester-Eonia basis swap, or two swaps against each other," the head of CVA says. "It's a chicken and egg problem because you need a curve if you want to trade, but if you don't have a curve you don't want to trade."

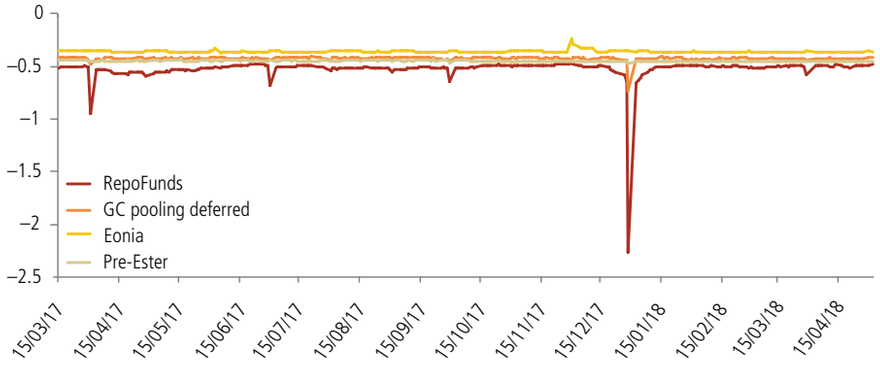
Concerns about Eonia have grown since shrinking volumes in the unsecured lending market caused a number of banks to withdraw from the Eonia panel. A dwindling number of contributors heightened the concentration risk of the rate, evidenced by the 12bp jump in the rate last November.

The EU Benchmarks Regulation does contain provisions for firms to use non-compliant benchmarks after the start of 2020, but only if abandoning the rate would "result in a force majeure event, frustrate or otherwise breach the terms of any financial contract". The grand-fathering provisions under Article 51(4) also require the express permission of the relevant competent authority, in this case Belgium's Financial Services and Markets Authority.

It is unclear whether the regulator would extend these provisions. Until then, market participants must hope the ECB selects its new RFR in time for them to be able to transfer contracts in an orderly fashion. ■

Previously published on Risk.net

2 Comparison of RFRs



Sources: Nex Data, Stoxx, EMMI and ECB

>> Further reading on www.risk.net

- Eonia death will hit valuations and OIS market – expert *www.risk.net/5676381*
- Ice's Sprecher criticises Libor replacement push *www.risk.net/5345891*
- FCA moots synthetic Libor as rates fall back *www.risk.net/5309366*

Ripple effect

The impact of moving away from Libor

The shift from Libor to an alternative risk-free rate will require considerable cost and effort, and the sooner the market takes action the fewer and lesser the risks associated with transition will be. A forum of industry leaders discusses key topics, including the impact of the shift on market pricing and risk management models, the drawbacks with alternative rates and the potential longevity of Libor once a mainstream alternative has been adopted



FINCAD®

Jonathan Rosen, PhD, Product Manager
Quantitative Analytics, Fincad
www.fincad.com

What are the key challenges associated with moving from Libor to alternative benchmarks?

Christian Behm, LPA: From the perspective of the market, the key challenge is to establish feasible and trusted alternatives, and create liquid markets. The amount of time it will take to solve the many technical issues is also crucial. In particular, there is very little time remaining for transitions in the euro market.

From the perspective of market participants, the main challenge is complexity. Any transformation programme will be required to deliver two distinct capabilities:

- To operate in an environment with both legacy and new rates side by side.
- To deal with an interbank offered rate (Ibor) cessation event with a substantial number of affected contracts.

In addition, the plans of the institutions responsible for the Group of Five currencies are not fully aligned. Finally, potentially different approaches depending on product and jurisdiction are to be expected.

The upcoming Eonia migration may act as a wake-up call to the industry and its institutions. A much greater challenge will be the upcoming transition from Libor and Euribor.

Andy Ross, CurveGlobal: The ability to hedge risk effectively is of paramount importance for ensuring a smooth, orderly transition away from Libor. As a result, it is vital that participants have access to a liquid and active futures market, which in all cases needs to align with regulatory requirements while supporting competition and choice, and enabling best execution.

Fortunately, growing endorsement of new benchmarks by market participants is prompting competitive innovation. This includes the launch of new futures contracts referenced to the Bank of England's (BoE's) reformed Sonia benchmark, and products that make it possible to trade the spread between Sonia and Libor with no legging risk.

James Schwartz, Morrison & Foerster: Libor has been central to the financial system for decades and is the basis for trillions of dollars in financial products. Replacing it will involve numerous challenges and risks.

The initial question is: what will replace Libor? So far, market participants have agreed that overnight rates are the preferred option. However, there are complex questions about how overnight rates can be adjusted for use in contexts that have been historically dominated by term rates such as Libor.

Difficult questions stem from legacy Libor transactions that will remain outstanding beyond 2021, when regulators state their preference to no longer require banks to make Libor submissions.

Certain products may contain fallback language in case Libor is not available, but in many cases those fallbacks are intended to address a temporary unavailability of Libor, not a permanent one. In other cases – such as in the derivatives context – contractual fallbacks seem unlikely to be helpful, meaning parties would be well advised to reach an agreement on what should happen when Libor is discontinued.

In either case, for legacy contracts the discontinuation of Libor raises the possibility of significant and disruptive value transfers because whatever replaces Libor is unlikely to be its economic equivalent.

Jonathan Rosen, Fincad: Switching to alternative benchmarks could have a sizeable impact on bottom lines when positions linked to Libor are forced to transition to new benchmarks. This will depend on the market conditions when Libor ends, but the impact will be at least a few percentage points, and there really is no upper limit within the currently proposed transition methodologies. Furthermore, the loss of the Libor derivatives market data as input to interest rate models will mean a drastic increase in the modelling complexity for pricing trades considered standard today. This is due to impacts ranging from disrupted curve-building, the need for new volatility models to directly model the alternative rates and the sudden demand to handle the effects of convexity that result from this transition. Unless new markets emerge to fill the void by supplying the data needed to model derivatives, the future looks uncertain for markets that rely heavily on Libor-linked derivatives for interest rate modelling.

Liang Wu, Numerix: A widely recognised challenge is the question regarding the level of market adoption that will exist for new alternative reference rate (ARR) products. The reason for this is that liquidity will be considered the single most important qualification for the adoption of these alternative rates. In that regard, a successful transition away from Libor would necessitate a sufficient level of liquidity for these products, but we must keep in mind that market participants tend to move only when others have moved first.

Another significant challenge is the amending and renegotiation of legacy contracts. What if some contracts, whether bilateral or multilateral, become impractical to negotiate, given they require 100% consent from all issuance holders? What if conflicts of interest arise? Banks may be wary of potential litigation.



Additionally, Libor-based instruments are still heavily relied on today for hedging, note and securitisation issuances, as well as curve construction. With banks given the option to no longer support Libor after 2021, and with the transition to several new alternative short-term interest rates well under way, market participants are concerned about the impact on derivatives valuations and risk management.



Roy Choudhury, Partner and
Global Ibor Leader, EY Financial Services
www.ey.com/ibor

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Roy Choudhury and Philippe Vidal, EY Financial Services: Ibors are deeply embedded in a wide range of cash and derivatives products, contracts, business processes, pricing and risk models, and technology infrastructure.

Thus, the challenges of moving to ARRs are manifold and include readiness to offer a full suite of products referencing ARRs; client communication; adoption of new fallback language and repapering; managing value transfer and basis risk; updating models; and process, data and technology infrastructure readiness.

Christopher Dias, KPMG: The transition from Libor to new risk-free rates (RFRs) is fraught with challenges that must be solved by the industry working together and, in some cases, industry participants taking the lead to establish a functioning market. The following are key among the many identified challenges:

- The structural requirements of each new RFR must evolve, including term structure, liquidity and underlying product growth.
- RFRs must be broadly adopted by market participants, including originators, issuers, buy side, sell side and consumers, across all aspects of financial markets.
- An effective method to reduce value transfer impacts for legacy contracts and acceptable across major participants must be developed.

Frances Hinden, Shell International: The biggest challenge is getting the Libor-dependent world to start actively working on it. Large derivatives traders and financial debt issuers may be there, but there is an enormous tail in the $750 trillion of existing 'legacy' Libor products lacking time, information, knowledge and resources. Many are small businesses or – particularly with US dollar Libor – retail customers. Long-dated Libor products are still growing because the alternatives – term rates and euro products, for example – are not yet there.

Do you anticipate Libor remaining 'alive' after 2021? Why?

Geoffrey Peck, Morrison & Foerster: While regulators have clearly stated their expectation that in 2021 Libor will be discontinued, year-end 2021 appears to be aggressive timing. Given the many legacy contracts that reference Libor and mature after 2021 – and the enormous amount of work still required to transition to a new benchmark – it seems reasonably likely that, one way or another, Libor will remain alive after that date. It may be that, to avoid a significant value transfer, the authorities will decide to keep it – or a placeholder for it – alive for some time while legacy Libor contracts are concluded.

Liang Wu: It is still too early to make a call on that, and the market appears to share that view, according to the *Ibor global benchmark transition report*, published in June 2018,[1] which is based on the *Ibor global benchmark survey transition roadmap*. Nonetheless, market participants should be prepared for a world without Libor after 2021. One reason is that the UK Financial Conduct Authority (FCA) – the regulator of Libor – has made it very clear that the current agreement it can reach with panel banks is only to sustain Libor until the end of 2021. There is no regulatory requirement after that for panel banks to continue making Libor submissions, which may present significant uncertainty. Currently, panel banks, despite their discomfort, are conducting the submissions based on judgement rather than actual borrowing transactions as reform intended, so it is entirely possible to see banks leaving the panel after 2021, which will then render the publishing of Libor unfeasible.

[1] *The International Swaps and Derivatives Association, Association for Financial Markets in Europe, International Capital Market Association, Securities Industry and Financial Markets Association (Sifma) and Sifma's Asset Management Group June 2018*, Ibor Global Benchmark Transition Report, *https://bit.ly/2KmRc6F*

Moreover, as new ARRs are identified, if there is sufficient liquidity to support the market adoption of new derivatives and cash products it will help the market transition more quickly to the new rates and decrease dependency on Libor, which would further diminish the chances of Libor being active after 2021.

Christian Behm: The question is more about when the cessation events will occur. A fair assumption would be to have a minor currency such as the Swiss franc undergo a cessation event first. Such a scenario would probably happen between 2022 and 2024. Other currencies will follow once the markets in successor rates are well established and legacy transactions have been reduced substantially. I do not expect an uncontrolled cessation in any of the major currencies.

A continuation of the panel-based 'hybrid' Ibors is unlikely, since the underlying money markets are not liquid, and operational risk – as well as cost associated with a panel membership – remains significant.

Frances Hinden: No. The regulators don't want it, the banks don't want to quote it, it is barely used for interbank funding and it is theoretically unsuitable for most uses to which it is put. To quote Andrew Bailey, chief executive officer of the FCA, in July: "Libor is measuring the rate at which banks are not borrowing from one another."

Christopher Dias: Although global regulators are resolute in their message that discontinuation of Libor is inevitable, they have not communicated much more in terms of substance. The announcement that the FCA will not compel contributing banks to submit rates after 2021 may portend the death of Libor, but nothing else. The reality may be that the timeline to sunset Libor will extend beyond 2021. The case for this longer timeframe is driven by the size of the market and the related effort to effect a transition, the complexity involved with creating and sustaining a functioning market, and – most importantly – the need for broad adoption from all industry participants.

Andy Ross: It's hard to imagine everyone completely abandoning a reference rate that includes bonds and swaps not due to mature for decades and, over time, it will become less feasible to quote Libor rates as they become less liquid. But, ultimately, it is in the hands of the Libor administrator, which will need to secure long-term commitments from a large number of panel banks to continue beyond 2021.

If Libor and a new RFR such as Sonia coexist in a multi-rate regime after 2021, it's possible they will each be used for very specific products and transactions. For example, Sonia might be the best choice for derivatives, while a term Libor benchmark – perhaps with a new name and structure – might continue to be used in other circumstances.

What is the future of Ibors beyond 2021?

Roy Choudhury and Philippe Vidal: While Ibor governance has been enhanced and it is possible some panel banks will be willing to continue submissions post-2021, there is a significant risk that panel banks will not be willing to submit Ibor indefinitely beyond 2021, especially for currencies and tenors with limited underlying transactions. Furthermore, even if panel banks are willing to submit beyond 2021, regulators may not allow use of the rate if it is deemed non-compliant with International Organization of Securities Commissions (Iosco) principles.

As such – and highlighted in speeches by global regulators – market participants should prepare for a potential scenario where Ibors are no longer available post-2021. In addition, across a number of Group of Five currencies, regulators have been clear that Ibor should not be used for new transactions beyond 2021.

If panel banks are willing to submit post-2021, and the rate is deemed to be compliant with Iosco principles, there may be a multi-rate environment for a number of currencies where Ibor, ARRs and, potentially, other rates exist in parallel for new and existing contracts, although there will be a remaining risk that Ibors may cease sometime thereafter.



Geoffrey Peck
Partner, Morrison & Foerster
www.mofo.com

Who do you think will be the first to move away from Libor?

Geoffrey Peck: The first movers away from Libor will likely be large global banks and other large sophisticated financial institutions with more operational resources to handle the transition. Derivatives dealers, in particular, may transition from Libor more quickly because they are accustomed to overnight discounting. Regional and small financial institutions are likely to follow next, then other financial entities, then corporates and other end-users.

Roy Choudhury and Philippe Vidal: The transition will be staggered rather than a big-bang process by the end of 2021. Furthermore, the transition process and speed will vary by currency, depending on the maturity of the proposed ARR. For example, the paced transition plan for the derivatives markets in the US to the secured overnight financing rate (SOFR) is likely to be different compared with Sonia in the UK, which is an existing rate. In the case of cash products, wholesale funding markets are expected to be early adopters of ARRs followed by commercial lending and, finally, consumer lending. There have already been issuances in the wholesale funding markets by government-sponsored entities and financial services firms with strong investor demand.

Liang Wu: Companies with Libor exposures that are concentrated on the derivatives market instead of the cash market, in my opinion, will be the first-movers. Derivatives contracts focus on hedging the general level of interest rate movements and do not necessarily stick to term rates such as Libor where bank credit risk is embedded. Furthermore, the concept of alternative overnight reference rates is not new to the derivatives markets.

On the other hand, cash markets still rely on term rates, which are quite different from alternative overnight reference rates.

Frances Hinden: Outside the derivatives markets, we are already starting to see government agencies (Fannie Mae) and supranationals (the European Investment Bank) issuing bonds linked to overnight RFRs. That is the obvious starting point, and corporate issuers will slowly start to follow suit, but it's going to be slow taking off because no corporate wants to risk wider spreads due to investor unfamiliarity or systems that can't cope. The past couple of weeks have seen some banks issuing fairly small amounts of Sonia- and SOFR-linked debt, but nothing yet in any size.

Christopher Dias: The move is largely motivated by regulators stressing the importance of safe and sound markets based on transparency and market transactions. With that in mind, large financial institutions have come together

in support of safer markets to develop plans for transition and solve key issues. Given the largest number of touchpoints to those impacted by the Libor transition resides with banks, it will be incumbent on them to lead the way. The effort will be significant. Banks will need to be at the forefront in terms of new products, market infrastructure development, liquidity, communication and – most critically – guiding market response to key issues.

Andy Ross: Based on first-hand experience, buy-side institutions and liability-driven investment managers in particular are already actively moving away from Libor. They recognise that, given the shrinking support for the legacy benchmark, the shift to an alternative RFR such as Sonia is inevitable. As they don't want to have to rely on fallback mechanisms, they are keen to be on the front foot, so they can mitigate any arbitrary and unhedgeable downsides.

Christian Behm: First movers are in the markets already. Most visible are the primary markets activities in the SOFR and Sonia, with some issuance activity. In the derivatives space, we see the large central counterparties competing for market share by offering support for new products and announcing the introduction of new futures contracts. However, it will be interesting to see when the first true post-Libor retail products will be made available. The smaller currencies, especially, might become more innovative earlier.



Liang Wu, Vice-President, Financial Engineering, and Head of CrossAsset Product Management, Numerix
www.numerix.com

What are the drawbacks with the new RFRs sponsored by global regulators?

Liang Wu: I wouldn't use the word drawbacks, but rather what are the characteristics of the new RFRs? First, these rates are selected or recommended by different working groups and there is no unified methodology in creating them, as is the case with Libor. Second, RFRs of different currencies are not necessarily following the same synchronised transition plan, which will post challenges and complexities in cross-currency swaps. Third, all RFRs are overnight rates; however, certain markets such as the cash market need term rates, which are currently not available via RFRs.

Christopher Dias: Not all problems can be anticipated or easily solved. In the case of Libor, the sheer number of contracts, market participants, currencies and transition-related issues exacerbate an already complex problem. Large industry participants are trying to solve this, yet there are some key drawbacks in moving from Libor, in particular the following:

- There will be very real value transfers moving from Libor to the new RFRs. Mapping legacy contracts to new rates and introducing a new basis will recalibrate current market positions, which can only result in creating winners and losers.
- The overall real-dollar cost will be significant but may vary by industry participant. If you consider the activities needed to transition by participant, the costs start to add up quickly. For example, the cost of amending millions of contracts; changing systems, operations and processes; along with customer outreach and tracking will all amount to a significant outlay for the industry.

James Schwartz: The new RFRs are qualitatively – and quantitatively – different from Libor. They are overnight rates, unlike Libor, which is a term rate, an unsecured rate, and reflects a credit spread. The International Swaps and Derivatives Association (Isda) has published a consultation to determine the best way to adjust overnight rates to make them work in the context of the derivatives markets, and there certainly are complexities. In addition, liquidity needs to be built into the new benchmarks for them to play the role envisioned for them.

It is important to bear in mind, however, that the new rates have a major strength that Libor has lacked in recent years reflecting large numbers of actual, observable transactions. Whatever drawbacks there may be in the new rates, they will not have some of the deep weaknesses that Libor has exhibited in recent years.

Jonathan Rosen: While interbank loans now have low volume – leaving Libor easily manipulated – Libor itself remains a useful benchmark with considerable volume in Libor-linked trades in the form of derivatives. The new RFRs are less prone to manipulation since they are chosen for their high liquidity, but they are not term, unsecured benchmark rates. When markets shift to trades linked to overnight benchmarks, there will no longer be a useful benchmark for term unsecured loans, which is a major problem since Libor is probably the best gauge of the systemic credit risk in the economy and a vital benchmark for commercial funding arrangements.

Another drawback to consider is having benchmarks for both unsecured and repo rates. These rates will behave very differently to Libor in times of market stress, and their behaviour will depend on whether there are securities held in collateral against these borrowing rates. This could have unexpected consequences – for example, the foreign exchange carry strategy could encounter basis risk between the repo and unsecured rates in times of turmoil.

Christian Behm: The largest drawback with the RFR is the missing definition of a fix-in-advance pay-in-arrears term rate. The potential solution of using fixings of overnight indexed swaps (OISs) is a challenge. Individual traders are raising concerns that liquidity in short-term OISs has almost vanished due to low interest rates and low absolute volatility. In markets with little or no tradition of short-term interest rate futures – such as Europe – this may cause serious problems.

A move to an overnight RFR-based product range will therefore require substantial work on settlement infrastructure and processes. It is also not favoured by some market participants, such as corporates.

Given these issues, we might also see new fixing methods. In some markets, such as Scandinavia, retail mortgage rates are already fixed via an outright auction.

Frances Hinden: The rates are theoretically much more suitable than Libor as they have no bank credit or term premium embedded. There are two main drawbacks. The first is that the rates in different currencies are split between secured rates such as SOFR and unsecured rates such as Sonia, so we have gained some basis risk. In most normal market conditions, this should have minimal impact because the rates are all virtually risk-free.

The other drawback is practical: there are big operational advantages, particularly for smaller companies, from having certainty in interest cashflows three months – or even one month – in advance. Accounting, payments, cashflow forecasting and all other treasury processes are simpler when you know how much is going to move to whom on what date. The emerging market standard for RFR-linked debt – or at least Sonia-linked debt – is to settle five

days later. But this is a lot shorter than three months – compared with the OIS market, where the standard is two-day settlement.

The issue is not in the cleared derivatives market – which is typically used by large financial counterparties with the systems and liquidity to manage overnight rates – but with smaller borrowers/lenders or asset managers that may have both debt and interest rate derivatives to hedge it. Regulators understand there is a real need for term rates in some segments of the market, but how these will work has not yet been decided – there's a BoE consultation on the subject, which closed at the end of September. There will remain the challenge of hedging a term-rate-based loan instrument with an overnight-rate-based derivative.

Andy Ross: Although Sonia may not have all of Libor's currency and tenor pairs, it is robust and underpinned by significant transaction volumes. In contrast, Libor is now more fragile and suffers from a dearth of qualifying transactions. According to the FCA, in one currency-tenor combination there were just 15 qualifying transactions in all of 2016. I struggle to see how anyone can credibly build a daily benchmark by averaging multiple quotes from a dataset such as that.

However, unlike Libor, which is most frequently referenced in three- and six-month tenors, Sonia is an overnight rate with no obvious forward-looking term rate. While this will merely be an inconvenience for some participants, for others – such as corporate treasurers – it may cause difficulties for firms used to interest rates being set at the beginning of an interest accrual period.

Despite these potential challenges, however, there's no reason why anyone in the interest rate market needs to trade on anything other than real, transaction-driven rates.



Christian Behm
Partner, LPA
www.l-p-a.com

What types of risk will investors face once Libor is discontinued?

Jonathan Rosen: The end of Libor will throw payout calculations in current trades into chaos, triggering fallback definitions, which could ultimately lead to an immediate impact on valuation. Fallbacks only help counterparties agree on how to calculate payments, not how to value trades. The most natural method for pricing uses the Libor rate curves, but instead fallbacks must be valued consistently with the overnight rate derivatives market.

Today, the derivatives markets used for interest rate forecasting are linked to Libor, and we would lose this valuable data for curve-building and pricing derivatives. The result could be many different prices for participants, with a potential impact on model risk. The fallback definition and pricing models relying on the derivatives markets as a whole need to evolve closely together towards the goal of a smooth transition and the avoidance of model-dependency fragmentation.

The default risk embedded in Libor cannot be completely transferred to the overnight benchmarks, so amended deals will transfer the exposure to market funding rates from borrowers to lenders. Hedges may not remain adequate once amended, and some hedging strategies could be disrupted by the disappearance of trades that reference Libor.



Andy Ross
Chief Executive
CurveGlobal
www.curveglobalmarkets.com

Will some participants be unlikely to ever move away from Libor?

Andy Ross: Some participants have a commercial interest in preserving Libor's dominance. In a recent industry survey conducted by Isda, 60% of respondents indicated they would continue trading Ibors – excluding short-term instruments – if they were to be published after 2021, with 18% indicating that they didn't plan to use alternative RFRs at all.

However, participants in the derivatives markets should ask themselves if a rate with so few underlying transactions is their best option, and be encouraged to use Sonia as fully as possible. It's also important to remember that there's a regulatory imperative – driven in the UK by the FCA and the BoE – to transition away from Libor.

Christopher Dias: It is highly likely there will be late but willing adopters of the new RFR structures, as well as a number of participants who outright refuse to adopt. Even if the transition away from Libor becomes more nuanced and less binary than anticipated, the benchmark's demise is inevitable. Participants refusing to adopt change will be faced with the choice of termination or negotiation. Those that choose to negotiate will find their choices do not include Libor.

Geoffrey Peck: The regulators have stated that Libor will be discontinued, so at a certain point there will presumably be no choice in the matter. But it seems likely that certain market participants will continue to transact based on term rates other than Libor. A subset of market participants, which can be loosely described as end-users, will likely wish to continue to use term rates, both for economic and operational reasons. For example, a recent consultation in the UK found that there would be strong demand for term rates in relation to corporate lending and securitisation structures, and medium demand for term rates in relation to retail loans, mortgages and floating-rate notes.

Christian Behm: Once markets in alternative rates are established, it will be too risky to continue making new Libor business. Also, there is little incentive. If there is demand for Libor-style risk containing bank-funding cost, there is room for innovations. For example, commercial paper auctions could be used in such an approach.

Frances Hinden: There are some participants in cash markets that do not want to move away from Libor because it is more expensive and resource-intensive than sticking with Libor, despite its flaws. However, there will eventually be no choice: the 'fallback' in their documentation may leave them with a fixed rate equal to the last published value of Libor. Failing that, they will have no choice but to change to something else, and by leaving it until the last minute, negotiations with counterparties will be more stressful than actively working on a transition plan.

Liang Wu: It's possible. For some existing issuances of bonds and securitisations, there could be cases for which the terms and conditions require a large percentage of holders (75–100% of them) to consent to amend the reference rate. It is possible that the required percentage of votes to switch out of Libor cannot be obtained.

What will be the impact on deals that currently reference Libor?

Jonathan Rosen: There is no consensus on the best way to remove Libor from the trades that currently reference it, and work is under way to standardise fallbacks in the event of Libor's disappearance. When Libor fallbacks are triggered, they will involve adding a spread onto the new benchmarks to emulate the Libor term risk but, depending on how this spread is calculated, it could affect the value of current trades referencing Libor. Current proposals involve static spot spreads, which do not change with market conditions and build spot spreads into the payout – very different to how Libor is calculated today.

For pricing trades with fallbacks, the best scenario is for fallbacks to mimic the payouts of standard derivatives linked to the alternative rates so the standard curves can still be used for pricing – otherwise there will be a significant issue with convexity. For example, unlike Libor, overnight rates have a different frequency to the payments of most interest rate swaps – so pricing a trade that directly replaces Libor with overnight rates will need a convexity adjustment, which means modelling the volatility of the new benchmarks and prices will become model-dependent.

Exotic trades that indirectly reference Libor – such as constant maturity swap (CMS) rates from Libor swaps – will have no clear definition. Once Libor is gone, and Libor-linked trades are no longer cleared, there is no agreement on how CMS and similar payouts should be determined. These are sweeping changes for the rates market and significant turmoil could be on the horizon for current participants.



Christopher Dias, Principal, Advisory
KPMG
home.kpmg.com

How safe a benchmark is Libor today?

Christopher Dias: Libor as a benchmark rate is safe for the time being. First, contributing banks have agreed with the FCA to continue providing rates until the end of 2021. Second, the ICE Libor benchmark has revamped its methodology to make rates more transparent, which suggests the improbability of Libor being discontinued prior to 2021. Last, a large number of Libor-referenced consumer contracts have terms that extend beyond 2021. This suggests Libor could stick around at least until greater run-off has occurred or the process to manage legacy contracts has more fully evolved. The challenge of managing communication with the number of consumers involved before the end of 2021 is enormous.

Geoffrey Peck: Institutionally, Libor is at present a fragile benchmark. There are so few actual unsecured interbank lending transactions that an Ibor is arguably a fiction. Given the importance of the benchmark, the regulators are correct to seek replacements. However, Libor's centrality to the financial system means the regulators would do well to assure the market of its continuing safety while the market transitions to new benchmarks. There is no telling what the Libor curve could look like, or how it could move, if the regulators were to announce a near-term date on which Libor is to be abolished. Perhaps the safest route might be to forbid the use of Libor in new transactions while keeping alive a synthetic Libor curve, perhaps derived from historical data, for legacy transactions.

Andy Ross: Trading risk that depends on a fixing based on the input from a small group of 'experts' is a cause for concern. Libor has been irreversibly weakened and is in precarious health – perhaps even on life support – so the risks are now considerable.

The markets that underpin Libor are extremely thin, hence the reliance on so-called 'expert judgement' rather than actual transactions. Trading decisions in the trillion-dollar markets in which we operate need to be firmly rooted in fact.

Christian Behm: In terms of manipulation, the reforms did improve the overall process significantly. From an operational perspective of a benchmark user, the move to alternatives is certain. This increases the operational risk of a Libor cessation event, which is certainly a very tangible risk.

Frances Hinden: That depends on what one considers 'safe'. Changes to the way Libor is administered make it unlikely that it is being actively manipulated – as in the past – but it is not robust and it has the same technical issues it has always had. By definition, it still contains an element of bank credit risk, which can be quite volatile.

Liang Wu: On November 24, 2017, the FCA confirmed that all 20 panel banks have agreed to sustain Libor until 2021. So today, Libor itself can still be considered as a safe benchmark in terms of rate availability. However, since Libor submissions are mainly based on judgement instead of actual transactions, the rate itself is still vulnerable to misconduct, although that does not signify any misconduct today.

What are the key differences between Ibors and ARRs, and how can firms manage the differences?

Roy Choudhury and Philippe Vidal: The ARR selected in each currency area is typically an overnight rate, and either secured or unsecured. The Ibors they seek to replace are available for tenors ranging from overnight to one year, and are unsecured, thus including a bank credit premium. In addition, there are structural differences between ARRs across the major G5 currencies. For example, SOFR in the US is a secured rate, whereas Sonia in the UK is an unsecured rate. To manage the differences between Ibors and ARRs, market participants will be required to understand, measure and manage the impact of this basis in their pricing, trading and hedging activities.

Why are ARRs considered safer than Ibors?

Roy Choudhury and Philippe Vidal: A key deficiency of Ibors is that they are based on transactions in the interbank funding markets that have significantly diminished in volume since the 2007–08 financial crisis. This lack of liquidity has resulted in Ibor significantly relying on expert judgement by panel banks. ARRs are based on transactions in liquid markets. Limited judgement is used in the calculation of ARRs, thereby making them more robust and less vulnerable to disruption or manipulation. ARRs are expected to be compliant with International Organization of Securities Commissions principles and provide a more robust reference rate in the long term.



James Schwartz
Of Counsel, Morrison & Foerster
www.mofo.com

What will be the impact of the move away from Libor on market pricing and risk management models?

James Schwartz: Libor continues to represent an important basis for pricing

and risk management, even after the [most recent] financial crisis, when certain derivatives dealers began discounting collateralised swaps at an overnight rate. The move away from Libor, from the standpoint of pricing and risk management, will require significant resources and co-ordinated efforts across risk, pricing and operations.

A central part of the effort will involve constructing new term interest rate curves – fundamental for valuing future cashflows – based on the RFRs. So far there is no consensus, however, on the methods for building those curves and how an overnight rate is to be projected onto a term rate.

Roy Choudhury and Philippe Vidal: Firms need to develop new interest rate projection and discounting curves to support ARR products, and market data proxies to support risk measurement and modelling. The impacts are pervasive, affecting many other models that rely on benchmark base curves such as asset-liability management, funds transfer pricing, deposit modelling, loan origination and other models that are dependent on interest rates.

Andy Ross: Effecting change in financial markets invariably involves cost and considerable effort, and this is certainly the case with the shift from Libor to an alternative RFR. But it's worth remembering that the new benchmarks are robust, backed by central banks globally and based on actual transactions.

When trading over-the-counter (OTC) or listed derivatives with a maturity over 2.5 years, there is a risk associated with changing the underlying benchmark. The challenge facing market participants is how to assess what risk premium to pay or receive for changing the rate to Sonia from Libor. When weighing up the decision to trade futures or OTC, how do you choose where and what to execute for best execution?

There are signs that the market recognises the need to move quickly, including robust adoption of the CurveGlobal inter-commodity spread (ICS) and Sonia futures contracts.

Even so, participants are still figuring out how to assess best execution on the same benchmark between two similar risk products. But choice is important here – let firms choose what is best for them. For example, are they better off trading the ICS between Sonia and Libor, or the forward rate agreement (FRA)/OIS International Monetary Market package OTC? The answer will clearly depend on factors such as market access, fees and liquidity, but choice is preferable to forcing every client down the same one-size-fits-all route.

Liang Wu: ARR-based derivatives contracts already exist in the market, and more will emerge, so curve construction, instrument pricing and risk models should be updated to adapt to cover those products. New curves reflecting ARR discounting and projection should be supported. Basis risks between Libor and ARRs, and between ARRs of different currencies, need to be taken into account. On the other hand, some parts of the cash markets require term rates. It is still not clear how alternative overnight reference rates can fit into the pricing and risk management models of term rates. ARR working groups are consulting to explore a potential solution.

Jonathan Rosen: There will potentially be a cascade of reactions to removing Libor and Libor-linked trades as modelling inputs. Interest rate curves at the various Libor tenors will disappear, leaving far fewer curves available to a market that has been multi-curve for a decade. However, investors cannot forget the embedded credit risk in term lending. This means it could be necessary to include more complex credit models – such as credit valuation adjustment exposure modelling on a sector basis – to recover the full multi-curve modelling that is currently standard.

Wherever interest rate volatility will be needed, it is unclear where the volatility data will come from once Libor is discontinued. Currently, the sources for interest rate volatilities are linked to Libor, such as swaptions on swaps that reference Libor. There will be a definite need for new volatility markets on the alternative benchmarks to carry out derivatives pricing, and the industry should strongly consider clearing new trades such as compounded overnight rate caps and swaptions. There will be a real need for these to model volatility and price vanilla legacy trades with fallbacks after Libor.

Furthermore, advanced models with baked-in Libor, such as the Libor market model, will need to be transformed to model the new benchmark rates. The overall impact on the current industry standard for volatility models is going to lead to a sea change for modelling requirements and complexity following Libor's discontinuation. This could lead to a big bang in new modelling approaches and a further need for standardisation in the interest rate volatility markets to provide the data needed by pricing models.

Christopher Dias: The transition from an uncollateralised rate to an RFR will necessitate changes to market pricing and give rise to risk management considerations. There will be a fundamental change in how new loans, swaps and other new products are priced, with the key changes rooted in how pricing desks treat credit basis adjustments. Going forward, pricing cash or derivatives products that previously referenced Libor will need to reflect that the starting point for RFR products is a RFR rather than an AA bank rate. To the extent any models used a Libor curve, whether for pricing or risk management, a basis adjustment will be required to reflect the credit difference between Libor and the RFRs.

Christian Behm: The bad news is that, while new RFR-based products are established, it may become even more complex and less transparent to price individual transactions. In particular, markets for non-linear products – such as options – will take some time to digest the change.

On the upside, it might be possible to significantly reduce the complexity associated with multi-curve approaches required today. In a RFR world there would be one curve per currency, which could increase efficiency significantly.



Frances Hinden
Vice-President, Treasury Operations
Shell International
www.shell.co.uk

Is there enough time to move the industry away from Libor before the end of 2021?

Frances Hinden: There is enough time if all industry players start acting now. Unfortunately, they are distracted by Brexit, US tax reform, and so on. There are two interrelated areas where action is needed: the first is to get the infrastructure in place to manage, measure, report on and account for products based on overnight rates, and the second is to start using the rates in cash markets. In theory, derivatives will follow – in practice, derivatives are leading the way. One challenge to transition is that derivatives traders have been at the forefront of developing instruments and standards for near-RFRs, but it is the 'real economy' that has to catch up.

Roy Choudhury and Philippe Vidal: The move to ARRs will be an enterprise-wide transformation, and many market participants will execute a phased transition plan. This requires significant legal efforts, documentation, modelling, systems, process, client outreach, operational readiness and other efforts, so the sooner planning and prioritised implementation begins, the better. Although 2021 may seem far away, firms that mobilise early and prioritise this topic within their organisations will find the transition more achievable, and are likely to drive business and reap competitive benefits from being early adopters. For example, banks able to offer a full suite of ARR-based cash- and derivatives-based products will be able to retain – and possibly gain – market share.

Firms with a significant exposure to Ibor-linked contracts that mature after 2021 will also have to move earlier than others to mitigate the risk of discontinuance. The transition of legacy Ibor contracts within a short period of time will be a significant, resource-intensive effort.

James Schwartz: The consensus is that, to move away from Libor before the end of 2021, the pace of the transition must accelerate dramatically. Liquidity needs to be built into products referencing the new RFRs. In addition, most market participants either have not mobilised a transition programme or have had only initial internal discussions about the transition. Relatively few have allocated budget and other resources to a Libor transition plan.

Unfortunately, given the uncertainties in this transition away from Libor, up to this point it has been tenable, if perhaps not advisable, to take a wait-and-see approach. If the Isda consultation on the RFRs reaches durable consensus, that could change quickly.

Andy Ross: Libor is deeply entrenched, and market participants need to have a solid grasp of the extent of their exposure, as a transition could have a material impact on the profit and loss of their businesses. The market has been given adequate notice but needs to take action sooner rather than later – now, in fact – to minimise the risks associated with the benchmark transition.

Products referencing alternative rates, such as Sonia, which allow participants to migrate from Libor in both the OTC and exchange-traded spaces already exist. Adoption is increasing, and liquidity continues to grow on a daily basis. In the swaps market, for example, there has been more than 100% growth (year to date) on LCH-cleared GBP swaps notional with a Sonia underlying rate to over £32 trillion notional outstanding (as of August 2018).

Christopher Dias: It is going to take a great deal of effort to achieve the move away from Libor by the end of 2021. Although large financial institutions have begun to mobilise their teams to identify their Libor exposure and plan a transition process, there is still a lot of work to be done. For certain products, this move will likely be easier than for others. Isda, for example, has undertaken efforts to modify definition language and issue protocols that will help with the transition of derivative contracts. All other Libor contracts, however, will require more direct effort, and progress here is moving more slowly. Regulators have expressed concerns with the current pace of transition and urged institutions to move more quickly. The real-time pressure will ultimately come from firms' failure to heed such guidance.

Christian Behm: That is dependent on currency. The US dollar market is ahead of the Alternative Reference Rate Committee-paced transition plan – particularly if the use of SOFR discounting is established over the next six to nine months.

In Europe, there is the opposite: planning for euro short-term rate (Ester) to replace Eonia has just started. If the EU Benchmark Regulation is enforced, it will have to be completed by 2020. In contrast to the Libor post-2021 statement, no clear Euribor policy statements have been issued so far.

The real test of the timetable is not the US and EU migration to a new RFR, but the creation of RFR term rates to mimic the Libor fix-in-advance pay-in-arrears procedure. The simplest method to derive term rates would be to use short OISs with a maturity of up to one year, which would be a challenge.

Overall, this situation has a complex and partially unknown timeline. This is why transformation programmes need to be able to deliver two capabilities: one for the parallel phase with two or more benchmarks at the same time, and the ability to manage and process an Ibor cessation event.

Liang Wu: It depends on the specific currency as well as the specific market. For example, while ARRs had already been identified for other currencies, only recently has Ester been identified as the ARR for the eurozone. The delay could compress the timeline for a full and successful transition away from Libor.

On the other hand, there might be enough time for the derivatives market to move away from Libor since an overnight reference rate is not a new concept in that market. For example, Sonia-based derivatives contracts are already well established. But it could still be challenging for the cash market because an equivalent replacement term rate is not readily available for that market. The creation of such a term rate is possible once sufficient liquidity is present in the underlying ARR derivatives market. However, whether that will leave enough time for the cash market before the end of 2021 is open to speculation.



Philippe Vidal, Partner and
EMEIA Ibor Leader, EY Financial Services
www.ey.com/ibor

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What should firms do now?

Roy Choudhury and Philippe Vidal: The pace of transition implementation is accelerating, and firms with significant Ibor exposures need to mobilise immediately. Kicking off or accelerating enterprise-wide impact assessments and scenario analyses, formalising transition programme governance, project plans and budgets, and confirming senior executives to co-ordinate enterprise-wide transition efforts is paramount.

Consistent with this view, on September 19 the Prudential Regulation Authority and FCA delivered a 'Dear chief executive' letter to certain banks and insurance companies requesting board-approved information describing Ibor transition readiness to be submitted to regulators by December 14, 2018.

This is expected to drive a significant focus on Ibor at many firms, further increase client and counterparty awareness of transition, and be a blueprint of expectations for firms to demonstrate Ibor transition readiness in many other jurisdictions. To satisfy the need to support regulators and other stakeholders – such as clients, information requests and the significant implementation effort by the end of 2021 – the time to act is now. ■

Fed's Quarles critical of opaque Libor data

ARRC chair Sandra O'Connor questions IBA transparency. By Robert Mackenzie Smith, **with editing by** Lukas Becker

Federal Reserve vice-chairman Randal Quarles has expressed concern that financial markets might not be fully aware of how few transactions are used to make up the US dollar Libor rate on a daily basis due to a lack of transparency around those trades.

Giving a speech via a pre-recorded video at an industry event hosted by the Federal Reserve Bank of New York on July 19, Quarles shared data compiled by the central bank which showed that in the second quarter, the median number of unsecured wholesale borrowing transactions used to make up the rates of one-month and three-month US dollar Libor was five and seven trades, respectively.

"People may have some general sense of this, but because IBA [Ice Benchmark Administration] does not release data on the transactions that actually underlie Libor, many may not be aware of how truly thin these markets have become," he said.

Doubling down on that statement, chair of the Alternative Reference Rates Committee (ARRC), Sandra O'Connor, who also serves as chief regulatory affairs officer at JP Morgan, said that in order to help the industry have a better idea of the state of Libor going forward, more data should be shared.

This could help in a 'zombie Libor' situation, where only a handful of banks remain submitting data to underpin US dollar Libor and information is needed by the industry to determine the quality of the benchmark, she said.

"One thing that strikes me about the data that Randy shared earlier, besides how few transactions there are, is even how little data IBA is currently showing to the marketplace. One easy thing, perhaps, to enable people to judge whether Libor's quality has gone down is to ask for more transparency from IBA itself for the number of transactions and volumes that they are seeing on a regular basis," she said.

The IBA declined to comment on the lack of data. It is understood that the administrator would need the permission of its 16 panel banks for US dollar Libor before it could distribute any of the information it receives, with that scenario understood to be unlikely given the data is used for compliance purposes.

The little information that is available about day-to-day unsecured wholesale funding volumes used to calculate the rate is spotty and hard to compare.



Federal Reserve vice-chairman Randal Quarles

In a second report into the evolution of risk-free rates published by the ARRC in March, it was estimated that on a typical day the volume of three-month US dollar Libor transactions is about $500 million. In a report published by the IBA, the administrator says that one-month and three-month rates were derived roughly 35–40% of the time by transaction data during a three-month period at the end of 2017.

The data, compiled by the Fed and presented by Quarles at the conference, is based on transactions aggregated across Fed funds, Eurodollar, certificates of deposit, and unsecured commercial paper from the 16 banks that submit to the US dollar Libor panel. Since the first quarter of last year, the highest number of median transactions for one-month Libor was nine and for three-month Libor was eight.

This, as regulators have pointed out, is very different to the secured overnight financing rate (SOFR) – the ARRC's selected alternative for US dollar Libor.

"SOFR has only been in existence three months, and SOFR futures have only been trading for two months, but on a daily basis there are already more transactions underlying them than there are underpinning Libor. SOFR itself reflects over $700 billion in overnight repurchase agreement transactions every day. One of the many benefits of using a rate so firmly anchored in a market of this depth is that no one can question whether SOFR is representative. It clearly is," said Quarles.

Since July 2017 when the chief executive of the UK's Financial Conduct Authority, Andrew Bailey, said the regulator would give up its power to compel banks to submit to the panels from the end of 2021, authorities have been busy repeating warnings that people need to prepare now for Libor's death.

IBA, which has been administering Libor since 2014, published a revised 'waterfall methodology' in April designed to keep Libor submissions based on transactions as much as possible, rather than expert judgement. The administrator hopes this will be used on an ongoing basis for calculating the benchmark from the first quarter of next year and keep Libor alive post-2021.

The Fed has also thrown its weight behind the development of a compound average of SOFR in order to develop a term rate that the central bank could publish. Quarles referenced an announcement in June from the European Investment Bank, which issued, for the first time, a floating-rate note paying a compound average of the sterling overnight index average.

"It has been suggested that we could call it SAFR, for secured average financing rate, and this is something that we are encouraging our staff to explore. Publishing a compound average rate that encourages broader use of SOFR would help make our financial system more resilient," he said. ■

Previously published on Risk.net



New model army

Quants are warning that the transition away from Libor will require a modelling overhaul, with all pricing, risk and valuation models needing to be changed to reflect the new rate. By Nazneen Sherif

Need to know

- Quants are starting to worry about how the Libor transition will affect pricing and risk management models.
- During the transition period, when Libor is neither dead nor alive, banks would have to model three curves – Libor, the new risk-free rate and OIS – and the bases between each pair.
- Building a forward-looking term structure for overnight rates such as SOFR in the US and Sonia in the UK will be tricky, and is likely to lead to multiple competing models within the same bank.
- Some complain obtaining the data used to build the term structure of the new rates will be tougher than the actual calculation itself.
- Since the new rate will not have enough history in the initial years of transition, risk management and volatility models, which typically rely on historical data, will need to be overhauled.

Members of the financial community tasked with finding an alternative to the discredited Libor benchmark have worked long hours developing a set of replacement rates. For another constituency – the quants responsible for using these new rates to reprice and revalue thousands of derivatives trades – the work is only just beginning.

But as the scale of the task becomes clearer, concerns are emerging over the impact of the new rates on pricing and risk management models. The rate switch will require changes to IT and reporting systems, additional databases and a rethink of the way interest rate derivatives are risk managed – a daunting prospect for many.

"A lot of things need to happen. Operationally this could be a huge issue," says one quant at a European bank. "You need to get market inputs, you need to save that to the database, you need to create discount curves, and your middle office needs to risk-hedge the exposures because now your risk measures are different."

In the US and UK, bankers have the advantage of knowing what the new fixing will be, with authorities selecting SOFR and Sonia as the risk-free rates (RFRs) for the dollar and sterling markets, respectively. Authorities in the eurozone and Japan are yet to decide on their RFR, leaving participants in those markets unable to start the groundwork necessary to update their modelling engines. Another unknown across all regions is the fallback rate that will take effect if Libor ceases to exist.

"It is a bit like the Wild West because we don't know what we are modelling yet," says Russell Goyder, a director in the quantitative research team at vendor Fincad.

The laundry list of jobs is long. Banks must reassess discount rates and term structures. They must build curves for forward-looking rates. And they must manage basis risk in cases where Libor exists alongside new RFRs.

Exacerbating the problem, say quants, is that senior management in some banks are yet to commit resources to the effort.

"We have started sniffing at the Libor-SOFR problem, but there is still so much uncertainty," says a senior quant at a US bank. "We would obviously need to start constructing forward curves for the

new rate. Senior management is less worried about technical details than about the effects on the market, and on the issue of legacy positions. This could be a big headache."

One quant at a second European bank predicts the transition will end in "a last-minute panic".

Libor no longer

In July last year, the UK financial regulator announced it would no longer compel banks to support the Libor family of interest rates from the end of 2021, raising the possibility the benchmarks will be discontinued after that point.

In the euro market, a decision over the replacement for Libor is not due to be made until later this year. The leading contender, dubbed Ester, will not be published officially until October next year.

For European firms, this delay makes it hard for them to prepare: "As long as there is no good successor for Libor, we cannot finalise a good policy?" asks Max Verheijen, managing director at investment adviser Cardano in Rotterdam. "Right now, we are between a rock and a hard place."

A key part of preparation is using the new rates to reconstruct interest rate curves for valuation and forecasting. The financial crisis caused a dramatic widening between Libor and the overnight indexed swap (OIS) rate – the former is used to calculate coupon payments, while the latter is the rate paid on cash collateral – and prompted banks to tear up years of practice in which all future cashflows had been discounted at Libor. The result, a collateral-based, multi-curve modelling framework, requires swaps participants to have Libor and OIS curves for each interest rate currency.

Sonia, the UK's Libor alternative, is long established so a curve already exists. By contrast, curves for new rates such as SOFR and Ester must be built from scratch. In the absence of established liquidity, any gaps in the curve will require interpolation across missing sections.

The complexity associated with building term structure in the earlier stages of transition may result in banks housing a range of models across different departments.

"Until some form of industry consensus emerges, we are going to see multiple competing potential definitions of term rates based on SOFR and, correspondingly, multiple alternative competing modelling approaches for the next, say, five years," says Fincad's Goyder. "If you found the transition from one curve to two curves expensive and difficult, that is just a taste of what is to come."

The transition will affect operations throughout the bank, as departments with indirect exposures to Libor are forced to alter practices to reflect the new rate.



"If there is no liquidity, the actual rate at which one bank can borrow from another will be different from the theoretical index and therefore you will have to take into account all kinds of funding basis between different curves"

Alexei Kondratyev, Standard Chartered

"In the risk areas of the bank or in valuation control and collateral management, Libor forms key parts of those areas – for example, in the way curves are constructed in valuation models," says Mark Cankett, partner at Deloitte. "That flows into margining and settlement. Making sure the processes around payments and settlements are able to handle and reconcile new flows and new rates appropriately is therefore important."

The clue is in the name

The RFRs – SOFR (secured overnight financing rate), Sonia (sterling overnight index average) and Ester (euro short-term rate) – have an overnight tenor. To create term rates at the end of a given period, banks must compound these overnight rates. Corporates prefer forward-looking rates such as Libor, which enable them to quantify payments in advance. Modellers will therefore need to build curves for forward-looking versions of term RFRs.

The committee responsible for deciding on the US alternative rate has proposed three methodologies for building a forward-looking term structure for SOFR. First, bootstrapping between the prices of nearby SOFR futures contracts; second, basing it on SOFR OIS transactions; or third, through actionable market quotes. The committee describes the futures-based methodology as "feasible". However, some argue this technique is overly complex.

"They have outlined a potential way of calculating a three-month rate [based on futures] which is for me strikingly complex. It is pretty dizzying heights of technical complexity for a legal document," says Fincad's Goyder.

Some banks have expressed a willingness to keep Libor alive beyond 2021, which suggests Libor and RFR-linked products will exist side by side for a time. Under this scenario, quants would have to juggle not just two rates and the basis in between, but three different types of rates – Libor, the new RFR and the OIS rates used for discounting swaps – and the bases between each pair.

For instance, if the swap references the new RFR and is discounted at OIS, the RFR-OIS basis would need to be modelled when pricing the swap using the standard multi-curve modelling framework. Incorporating this basis into models, especially for non-linear rates products, is no easy task.

Laurent Chedin, head of CVA at Crédit Agricole's investment bank, says: "We have Euribor three-month, Euribor six-month and Eonia, so we are left with three curves today with bases between each of these three curves. Tomorrow the ECB will create Ester. Just by creating one additional curve we are creating one additional curve and one additional term structure, but we are also creating the bases, Ester to Eonia, Ester to Euribor three-month, Ester to Euribor six-month.

"So we are creating one additional curve and three additional bases, and that is just in Europe," he adds. "In other currencies you are making multi-curve modelling more complex, more difficult and more cumbersome to manage."

Any illiquidity in the new RFR may render the rate unrepresentative of banks' real funding cost. This could result in a basis between the rate at which the bank can fund itself and the theoretical funding rate given by the benchmark. The basis, in turn, would

affect valuation models, as they discount cashflows using the funding rate on the collateral posted on the trade.

"If there is no liquidity, the actual rate at which one bank can borrow from another will be different from the theoretical index, and therefore you will have to take into account all kinds of funding basis between different curves," says Alexei Kondratyev, managing director in the financial markets team at Standard Chartered.

For large banks that still use decades-old legacy systems in various parts of the business, this will be a sizable task.

"You have to update all the systems that have been in place for a while, which may not naturally handle multi-curve very well," says James Church, vice-president in the products and R&D team at Fincad. "The staff who wrote the systems in the first place may no longer be in the organisation, which increases the amount of work because you need to figure out what went on before."

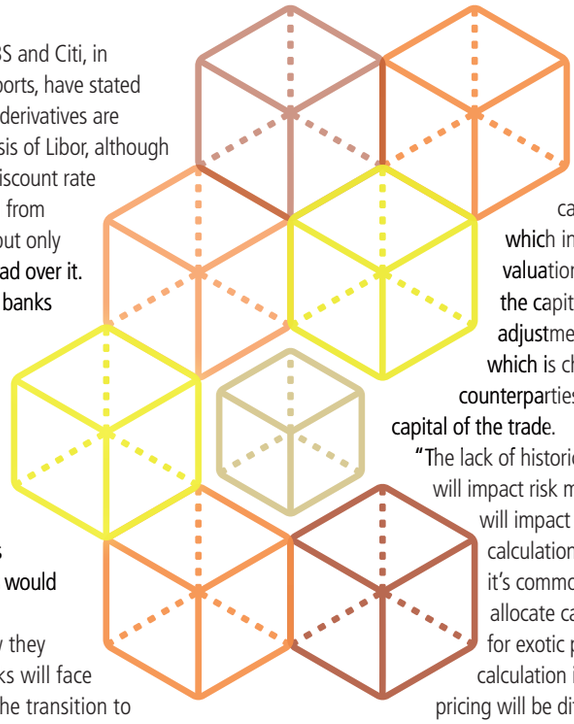
Discount story

Despite the prospect of competing rates, the shift in benchmark could have a unifying effect on one area of swaps activity. After the financial crisis, larger banks began switching to OIS-based discounting of collateralised swaps to better reflect the borrowing rate. Many smaller banks, however, stuck with Libor as their base curve. The shift from Libor to a new RFR could finally force these holdouts to align their discounting practices with the rest of the industry.

Dealers such as UBS and Citi, in their 2017 annual reports, have stated their uncollateralised derivatives are discounted on the basis of Libor, although it is understood the discount rate itself is not calculated from the benchmark rate, but only represented as a spread over it. However, many small banks are still thought to be discounting uncollateralised swaps at Libor. Benchmark reform and the transition away from Libor means the way banks report these numbers would need to change.

Regardless of how they discount swaps, banks will face a data challenge in the transition to a new set of reference rates. Risk measurement relies heavily on data but the new RFRs lack historical data, making it harder for risk managers to extract loss distributions and volatility. In the absence of sufficient history, risk managers would need to resort to using proxies or new risk measurement techniques.

"If you switch to a new index, it does not have the kind of history to estimate the model from," says the quant at the first European bank. "That is the biggest theoretical issue for both valuation and risk management, because risk managers mostly use historical data and historical volatility for vega risk and VAR measures."



Changes to risk calculations will ultimately feed through into regulatory capital calculations, which in turn can affect valuations through the capital valuation adjustment, or KVA, which is charged to swap counterparties for the cost of capital of the trade.

"The lack of historical data will impact risk management, will impact capital calculations. Nowadays it's common for traders to allocate capital into pricing for exotic products. If that calculation is different, your pricing will be different," says the quant at the first European bank.

For volatility products such as swaptions, valuations are derived from historical data. Gaps in this data will affect volatility models.

"There is a whole world of derivatives that need dynamic volatility models which might have to change more fundamentally in their nature. Curves are still curves. I could imagine volatility models being disrupted more," says Fincad's Goyder.

Where products are valued using an implied volatility curve based on option prices, a lack of options based on the new RFRs will cause pricing difficulties.

"It is more of a chicken and egg problem. Where do we start to trade? Where is the liquidity? And where is the data?" says Marc Henrard, head of quantitative research at vendor OpenGamma. "For the moment we have a long history of Libor so dealers are offering products such as swaptions. I see it more as a problem of getting the market started and who will be the first person to trade a swaption on OIS." ■

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> "We are creating one additional curve and three additional bases, and that is just in Europe. In other currencies you are making multi-curve modelling more complex, more difficult and more cumbersome to manage"
>
> Laurent Chedin, Crédit Agricole

The shift may also encourage all banks to discount uncollateralised swaps using the appropriate funding rate of the bank represented as a spread to OIS rather than Libor. Discounting at the funding rate allows the price to reflect so-called funding valuation adjustment (FVA), which factors in the cost of funding the trade.

"The planned discontinuation of Libor across most jurisdictions will in a sense force the hand of banks to evolve their FVA. As the replacements of Libor are typically closer to OIS, this second element aligns with the first to advocate for an FVA that would be based on OIS rather than Libor," says the head of the CVA desk at a large European bank.

For instance VAR measurement is typically based on a long history of loss data. For interest rate books, losses will be sensitive to Libor rates. Standard measures such as DV01 – which shows an asset's change in price for every basis point of interest rate change – are stated in terms of Libor.

"If you look at how a bank manages its market risk and the risk engine and tools it uses, even something as simple as DV01, those simple measures of market risk, are referencing Libor," says one London-based consultant.

>> Further reading on www.risk.net

- Some banks open to committing to Libor post-2021 *www.risk.net/5674056*
- Regulator calls for term Sonia as transition talk ramps up *www.risk.net/5670946*
- Model risk in the transition to risk-free rates *www.risk.net/5663921*

A multi-rate future?

Using new risk-free rates alongside Libor equivalents is gaining support in at least two Asia-Pacific countries. By Narayanan Somasundaram **and** Chris Davis

Long after Libor disappears, its local equivalents in countries such as Japan and Australia are set to stay on, at least for some products, and that could be a boon for market participants in the two nations.

The reluctance of panel banks to continue supporting Libor indefinitely may have forced markets that use the benchmark to diverge from the multi-rate approach envisaged by the Financial Stability Board's (FSB's) road map in 2014. But in the two Asia-Pacific countries, regulators are promoting new risk-free rates (RFRs) while also strengthening their existing credit-based benchmarks – Tibor (Tokyo interbank offered rate) and Australia's bank bill swap rate, or BBSW.

"We understand there may be a multi-rate approach in Japan and Australia, in which firms switch to using RFRs for products where appropriate, but continue to use Tibor and BBSW, respectively, for other products," says Rick Sandilands, senior counsel for Europe at the International Swaps and Derivatives Association (Isda).

While there are likely to be challenges with hedging in a multi-rate world, it could still be a practical solution. Certain products, such as floating-rate notes and corporate loans, can continue to be tied to banks' short-term funding costs, while others can reference payments to a new RFR. It means potentially trillions of dollars' worth of contracts linked to Tibor and BBSW do not imminently need to be renegotiated bilaterally, as will happen in the US, UK and Switzerland over the next three years.

"The approach by Japan and Australia could well turn out to be a less of a heavy lift for the industry and regulator," says a London-based official at an industry body. "These jurisdictions, no doubt, are working on building the robustness of their Ibor rates and simultaneously looking at building out their RFRs."

Need to know

- Japan and Australia are planning to retain Libor-equivalent benchmarks, to run alongside risk-free rates, for pricing financial instruments.
- This differs from countries such as the US, UK and Switzerland, which are preparing to ditch Libor entirely.
- One reason for keeping Ibors is to avoid a far-reaching – and costly – repapering of existing contracts referencing those rates.
- In preparation for this new multi-rate approach, Japan and Australia are tweaking their existing benchmarks, Tibor and BBSW, to make them more robust.
- But both countries must be wary of hedging mismatches that could cause problems for basis risk.

Seeking alternatives

Fears over Libor's susceptibility to manipulation have forced regulators and industry to cut ties to the family of benchmarks, which price everything from derivatives contracts to deposits to bonds to student loans. As a result, national authorities have been tasked with identifying and selecting alternative rates. Currently, Japan uses two Libor-style reference rates: Tibor, and yen Libor. The first is a domestic rate, set by a panel of Japanese banks. It is used to price an estimated $5 trillion of financial instruments, according to a report by the FSB. The second is more widely used – with $30 trillion in outstanding notionals – and includes yen transactions made outside Japan. The two rates are mainly used for pricing derivatives and floating-rate corporate loans, according to the country's central bank.

As an RFR rate to replace Tibor and yen Libor for derivatives transactions, Japan has chosen Tonar, or the Tokyo overnight average rate, an uncollateralised overnight call rate. This was preferred to its rivals due to its risk profile, ease of use and healthy volumes.

In Australia, the Libor-equivalent benchmark is BBSW. Instead of being phased out like Libor, BBSW has been improved and will likely stay on as the main derivatives reference rate. BBSW will also continue to be the basis for products that hinge on banks' short-term wholesale funding cost, such as floating-rate notes issued by banks, corporate loans and derivatives products.

The RBA, though, has suggested that floating-rate notes issued by governments, non-financial corporations and securitisation trusts, which are currently priced at a spread to BBSW, could instead tie their coupon payments to the cash rate. The RBA also says there has been some interest in using the cash rate for derivatives trades instead of BBSW.

The cash rate is the reference rate for overnight indexed swaps (OISs) and other financial contracts. The RBA measures the cash rate directly from transactions in the interbank overnight cash market, which keeps it in line with globally preferred benchmark principles.

The reason Japan and Australia are considering retaining their existing credit-based benchmarks to work in parallel with the new risk-free rates is the sheer operational burden of removing Libor-style benchmarks. Financial contracts worth $350 trillion globally are priced against Libor. From 2021, banks that provide prices to the Libor administrator will no longer be obliged to participate, meaning a likely end to the benchmark. Even so, some market participants are questioning whether it would be easier for both clients and banks to allow the rate to continue past that date given the task of shifting derivatives contracts to a new reference rate.

"Some of the contracts tied to the benchmark rates can run for as long as 100 years, so the logistics of conversion is a lengthy, onerous and ultimately expensive process," says Martin Whetton, a senior rates strategist at ANZ Bank.

While Isda is working on a protocol to migrate legacy derivatives contracts on to new reference rates should Libor cease, this protocol would not apply to individual bonds or consumer loans. Contracts referencing these instruments would require manual repapering, an expensive and time-consuming process for banks. This may help explain why regulators are keen to strengthen the existing benchmarks, according to a Hong Kong-based official at an industry association.

Reiko Tokukatsu, a relative value strategist at BNP Paribas, says "administratively, banking would become very difficult" if Tibor were to disappear because of the large number of loans linked to the benchmark. In Australia, retaining BBSW is "the most favourable outcome, given the existing framework", says ANZ's Whetton.

On the hedge

A multi-rate approach is not without its faults. Having bonds and loans on one rate and the hedges referencing another creates basis risks that need to be managed by the basis swap market.

Basis risk is a concern in Japan because there is no liquid market to manage basis risk between Tibor and Tonar. The present practice for swap dealers

looking to manage Tibor risk is to hedge in the Tibor-Libor basis swap market, with any further basis risks subsequently hedged through the Libor-OIS market. Clearly, that method becomes impractical should Libor disappear post-2021.

While Australia would face similar problems, some of the challenges are mitigated by the existence of a basis swap market between BBSW and the cash rate market. The floating rate of the cash side of the swap is tied to a daily interbank overnight cash reference rate, while the other floating-rate payment is based on BBSW.

Here, dealers and investors can swap the floating-rate cashflows over horizons that may extend over a long period. Traders also take comfort from the liquidity in the Australian dollar OIS market at least out to a one-year term, with scope for longer tenors. Liquidity in yen OIS, meanwhile, remains poor.

Hedge accounting is also an issue. Market participants are not clear about the effect of switching floating-rate notes to an RFR but keeping products such as loans and derivatives on the old credit-based benchmarks. Under the new accounting regime, International Financial Reporting Standard 9, there needs to be an economic relationship between the hedged item and the hedging instrument in order to obtain hedge accounting treatment.

Damien Jones, in the financial accounting advisory team at EY in Sydney, sees a number of hedge accounting challenges. Any switch of benchmark should consider the impact on existing hedges, particularly cashflow hedges and whether forecasted transactions based on the old benchmark are still likely to occur. He also highlights the potential for "basis risk ineffectiveness" when hedging instruments are not fully aligned to new hedged rates.

There are also problems stemming from the difference in the way the reference rates are set. In Japan, interest on conventional yen Libor and Tibor products is determined at the beginning of the payment period, whilst interest payments on OIS products are set-in-arrears – that is, determined at the end of the payment period.

That makes Tonar swaps unsuitable to use as a hedge for floating-rate notes and loans referencing Tibor, says Taki Hidesada, a rates strategist at Mitsubishi UFJ Morgan Stanley Securities.

While Tibor swaps could be retained to hedge domestic loan and floating-rate bonds, they're likely to be less liquid than Tonar swaps once the market transitions away from yen Libor. Also, it's not ideal to use Tibor as the reference rate for other products such as cross-currency swap hedges, Hidesada explains.

The difficulty stems from the resolve of regulators in other markets, such as dollar and sterling, to shift the pricing of their derivatives exclusively to RFRs. With Tibor including bank credit risk and other RFRs not, two reference rates on a cross-currency swap with different underlyings could move for different reasons, thereby distorting the basis. The fact that one rate would be set-in-arrears and one set-in-advance would cause further problems.

"RFRs for other currencies, such as the US's SOFR (secured overnight financing rate) or the UK's Sonia, versus Tibor will cause confusion," says Hidesada.

Hidesada believes that for products such as floating-rate loans and derivatives, it will be necessary for the market to find a way to transition to a set-in-arrears OIS regime. He proposes a semi-multiple rate approach (see box: *Introducing the semi-multiple rate approach*).

The three tenors

One benefit of retaining existing rates is to give nations time to build liquidity in their OIS market and a term curve. From March 26, the Japan Securities Clearing Corporation plans to expand its clearing products to include OIS with one-month, three-month and six-month coupon payments, adding to the currently eligible OIS with a one-year coupon payment. Authorities hope this will boost liquidity from almost negligible levels now and aid the transition from yen Libor to the new risk-free rate.

About $40 billion equivalent notional of yen OIS swaps was cleared at the JSCC in the second quarter of 2017, according to data from Mitsubishi UFJ Morgan Stanley Securities. The firm estimates that volumes need to reach an equivalent of $1 trillion notional per six months to build a sufficiently reliable forward curve for the refixing of legacy Libor contracts. The yen OIS data also compares with volumes of $56 trillion notional US dollar OIS and an equivalent of $21 trillion notional in euro at UK clearer LCH.

But the success of a multi-rate market in Japan and Australia is predicated on improvements to the existing benchmarks, so they can avoid the fate that has befallen Libor. Last year marked Japan's first major reform for Tibor since its launch in 1995. It moved away from crunching solely interbank call rates to new formulae that incorporated more data to offset any lack of call transactions. It now covers not only unsecured call transactions, but also actual transactions in the wholesale funding market, including negotiable certificates of deposit and large term deposits with corporates.

The changes introduced by the body that administers Tibor have brought it in line with the principles established by global securities regulators in 2013 for financial benchmarks to be based as far as possible on actual transactions.

Australia has a new staged methodology to calculate BBSW. This means that real transactions in bank bills and negotiable certificates of deposits determine the BBSW rate. That will replace the method where the benchmark was calculated from executable bids and offers for bills issued by the major banks. This method had a flaw: the low trading volumes at 10am when BBSW was measured.

To address that, regulators are strengthening the methodology to enable the benchmark to be calculated directly from a wider set of market transactions. From January, trades submitted by market participants to the administrator, ASX, have been used to calculate a volume-weighted average price (VWAP). Between March and late April, ASX will calculate a VWAP rate at the same time as the BBSW rate is published. The live date for the new methodology is expected to be April 23, according to the ASX.

The three-stage 'waterfall' approach to calculating BBSW will see a VWAP price determined via eligible securities within the trading window as stage one. The second stage will be a national best bid and offer, which will use live and executable bids and offers to determine a price, if stage one fails. A third stage will use relevant pricing information, via an algorithm, if stages one and two do not calculate BBSW.

Authorities hope these changes will preserve the practicability of the benchmark. "If as an administrator you can defend your rate – demonstrate it meets all the global rules, it is a VWAP for transactions and is a trade-based rate with the failsafes – I don't see how you can be criticised for holding on to it," says the London-based official at the industry body. ■

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INTRODUCING THE SEMI-MULTIPLE RATE APPROACH

Rates strategists believe institutions in Japan are likely to require some form encouragement to develop the operational infrastructure required to move to a set-in-arrears benchmark for their bond and loan portfolios.

One idea that has been proposed is to take a so-called "semi-multiple rate" approach.

The yen OIS market would be effectively split into two groups. One group would be formed of dealers using OIS in which the floating leg is fixed in advance. The other group would continue to follow the current convention – fixing in arrears. Clearing houses would enable two-way hedging between the two groups. To provide an incentive for market participants to build liquidity, those who use set-in-arrears OIS would receive a prescribed spread on six-month OIS from swaps users using set-in-advance OIS.