

CHANGING THE WORLD'S MOST IMPORTANT NUMBER

LIBOR TRANSITION



1. EXECUTIVE SUMMARY

The London Interbank Offered Rate (LIBOR) is the reference interest rate for tens of millions of contracts worth more than USD 240 trillion, ranging from complex derivatives to residential mortgages. LIBOR is also hardwired into all manner of financial activity, such as risk, valuation, performance modelling and commercial contracts. It has been called the “world’s most important number”.

However, significantly reduced volumes of interbank unsecured term borrowing, which is the basis for LIBOR, is calling into question its ability to continue playing this central role.

Working groups convened by regulators in the most used LIBOR currencies have already converged on alternative reference rates. In addition, the UK’s Financial Conduct Authority (FCA) last year announced that after 2021 it would no longer persuade or compel panel banks to submit the rates required to calculate LIBOR.

Publication of LIBOR rates will not necessarily end after 2021. Nothing prevents banks from continuing to submit the relevant data and ICE Benchmark Administration from publishing the rates. In addition the submitting banks are conscious of the conduct risk inherent in making judgment-based submissions to a benchmark that determines the value of a vast number of contracts. Even if LIBOR is not discontinued, regulatory pressure to transition to new rates is expected to increase.

The transition from LIBOR will bring considerable costs and risks for financial firms. Since the proposed alternative rates are calculated differently, payments under contracts referencing the new rates will differ from those referencing LIBOR. The transition will change firms’ market risk profiles, requiring changes to risk models, valuation tools, product design and hedging strategies.

LIBOR may become unavailable even though products referencing it remain in force. These contracts typically include “fall-back provisions” which specify contract terms in case LIBOR is unavailable. If the period of unavailability is brief, as envisaged when the contracts were drafted, the resulting losses and gains are manageable. But if fall-back terms are used for the remaining life of the contract, the economic impact is likely to be significant, with one side a winner and the other a loser.

Renegotiating a large volume of contracts would be difficult, especially when one party has a contractual right to a windfall gain. If contracts are left to convert to fall-back provisions if LIBOR becomes unavailable, a vast number of price changes would occur in a short period. The associated financial, customer and operational impacts would be difficult to manage.

Financial firms will also face a serious communication challenge with retail customers. For example, most variable rate mortgage customers in the US may understand that their rate is LIBOR+200 basis points (or similar) but have little understanding of LIBOR itself. Unless appropriately communicated, they are likely to think that a proposed alternative rate of the Secured Overnight Financing Rate (SOFR) +230 basis points is a worse deal, even if SOFR is on average 30 basis points lower than LIBOR.

Transitioning away from LIBOR could create considerable conduct, reputational and legal risk. Even today, writing long-dated business that may extend beyond a LIBOR transition period entails conduct risk. Without clarity about the alternative rates or when the transition will happen, it is difficult to know how contracts should be priced. The longer uncertainty persists, the greater the mis-selling risk incurred by financial firms.

Financial firms still have the opportunity to work with regulators to influence the transition process and outcomes. The alternative rates are defined but market expectations and choices are not.

A wait-and-see approach would be unwise. Given the volume of products and processes that will have to change, transition away from LIBOR entails considerable work and risk. Preparations should start immediately.

2. REGULATORS SEEK REPLACEMENTS FOR LIBOR

The London Interbank Offered Rate (LIBOR) is ubiquitous in the financial landscape. Called the “world’s most important number”, it is used as a reference rate in a wide range of wholesale and retail financial products, the total notional outstanding value of which exceeds USD 240 trillion¹ (see Figure 1). As well as corporates and institutions, we estimate that over 15 million retail customers globally currently hold products that reference LIBOR.

Figure 1: Notional outstanding balances by reference rate

NOTIONAL VOLUMES BY REFERENCE RATES AND INDICATIVE CONCENTRATIONS
ORDER OF MAGNITUDE – (USD TN)

| NOTIONAL VOLUME | | USD-LIBOR | GBP-LIBOR | EURO-LIBOR | JPY-LIBOR | CHF-LIBOR |
|------------------------------------|--------------------------|-----------|-----------|------------|-----------|-----------|
| | | 175–185 | 30 | <2 | 30 | 5 |
| By asset class | | | | | | |
| Syndicated loans | Syndicated loans | High | Medium | Low | Medium | Low |
| Business loans | Corporate business loans | High | Medium | Low | Medium | Low |
| | Other business loans | High | Medium | Low | Medium | Low |
| | CRE/Commercial mortgages | High | Medium | Low | Medium | Low |
| Retail loans | Retail mortgages | High | Medium | Low | Medium | High |
| | Credit cards | High | Medium | Low | Medium | Low |
| | Auto loans | High | Medium | Low | Medium | Low |
| | Consumer loans | High | Medium | Low | Medium | Low |
| | Student loans | High | Medium | Low | Medium | Low |
| Floating rate notes | Floating rate notes | High | Medium | Low | Medium | Low |
| Securitisation | RMBS | High | Medium | Low | Medium | Low |
| | Other (CMBS/ABS/CLO) | High | Medium | Low | Medium | Low |
| OTC Derivatives | Interest rate swaps | High | Medium | Low | Medium | High |
| | Forward rate agreements | High | Medium | Low | Medium | High |
| | Interest rate options | High | Medium | Low | Medium | Low |
| | Cross-currency swaps | High | Medium | Low | Medium | Low |
| Exchange Traded Derivatives | Interest rate options | High | Medium | Low | Medium | Low |
| | Interest rate futures | High | Medium | Low | Medium | Low |
| Deposits | Deposits | High | Medium | Low | Medium | Low |
| Prevalent term | | 1M/3M | 1M/3M/6M | 3M/6M | 3M/6M | 3M/6M |
| % roll off after 5Y | | 70% | 60% | N/A | N/A | N/A |

Key: **High** >\$1 TN **Medium** \$100 BN-<x<\$1 TN **Low** <\$100 BN

Source: Oliver Wyman analysis

¹ In 2014 the Financial Stability Board reported a total outstanding notional value of USD 370 trillion which included EURIBOR and TIBOR. USD 240 trillion is the total outstanding notional value referencing the five currency LIBORs, excluding contracts referencing EURIBOR and TIBOR and is updated for latest available data as of December 2017

LIBOR is also used in adjacent processes – integral to risk, valuation and accounting models, for example – and in non-financial contracts, for example in late payment clauses and as a performance benchmark for measuring returns and funding costs. The extent to which LIBOR has filtered through the financial world is difficult to overestimate.

Nevertheless, LIBOR’s central role in the financial system appears to be coming to an end. Following the 2012 rate-fixing scandals, substantial improvements have been made. However, over this period, activity in the market on which LIBOR is based – unsecured interbank term borrowing – has declined substantially. Following the financial crisis, banks have shifted away from unsecured short-term borrowing, preferring repos, bonds and other forms of financing. And the post-crisis liquidity rules, which treat interbank borrowing as unstable, have reinforced the trend. In his July 2017 speech, Andrew Bailey, Chief Executive of the FCA, spoke of a currency-tenor combination where submitting banks “executed just fifteen transactions of potentially qualifying size in that currency at tenor in the whole of 2016”.

This lack of activity calls into question the sustainability of LIBOR as a benchmark rate in its current form. Although its status arose as a market convention rather than a regulatory diktat, regulators have expressed a desire to see financial firms move away from LIBOR. In 2017, the FCA declared that after 2021 it will no longer persuade nor compel banks to submit their interbank borrowing rates to ICE Benchmark Administration (IBA), which has administered LIBOR since 2014. Working groups have been established for each LIBOR currency and most have converged on an alternative reference rate (see Figure 2).

Figure 2: Alternative reference rates

OVERVIEW OF PREFERRED ALTERNATIVE RATES

| CURRENCY LIBOR | PREFERRED ALTERNATIVE RATE | ADMINISTRATOR | NATURE | DATA/ TRANSACTIONS SOURCE | O/N RATE AVAILABLE | TERM RATE AVAILABLE ⁷ | WORKING GROUP |
|---|-------------------------------|--|-----------|---|--------------------|----------------------------------|---|
|  | SOFR ¹ | Federal Reserve Bank of New York | Secured | Tri-party repo, FICC GCF repo, FICC bilateral treasury repo | ✗ Target 2018 | ✗ Planned 2021 | Alternative Reference Rates Committee (ARRC) |
|  | Reformed SONIA ² | Wholesale Markets Brokers' Association (WMBA) Transitioning to Bank of England | Unsecured | Unsecured overnight sterling transactions negotiated bilaterally and brokered in London by WMBA | ✓ | ✗ Under consideration | Working Group on Sterling Risk-Free Rates |
|  | SARON ³ | SIX Exchange | Secured | CHF repo transactions in the interbank market ⁶ | ✓ | ✗ Under consideration | National Working Group on Swiss Franc Reference Rates |
|  | TONAR ⁴ | Bank of Japan | Unsecured | Data provided by money market brokers | ✓ | ✗ Under consideration | Study Group on Risk-Free Reference Rates |
|  | Under discussion ⁵ | European Central Bank | TBD | TBD | - | - | Newly established |

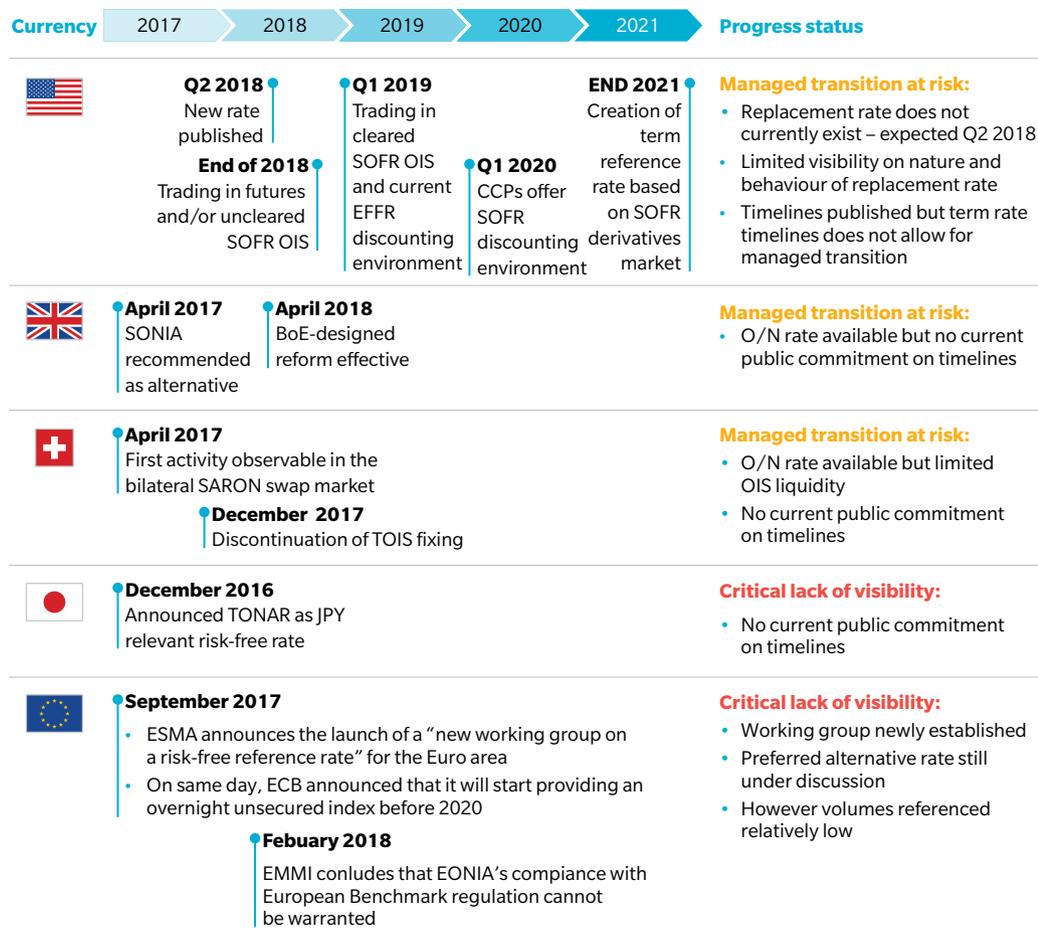
1. Secured Overnight Financing Rate; 2. Sterling Overnight Index Average; Reformed SONIA will not be available until April 2018; 3. Swiss Average Rate Overnight; 4. Tokyo Overnight Average Rate; 5. EMMI concluded in Feb 2018 that EONIA's compliance with European Regulation by Jan 2020 "cannot be warranted";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

Source: Working Groups, Oliver Wyman analysis

As with the rise of LIBOR, the shift to these alternatives will depend on choices made by market participants. The transition is unlikely to be required by regulation and, strictly speaking, LIBOR could survive as the pre-eminent reference rate. However, given the regulatory direction of travel, this seems unlikely.

The timing of the likely transition will vary by currency depending on the availability of the alternative reference rate and liquidity in the relevant markets (see Figure 3). For example, in the UK, SONIA is already widely used as the reference rate for Sterling Overnight Indexed Swaps (OIS) and discounting for Sterling interest rate portfolios. By contrast, the new US rate, SOFR, will not be published until the second quarter of 2018, and the publication of term rates for SOFR is not expected before the end of the transition period in 2021.

Figure 3: Transition timeframe



3. THE NEW REFERENCE RATES WILL NOT BE ECONOMICALLY EQUIVALENT TO LIBOR

If the new reference rates were to differ from LIBOR only in the way they are calculated and not in their resulting levels, the transition to them would be largely administrative. However, the new rates are likely to differ materially from LIBOR, sometimes dramatically – especially during periods of financial stress.

As shown in Figure 2, the proposed alternative reference rates are all overnight rates. Yet LIBOR rates are published for multiple terms, the most commonly used LIBOR tenors being one, three and six months. Moreover, two of the alternative rates are secured and therefore exclude the credit spread related to bank credit risk currently embedded in LIBOR. In addition, the unsecured alternative rates, being overnight, have a vanishingly small credit spread that does not correspond to the spread in the LIBOR term rates. Contracts based on the new overnight reference rates would unavoidably entail different payments from contracts based on longer-tenor LIBOR rates.

Consider a contract that today sets an interest payment at GBP 3M LIBOR+100 basis points (bps). This cannot be translated into a contract referencing SONIA that will give rise to the same future payments. The average difference between GBP 3M LIBOR and a computed forward-looking 3M SONIA rate is roughly 30 basis points (see Figure 4). But 3M LIBOR+100bps is not equivalent to SONIA+130bps, because this 30bps difference represents an average of differences that vary dramatically over time. In the last 10 years alone, this difference has been as great as 398bps, and can be negative when the yield curve inverts. Payments made under a contract priced at 3M LIBOR+100 bps and under a contract priced at 3M SONIA+130bps will only be the same level on rare occasions.

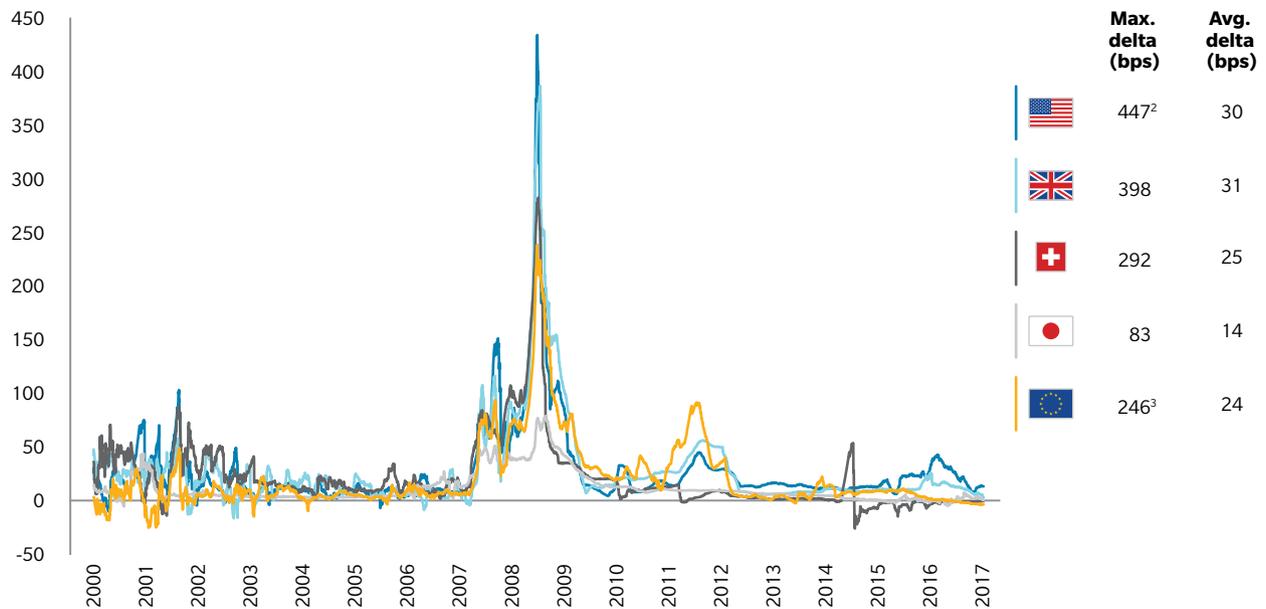
The working groups are now considering term structures for the new reference rates. It is not yet clear how term structures will be derived, when these rates will be determined, or whether they will be determined at all. But even if term-adjusted reference rates are produced, payments will still differ from the LIBOR rates, creating significant valuation differences.

Given that bank funding no longer includes much unsecured interbank lending, setting prices on LIBOR does not provide the “natural hedge” it once did. As a result, moving to the new reference rates will change the nature of the asset-liability mismatch risk banks face between their borrowing and lending activities.

In short, shifting from LIBOR to the proposed alternative reference rates will not be like shifting from miles to kilometres in the measurement of distance. It will require more than applying a simple conversion rate to the values in products to arrive at an economically equivalent contract. New contracts and products, using the new reference rates, will not be economically identical to the old ones based on LIBOR. The transition will thus have important long-term implications for product design and market risk management.

Figure 4: Difference between 3M LIBOR and alternative rate

DELTA BETWEEN 3M LIBOR AND 3M COMPUTED FORWARD LOOKING ALTERNATIVE RATE¹ – BY CURRENCY
2000–2017, BPS



1. 3M forward looking alternative rate calculated based on a geometric average of the overnight rate over a 90 day period on a forward looking basis
2. Effective Federal Funds Rate used as a proxy for SOFR in the absence of a published alternative rate
3. EONIA used for the purposes of this analysis

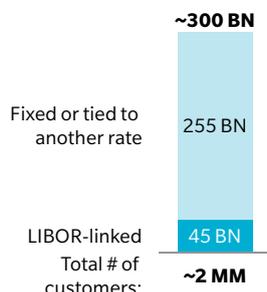
Source: Bank of England, Thomson Reuters datastream, SNB data portal, Oliver Wyman analysis

In the short-term, the risk management challenge created by the transition is likely to be exacerbated by new reference rates coming available at different times. Financial firms could find themselves operating in LIBOR for some currencies (e.g. USD) and new reference rates in other (e.g. GBP, and CHF), sometimes within the same deals. This risk could be reduced if the transition process, currently being undertaken independently for each currency, were coordinated at an international level. However, there are no such plans at the moment.

Given the prevailing uncertainties, it is challenging to estimate the financial impact of the transitions on the various businesses that now reference LIBOR. However, to give a more tangible sense of what may be at stake, we have provided hypothetical case studies for three lines of business: variable rate mortgage lending in the US, UK commercial lending and pension fund interest rate hedging.

Retail mortgages for a model bank in the US

Illustrative book for a large bank USD BN



Impact of LIBOR to SOFR direct substitution

~300 K
US Retail customers affected per bank

~\$120 MM
Annual bank/investor income at risk¹

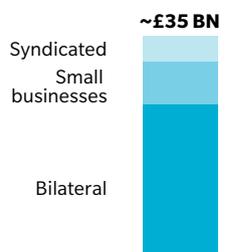
Transition challenges

- Communicating to hundreds of thousands of retail customers
- Potential need for customer approval
- Potential need for investor approval
- Reputational, legal risk of rate divergence working against customers
- Issuing LIBOR-linked mortgages now – knowing LIBOR may transition
- Coordination for securitization investors

1. Based on a potential delta of 25 bps between SOFR/LIBOR (2 year average delta between 3M LIBOR and computed 3M forward-looking EFFR)

Corporate and SME lending for a model bank in the UK

Illustrative LIBOR-linked loan book of a UK bank



Impact of LIBOR to SONIA direct substitution

~100 K
UK Corporate & SME clients affected per bank

~£55 MM
Annual bank income at risk¹

Transition challenges

- High levels of contract variation, dealing with paper contracts
- Loss of cash flow visibility for borrowers if no term rate exists
- Ensuring clients can continue to hedge if rate shifts
- Pricing, terms and disclosures for any new LIBOR-linked lending and associated hedges which date beyond 2021

1. Based on a potential delta of 15 bps between SONIA/LIBOR (2 year average delta between 3M LIBOR and computed 3M forward-looking SONIA)

GBP interest rate swap book for a pension fund

Illustrative directional pension fund swap book

~£1 BN

*LIBOR swaps across
5–30yr maturities*

*Pension fund is beneficial owner
paying floating rate and receiving
fixed rate*

Impact of transitioning existing LIBOR swaps to SONIA

£30–50 MM
*Notional valuation (and collateral
requirement) impact*

up to ~3%
DV01 risk impact (to be rebalanced)

**If existing LIBOR swaps taken
off and replaced with new
SONIA swaps:**

0%¹
DV01 risk impact

up to 10–15%
Higher initial margin for cleared trades

*Valuation impact dependent on timing of when
existing swaps are closed and margin settled*

Transition challenges

- Potential large mark-to-market impacts if LIBOR swaps replaced with SONIA swaps
- Potential higher margin requirements (for any cleared swaps)
- Need for managers to re-design swaps portfolios to ensure risk profile is maintained
- Operational impacts for fund managers – updates to booking, risk models, valuation approach, collateral changes

1. Assuming portfolio held constant pre and post transaction

4. “THE BACK BOOK”: CURRENT LIBOR-BASED CONTRACTS

Many millions of financial contracts reference LIBOR, often defining it as the rate listed under that heading by a named information provider, such as Bloomberg or the Wall Street Journal. What happens if, one day, LIBOR is no longer reported while those contracts are extant?

All well-drafted contracts have “fall-back provisions”, which specify an alternative rate in case LIBOR is unavailable. Thanks perhaps to historic confidence in LIBOR, these provisions assume a short period of unavailability, caused perhaps by a technical glitch. Such provisions might say, for example, that if LIBOR is unavailable, the rate last used will continue unchanged. Over a few days, this would entail small differences in payments even if interest rates moved significantly. But if “the same rate” persisted over a period of months or years, as it would for many contracts if LIBOR ended, the differences (which translate to gains and losses) would be considerable. For example, US mortgage lenders locked into charging today’s low interest rates on LIBOR-linked variable rate products would incur large losses if interest rates were suddenly fixed and market rates rose significantly.

Rather than persist under a disadvantageous fall-back provision, the losing party will be keen to re-negotiate the contract. But the gaining party will be equally keen to retain the existing terms. Where interbank and other institutional business is concerned, the gains and losses may “come out in the wash”, provided a firm is not systematically on one side of deals. And financial firms may have an interest in renegotiating agreements conforming to the new, industry-agreed norms. When it comes to contracts between financial firms and corporate customers, retail customers or small businesses, the financial firm is almost sure to be the loser from a reputational standpoint. Refusing to amend a LIBOR-based residential mortgage will cause the homeowner no reputational or legal risk. Not so for the mortgage lender. In this David and Goliath duel, David starts the hot favourite. The end of LIBOR thus represents a significant operational, reputational, and legal risk for financial firms with LIBOR-based retail products.

Even where fall-back provisions do not lock financial firms into loss-making arrangements, the transition away from LIBOR will be fraught with risk. Because the new rates are overnight and in some cases secured, they are likely to be lower than the LIBOR rates they replace. This means new contracts will often increase the “add-on” – the “plus XXX basis points”. Even if the customer is no worse off in aggregate, the “optics” could be problematic. And, as noted above, depending on how the difference between overnight and longer LIBOR rates changes over time, customers could in fact be worse off than they would have been on LIBOR (and possibly better off, of course). A field-day for anti-bank advocacy groups and lawyers selling class action suits beckons!

To minimise these reputational and legal risks, firms will need to communicate a clear, consistent and justifiable transition approach to both counterparties and regulators. They will need to be especially careful when dealing with less sophisticated retail and commercial counterparties.

Additional complexity: Numerous instruments including residential mortgages, commercial mortgages, structured products, and corporate bonds use a trustee for administration. The trustee is a fiduciary and is there to manage payments from the debtor and payments to the bond holders, and other administrative tasks. Many large banks have a Corporate Trust business. LIBOR transition will be a particular concern for these trustees as they will need to manage the post-LIBOR changes. For example, unless the issuer and bondholders agree, a LIBOR-based bond that has fall-back language akin to “use the last rate” will be enforced and administered by the trustee. In general trustees have little-to-no flexibility to change the existing terms and little incentive to do anything other than follow the existing fall-back language – even if it is widely different from the original product intent. Thus we believe Corporate Trust departments will be “ground zero” for the negotiation and resolution of legacy products if LIBOR is discontinued.

5. MANAGING THE TRANSITION

Banks and other market participants with significant LIBOR positions face major risks and administrative burdens arising from the transition to the new rates. Firms that do not act quickly in anticipation of the transition will increase both their risks and costs. They will be ill-prepared to manage customers through the changes and to manage the ALM implications. And they will continue to build up exposures which reference LIBOR. This increased quantity of conversion work will be compressed into a tighter timeframe, exacerbating the disruption and attendant costs. “Do nothing” firms will also find themselves following industry standards and protocols as they emerge, rather than playing a role in shaping them.

By contrast, a firm that moves early to redesign products on the new reference rates can choose to stop writing new business that references LIBOR and, where possible, start converting existing contracts. How rapidly this process can take place, and LIBOR exposures be run down, will depend not only on internal capacity but on external factors, such as the availability of the replacement rate, liquidity of products referencing the new rates, supporting market infrastructure and the willingness of customers and counterparties to transition. Nevertheless, large players who move early will have an opportunity to shape industry norms.

Increasing conduct risk with every new LIBOR contract: Financial institutions currently writing new long dated business extending beyond 2021 that references LIBOR are building up a book of potential problems. How are loans, bonds and derivatives with maturities beyond 2021 currently being priced with the knowledge that LIBOR is likely to discontinue in the future? How are clients informed about the behaviour of their contracts should LIBOR become unavailable? If loans or bonds are issued with associated hedging swaps, does the client understand the implications for their hedge should the derivatives contract revert to fall-back rates? There is also potential concern around asymmetry of information given those participating in currency alternative reference rate working groups will likely be more attuned to the implications of LIBOR transition than clients or counterparties not involved. But at the same time, the market cannot come to a standstill. To continue to do business but mitigate conduct risks, we believe there is an urgent need for banks to revisit client communication and disclosures to ensure transparency around future risks and uncertainties.

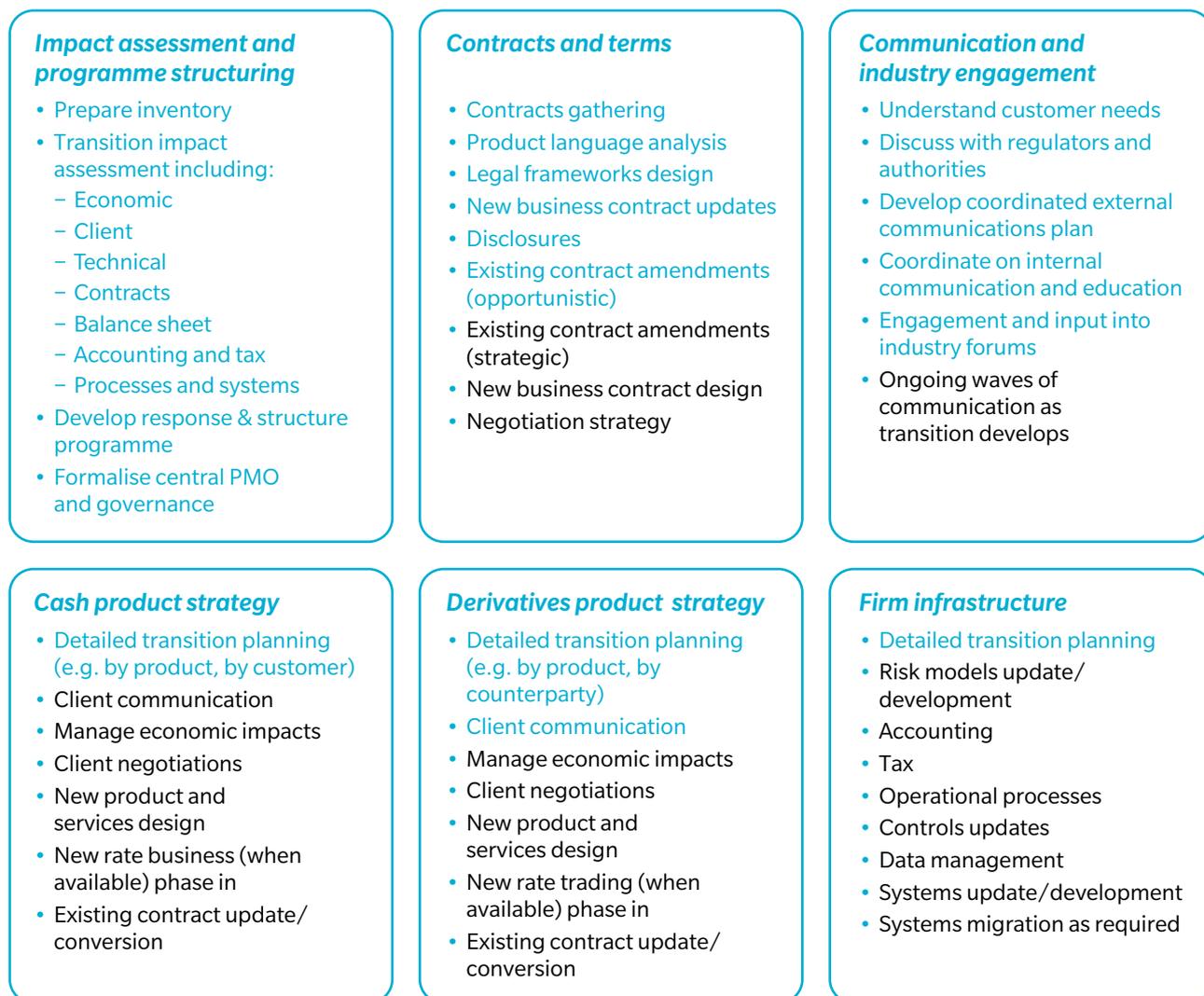
Each firm’s transition will vary depending on the type of market participant and their exposure to LIBOR. The first step will thus be to get a better understanding of where the firm is exposed to the transition from LIBOR, the impact of this transition and the scale of the risks and transition tasks. For firms with any material exposure, the transition work will span the organisation – from product strategy and customer and counterparty management through to risk models, contracts, finance processes and systems (see Figure 5).

The difficulty of contract renegotiation and product redesign will differ by asset class and currency. For example, transition discussions for derivatives are more mature and contracts

are largely standardised, so industry protocols may well emerge quickly. Netting of exposures may also be possible. In cash products such as loans, however, documentation is less standardised and financial institutions may need to renegotiate contracts individually. Difficulties will also be greater in regions where replacement rates are not already in use, such as the US. This could lead to a bifurcation in the transition (cash vs. derivatives, between currencies), which will add to the operational risk and basis risk for market participants and potentially trigger accounting issues if interest rate hedging products are no-longer considered effective.

Industry infrastructure providers, such as exchanges and clearing houses, and individual market participants, will probably need to manage activity on both LIBOR and the replacement rates in parallel during the transition period. Sufficient liquidity in both rates will be a pressure point at either end of the transition period.

Figure 5: LIBOR transition high level book of work



2018 priority actions

6. UNCERTAINTY PERSISTS BUT THE CLOCK IS TICKING

The transition from LIBOR remains a matter of great uncertainty. The term structures of the new reference rates, or even if they will have term structures, remains unclear. So does the timing of the transition. Indeed, LIBOR could survive beyond 2021 and continue playing its role as the reference rate for many financial products and contracts. But counting on that outcome would be a major gamble, which financial firms should avoid by beginning preparations now.

The current uncertainties present financial firms with an opportunity. They can engage with regulators and industry bodies to help shape the transition process and its outcomes. And they can firm up their position based on internal impact analyses and reviews of customer needs. But they must not use this uncertainty, and the fact that the end of compelled rate submission is still three plus years away, as a pretext for inactivity. For banks with large LIBOR-linked exposures, the risks entailed by the transition are large. And three years is not long to undertake a project that could cover hundreds of thousands of contracts and affect multiple business lines and every function in the organisation.

Early industry estimates are that the cost of transition could be greater than \$200 MM for some banks – a similar order of magnitude to recent regulatory change programmes such as MiFID 2 and historical transition programmes such as the Euro transition and Y2K. Yet awareness of this upcoming challenge remains surprisingly low.

Transitioning out of LIBOR should be moving rapidly up the management agenda.

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