

The end of LIBOR

IT'S SO HARD TO SAY GOODBYE

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

J. Christopher Giancarlo
Chairman, U.S. Commodity Futures Trading Commission
July 2018

EXECUTIVE SUMMARY

- Since 1986, the London Interbank Offered Rate (LIBOR) has been one of the most important interest rates in the world and is referenced as the standardized benchmark for many financial instruments such as interest rate derivatives (swaps, options, Eurodollar futures), floating rate notes, business loans and securitized products (mortgages), and government bonds amounting to almost \$350 trillion in outstanding notional.
- In response to concerns about market manipulation as well as continued decline in the degree to which banks fund themselves in the London interbank market, global regulators have selected alternative reference rates to LIBOR.
- In the United States, the Alternative Reference Rates Committee (ARRC) has been tasked with two primary goals—to identify an alternative reference rate to replace LIBOR, and to develop a market strategy to make the transition.
- In April 2018, the Federal Reserve Bank of New York (NY Fed) began publishing the Secured Overnight Financing Rate (SOFR), a new benchmark rate intended as a replacement for LIBOR. However, this rate is structurally different from LIBOR and there have been some concerns expressed about the possibility of significant economic impact and uncertainty over how this transition process will develop.
- Transitioning away from LIBOR will be an expensive and complicated endeavor that will take several years to achieve. While much uncertainty remains, insurance firms should plan for LIBOR cessation by first identifying LIBOR exposure on a product-by-product basis, reviewing fallback language in legacy contracts, and evaluating systems readiness.

OCTOBER 2019

**Milliman Financial Risk
Management LLC**
Capital Markets Group

Ram Kelkar, CFA

David Schreiner, FRM

Jeanne Russo

Josh Dobiac, LLM, JD, MS, CAIA

LIBOR

Often referred to as the “world’s most important number,” LIBOR is a widely used benchmark that indicates the interest rate at which banks are willing to lend to one another on an unsecured basis (without collateral). It is produced for five currencies (Swiss franc, euro, pound sterling, Japanese yen, and U.S. dollar) and seven tenors per each currency (overnight/spot next, one-week, one-month, two-month, three-month, six-month, and 12-month), based on submissions from a reference panel of between 11 and 18 contributor banks for each currency, resulting in the publication of 35 rates every applicable London business day. In this paper, “LIBOR” is used to refer specifically to the LIBOR with the deposit term that is most common in a given currency’s swap market. For example, for U.S. dollars it would be three-month. The Japanese yen, pound sterling, and euro would be six-month.

An estimated \$350 trillion of market instruments are tied to LIBOR. Derivatives are the largest proportion and the notional amount accounts for almost 95% of the total outstanding gross notional value referencing LIBOR. The other 5% are cash products that include floating rate notes, syndicated loans and bilateral corporate loans, term wholesale deposits, overdraft and trade finance facilities, covered bond, capital securities, perpetual and securitized products, as well as retail and commercial mortgages.

THE PROBLEMS WITH LIBOR

After the global financial crisis, banks awakened to the scale of counterparty risk and became less willing to lend to one another on an unsecured basis and new laws were created to encourage banks to use other forms of borrowing to reduce their reliance on volatile short-term lending. As a result, interbank lending has decreased significantly. On many days, there are no transactions at all so that some quotes are based on “expert judgment” of the panel banks. The scarcity of transactions raises concerns about the willingness of contributing banks to continue submitting judgment-based quotes. The risk is that they may eventually choose to stop submitting altogether. Simply put, unsecured borrowing by banks has significantly declined and is no longer a liquid source of bank funding.

There is also a trust issue as a result of several instances where LIBOR rates were manipulated. The first scandal to be publicized happened during the global financial crisis, when rate-setting banks tweaked their quotes to mitigate market panic. Other well-publicized examples of LIBOR manipulation have also come to light in recent years where traders have manipulated quotes to distort markets to increase their profits.

Finally, LIBOR is not exactly a risk-free rate because it was originally intended to reflect bank credit risk, though it is open to debate whether that definition even applies any more.

LIBOR’s risk component was apparent during the crisis when the spread between LIBOR and overnight indexed swap (OIS)¹ spiked as bank credit risk went up during the flight to quality.

Figure 1: LIBOR-OIS Spread During the Global Financial Crisis



Source: Bloomberg

There is an agreement between the financial authorities and the reference panel to continue to publish LIBOR through the end of 2021. After 2021, there is no guarantee that LIBOR will continue to exist, as submission will be voluntary.

The publication of LIBOR is likely to be discontinued by the end of 2021 per various pronouncements from the Financial Conduct Authority (FCA) and other regulatory agencies.

BACKGROUND ON CURRENT ROLE OF BENCHMARK INTEREST RATES IN THE U.S. MARKET

Before discussing the transition from LIBOR to SOFR it is useful to have some background information on the current roles of the different “risk free” rates in the market. Prior to the global financial crisis, the LIBOR curve was often used as a proxy for the “risk-free” rate (RFR) used in valuing derivatives. Swap rates were considered more appropriate for risk-neutral valuation than bond yields because proceeds from derivative transactions were commonly invested in the interbank market and not the bond market. Liquidity risk and funding costs were very low and thus largely ignored in the pricing and hedging of derivatives. Counterparty default risk was considered to be negligible and many over-the-counter (OTC) trades were unsecured. For each currency, a single LIBOR curve was used for discounting when pricing virtually all traded derivatives. After the crisis, bank failures proved that interbank lending rates were in fact not risk-free and that significant counterparty risk existed in derivatives transactions that were not subject to collateralization.

¹ Although spreads between LIBOR rates and OIS rates have fallen significantly since crisis levels and are now significantly more stable, derivatives pricing and hedging practices have changed fundamentally as a result, discussed below. As a result, virtually all traded swaps are or soon will be subject to full collateralization. Milliman (December 16, 2014). OIS discounting for life insurance hedging. Retrieved from <http://www.milliman.com/insight/2014/OIS-discounting-for-life-insurance-hedging/>.

In the aftermath of the global financial crisis, derivatives pricing and hedging have fundamentally changed, and a new “risk-free” benchmark, the OIS rate, has emerged. Due to the European Market Infrastructure Regulation (EMIR) in the EU and the Dodd-Frank Act in the United States, most swaps are now cleared through central counterparties (CCPs). Those swaps that are exempt from mandatory central clearing are usually governed by an International Swaps and Derivatives Association (ISDA) Credit Support Annex (CSA) or similar collateral agreements between counterparties. As a result, virtually all traded swaps are subject to collateralization.

CCPs have generally opted to pay interest on collateral at the OIS rate, i.e., the effective federal funds rate (EFFR) in U.S. dollars, Euro OverNight Index Average (EONIA) in euros, Sterling Over Night Index Average (SONIA) in pound sterling, and Tokyo Overnight Average Rate (TONAR) in Japanese yen. Similarly, the common practice for CSA agreements is to fund collateral at the OIS rate. Under an arbitrage-free pricing relationship, the discounting rate for valuation must match the collateral funding rate. Thus, the market has already made the switch to OIS discounting for derivatives pricing, given the strong push toward exchanges, centralized clearing, and collateralization and secured funding.

The move to OIS discounting has made curve construction as well as asset valuations significantly more complex. The market standard for interest rate swaps continues to reference floating coupons indexed to LIBOR. Therefore, when valuing an interest rate swap on a market-consistent basis, a dual-curve framework is currently required instead of a traditional single-curve framework. Future floating LIBOR payments need to be projected to determine swap cash flows and an OIS curve is needed to perform risk-neutral discounting of cash flows.

The move to newer risk-free curves also poses some interesting issues for market-consistent valuations, and in particular for the long-duration liabilities that are often required in the insurance industry. The LIBOR-coupon interest rate swap market is still the most actively traded and liquid market at longer terms. Newer curves may not be as actively traded for many currencies. This means that the risk-free curves at longer durations can involve assumptions made by broker-dealers about expected LIBOR-RFR spread levels.

One of the benefits of the move to central clearing is that variation margin is calculated centrally on a consistent basis. Clearinghouses use an OIS-based methodology, hence there is now a central reference for defining the OIS curve. This should in theory make derivative valuation with the OIS curve an even more standard practice. For liability valuations, where there is no actively traded liquid liability to benchmark against, continued use of LIBOR or assumptions about fixed LIBOR-OIS spreads are likely to remain common practices at least until the LIBOR to SOFR transition.

THE TRANSITION FROM LIBOR TO SOFR

The Alternate Reference Rates Committee (ARRC) has been tasked with two primary goals—to identify an alternative reference rate to replace LIBOR and to develop a market strategy to make the transition. ARRC selected the Secured Overnight Financing Rate (SOFR) as the recommended benchmark interest rate to replace LIBOR for U.S. dollars.

In April 2018, the New York Fed began publishing SOFR as a new benchmark rate intended as a replacement for LIBOR. However, SOFR is structurally different from LIBOR and there is the possibility of significant economic impact and uncertainty over how this transition process will develop.

SOFR is a broad U.S. Treasury repurchase agreement (repo) rate, a transactions-based rate incorporating tri-party repo data, the General Collateral Finance Repo Service (GCF Repo) data of the Fixed Income Clearing Corporation (FICC), and bilateral Treasury repo transactions cleared through the FICC². Non-cleared bilateral repo transactions are presently not available, but could be used in the future. Currently, SOFR is a good representation of general funding conditions in the overnight Treasury repo market. As such, it will reflect an economic cost of lending and borrowing relevant to a wide array of market participants active in the market, including not only broker-dealers, but also money market funds, asset managers, insurance companies, securities lenders, and pension funds.

In June 2019, the Financial Accounting Standards Board (FASB) took a step toward providing accounting relief for contract modifications arising from reference rate reform. Later in September 2019, the FASB issued a proposed Accounting Standards Update (ASU) that would provide temporary optional guidance to assist in the transition away from LIBOR to new reference rates³.

In October 2019, the United States Department of the Treasury and the Internal Revenue Service (IRS) issued proposed regulations allowing taxpayers to avoid adverse tax consequences from changing the terms of debt, derivatives, and other financial contracts to replace reference rates based on interbank offered rates (IBORs) with certain alternative reference rates⁴.

2 Tri-party repo market is secured by a ranged of Treasury securities and is used to finance general collateral pools rather than specific securities. Money market funds and securities lenders are among the most prominent cash providers in this segment, while securities dealers are primary borrowers of cash. The GCF repo market is a segment of the tri-party repo market cleared through the FICC. GCF trades are blind brokered among clearing members of the FICC. The FICC's Delivery-versus-Payment (DVP) service is a segment of the bilateral repo transactions that is centrally cleared through a CCP, and not necessarily blind brokered.

3 FASB (September 5, 2019). FASB Proposes Guidance To Assist in Transition Away From Interbank Offered Rates To New Reference Rates. Press Release. Retrieved from https://www.fasb.org/cs/ContentServer?c=FASBContent_C&cid=1176173291628&d=&pagename=FASB%2FFASBContent_C%2FNewsPage.

4 U.S. Department of the Treasury (October 8, 2019). Treasury and IRS Announce Regulatory Relief for Taxpayers. Press Release. Retrieved from <https://home.treasury.gov/index.php/news/press-releases/sm788>.

SOFR IMPLEMENTATION

For the transition to progress, several issues are outstanding and must be resolved. To start, aside from a permanent end to LIBOR, what other events should prompt users to transition from LIBOR to SOFR? Because products that currently reference LIBOR benefit from a concentration of liquidity, the adoption of alternatives will be challenging and is a major reason the authorities need to be involved. Also, the particular method of changing from LIBOR to SOFR will vary and the solution is not just a simple substitution. There are structural differences between LIBOR and SOFR that need to be accounted for in the transition, most notably term structure and credit risk.

Presently, a major shortcoming of SOFR is that it is an overnight rate rather than a term rate so a term structure will have to be constructed for longer maturities. At the moment there are not enough daily transactions at certain maturities to develop a full term structure. For the framework of the underlying term rate to work well and to have enough underlying transactions to construct a term rate, the bulk of derivative transactions would need to be based on the underlying OIS and futures market. Development of a term structure will require the CCPs to gradually lengthen the maturity of contracts to clear into the new environment as liquidity in longer-term SOFR derivatives develops. A synthetic constant maturity term rate could be imputed by bootstrapping between the prices of nearby SOFR futures contracts. However, the volume of SOFR futures traded on CME is concentrated among a small number of large banks and widespread use will be necessary to build liquidity. If the SOFR futures were to inherit the volume of the Eurodollars and federal funds, then a robust reference rate could likely be constructed using this data. As soon as a liquid term derivatives market is established, SOFR is likely to be used more regularly in cash and derivatives transactions.

Another challenge is that SOFR is a near risk-free rate, because the underlying repo transactions are secured by Treasuries, whereas LIBOR is based on unsecured transactions and is intended to include the price of bank funding risk or credit risk. This means that a change to SOFR will tie more closely to the cost of government funding rather than that of the private sector and could lead to problems during times of market stress. During a flight to quality, when investors are selling risky assets for government debt, SOFR will likely fall whereas LIBOR will rise. The two rates respond differently as LIBOR tries to capture the additional credit risk premium required. Therefore, a simple switch from LIBOR to SOFR would require a spread adjustment to ensure that the pre- and post-amendment rate levels are compatible. While there are multiple ways to adjust for the term and credit differences, a goal of regulators is to create a value-neutral adjustment process that does not create winners and losers as LIBOR contracts reset to SOFR.

Figure 2: Benefits and Weaknesses of SOFR

BENEFITS	WEAKNESSES
<ul style="list-style-type: none"> Market rate based on actual transactions not “expert judgement” Overnight repo market is deep and liquid Produced by the Federal Reserve providing objectivity and credibility No cessation risk. Aligned with international standards. 	<ul style="list-style-type: none"> Only an overnight rate. LIBOR captures term risk rates at different maturities. Overnight repurchase agreements are based on Treasuries, implying no credit risk whereas LIBOR is based on unsecured transactions and intended to include the price of bank funding or credit risk. Though the market is growing, liquidity on SOFR derivatives is low and in its infancy.

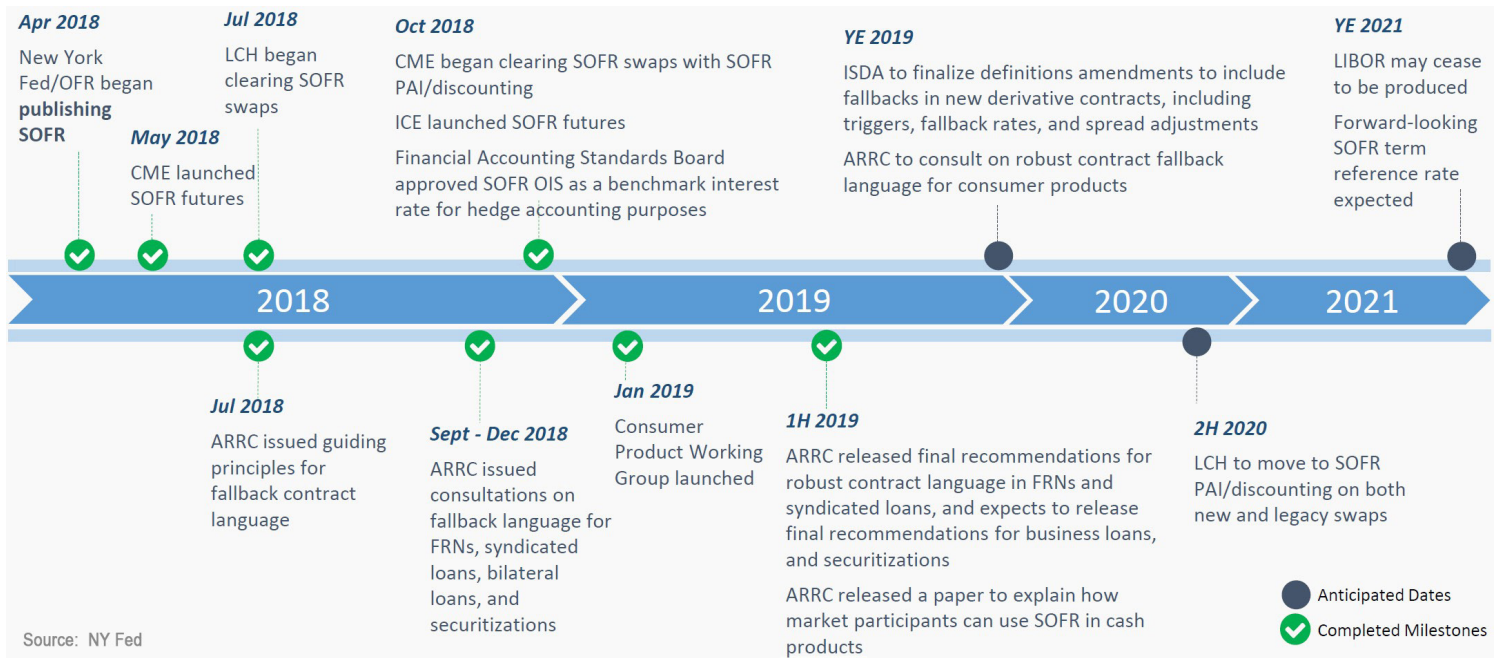
TIMELINE⁵

So far, a well-defined timeline exists only for the derivatives market, mainly focusing on building a liquid market for SOFR derivatives rather than transitioning away from LIBOR.

- ARRC members have created infrastructure for trading futures and/or OIS using SOFR.
- In April 2019, the Alternative Reference Rates Committee (ARRC) released recommended contractual fallback language for floating rate notes (FRNs) and syndicated loans.
- In September 2019, ISDA issued a “Consultation on Parameters for IBOR Fallback Adjustments” to finalize the methodologies for adjustments to be made to derivatives fallbacks.
- By year-end 2019, ISDA expects to finalize definition amendment to include fallback in new derivative contracts, including triggers, fallback rates, and spread adjustment.
- CME has proposed a transition to SOFR discounting as of July 2020 while LCH is targeting a transition as of October 2020.
- By the end of 2021, ARRC expects that a term reference rate based on SOFR derivatives is available, and LIBOR may cease to exist.

⁵ Federal Reserve Bank of New York (April 2019). SOFR: A Year in Review. Retrieved from https://www.newyorkfed.org/media library/Microsites/arrc/files/2019/SOFR_Anniversary.pdf.

Figure 3: Timeline and Key Milestones for Implementation of SOFR



WHAT HAPPENS TO LIBOR CONTRACTS WHEN LIBOR DISCONTINUES?

One of the most pressing issues for the industry related to the transition from LIBOR is the migration of LIBOR-linked exposures to SOFR should the publication of LIBOR cease in 2021. Contract language for most LIBOR-linked financial products are designed for a temporary interruption of LIBOR rather than a permanent discontinuation of it. This leads to considerable uncertainty on the fate of these contracts. If fallback terms within these contracts are not modified for the remaining life of the contract, the economic impact could be significant, creating winners and losers. Industry bodies have been consulting with market participants to create credible fallback language to be inserted into contracts for the permanent cessation of LIBOR. The main goal of the fallbacks is to agree on new contract language before LIBOR ceases to exist, that is, before the winners and losers are evident. Modifying such a large volume of contracts will be challenging, particularly in the case when one party has a contractual right to a significant gain.

Derivatives markets may have an easier time with the fallback transition as compared to the cash markets. Since ISDA governs the fallbacks for derivatives, legacy derivative contracts are likely to be covered under any new ISDA fallback language protocol. Current ISDA guidelines for the OTC interest rate swaps markets instruct the calculation agent to poll banks to calculate their own estimates of LIBOR if the official rates are not published, but for legal reasons it is highly uncertain whether these banks will share this data past 2021. ISDA is working on new fallback language for derivatives with the

goal of agreeing on the language before the benchmark ceases to exist and before the winners and the loser are evident. Preliminary results were published by ISDA in November 2018 and what appears to be the most popular option is to shift to the risk-free rates (RFRs) plus a constant spread on historical differences with LIBOR, but the language remains a work in progress⁶. There is also discussion of a potential value transfer for cleared swaps, where the clearinghouses offset gains and losses, at the client level, to prevent creating winners or losers. CME has proposed that, as of close of business July 17, 2020, the value transfer attributed to the change from valuing positions using EFR to SOFR discounting would be neutralized by making a cash adjustment and booking a series of EFR/SOFR basis swaps into participants' accounts. For those participants that do not want to hold these basis swaps, an auction or other transfer mechanism could be used⁷. LCH has proposed a combination of cash and compensating swaps targeting October 17, 2020. Participants can elect a cash-only option facilitated via an auction⁸. However, this solution would not apply to non-cleared OTC derivatives because there is no centralized clearing member governing these trades.

6 ISDA (November 27, 2018). ISDA publishes preliminary results of benchmark consultation. Press release. Retrieved from <https://www.isda.org/2018/11/27/isda-publishes-preliminary-results-of-benchmark-consultation/>.

7 CME Group (September 3, 2019). SOFR Discounting and Price Alignment Transition - Proposal for Cleared Swaps. Retrieved from <https://www.cmegroup.com/education/articles-and-reports/sofr-price-alignment-and-discounting-proposal.html>.

8 LCH Limited (July 26, 2019). Proposed next steps for transition to USD SOFR discounting in SwapClear. Retrieved from https://www.cftc.gov/media/2421/MRAC_LCHSOFRDiscountingLetter090919/download.

In the cash market, similar but more complex problems exist for LIBOR fallback language, and may prove more difficult to resolve with no existing centralized mechanism for cash markets unlike the role played by ISDA in the derivatives market. Because consistent fallback language is scarcer as the fallbacks differ from cash product to cash product and sometimes even within individual cash products, the transition of fallbacks for cash products could be more difficult than for derivatives⁹. Consequently, industry working groups are leading similar efforts to align fallback language for cash instruments. Like the derivatives market, the cash market fallback transition continues to be a work in progress, but the ARRC has come up with some preliminary suggestions. For some cash products, the ARRC has recommended a SOFR plus spread model, similar to derivatives, but with extensive “waterfall” language for both the benchmark rate and spread¹⁰. This is required, in part, because the preferred fallback rate for cash markets is based on a forward-looking term SOFR rate, which does not exist yet.

FINANCIAL REPORTING CHANGE AND SOFR

Compounding the challenges of LIBOR going away is that accounting regulations are set to change at almost the same time. GAAP LDTI is set to be required for fiscal years starting December 15, 2021, and IFRS 17 will be required on January 1, 2022. Both of these accounting regimes require substantive investment in new systems to account properly for the new requirements for insurance liability valuation. Adopting conforming methodologies while simultaneously transitioning to a SOFR standard adds an element of difficulty that may not be fully appreciated by all insurers. Of particular concern is the setting of discount rates for liability valuations, which are done at product inception date, or current valuation date, depending on the valuation approach adopted. This may require discount curves to be managed in the long-term that have different underlying bases (LIBOR vs SOFR) which could add volatility to the emergence of profit, and distort accounting results as LIBOR is no longer actively traded. Alternatively, if discounting is kept on an OIS basis (or if a top-down approach to discount curve construction is used), then there may be less volatility on the transition, but less effective ALM as assets are valued on a fair value basis under IFRS 9 (which may necessitate multiple curves) while liabilities are valued on a different basis.

⁹ For some examples, the calculation agent for most corporate FRNs is supposed to poll banks and if that cannot be done they are to use the preceding LIBOR rate, effectively converting the floating note to a fixed note. Leveraged loans are to use the prime rate minus a 100 basis points (bps) cut in margin. For some securitizations, it is to be the prime rate plus a spread while in others it is to be the last quoted LIBOR rate. For Collateralized Loan Obligations, the language is incomplete and simply asks investors to agree on a new benchmark. Some other securities require 100% approval of exiting holders or shareholder votes. Government-sponsored enterprises (GSEs) like the Federal Housing Finance Agency (FHFA) have the sole discretion to designate a new reference rate to replace LIBOR with any other adjustments or factors it deems appropriate within its contracts.

¹⁰ The ARRC released consultations for publishing feedback on fallback contract language for several cash products. After a full review of public feedback at the close of comment period, the ARRC will release final recommendation on fallback language to be incorporated into new U.S. dollar LIBOR contracts for market participants' voluntary use. Federal Reserve Bank of New York. Fallback Contract Language. Retrieved from <https://www.newyorkfed.org/arrc/fallbacks-contract-language>.

RISKS AND IMPLICATIONS FOR INSURANCE COMPANIES

The transition to SOFR from LIBOR has implications for all individual investors and financial companies exposed to LIBOR risk. This section will focus on the implications for U.S. insurance companies.

Issues that insurance firms should be focusing on now include:

- Perform a comprehensive inventory of LIBOR exposure in assets and liabilities on a product-by-product basis, reviewing fallback language in legacy contracts
- Educate internally about the transition
- Simplify exposure, where possible, by compressing existing positions to reduce the number of transactions that need to be transitioned
- Review fallback language and work to determine appropriate action
- Analyze information technology (IT) systems readiness and other operational impacts:
 - SOFR will need to be incorporated into data streams
 - Update processes, risk models, valuation methodology, collateral changes, and controls

It is important to remember that LIBOR is not only the reference rate for millions of financial contracts, but also nonfinancial contracts such as late payment clauses and funding costs, and as a performance benchmark for measuring returns. It is also deeply rooted in a myriad of financial activities that encompass risk models, valuation tools, performance attribution, hedging strategies, and accounting. All of these considerations must be taken into account in order to formulate a comprehensive transition plan.

Further complications could arise from inconsistent trigger events or the preferred calculation of fallback rates across products. For example, a trigger basis could arise between cash and derivatives as certain events trigger a fallback for cash products and not for derivatives or even trigger a fallback to different rates (compounded overnight SOFR for derivatives vs. term for cash). This could not only have economic implications for cash products hedged with derivatives, but also impact hedge effectiveness. Potential asset-liability mismatch may result if the transition to the new rate does not happen in tandem. Because financial transactions do not occur in isolation, the relationship between assets and liabilities in a portfolio must be handled carefully to avoid disruption, where managers may need to reconstruct portfolios to ensure risk profiles are maintained.

ISDA continues its consultation to develop industry consensus to address the term structure and credit spread embedded in LIBOR, and so far all published options result in fixed spread adjustment methodologies. Because any alternative rate is unlikely to remain constant over the life of the product, there will be increased basis risk for existing LIBOR products that transition to a new rate with a fixed spread, creating significant

valuation differences. Shifting from LIBOR to SOFR is more complicated than applying a simple conversion rate to attain an economically equivalent contract.

Transitioning legacy contracts to SOFR discounting will entail a value transfer and a change in risk profile. As previously mentioned, clearinghouses could offset a potential value transfer for cleared swaps. The compensation mechanism could include basis swaps, cash payments, or a combination of both. Potentially, companies would then need to accommodate these new basis swaps in their systems. This value transfer solution, however, would not apply to non-cleared OTC derivatives (e.g., swaptions), as there is no centralized mechanism. Therefore, such products as OTC swaptions could see winners and losers.

It is yet to be determined whether the change from LIBOR to SOFR for OTC swaps will subject the LIBOR legacy trades to the new clearing and margining rules that fall under the Dodd-Frank Act. In June 2019 the U.S. Commodity Futures Trading Commission (CFTC) announced it will provide no-action relief to permit certain amendments to legacy swaps without losing their status as legacy swaps¹¹. This language notably covers only swaps and the definition of “immaterial” is unclear, but this move could permit legacy swaps to be converted from LIBOR to SOFR without triggering mandatory requirements or uncleared margin requirements. However, if the transition trades are subject to the new rules, there could be a sudden jump in funding requirements (i.e., margin) for certain derivative users.

As of now it is undetermined whether insurers would be obligated to move toward using the SOFR curve instead of their current practice of using either the Treasury curve or an interest rate (IR) swap curve for reserve calculations and accounting. GAAP discounting rates are asset earned rates while statutory rates are National Association of Insurance Commissioners (NAIC)-prescribed round numbers. At the present time, life insurers typically use an IR swap curve for variable annuity (VA) GAAP valuation as opposed to the Treasury curve or OIS. After LIBOR is discontinued, it is believed that there could be three risk-free options available: SOFR, Treasury, and OIS.

If the SOFR curve ends up being similar to the Treasury curve or OIS, then insurance companies should consider switching to one of these two rates when the Long Duration Targeted Improvements (LDTI) standard take effect. GAAP LDTI is scheduled for January 1, 2022 for large insurers and January 1, 2024 for small and medium insurers. This standard will require a major valuation update, so a few basis points could be viewed as non-material. After that, companies can determine whether they want to switch to SOFR when there is more liquidity. Fixed index annuities (FIAs) with Guaranteed Lifetime Withdrawal Benefits (GLWBs) will also be required to use risk-free rates

with the GAAP LDTI update, so the companies with these products will be affected as well. The impact of an updated risk-free rate on statutory and GAAP metrics will be to the extent that the change in the risk-free curve impacts hedging¹². However, it is our expectation that there would be little change in the current U.S. GAAP or statutory valuation due to the discontinuation of LIBOR.

At a minimum, U.S. insurance companies should have a plan for the migration of their legacy LIBOR-linked exposures, given that LIBOR's publication may cease to exist in 2021. Companies need to be aware of their exposures to basis risk and inefficient hedges that may result due to their mismatches.

An insurance company will generally have two alternatives:

1. Fallback language for contracts linked to LIBOR will need to be renegotiated and amended because the original fallback language is typically intended to only address the temporary, not permanent, unavailability of LIBOR.
2. New instruments for basis trades will likely come online to help manage and hedge away LIBOR transition risks.

If a company forgoes the first alternative and waits too long to enter into the basis trade noted in the second alternative above, it could incur risk from the spread widening due to “herd” behavior, with many companies needing to trade in the same direction.

Firms should actively monitor liquidity conditions in both LIBOR and SOFR in parallel as well as formulate plans to incorporate SOFR as LIBOR's replacement. Transitioning will require a cross-functional approach that includes collaboration between portfolio and risk management, legal and compliance, IT, and operations teams.

CONCLUSIONS

While many details of the transition remain to be determined, regulators appear firm about moving ahead with this transition from LIBOR to SOFR. Although some Wall Street firms and industry participants seem to think that LIBOR may still be around for longer than regulators expect, there is no guarantee that LIBOR will be a reliable benchmark after 2021. The debate is global in nature, as countries have chosen various alternative rates to replace LIBOR, with varying timelines for transitioning. The time has come for firms with exposure to LIBOR-linked products and contracts to have a plan for the announced transition.

Transitioning away from LIBOR will be an expensive and complicated endeavor that will take several years to achieve,

¹¹ CFTC (June 6, 2019). CFTC Staff Issues No-Action Relief from Uncleared Swap Margin Rule for Certain Amendments to Legacy Swaps. Press release. Retrieved from <https://www.cftc.gov/PressRoom/PressReleases/7935-19>.

¹² IFRS (May 2019). Interest Rate Benchmark Reform Proposed amendments to IFRS 9 and IAS 39. Retrieved from <https://www.ifrs.org/-/media/project/libor-reform/ed-libor-reform-may-19.pdf>.

but early mobilization will provide the opportunity to plan ahead for potential risks and minimize the impact and cost of transitioning away from LIBOR. With LIBOR entrenched in so many operations and processes, firms with LIBOR exposure should compile a comprehensive inventory, identifying, on a product-by-product basis, whether SOFR or a different reference rate is more appropriate to use. The relationship between assets and liabilities should be analyzed carefully to ensure the risk profile is maintained.

Specifically, insurance companies could be exposed to basis risk and changes in the accounting treatment of cash flow and fair-value hedges, as the discount rates used to value liabilities and the associated hedges could transition to different reference

rates. The transition to SOFR will require liquidity in futures and swaps that reference the index as well as in basis swaps between SOFR, OIS, and LIBOR. Many questions remain about the transitioning of legacy contracts referencing LIBOR, particularly about whether the industry needs to amend contracts to reference an alternative rate, or amend the definition of LIBOR through the fallback protocol to replace the current methodology with alternative reference rates. Clearly, ISDA fallback triggers and protocols will be crucial to the transition.

Any company with exposure to LIBOR should not wait until the mandatory transition, but instead prudently manage their exposure sooner rather than later for what is widely considered the eventual end of LIBOR.

Milliman Financial Risk Management LLC is a global leader in financial risk management to the retirement savings industry. Milliman FRM provides investment advisory, hedging, and consulting services on over \$150 billion in global assets (as of June 30, 2019). Established in 1998, the practice includes over 200 professionals operating from three trading platforms around the world (Chicago, London, and Sydney). Milliman FRM is a subsidiary of Milliman, Inc.

Milliman is among the world's largest providers of actuarial and related products and services. The firm has consulting practices in healthcare, property & casualty insurance, life insurance and financial services, and employee benefits. Founded in 1947, Milliman is an independent firm with offices in major cities around the globe.

For more information, visit milliman.com/FRM or call +1 855 645 5462.

The information, products, or services described or referenced herein are intended to be for informational purposes only. This material is not intended to be a recommendation, offer, solicitation or advertisement to buy or sell any securities, securities related product or service, or investment strategy, nor is it intended to be relied upon as a forecast, research or investment advice.

The products or services described or referenced herein may not be suitable or appropriate for the recipient. Many of the products and services described or referenced herein involve significant risks, and the recipient should not make any decision or enter into any transaction unless the recipient has fully understood all such risks and has independently determined that such decisions or transactions are appropriate for the recipient. Investment involves risks. Any discussion of risks contained herein with respect to any product or service should not be considered to be a disclosure of all risks or a complete discussion of the risks involved.

The recipient should not construe any of the material contained herein as investment, hedging, trading, legal, regulatory, tax, accounting or other advice. The recipient should not act on any information in this document without consulting its investment, hedging, trading,

legal, regulatory, tax, accounting and other advisors. Information herein has been obtained from sources we believe to be reliable but neither Milliman Financial Risk Management LLC ("Milliman FRM") nor its parents, subsidiaries or affiliates warrant its completeness or accuracy. No responsibility can be accepted for errors of facts obtained from third parties.

The materials in this document represent the opinion of the authors at the time of authorship; they may change, and are not representative of the views of Milliman FRM or its parents, subsidiaries, or affiliates. Milliman FRM does not certify the information, nor does it guarantee the accuracy and completeness of such information. Use of such information is voluntary and should not be relied upon unless an independent review of its accuracy and completeness has been performed. Materials may not be reproduced without the express consent of Milliman FRM. Milliman Financial Risk Management LLC is an SEC-registered investment advisor and subsidiary of Milliman, Inc.

© 2019 Milliman Financial Risk Management LLC - 10/19