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RESEARCH NOTE

SOFR and the path forward

Following up on our transition primer, **Leaving LIBOR**, we take a deeper look at SOFR, which will likely be the replacement rate in the United States. In this piece we discuss the differences between LIBOR and SOFR, how the SOFR market has developed since its inception in 2018, and the steps that must be taken to ensure a smooth transition away from LIBOR.

The broad movement away from unsecured interbank lending after the financial crisis left LIBOR, the preeminent short-term interest rate benchmark since the 1970s, increasingly unrepresentative and vulnerable to manipulation. Thus, the financial world has undertaken the massive lift of transitioning away from the rate, which is not only ubiquitously used in corporate debt and derivatives markets but also in residential mortgages and other consumer contracts. In the U.S., progression toward a new benchmark, SOFR, is tracking ahead of the schedule laid out by the Alternative Reference Rates Committee (ARRC), a public-private committee tasked with overseeing the transition.

SOFR-get about LIBOR!

In 2017, the U.K. Financial Conduct Authority officially announced it would not compel panel banks to submit LIBOR interbank lending quotes beyond the end of 2021, essentially declaring the end of LIBOR. In the U.S., the secured overnight financing rate, or SOFR, is expected to replace LIBOR as the preferred short-term benchmark rate.

SOFR is an overnight rate that tracks transactions in the Treasury repurchase (repo) market. Repo transactions are widely used by a variety of entities to manage cash flow needs. It is a form of financing in which a borrower sells a Treasury security to a lender for cash and agrees to repurchase the security at a later date for a slightly higher price, in effect paying interest. The SOFR rate is calculated daily as a volume-weighted median of all overnight Treasury repo transactions.¹

We identify four key differences between SOFR and LIBOR and discuss how they could impact markets during and after the transition period.

- 1** SOFR is a secured rate, while LIBOR is an unsecured rate. Repo transactions are inherently secured, in that Treasury securities are posted as collateral. Should the borrower default on its obligation to repurchase the Treasury security, the lender may retain the security, essentially shielding it from loss. Collateralized transactions face different market factors than do unsecured transactions.
- 2** SOFR is based on a deep and liquid market, while LIBOR is not. This is a core strength of SOFR and the key weakness of LIBOR. Daily transaction volumes underlying SOFR regularly surpass \$1 trillion. Meanwhile, the unsecured interbank lending market that LIBOR is designed to track sees daily volumes of less than \$1 billion. Because banks have largely stepped

¹ These include tri-party repo, GCF repo, and bilateral Treasury repo (but we won't get into all that).

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RESEARCH NOTE

away from the wholesale unsecured lending markets, the majority of LIBOR submissions are now based upon bank models, not real transactions.

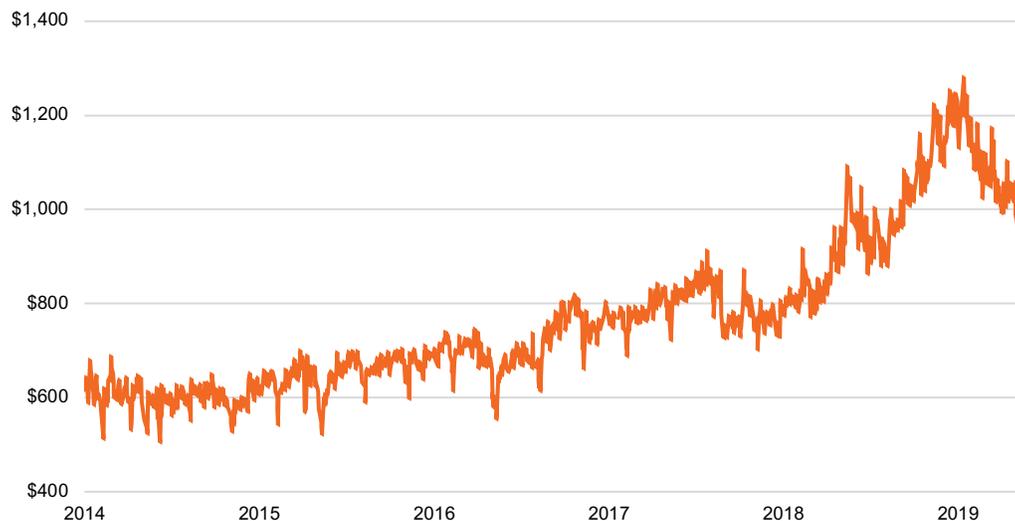
- 3 Because it tracks secured lending collateralized by risk-free Treasury securities, SOFR tracks a market that is nearly default-risk free. In contrast, LIBOR incorporates both bank credit and liquidity risk. This presents a new issue for banks, as SOFR will not adequately represent the cost of funding their positions.
- 4 LIBOR is a forward-looking rate, while SOFR is backward-looking (for now). LIBOR quotes tenors from overnight to 12 months based upon transactions and submissions from banks about their estimated funding costs. For SOFR, repo transactions are overnight in nature, making it an overnight, backward-looking rate. The SOFR market will therefore need to develop a “term structure,” or a yield curve, before it can be ubiquitously used as a benchmark interest rate on derivatives and debt securities.

SOFR, so good: transition proceeding as planned

The market underlying SOFR, the overnight Treasury repo market, is extremely large and liquid, seeing daily transaction volumes above \$1 trillion most days, and has grown considerably over the past few years (see Figure 1). When compared to the Fed funds market, which sees \$50–\$100 billion of daily transactions, and the wholesale unsecured market (LIBOR), which represents less than \$1 billion of daily volume, we can get a sense of the depth of SOFR’s underlying market. This has been a key consideration for ARRC as it has debated the best way to replace LIBOR.

The market underlying SOFR, the overnight Treasury repo market, is extremely large and liquid.

FIGURE 1: SOFR MARKET NOW SEES \$1T IN DAILY TRANSACTION VOLUME



Source: U.S. Federal Reserve.

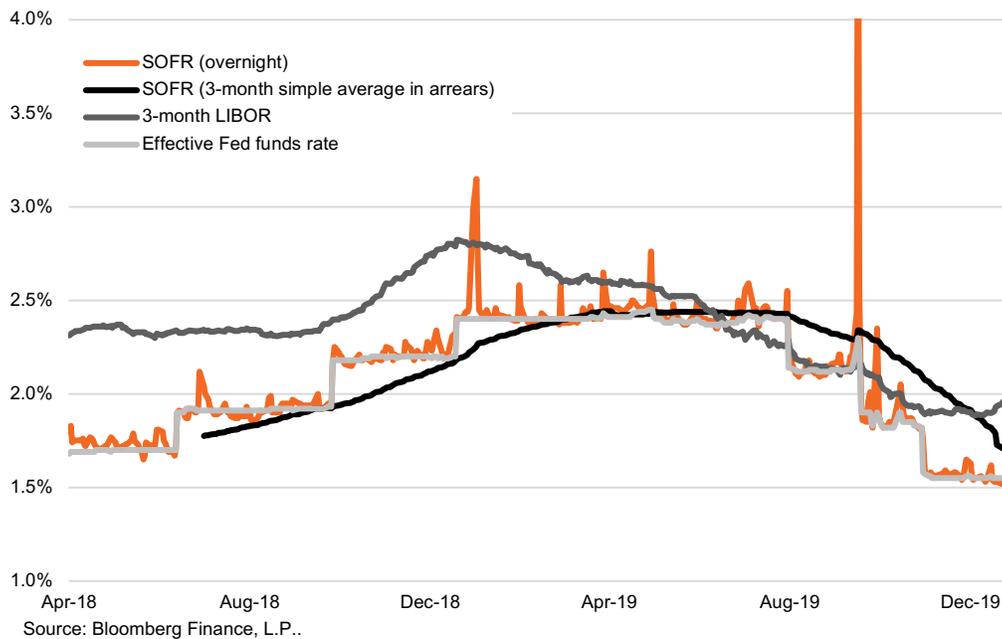
So far, the young SOFR market has developed in line with, and in some respects even ahead of, ARRC’s transition plan. While the rate is not yet ready today to completely replace LIBOR, it is worth taking a look at the headway that has already been made. We note three key areas where stakeholders have been able to observe progress in the SOFR market.

RESEARCH NOTE

HOW SOFR IS TRADING

In general, overnight SOFR has traded and will likely continue to trade with some volatility. Demand for overnight funds is inherently volatile and cyclical, and there are also collateral supply factors that cause the rate to oscillate. As can be seen in Figure 2, SOFR has traded with heightened volatility especially around month- and quarter-ends and during the much-publicized September 2019 episode. However, the averaging method currently being used by SOFR debt issuers largely smooths out this volatility. In fact, 3-month average SOFR has actually traded with lower volatility than 3-month LIBOR.

FIGURE 2: MONEY MARKET RATES



One of the key developments in the push to make SOFR benchmark-ready has been the start of trading in SOFR futures and swaps.

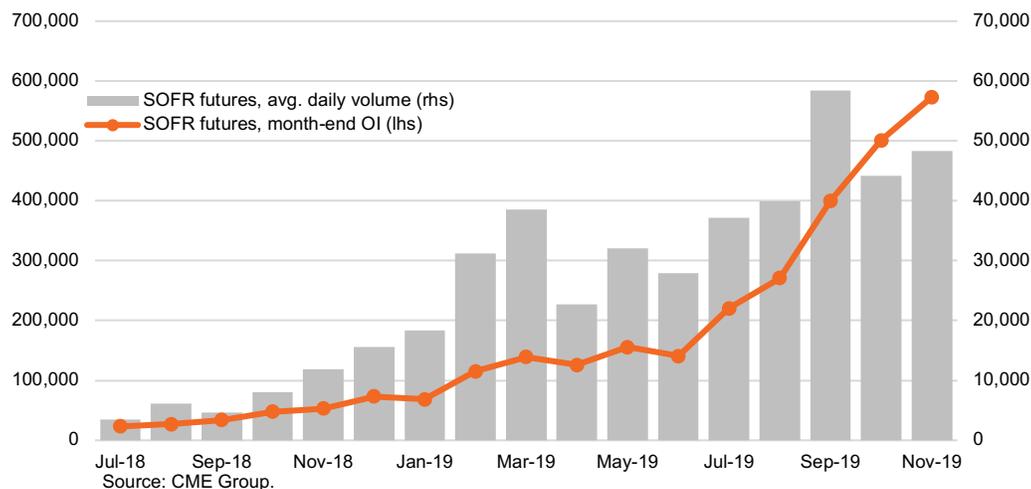
DEVELOPMENT OF SOFR DERIVATIVES MARKETS

The ability to construct a SOFR term structure, which is essential to facilitate broader adoption of the rate and to smooth out rate volatility, relies on the growth of a robust derivatives market. One of the key developments in the push to make SOFR benchmark-ready has been the start of trading in SOFR futures and swaps, which began the month after the rate's inception and ahead of ARRC's schedule.

CME Group is seeing average daily volumes of close to 50,000 contracts in 1-month and 3-month futures (see Figure 3). Meanwhile, trading in SOFR swaps remains generally light, and the first-ever SOFR option was traded in early January 2020. The goal is to build up liquidity to a point where markets are comfortable trading in SOFR-referenced derivatives rather than LIBOR. Currently, 1- and 3-month futures contracts are offered by both CME Group and Intercontinental Exchange (ICE).

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FIGURE 3: SOFR FUTURES MARKET VOLUME GROWING



DEBT MARKET UPTAKE OF SOFR

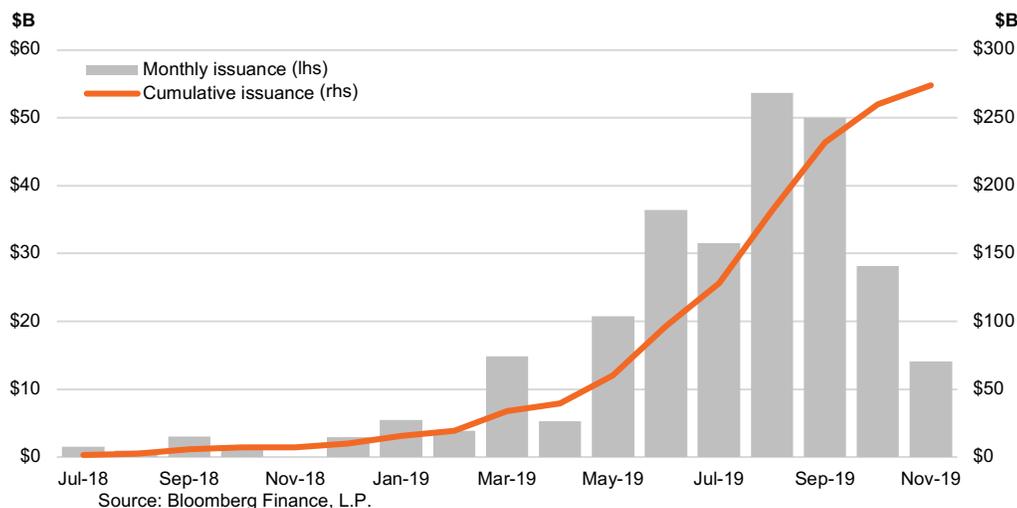
Another key milestone for the nascent SOFR market has been the issuance of SOFR-linked debt. The amount of floating rate debt issued since July 2018 that carries a SOFR-linked coupon is approximately \$274 billion (see Figure 4). The majority of this debt, more than 75% of it, has been issued by government-sponsored enterprises (GSEs) such as FHLB and FNMA. The rest has been issued mostly by banks.

Most of the issues have been short term, with tenors of 24 months or fewer. Additionally, because a term SOFR rate is not yet available (due to an insufficiently liquid derivatives market), convention has been to use 3-month simple average SOFR in arrears. This means that daily SOFR rates over the past 3 months are averaged to lock in the coupon rate for the following period. The downside to this method is that a coupon rate for the current period is inherently based on market rates from the previous period, but it is currently the best option in lieu of a term (forward-looking) rate.

The amount of floating rate debt issued since July 2018 that carries a SOFR-linked coupon is approximately \$274B.

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FIGURE 4: NEARLY \$300B IN SOFR-LINKED DEBT HAS BEEN ISSUED



Still a LIBOR-ious task ahead: the path forward

While the transition has so far gone largely according to ARRC's plan, there are significant steps that still must be taken for SOFR to replace LIBOR as the benchmark on hundreds of trillions of dollars of financial assets. We focus on two key areas: the development of a term structure, which is essential for issuance of future SOFR-linked products, and legal fallback language, which is essential for the successful transition of existing contracts.

DEVELOPMENT OF A TERM STRUCTURE

One of the benefits of LIBOR is that it has a term structure out to 12 months. This allows for coupon rates to be reset at rates that **reflect future market interest rate expectations**. For example, for a quarterly reset floating rate note (FRN) based upon 3-month LIBOR, the coupon rate for the succeeding quarter will be reset at the prevailing level of 3-month LIBOR (plus a spread) at the beginning of the period. 3-month LIBOR is a term rate, and thus has embedded within it market expectations for the path of rates over the next 3 months.

Since SOFR is only quoted on an overnight basis, term rates must be established from a strong derivatives market. Currently, open interest in SOFR futures stands at approximately 570,000 contracts. The bad news: this is about 22 times smaller than open interest for Eurodollar futures (which reference LIBOR) and four times smaller than Fed funds. The good news: market growth for SOFR in its first year-plus has been much faster than either Eurodollar or Fed funds in their respective opening 12 months.

Ultimately, development of a term structure is a bit of a chicken-and-egg scenario. In order for debt markets to move en masse toward issuance of SOFR-linked securities, a term structure will have to develop, which as mentioned will require a liquid derivatives market. However, the simplest way for a liquid derivatives market to develop is for investors to hedge SOFR-linked floating rate exposure via futures or swaps. The Treasury is currently considering issuing SOFR-linked FRNs, which could help build trading in derivatives markets.

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ADDRESSING FALLBACK PROVISIONS

Strong fallback provisions in the legal documents of legacy financial contracts will be pivotal in ensuring an orderly transition away from LIBOR for those contracts. While the majority of the nearly \$200 trillion in LIBOR-linked contracts are set to mature before year-end 2021, there are approximately \$40 trillion that extend beyond, including at least \$4 trillion of debt securities and securitizations.² Appropriate adjustments will need to be made to these contracts to deal with all possible scenarios come transition time. Additionally, any newly incepted deals that reference LIBOR should include fallback language as well.

Strong legal fallback language will deal with three main questions. First, what will trigger the official shift away from LIBOR? Things could get chaotic should, say, derivatives markets and debt markets shift at different times. Second, what will the new rate be when LIBOR ceases? If term SOFR is not yet available, ARRC has recommended a waterfall of backup rates, such as average SOFR in arrears. Third, how will differences between SOFR and LIBOR be accounted for? With SOFR being a risk-free rate and LIBOR having embedded credit risk, there will likely need to be some sort of spread added to SOFR. Derivatives markets appear to be coalescing around an adjustment based upon the 5-year median spread between LIBOR and SOFR proxy, though nothing is set in stone.³

ARRC has released suggested language for cash products, while ISDA, a trade organization for OTC derivatives markets, is in the process of gathering information and suggesting language for derivatives contracts. While these changes to legal documentation are likely to be broadly adopted, they are indeed recommendations and therefore totally voluntary. Solutions to each of these issues will require a massive joint effort from both the public and private sectors.

Looking ahead

The timeline of this massive financial engineering project requires that a replacement benchmark be ready by the end of 2021. Outstanding issues include developing a robust and liquid derivatives market, which will facilitate production of a SOFR term structure and, ultimately, broad adoption of SOFR as a benchmark for debt securities. Additionally, lawyers will be hard at work developing and implementing appropriate fallback language to ensure a smooth transition for existing contracts.

Fortunately, regulators are well aware of the risks presented by the transition. In the U.S., the Fed continues to monitor progress, while ARRC members include representatives from important stakeholders such as the CFTC, FDIC, U.S. Treasury and the private sector. Meanwhile, lenders, borrowers and other market participants are assessing their LIBOR-related risks. Here at FS Investments, we have set up a LIBOR transition task force to analyze the transition impacts on our own portfolio investments, as well as potential market

We believe the transition remains on schedule and, given the scope of public and private motivation, believe it likely that the transition in the U.S. goes relatively smoothly.

² Alternative Reference Rates Committee, "Second Report," March 2018. This data is as of December 31, 2016, and is the latest data publicly available. These dollar amounts have likely increased in the succeeding three-plus years.

³ The Brattle Group, "Summary of Responses to the ISDA Consultation on Final Parameters for the Spread and Term Adjustments," November 2019.

RESEARCH NOTE

effects. While risks certainly persist, we believe the transition remains on schedule and, given the scope of public and private motivation, believe it likely that the transition in the U.S. goes relatively smoothly.

Further reading

Federal Reserve Bank of New York, Alternative Reference Rates Committee.

Transition from LIBOR webpage

Frequently Asked Questions (September 2019)

Summary of ARRC's LIBOR Fallback Language (November 2019)

Schrimpf, Andreas, and Vladyslav Sushko, *Beyond LIBOR: a primer on the new reference rates*, BIS Quarterly Review, March 2019.

SIFMA, *SIFMA Insights: Secured Overnight Financing Rate (SOFR) Primer*, July 2019.

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