# Hello, SOFR!

## Frequently asked questions on the new benchmark

- On April 3, the Fed began publishing the Secured Overnight Financing Rate (SOFR), marking a first step on the long road to replacing LIBOR as the standard interest rate benchmark
- SOFR is an overnight rate based on Treasury repo. Specifically, it includes tri-party repo, GCF, and FICC-cleared bilateral trades
- Relative to other rates, SOFR is based on a much more active and liquid market, accounting for roughly $800-850bn of average daily transaction volume. This is one of the reasons why SOFR is the preferred replacement benchmark for LIBOR
- Historically, SOFR tends to trade below IOER, GCF, and FFE
- Why does SOFR trade below the GCF rate? The composition of SOFR includes not only GCF trades but also tri-party repo and bilateral trades. The latter two rates tend to trade below GCF and are based on a much larger market. Given SOFR is calculated on a volume-weighted basis, the inclusion of tri-party and bilateral transactions naturally biases SOFR lower
- Looking ahead, CME will likely launch monthly and quarterly futures tied to the new SOFR benchmark in about a month. Later this year, it also anticipates launching clearing for OIS and tenor basis swaps with exposure to SOFR. Both will be helpful in the development a term structure for SOFR such that it could be used as a basis for LIBOR at some point in the future
- However, we remain a long ways off from replacing LIBOR as a benchmark, according to the ARRC's "Paced Transition Plan"

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## Hello, SOFR!

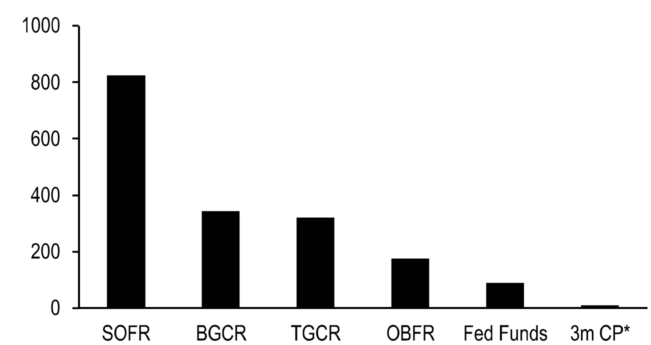
On April 3, the Fed began publishing the Secured Overnight Financing Rate (SOFR)—a momentous event marking the first concrete step on the long road to eventually replacing LIBOR. Participants in the money markets and users of derivatives have been eagerly awaiting this day, though given the volume of questions we received this week from a variety of participants, we thought we would recount some of the more frequently asked questions.

- **What is SOFR?** As noted above, SOFR stands for the Secured Overnight Financing Rate.[1] As the name suggests, it is an overnight rate based on transactions conducted in the Treasury repo market. Specifically, it includes tri-party repo, GCF, and FICC-cleared bilateral trades. Together, these transactions account for roughly $800-850bn of average daily transaction volume, which makes SOFR a particularly robust benchmark relative to other rates—one of the primary reasons why SOFR is the preferred replacement benchmark for LIBOR (**Exhibit 1**).

  In conjunction, the Fed also began publishing daily data on two additional indices: the Tri-Party General Collateral Rate (TGCR)[2] and the Broad General Collateral Rate (BGCR)[3], which are subsets of the SOFR benchmark (**Exhibit 2**).

**Exhibit 1: Relative to other rates, SOFR is a significantly more robust benchmark given that it's based on roughly $850bn of daily volumes**

Volumes of various benchmark rates, as of 4/3/18 ($bn)




Source: Federal Reserve
* 3m refers to 81+ day maturities

**Exhibit 2: The Fed is publishing data on three indices. Two of them are subsets of the SOFR benchmark**

Breakdown of the TGCR, BGCR, and SOFR

| | TGCR | BGCR | SOFR |
|---|---|---|---|
| Transaction-level data from a tri-party clearing platform | ✓ | ✓ | ✓ |
| Transaction-level data from DTCC's GCF service | | ✓ | ✓ |
| Transaction-level datta from FICC-cleared bilateral Treasury repo trades | | | ✓ |
| Federal Reserve transactions in the repo market (e.g., ON RRP) | × | × | × |

Source: J.P. Morgan

- **How is it calculated?** SOFR is calculated as a volume-weighted median of transaction-level tri-party repo data from Bank of New York Mellon as well as GCF repo transaction data and data on bilateral repo transactions cleared through FICC's DVP service, collected from DTCC. With respect to bilateral transactions, those with rates below the 25th volume-weighted percentile rate are removed from the distribution of bilateral repo data each day. This has the effect of removing some (but not necessarily all) transactions in which the specific securities are said to be trading "special".

[1] https://apps.newyorkfed.org/markets/autorates/sofr
[2] https://apps.newyorkfed.org/markets/autorates/tgcr
[3] https://apps.newyorkfed.org/markets/autorates/bgcr

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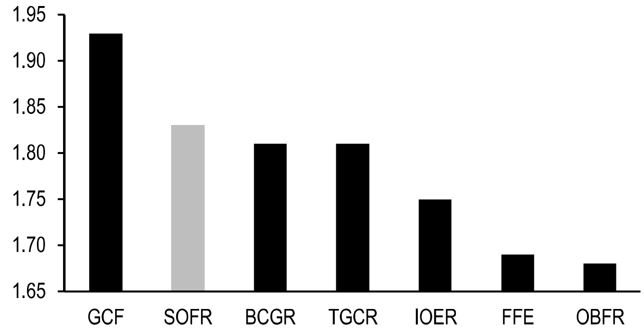
- **How does it trade relative to other money market rates?** As of 4/3/18, SOFR registered 1.83%, trading 10bp below GCF, 8bp above IOER, and 14bp above FFE (**Exhibit 3**). It's somewhat usual for SOFR to trade this significantly above Fed funds or even above IOER for that matter, but we believe this has been a function of markets still trying to recover from quarter-end and the large amount of T-bill supply that has hit the market, and will likely moderate in the coming days. For most of 2017, we find SOFR traded on average 20bp below IOER, 11bp below FFE, and 6bp below GCF (**Exhibit 4**).

**Exhibit 3: As of 4/3/18, SOFR registered 1.83%, trading 10bp below GCF, 8bp above IOER, and 14bp above FFE**

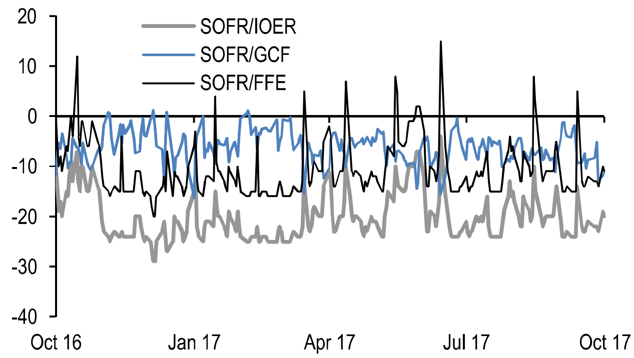
Various overnight money market rates, as of 4/3/18 (%)




Source: Federal Reserve, Bloomberg, J.P. Morgan

**Exhibit 4: Historically, we find SOFR tends to trade below IOER, GCF, and FFE**

IOER, GCF, and FFE spread to SOFR, 10/17/16-10/17/17 (bp)




Source: Federal Reserve Bank of New York, J.P. Morgan

- **Why does it trade below the GCF rate?** When most market participants talk about the GC rate, they are referring to the GCF Treasury repo rate which reflects the trades in which dealers face each other. More specifically, only dealers that are part of FICC's Government Securities Division can participate. As such, it does not reflect the same characteristics as SOFR, which not only includes the GCF rate, but also tri-party general collateral rates (TGCR) as well as bilateral rates, both of which have tended to trade below GCF.

  TGCR—which reflects where dealers would borrow from non-dealers in exchange for cash—has persistently traded below GCF by an average of 12bp over the past few years (**Exhibit 5**). The difference between the two is driven largely by the amount of liquidity in each of these markets. Relative to the GCF market, there's substantially more demand from cash lenders like MMFs looking to lend to dealers on an overnight repo basis. Indeed, the size of these two markets varies dramatically: the GCF repo market is only about $30bn, while tri-party repo volumes are around $300-$350bn. As such, given the small size of the GCF market and the fact that SOFR is calculated based on a volume-weighted basis, it's not surprising to see the latter trade lower.

  The same is true for bilateral rates. Based on a presentation provided by the NY Fed, FICC-cleared bilateral rates tend to trade more in-line with TGCR. As **Exhibit 6** shows, while bilateral rates tend to vary more broadly, by and large, most transactions are clustered around TGCR. That bilateral rates trade below GCF makes sense, as the FICC bilateral repo market is also significantly larger than the GCF market. At around $450bn, it's one of the most active parts of the Treasury repo market. Given the choice, dealers prefer to borrow Treasuries in the bilateral market given the operational ease of funding bilaterally (i.e., transactions settle instantaneously in the bilateral markets as opposed to waiting

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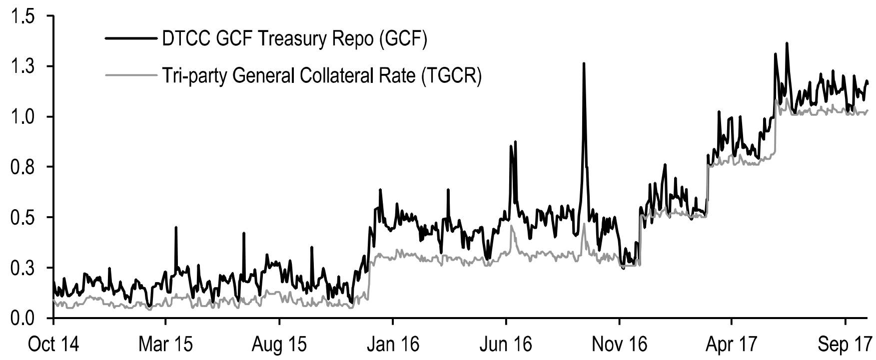
at the end of day in the GCF market). This operational ease allows dealer to access a greater amount of liquidity in the bilateral repo markets than in the GCF market, which naturally biases bilateral rates lower than GCF. It's also the case that for some, the motivation for trading in the bilateral repo market involves the acquisition of a specific Treasury security which means that the borrower of a security is generally willing to pay up in price and offer a lower yield to do so. As such, the inclusion of bilateral transactions also pushes SOFR lower than GCF.

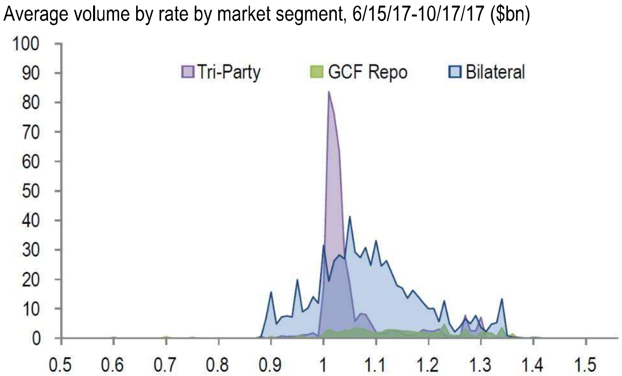
All told, the GC/GCF rate is not and has not been a good reflection of broader dealer funding rates given the small size of this market. Instead, overnight secured funding rates are better reflected in the tri-party repo market as well as the bilateral repo market, which SOFR mostly represents.

**Exhibit 5: TCGR tends to trade below GCF by about 12bp on average...**
DTCC GCF Treasury repo rate versus Tri-Party General Collateral Rate (%)




Source: Federal Reserve Bank of New York, J.P. Morgan

**Exhibit 6: FICC-cleared bilateral rates tend to trade more in-line with TGCR**
Average volume by rate by market segment, 6/15/17-10/17/17 ($bn)




Source: Federal Reserve Bank of New York, Joshua Frost's ARRC roundtable presentation; Bank of New York Mellon, J.P. Morgan Chase, DTCC

Note: All month and quarter-ends are excluded

- **What's next?** Now that the Fed is publishing SOFR on a daily basis, the next step is developing a derivatives market with cash flows tied to this new index. To this end, in early May, CME will likely launch monthly and quarterly futures tied to the new SOFR benchmark (for details, see Interest Rate Derivatives, *US Fixed Income Markets Weekly*, 3/2/18). They expect to offer two complementary instruments: 20 sequential quarterly contracts tied to IMM dates with a payoff based on daily compounded SOFR levels, and 7 sequential

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monthly contracts with a payoff based on simple average levels. The development of a SOFR futures market will allow market participants to start seeing a term structure for SOFR, such that eventually it could be used as a basis for replacing LIBOR.

Separately, CME also anticipates launching clearing for OIS and tenor basis swaps with exposure to SOFR. They expect the initial maximum maturity for these instruments to be five years, and they will use Fed funds-linked discount rates for price alignment interest (PAI) and valuation. However, as outlined in the Alternative Reference Rate Committee's "Paced Transition Plan", the timing for this is likely towards the end of 2018/early 2019 (**Exhibit 7**). Even then, there are a couple more critical steps that need to take place before the market can efficiently move away from LIBOR prior to 2022.

All told, we are a long way off from replacing LIBOR with SOFR as the new benchmark. However, the publication of SOFR is an important step forward toward that achieving that goal. For more background on benchmark reform, please see *A Q&A on Global Interest Rate Benchmark Reform*, 11/21/17.

**Exhibit 7: The ARRC has set out a "Paced Transition Plan" for the transition to SOFR**
ARRC Paced Transition Plan

| | |
|---|---|
| **April 3, 2018** | Federal Reserve Bank of New York begins publishing SOFR |
| **2H 2018** | Infrastructure for futures and/or OIS trading in SOFR is put in place by ARRC members. |
| **End of 2018** | Trading begins in futures and/or bilateral, uncleared, OIS that reference SOFR. |
| **Q1 2019** | Trading begins in cleared OIS that reference SOFR in the current (EFFR) PAI and discounting environment. |
| **Q1 2020** | CCPs begin accepting new or modified swap contracts (swaps paying floating legs benchmarked to EFFR, LIBOR, or SOFR) that pay SOFR as PAI and are discounted with a SOFR curve. In this stage, market participants are allowed a choice at the time of execution of each trade between clearing contracts that calculate PAI and discounting using either EFFR or SOFR, with both types of contracts cleared within the same clearing guarantee fund. CCPs would gradually lengthen the maturity of contracts accepted for clearing in the new SOFR PAI/discounting environment to ensure that liquidity was adequate to support the new discount curve. |
| **Q2 2021** | CCPs no longer accept new swap contracts for clearing with EFFR as PAI and discounting except for the purpose of closing out or reducing outstanding risk in legacy contracts that use EFFR as PAI and discount rate. Existing contracts using EFFR as PAI and discount rate and new contracts using SOFR as PAI and discount rate continue to exist in the same pool. Existing contracts roll off over time as they mature or are closed out. Methods for accelerating this close out, and the potential to pre-announce the closure of the CCPs' EFFR-based PAI and discount rate capability, may play a part. |
| **End of 2021** | Creation of a term reference rate based on SOFR derivatives. |

Source: Second Report of the ARRC

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