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SPEECH

The Role of the New York Fed as Administrator and Producer of Reference Rates

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Introduction

Welcome to this year's primary dealer meeting. Primary dealers play several important roles as trading counterparties in the implementation of monetary policy, as participants in Treasury auctions, and as providers of information on financial markets. These annual meetings provide us an opportunity to strengthen this relationship and communicate our expectations. We also have a shared interest in ensuring that markets function efficiently, effectively, and fairly. To help achieve these goals, the official sector employs a variety of channels, including legal, regulatory, and supervisory. Additionally, officials work with market participants to help guide private-sector solutions. Today, I will speak about our shared efforts in the reform of reference interest rates, focusing the discussion on the Federal Reserve Bank of New York's (New York Fed) part as an administrator and producer of reference rates. The views presented here are mine alone and do not necessarily reflect those of the New York Fed or the Federal Reserve System.[1]

Responding to LIBOR's Uncertain Future

Reference rates serve a number of purposes in financial markets. They facilitate trading in standardized contracts, which can lower transaction costs and improve market liquidity. They can reduce information asymmetries by providing a transparent, independent pricing source. A robust and reliable reference rate can also reduce moral hazard by limiting incentives to misreport pricing for settling a contract. However, a reference rate that is not well designed may increase moral hazard by creating incentives to manipulate the rate.[2]

No reference rate is more ubiquitous than the London Interbank Offered Rate (LIBOR). U.S. dollar LIBOR is estimated to be referenced in $150 to $200 trillion of financial contracts, including loans, interest rate swaps, and mortgage-backed securities.[3] Many market participants, including the primary dealer community gathered here today, have exposure to U.S. dollar LIBOR. However, as Financial Conduct Authority (FCA) Chief Executive Andrew Bailey noted in a speech last July, the lack of activity in the wholesale unsecured funding markets that underlie LIBOR means the sustainability of LIBOR cannot be guaranteed.[4] In fact, existing LIBOR panel banks have only agreed with the FCA to support LIBOR through the end of 2021.[5] While U.S. dollar LIBOR may exist past 2021, prudent risk management implies preparing for a world without it.

For several years, the Federal Reserve—in conjunction with others in the official sector—has supported private-sector efforts to identify viable alternatives to U.S. dollar LIBOR, reduce reliance on LIBOR, and strengthen financial contracts to better address the risk of a cessation of LIBOR. Until relatively recently, this work has focused on the interest rate derivatives market, which represents a very large proportion of total gross notional exposure to LIBOR. But, as Governor Powell noted in a speech in November, the risks to LIBOR highlighted by Andrew Bailey emphasize the need for all participants in the markets where LIBOR currently is referenced to seriously consider how best to transition away from its use.[6]

Further, as you are aware from previous meetings, in 2016 the Treasury Market Practices Group (TMPG) incorporated recommendations in its Best Practices that market participants should understand their vulnerabilities in using financial benchmarks. The TMPG recommends that where current benchmarks are inconsistent with the *Principles for Financial Benchmarks* (*Principles*) published by the International Organization of Securities Commissions (IOSCO), market participants should develop plans to use alternative benchmarks that are consistent with the *Principles*.[7,8] It is important that market participants fully assess their exposure to U.S. dollar LIBOR given both its weaknesses as a benchmark and the risk that it may not always be published, and that they take steps to mitigate their exposure by adopting more robust contract language and transitioning to alternative rates.

This past June, the Alternative Reference Rates Committee (ARRC) selected an overnight Treasury repo reference rate that the New York Fed plans to produce—the secured overnight financing rate (SOFR)—as "best practice for use in certain new U.S. dollar derivatives and other financial contracts".[9,10] The ARRC's selection of this rate is part of the motivation behind my comments on the New York Fed's role as an administrator and producer of reference rates.

Over the last two years, the New York Fed has enhanced the calculation of the effective federal funds rate (EFFR) and launched an entirely new rate, the overnight bank funding rate (OBFR). We also announced plans to begin producing three Treasury repo reference rates, including the SOFR that was selected by the ARRC. At the core of these developments are investments the Federal Reserve has made in all aspects of the administration and production of reference rates to ensure that our rates are reliable measures of market activity. These rates are anchored in active underlying markets, are based on a comprehensive set of transactions that incorporate controls to mitigate risk of errors and manipulation, and are capable of being published every day, even in adverse circumstances.

The New York Fed produces reference rates primarily to inform monetary policy implementation by developing a better understanding of money market dynamics and to aid market functioning by providing transparency. For example, collecting the transaction-level data necessary for producing robust reference rates enhances the Federal Reserve's ability to analyze market developments. While we have not historically produced rates with the explicit goal of having them referenced in financial contracts, we understand that they often are used that way.[11] And, we are committed to the continued production of durable rates that market participants can have confidence in over the long run.

In the remainder of my remarks, I will first describe the improvements the New York Fed has made to our production process and how those improvements ensure that the rates we produce today are reliable. I will then discuss how our three new rates will help deepen our understanding of money market dynamics and provide transparency for secured money markets. Finally, I will address how we plan to maintain the relevance and reliability of our reference rates as markets evolve.

Evolution of the Effective Federal Funds Rate

Administering and producing reference rates is not a new activity for the New York Fed. Daily calculation of the EFFR dates back at least to the 1950s. Today, changing the target range for the federal funds rate is the Federal Open Market Committee's (FOMC) primary means of communicating adjustments in the stance of monetary policy, and the EFFR serves as a measure to assess whether conditions in money markets are consistent with the policy stance. However, when the New York Fed first produced the EFFR, the federal funds rate was not the FOMC's policy target.[12] Like the OBFR today and our forthcoming repo rates, the EFFR served as a useful indicator of conditions in an important money market.

From the 1950s until early 2016, the EFFR was calculated as a volume-weighted mean based on data collected voluntarily from federal funds brokers. While we continue to be confident in the integrity of the EFFR production process employed during those years, the international focus on best practices in the production of reference rates following revelations about the manipulation of LIBOR hastened our efforts to review all aspects of the EFFR production process. This review included an assessment of whether the EFFR could be strengthened by switching to a more robust data source that better reflected activity in the federal funds market, and whether a volume-weighted mean remained the most appropriate measure of central tendency.

As a result, in March 2016, we began calculating the EFFR using the Report of Selected Money Market Rates (the FR 2420 report), which collects transaction-level data directly from a large set of domestic banks and agencies of foreign banks operating in the United States.[13,14] The FR 2420 report offers a wider breadth of market coverage, higher transaction volumes, and more granular information for better data monitoring than the brokered data used previously. At the same time, the measure of central tendency employed was switched to a volume-weighted median, after analysis indicated a median is less likely to be materially impacted by erroneous data and outliers than a volume-weighted mean.[15,16]

Additional changes were implemented to further strengthen the EFFR. We invested in a sophisticated production platform to ensure a well-controlled end-to-end production process, from collection of the data to rate calculation and publication. We refined our framework for regular review by oversight bodies, and enhanced our ethics and conflict-of-interest policies for staff involved in reference rate production. We also put in place a resilient backup production process—including geographic dispersion of staff and platforms involved in data collection, administration, and publication—and developed a data contingency plan that features a backup source of transaction data.

Reflecting our commitment to producing rates aligned with international best practices, we will publish a statement for all reference rates the New York Fed administers and produces documenting their compliance with IOSCO's *Principles*. We anticipate publishing such a statement for the EFFR and OBFR in the next few weeks, and we will release similar documentation of compliance with IOSCO's *Principles* for the three planned Treasury repo rates likely around the time of their initial publication.

Development of a New Overnight Bank Funding Rate

As we worked to enhance production of the EFFR, we also developed the OBFR—the New York Fed's first reference rate designed from the outset to be compliant with IOSCO's *Principles*. The OBFR was created to increase the amount and quality of publicly-available information about overnight unsecured funding costs of U.S.-based banks. The OBFR is calculated using both federal funds and Eurodollar transactions, as reported in the FR 2420 report.[17,18] Many U.S.-based banks are active in the federal funds and Eurodollar markets, so having a measure of borrowing costs across both markets provides a more complete picture of overnight unsecured borrowing costs than looking at the federal funds market alone.

When we launched the OBFR in the first quarter of 2016, daily Eurodollar volume was in excess of $200 billion. Today, however, volume is nearly 50 percent lower. The decline largely reflects two factors: less investment by prime money market funds, and a substitution from offshore to onshore wholesale deposits by some banks. The former is a function of the more than $1 trillion decline in prime money market fund assets under management in 2016 associated with the implementation of the Securities and Exchange Commission's (SEC) money market fund reforms.[19] The latter reflects some U.S.-based banks shifting from taking deposits in their Caribbean branches to taking similar deposits onshore.[20] Eurodollar deposits currently are captured in the FR 2420 report, and included in the OBFR. However, onshore wholesale deposits are not captured. The Federal Reserve is considering enhancing the FR 2420 report to capture such "onshore Eurodollar" deposits, where the motivation, counterparty, and pricing are similar to the Eurodollar deposits included in the FR 2420 report. If these transactions are collected in the FR 2420 report, we will consider including them in the OBFR as well.

Consistent with our ongoing analysis of the scope of transactions underlying the OBFR, creating a durable reference rate that is reliable over the long run involves some need for flexibility. Financial markets are not static; they evolve. And, for a reference rate to remain relevant over the long run, it must have the flexibility to evolve with the market that underlies it. Of course, changing the calculation of a rate too frequently may create excessive volatility and uncertainty as to exactly what the rate measures, potentially contributing to a loss of confidence in the integrity of the rate. For this reason, we believe it is important to be clear in describing what each reference rate we produce is meant to measure. We do not wish to make frequent changes to the rates we produce, but we are committed to making necessary ones.

Expanding Production to Treasury Repo Rates

Secured markets—the Treasury repo market in particular—also play a critical role in the efficient functioning of financial markets and the implementation of monetary policy.[21] However, historically there have been limited data available to the public on the Treasury repo market.[22] In November 2016, the New York Fed announced that, in cooperation with the Treasury Department's Office of Financial Research (OFR), we were considering publishing three reference rates based on overnight Treasury repo transactions to improve repo market transparency. Publication of these rates should improve market functioning and our insight into monetary policy implementation. Additionally, the ARRC had expressed interest in a repo rate produced by the public sector as a possible alternative to U.S. dollar LIBOR.[23]

Why Produce Three Treasury Repo Rates?

Having identified an opportunity to provide greater transparency into conditions in the Treasury repo market and support reference rate reform, we decided to produce not just one new repo rate, but three. Why three?

First and foremost, we wanted to produce a rate reflective of a broad swath of activity in the Treasury repo market. At the same time, we recognized that one broad rate might not consistently reflect differing conditions in various segments of the market. Dynamics in the overnight Treasury tri-party repo market—the segment of the market characterized by cash-rich investors such as money market funds lending to government securities dealers—may not always be the same as dynamics in the blind-brokered, largely interdealer GCF Repo service offered by the Depository Trust & Clearing Corporation (DTCC). For example, greater opportunity for balance sheet netting resulting from a single central counterparty in the GCF Repo market, and the blind-brokered nature of trading in that market are two differences between the tri-party and GCF Repo markets that impact the set of counterparties active in each market and incentives for trading. Both of these factors could manifest in a divergence in rates.[24]

Trades in the tri-party and GCF Repo markets are made against pools of "general" collateral. In a general collateral (GC) repo trade, the cash provider stipulates a population of acceptable collateral—for example, all Treasury securities—but does not stipulate the specific securities that must be pledged to settle the transaction. However, in the bilateral repo market, where the services of a tri-party agent are not used, the counterparties themselves identify specific securities to settle each trade. As a result, the bilateral repo market can be used to temporarily acquire specific securities, which can create different trading incentives than simply investing cash against a pool of securities. In particular, demand for specific securities—the supply of which may be relatively scarce—can have a significant impact on rates in the bilateral repo market.

The money market funds eligible to participate in the Federal Reserve's overnight reverse repurchase facility (ON RRP) predominantly lend cash in the tri-party market.[25] As such, a rate focused only on the tri-party repo market may be useful when evaluating money market fund participation in the ON RRP. On the other hand, a broad measure of the cost of financing Treasury securities in the repo market—one not just limited to GC trades—may be a better fit for other purposes. For example, a broad measure may be a better reflection of the average secured funding cost for a bank holding company that participates across the tri-party, centrally-cleared interdealer, and bilateral repo markets.[26]

Our choice to produce three overnight Treasury repo rates recognizes this "fit for purpose" issue. Given existing market segmentation and the potential for activity to shift across segments as the repo market evolves, one rate likely is not a perfect fit for all needs. However, producing a vast number of very similar rates is not practical either. From the public feedback received, we believe that producing these three rates will strike the right balance.

What are the Three Rates the New York Fed Will Produce?

I will provide an overview of each rate's "Interest," the term in IOSCO's *Principles* for what a rate conceptually is intended to measure. Transactions in which the Federal Reserve is a counterparty will be excluded from all three rates, as the rates are meant to reflect private-market transactions, and the Federal Reserve's motivation for transacting in the repo market tends to be different than for other participants.[27]

The first rate—the tri-party general collateral rate, or TGCR—is intended as a measure of rates on overnight, tri-party Treasury GC repo transactions where the counterparties involved know each other's identity at the time of the trade. The terms of all tri-party trades are bilaterally negotiated between the security and cash providers before using the services of a tri-party agent to clear and settle trades. Based on recent data, the TGCR would include around $280 billion of daily tri-party repo transactions.

The second rate—the broad general collateral rate, or BGCR—is intended to capture all trades where the specific securities provided as collateral are not identified until after other terms of the trade are agreed. The BGCR will include all trades in the TGCR plus other GC trades, such as those that are blind brokered. Given the addition of approximately $15 billion in overnight Treasury GCF repo transaction volume, if calculated today the BGCR would capture nearly $300 billion in daily transaction volume.

The third rate—SOFR—is the broadest measure of the cost of borrowing overnight in the repo market using Treasury securities as collateral. The first two rates—the TGCR and BGCR—both focus exclusively on the GC repo market, but, as I noted earlier, not all repo trades are for "general" collateral. Many trades in the bilateral repo market are at rates similar to those on GC repo trades in the tri-party repo market, with the cash providers' motivation for lending in the bilateral market very similar to the motivation of a cash provider in the tri-party repo market. However, in some bilateral repo market trades the cash provider is seeking to acquire specific Treasury securities, and the specific securities to be delivered are determined at the outset of the trade, before a rate is agreed. When such trades occur at rates below prevailing rates on GC trades, the securities collateralizing the repo are said to be trading "special." The more demand for a specific security exceeds the supply available to be lent, the greater the "specialness" premium for that security, and the lower the rate on repo trades for that security. A cash provider's motivation for entering GC and "specials" repo trades is different—investing cash in the case of a GC trade and acquiring specific securities in a "specials" trade. However, irrespective of the motivation of the cash provider, both types of trades provide the cash borrower a means to borrow funds with Treasury securities as collateral.

SOFR is intended to reflect the general cost of borrowing cash overnight collateralized by Treasury securities, regardless of the motivation of the cash providers participating in the trades. However, a limited number of Treasury securities often trade with a significant "specialness" premium—i.e., at rates considerably lower than those prevailing for GC trades and most "specials" trades. A significant "specialness" premium implies that the supply-demand dynamics for a particular Treasury security are very different than for the vast majority of Treasury securities. To mitigate the potential influence of Treasury securities trading very "special," we will remove a portion of the lowest-rate transactions in the bilateral repo market from the calculation of the SOFR.

Given the significant activity in the bilateral repo market cleared by the Fixed Income Clearing Corporation (FICC), transaction volume underlying the SOFR would be in the neighborhood of $800 billion if calculated today, more than double the volume underlying the BGCR.

Starting in the second quarter of this year, the New York Fed expects to begin producing and publishing the three repo rates on a daily basis, alongside the EFFR and OBFR. We have explored how best to calculate each of the three rates—also incorporating public comment received through the Federal Register Notice process—and arrived at a calculation methodology for each rate. I will not discuss every aspect of each rate, as that detailed information is already available, but there are four key points that are important to highlight.[28]

First, all three repo rates will be calculated as volume-weighted medians.[29] We selected the volume-weighted median as the most appropriate measure of central tendency for these rates for the same reasons we selected it for the EFFR and OBFR. A median is more robust to submissions of erroneous data and is more likely to reflect a transacted rate, as compared with a volume-weighted mean.[30]

Second, we have put in place various measures that should mitigate the risks associated with data collection for all three rates. While some have expressed concern that a portion of the data underlying the rates is collected under a commercial agreement, the production of a transaction-based rate necessitates the collection of transaction data, and there are inherent risks in any data collection. I would also note that in November, OFR announced plans to issue a Notice of Proposed Rulemaking this year to collect the cleared repo data underlying the BGCR and SOFR.[31] Simply put, if the markets underlying the three repo rates are active, I do not anticipate that acquisition of necessary data will be an impediment to the ongoing production of the rates.

Third, I want to provide further clarity around our method for identifying the set of bilateral trades to be excluded or "trimmed" from the SOFR, and discuss why we settled on this particular approach.

Our use of a volume-weighted median helps to ensure that "specials" will not have an undue influence on the rate; however, we have taken additional precautions to ensure that this is the case. All transactions in the FICC-cleared bilateral data set with rates below the 25th volume-weighted percentile will be removed, and the remaining bilateral transactions will then be combined with the tri-party and GCF Repo transactions to calculate the SOFR. In selecting this trimming methodology, we sought a method that would remove transactions for securities trading with an extreme "specialness" premium, consistent with the concept of the SOFR I outlined earlier, while also being relatively easy to communicate. We explored a variety of potential trimming methods and settled on the one we feel is the simplest that still gets the job done.

Finally, we are working to determine what additional historical data we can provide for all three repo rates, which is reflective of the requests for such data received through the public comment process. There has been particular focus on data for the SOFR, as some have suggested that providing a time series of the SOFR extending back prior to 2007 and the onset of the financial crisis would ease adoption of the rate as an alternative to U.S. dollar LIBOR. We have previously released indicative rates for the TGCR, BGCR, and SOFR from August 2014 forward based on transaction-level data provided by the tri-party clearing banks and DTCC, and we are looking into producing similar indicative rates for dates earlier than 2014.[32, 33] However, the calculation of these rates utilizes some information that first became available after the financial crisis as part of reforms to the tri-party repo market infrastructure. While we may be able to provide additional historical data beyond what we have already published, it is unlikely such data will reach prior to the onset of the financial crisis for any of the three rates.

However, for nearly two decades, the New York Fed has collected daily summary data from the primary dealers on their borrowing across all segments of the overnight Treasury general collateral repo market. A rate based on these summary data may serve as a useful indicator of the behavior of rates in the overnight Treasury repo market, and the New York Fed is considering a one-time release of a time series of this primary dealer survey rate. While a rate based on the primary dealer data would cover similar segments of the repo market as the SOFR, the rate would not be a perfect substitute for the SOFR. For example, the primary dealer survey rate would be a volume-weighted mean, would only cover the GC segment of the repo market, and would not cover activity by non-primary dealers. Additionally, the rate could not be produced in a process aligned with international best practices.

Looking Ahead

To conclude, I hope that I have provided you with a brief history of the New York Fed's role as an administrator and producer of reference rates while highlighting various aspects of the Treasury repo rates we plan to begin producing later this year, including the role these rates play in mitigating risks from overreliance on U.S. dollar LIBOR. In the end, I hope you walk away with two key messages.

First, the New York Fed is committed to producing durable reference rates. That is, we are committed to producing rates that are robust and resilient, both now and in the future. These rates are compliant with IOSCO's *Principles*, and best practice dictates that administrators periodically review the rates they produce to assess whether changes in the underlying markets require changes to those rates. The New York Fed plans to perform such reviews periodically for the repo rates, as well as for the EFFR and OBFR. We do not anticipate frequent changes to how we calculate the rates we produce, but if we believe changes are necessary, we are committed to making them, and to doing so in a transparent fashion that provides an opportunity for public input. The integrity of the rates we produce is of the utmost importance, whether they are used for analytical purposes or as reference rates in financial contracts.

Second, recognizing that the long-term availability of LIBOR cannot be guaranteed, it is critical that market participants with exposure to U.S. dollar LIBOR assess their associated risk and take steps to mitigate their exposure. While individual firms must decide on the most appropriate way to manage LIBOR-related risk, we encourage all to take two steps at a minimum: (1) adopt contract language capable of addressing the cessation of a reference rate, and (2) reduce reliance on U.S. dollar LIBOR by transitioning to robust alternative rates, such as the SOFR. In addition to being in the best interest of individual financial institutions, greater reliance on robust alternative reference rates aids the transmission of monetary policy and reduces financial stability risks.

Thank you.

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[1] I would like to thank William Riordan for his assistance in the preparation of these remarks, as well as colleagues in the Federal Reserve System, including David Bowman, James Clouse, Joshua Frost, Jane Ihrig, Joshua Louria, Simon Potter, and Sam Schulhofer-Wohl, for numerous insightful comments and suggestions.

[2] For more on the use of reference rates, please see Towards better reference rate practices: a central bank perspective, Bank for International Settlements, March 2013, and Duffie, Darrell, and Jeremy C. Stein. 2015. Reforming LIBOR and Other Financial Market Benchmarks. Journal of Economic Perspectives, 29(2): 191-212.

[3] See Reforming Major Interest Rate Benchmarks, Financial Stability Board, 22 July 2014.

[4] See The Future of LIBOR, Andrew Bailey, 27 July 2017.

[5] See FCA statement on LIBOR panels, 24 November 2017.

[6] See Introductory Remarks, Governor Jerome H. Powell, 2 November 2017.

[7] See TMPG Releases Updated Best Practice Guidance to Address the Use of Financial Benchmarks, 24 February 2016.

[8] See IOSCO publishes Principles for Financial Benchmarks, 17 July 2013.

[9] In 2014, the Federal Reserve convened the ARRC in cooperation with the Treasury Department and Commodity Futures Trading Commission. The ARRC was charged with identifying a robust alternative to U.S. dollar LIBOR, and with developing a plan to encourage its use in some derivatives and other transactions. For more on the ARRC, including the selection of its preferred alternative to U.S. dollar LIBOR, see the ARRC website.

[10] "Treasury repo" refers to repurchase agreement (repo) transactions on U.S. Treasury securities.

[11] In May 2016, The Risk Management Association (RMA) and the Securities Industry and Financial Markets Association (SIFMA) recommended the use of the OBFR "as a benchmark for pricing and performance reporting purposes to replace the fed funds open rate." (https://www.sifma.org/resources/news/rma-and-sifma-recommend-new-york-feds-overnight-bank-funding-rate-as-new-benchmark-to-replace-the-fed-funds-open-rate/) The announcement by RMA and SIFMA followed work by the TMPG on best practice guidance to address the use of financial benchmarks in the Treasury, agency debt and agency mortgage backed securities markets.

[12] The FOMC did not begin targeting the federal funds rate until the 1980s. See Thornton, Daniel L., When Did the FOMC Begin Targeting the Federal Funds Rate? What the Verbatim Transcripts Tell Us. FRB of St. Louis Working Paper No. 2004-015B.

[13] For more on changes to the calculation of the EFFR, including the use of the FR 2420 report data, see Statement Regarding Planned Changes to the Calculation of the Federal Funds Effective Rate and the Publication of an Overnight Bank Funding Rate (2 February 2015) and Statement Regarding the Implementation of Planned Changes to the Effective Federal Funds Rate and Publication of the Overnight Bank Funding Rate (6 January 2016).

[14] For more on the FR 2420 report, which was launched in 2014, see the New York Fed's reporting form.

[15] A volume-weighted median rate is calculated by ordering the transactions from lowest to highest rate, taking the cumulative sum of volumes of these transactions, and then identifying the rate associated with trades at the 50th percentile (middle) of dollar volume.

[16] For more information on the selection of a volume-weighted median for the EFFR and OBFR, see the technical note included with the New York Fed's Statement Regarding the Calculation Methodology for the Effective Federal Funds Rate and Overnight Bank Funding Rate (8 July 2015).

[17] Eurodollars are unsecured U.S. dollar deposits held at banks or bank branches outside of the United States. However, there is an active market for Eurodollars in the U.S., with U.S.-based banks indirectly borrowing Eurodollars through their offshore branches and then transferring the funds onshore.

[18] Currently, daily transaction volume in the federal funds market is about $90 billion, while the Eurodollar market is larger, with daily volume of about $120 billion.

[19] For more on the money market fund reforms, see SEC Adopts Money Market Fund Reform Rules, 23 July 2014.

[20] The minutes from the May 2017 FOMC meeting noted that the Committee was informed of analysis Federal Reserve staff were undertaking to understand "changes in the practices of some domestic and foreign banks for booking certain types of liabilities" that had resulted in a reduction in Eurodollar transactions in the FR 2420 report.

[21] The New York Fed's Open Market Trading Desk does not operate directly in the federal funds market to implement monetary policy; rather, temporary open market operations to aid in control of short-term interest rates are conducted in the repo market.

[22] The Treasury repo market is estimated to be in excess of $4 trillion, but the exact size of market is difficult to measure, given a paucity of data on certain segments of the market. This estimate is based on methodology used in Mapping and Sizing the U.S. Repo Market, Liberty Street Economics, 25 June 2012.

[23] The ARRC noted in its Interim Report and Consultation (May 2016) that it "expressed some preference for a [repo] rate produced by the public sector."

[24] Currently, the value of cash borrowed in the overnight Treasury tri-party repo market is many multiples of that borrowed in the GCF Repo market. As such, dynamics in the tri-party repo market likely will dominate in a reference rate that combines activity in both markets. However, the size gap between the two market segments was much smaller in recent years, and it may narrow again as the two markets evolve. In assessing repo market segmentation, we did not simply focus on current market dynamics, but also looked at historical behavior while recognizing that the repo market may evolve in uncertain ways.

[25] While still predominantly using the tri-party repo market for lending cash in the repo market, money market funds have expanded their lending in the bilateral repo market since the SEC's money market fund reforms were implemented in 2016.

[26] The rate capturing the broadest measure of the activity in the overnight Treasury repo market will include transactions executed in the tri-party and GCF Repo markets, as well as transactions executed using the Fixed Income Clearing Corporation's (FICC) DVP repo service. FICC's DVP repo service is a form of bilateral repo, as it does not use the tri-party infrastructure to settle trades.

[27] Cash borrowers in the repo market generally are motivated by a need to raise cash, including financing their security holdings. Meanwhile, cash providers typically are motivated by either earning a return on invested cash or acquiring specific securities. However, repos also serve as one of the Federal Reserve's tools for monetary policy implementation, and the Fed's motivations for using repos likely are quite different from other market participants. For example, the Fed's motivation for operating the ON RRP is neither to raise cash nor to finance the Treasury securities held in the System Open Market Account. As indicated in the FOMC's Policy Normalization Principles and Plans, the ON RRP helps control the federal funds rate by supplementing interest paid on excess reserve balances.

[28] For information on the calculation of the repo rates please see Investigating the Proposed Overnight Treasury GC Repo Benchmark Rates, Liberty Street Economics, 19 December 2016; Introducing the Revised Broad Treasuries Financing Rate, Liberty Street Economics, 19 June 2017; The Cleared Bilateral Repo Market and Proposed Repo Benchmark Rates, FEDS Note, 27 February 2017; and the Federal Register Notice linked to this Federal Reserve Board press release (8 December 2017).

[29] In addition to publishing the volume-weighted median, the New York Fed will publish summary statistics for each rate. These will consist of the 1st, 25th, 75th, and 99th volume-weighted percentile rates, and the transaction volumes.

[30] Although some have expressed concerns that a median may be significantly more volatile than a volume-weighted mean in the context of these repo data, the New York Fed's internal analysis of the transaction-level data has not found this to be the case. In fact, a volume-weighted median actually appears to be less susceptible to changing in response to small changes in the empirical distribution of rates than either a volume-weighted mean or a trimmed mean.

[31] See OFR Update on Bilateral Repo Collection, 22 November 2017.

[32] These indicative rates were produced using transaction-level data from the tri-party clearing banks and DTCC that are similar to those that will underlie the production TGCR, BGCR, and SOFR when they are formally launched later this year, and were compiled using the calculation methodology that will be utilized for the production rates. However, the indicative rates were not produced in a manner that is as robust as the IOSCO-complaint production process that will be utilized when the rates are launched in the second quarter of this year.

[33] For the previously released indicative rates, see Joshua Frost's presentation at the Alternative Reference Rates Committee Roundtable, 2 November 2017.