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## **Current Conditions in US Money Markets as reported by Market Participants**

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### **I. Introduction**

To better understand supply, demand, and pricing in today's money markets, selected members of the Money Markets team of the Long-run Framework project conducted telephone interviews with 26 significant money market participants. Participants discussed several aspects of overnight and short-term funding market functioning, including price discovery, relevant reference rates or markets, and the extent to which markets are well connected. This memo summarizes market participant feedback while providing context for their replies (see Appendix 1 for more detail). A common theme that emerged from the interviews is that market participants are still adjusting to the impact of new regulations in the presence of high levels of excess reserves. Although a large majority of market participants stated that different money market segments remain well connected to one another, they also report significant fragility in key markets:

- The fed funds market is dominated by one class of seller, the Federal Home Loan Banks (FHLBs), who report few options for their short-term investments other than fed funds. Fed funds demand relies heavily on Foreign Banking Organizations' (FBOs) willingness to borrow funds in overnight tenors to conduct IOER arbitrage. As new regulations encourage banks to borrow at longer tenors, FBOs reported that they borrow overnight fed funds and Eurodollar time deposits as more of a customer service than a core feature of their funding strategy.
- Prime MMFs are a key investor class that connects overnight unsecured and secured rates. MMF reform to be implemented this October may significantly reduce asset held by Prime MMFs. This, in turn, may lead to episodes of secured rates behaving differently than unsecured rates.
- Respondents noted that general collateral (GC) repo markets have become considerably less dynamic, as dealers have "right-sized" their customer base, now viewing repo as a necessary "loss leader" in order to operate in fixed income markets. As dealers have scaled back their repo activity they have also placed a premium on maintaining stable customer relationships, leading to reduced volatility in customer tri-party repo transactions. This may affect monetary policy implementation as

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<sup>1</sup> Federal Reserve Bank of New York with assistance from Noah Atchison, Kyle Lee, Charles Press, and Dick Todd.

relatively non-responsive repo markets may no longer provide helpful, timely information about current money market conditions.

- Respondents differ about how relevant other money market rates are for computing fair value in their specific market, i.e. comparator rates. Some respondents suggest that comparator rates were not that useful in a current, ultra-stable price environment. Other respondents note that Treasury bill yields are a good indication of broad money market conditions while a plurality state that overnight Treasury GC repo rates provide the best insight. Some respondents expressed disappointment that the widely cited GCF repo index is considerably more volatile than rates that are generally available in the broader tri-party repo market.

The memo describes: (1) the major players across the three money markets that are critically important for monetary policy implementation (Fed funds; overnight offshore time deposits, or Eurodollars; and the overnight Treasury general collateral repo market, or GC Repo); (2) market participant feedback on how each of these three markets is performing; (3) inter-connections across all money markets; and (4) relevant reference/comparator rates.<sup>2</sup> There are four Appendices: Logistics of Market Participant Interviews; Dealer Netting Behavior; Impact of the Committed Credit Requirement on the tri-party repo market; and Treasury Bills as a Relevant Comparator Rate.

## II. Market Presence of Different Money Market Participant Types

### Trading Volumes of Major Participant Types

Major Borrower Types	GC Repo	Fed Funds	Eurodollar
Domestic Banks	Low	Low	Low
Foreign Banks	Low	High	High
Primary Dealers	High	None	None

Major Investor Types	GC Repo	Fed Funds	Euro Dollar
MMFs	High	None	High
FHLBs	Low	High	None

### Domestic Banks

<sup>2</sup> Although the Desk traditionally accepted Treasury, agency and agency MBS repo collateral in its pre-crisis temporary open market operations, this memo focuses solely on repo operations backed by Treasury collateral, which is the benchmark for secured financing of “safe assets”. The agency financing market is relatively small and spreads between Treasury and agency MBS repo have been range-bound for the most part, except for the crisis period when agency MBS financing rates increased relative to Treasury repo rates due to credit quality concerns in the agency MBS market.

- Large domestic commercial banks typically have ample deposits and high levels of excess reserves which translate into little need for external short-term funding. Domestic bank demand for reserves for IOER arbitrage purposes is also low, because of the daily calculation for the leverage ratio requirement and the application of the FDIC assessment fee to total assets since 2011. Nonetheless, some large domestic banks maintain a presence as borrowers of short-term funds to maintain balance sheet flexibility.
- Domestic banks that are active borrowers in wholesale funding markets tend to focus on issuing liabilities in tenors greater than 3 months, reportedly to improve Liquidity Coverage Ratio (LCR) metrics.

### **Foreign Banks**

- FBOs are the primary borrowers in both the fed funds and Eurodollar time deposit markets and they are generally indifferent between the two. FBOs desire consistent access to USD funding markets as they lack a natural USD deposit base to fund their USD denominated assets.
- FBOs express a strong interest in issuing wholesale funding liabilities with tenors of at least three months but only a mild interest in very short tenors. Nonetheless, some FBOs appear to be very willing (apart from month- and quarter-end dates) to borrow in very short tenors to arbitrage between the fed funds and the IOER rates. FBOs view IOER arbitrage demand as stable as long as the IOER rate exceeds borrowing costs by at least 5 basis points. However, it is likely that overnight unsecured borrowing demand would not completely evaporate if the IOER spread narrowed beyond this threshold. Indeed, some FBOs stated their motivation to borrow overnight funds from certain counterparties was to potentially increase their ability to obtain longer term funding from the same counterparties.
- There are several reasons for FBOs to engage in IOER arbitrage. One reason is the positive risk/return of this transaction. Some FBOs have also cited avoidance of daylight overdrafts as a benefit of maintaining relatively large reserve balances. Others cite a strategy of routinely “over-borrowing” in wholesale funding markets as a way to increase their liquidity profile and enhance funding resiliency.

## Primary Dealers

- Primary dealers are active in GC repo markets to support activities of their broader trading desk (such as long or short positions in securities they own outright), including funding and sourcing securities. Dealers also mention that having an active repo desk promotes funding resiliency and increases their preparedness for contingency situations.
- Higher capital requirements, particularly the leverage ratio, have made it more costly for dealers affiliated with bank holding companies to use their balance sheets to engage in repo market arbitrage. Dealers are not only more reluctant to engage in arbitrage, but also report rationing their overall repo activity with customers, including turning some customers away, with a view that traditional repo transactions are a “loss leader” from a leverage ratio perspective.
- In response to the evolving regulatory framework, dealers now seek greater stability and predictability in their core financing activity. Several dealers reported using a strategy of borrowing about the same amount of funds from each customer on a daily basis and relying on the inter-dealer market to address inherent volatility in repo volume that arises from broader desk activity.
- Capital requirements have led dealers to focus on transactions that can be netted, to avoid increasing total assets. Most, but not all, netted repo transactions use the Fixed Income Clearing Corporation (FICC) as a central counterparty. Some participants cite netting criteria as critical determinants of their repo activity. Appendix 2 provides details on dealer repo netting practices.

## 2a-7 Money Market Mutual Funds (MMFs)

- The 2a-7 industry is still adapting to ongoing reform initiatives. [Reforms dating back to 2010](#) increased short term liquidity requirements. [Reforms that take effect in mid-October 2016](#) are likely to shift shareholder demand from Prime toward Government MMFs, reducing the overall presence of MMFs in non-government wholesale funding money markets over time.
- MMFs report that their repo investments with dealers are constrained by dealers’ collateral and balance sheet capacity, but the MMFs have greater flexibility in varying the amount of their Eurodollar time deposit investments.
- MMFs are required to keep 30 percent of their Assets under Management (AUM) in instruments that have tenors of 7 days or less; 10 percent must have an overnight maturity. MMFs report that they have less difficulty in becoming fully invested in these short tenors following the introduction of ON RPP operations, although this difficulty still persists on month-ends and quarter-ends as discussed in Appendix 3.
- There is a supply/demand mismatch in the interaction between MMFs and banks. MMFs prefer to invest in short-dated bank liabilities, with a substantial demand for tenors of 7

days or less, while banks prefer to issue liabilities in tenors beyond 3 months. As a result, some FBOs report issuing short term liabilities to MMFs with the intent of improving relationships that may lead to potential term investments. MMF portfolio managers did not acknowledge any implicit “bundling” between their trades in short and long term bank liabilities with individual banks, but most acknowledge that issuers of their longer term bank paper tend to be the same entities that issue them products with tenors of seven days or less.

### **Federal Home Loan Banks (FHLBs)**

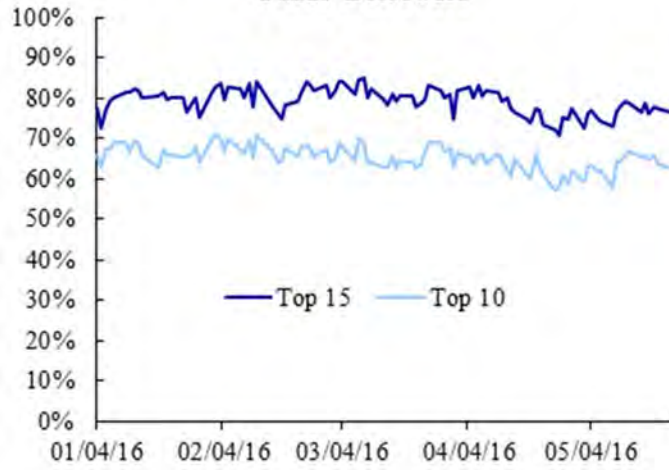
- All eleven FHLBs are active investors (sellers) in the fed funds market; together they represent about 95% of the lending in this market, per FR 2420 data. As noted above, their primary counterparties are FBOs.
- FHLBs are the dominant supplier of fed funds because they have a consistent need for overnight investments and have a preference to receive maturing proceeds early in the day, which makes fed funds more attractive than other investment alternatives such as tri-party repo. FHLB’s consistent need for these investments arises from a liquidity coverage requirement imposed by their regulator, the FHFA, along with the FHLBs’ desire to make advances (loans) to their members on a same-day (T+0) settlement basis.

## **III. Current State of Select Wholesale Funding Markets**

### **Fed funds**

As mentioned, the fed funds market is dominated by the eleven FHLBs selling primarily to FBOs and secondarily to domestic banks. Borrowing in the fed funds market is fairly concentrated with the top 15 borrowers typically accounting for just under 80% of total borrowing per FR2420 data (Figure 1).

**Figure 1: Concentration of Largest Fed Funds Borrowers**



Source: FR.2420

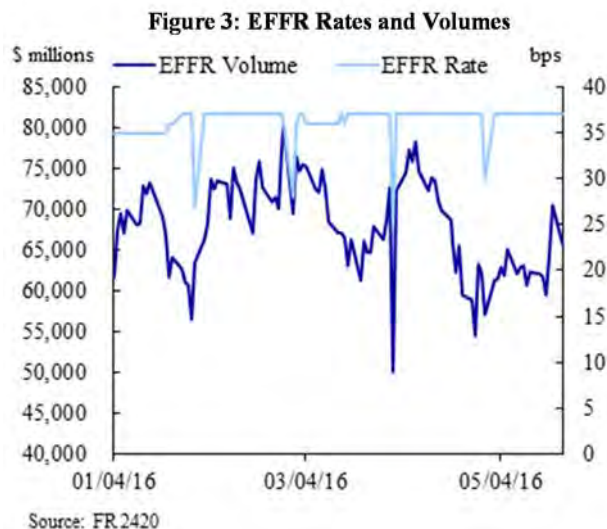
As a percentage of total fed funds trading, FHLB selling typically varies in a narrow band of about 94% to 96%, as reported in FR 2420 data (Figure 2). Individual FHLB fed funds selling volumes tend to vary with the size of their respective liquidity pools, but collectively the FHLBs have dominated fed funds supply at least since Fannie and Freddie retreated from the market in 2011, amid concerns about the creditworthiness of large European bank borrowers. Of note, the 2011 exit by Fannie and Freddie illustrates that the current market structure could change again in the future, if Fannie or Freddie were to resume fed funds trading or if the FHFA directed the FHLBs to have a singular asset focus on the US housing market, for example. Each FHLB is required to maintain overnight liquidity levels sufficient to cover, at a minimum, maturing principal and interest payments coming due over the next 5 days. FHLB's will also increase the size of their liquidity pools if they expect demand for member advances to increase. Similarly, the demand side of the market could change if future regulatory changes prompt FBOs to seek wider spreads for IOER arbitrage.

**Figure 2: GSE Lending as a % of Total Fed Funds Volumes**



Source: FR.2420

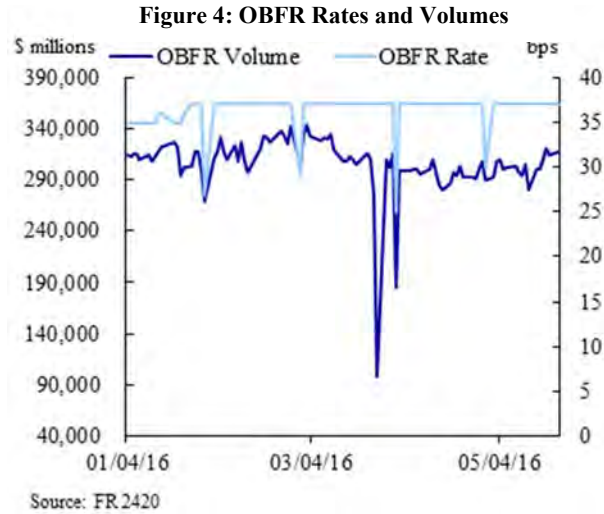
Except at month- and quarter-ends (when FBO capital requirements become more binding), there currently is little temporal volatility in the effective fed funds rate (EFFR). FHLBs did not reference any relevant comparator rates except for IOER, the ON RRP, and the (self-referential) Fed Funds Open. Participants attribute the price stability to the fact that the same buyers tend to interact with the same sellers on a daily basis. Further, FBOs have quantity flexibility because they are generally using the borrowing proceeds for IOER arbitrage only. Indeed, individual FHLBs report that price execution in the fed funds market tends to be independent of the size of their selling need/liquidity pool level (Figure 3).



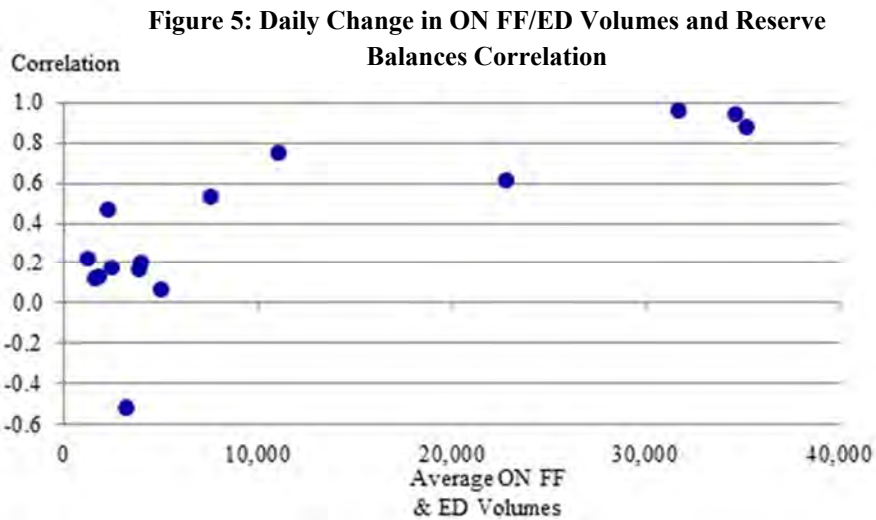
Participants in the fed funds market frequently execute trades with each other not only at the same rate each day but also at about the same time each day. This suggests that the fed funds market is somewhat “hard wired” for one day to look like the next, although there is indirect competition which can affect trading distributions. For example, as FHLBs prefer to receive maturing proceeds by 10 am ET, many FBOs accommodate this request free-of-charge, even though market convention is for the buyer to hold the funds for 23 hours. Some FBOs also compete by purchasing funds late-in-the-day without a discount, even though FBOs know that the sellers have little outside options for their late-day investments.

### **Eurodollars**

The Eurodollar market is currently dominated by FBOs borrowing from non-bank entities such as Prime MMFs. FBOs are reportedly primarily interested in securing USD funding with tenors beyond three months but some also have sizeable IOER arbitrage positions. Within a range, and with the exceptions of month-end, quarter-end dates, large FBO borrowers can tolerate volatility in their borrowing levels without changing their borrowing rate (Figure 4).



Even though FBOs know that FHLBs have limited investment options, they tend to bid the same borrowing rates in both the Eurodollar and the fed funds markets. This is fundamentally important in keeping the fed funds rate relatively well connected to other overnight trading rates. Most FBO's cite a general indifference between borrowing fed funds or Eurodollars, although some cite a preference for borrowing in the fed funds market because short term borrowing from FHLBs may receive preferential treatment relative to short-term borrowing from other entities in LCR calculations under certain conditions.



FBOs note that IOER arbitrage activity is not profitable from a return-on-equity or leverage ratio compliance perspective. Nevertheless, aside from month-end and quarter-end dates, many FBOs are de facto engaging in IOER arbitrage—borrowing money in the overnight, unsecured funding markets with the intent of making a spread between their borrowing rate and the IOER compensation rate (“the IOER arb spread”). This is evidenced in Figure 5 which shows a correlation between changes in end-of-day reserve balances with changes in the Overnight Bank

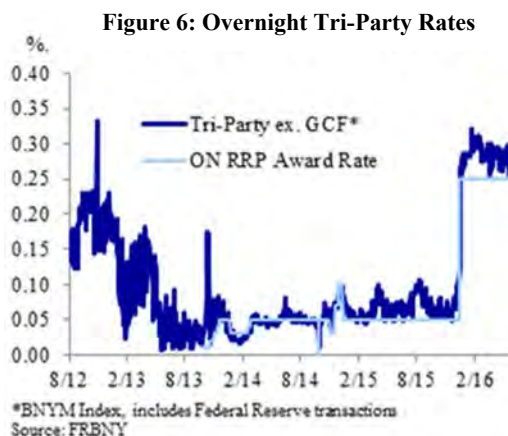


Funding Rate (OBFR) borrowing levels for the 15 largest OBFR borrowers from November 2015 through February 2016. Correlations are plotted against average OBFR borrowing levels. While several borrowers evidence low correlations and one is actually negative, the banks that are borrowing the largest amounts tend to have the highest correlations, indicating that increases in borrowing amounts tend to directly increase end-of-day reserve balances, and vice versa.

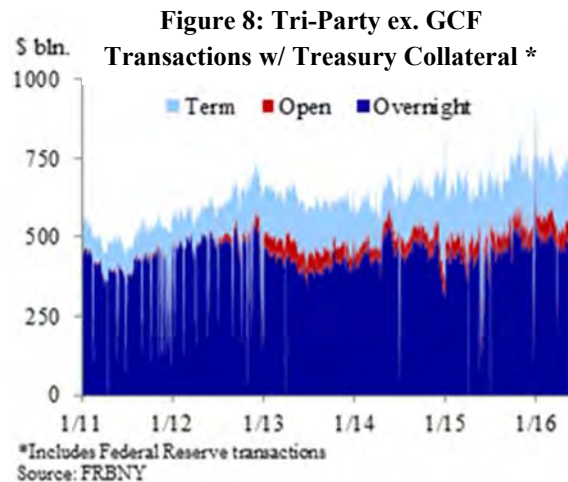
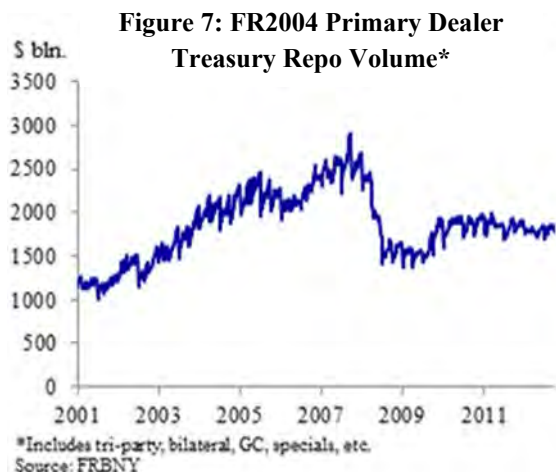
FBOs cite internal limits on the size of this IOER arbitrage activity while noting that it is not particularly price sensitive as long as the IOER arb spread remains above the “low single digit” level. One FBO opines that the IOER arb spread, currently at 13 basis points, could move to as low as 7 basis points or as high as 17 points without necessarily eliciting a response from buyers or sellers in the market. Like the fed funds market, the Eurodollar market currently has a fairly stable set of participants and outcomes but could change significantly in the future in response to evolving bank capital and MMF regulations.

### Treasury GC Repo Market

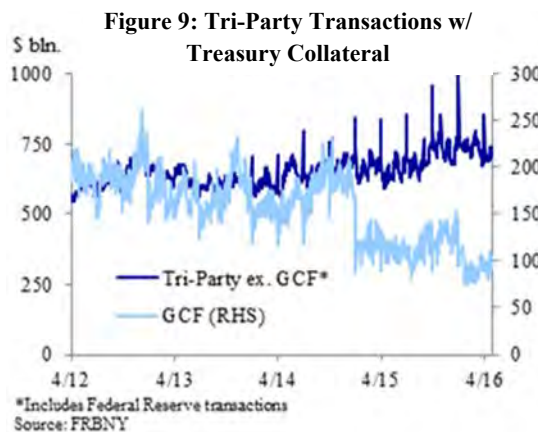
The Treasury GC repo market is segmented by settlement convention into distinct Delivery vs. Payment (“DvP repo”) and tri-party repo markets, with clearing banks providing settlement service to both sides of the repo transaction in the latter market. The tri-party market is further segmented into GCF repo, an inter-dealer market in which the Fixed Income Clearing Corporation (“FICC”) is a central counterparty, and customer repo. DvP repo, which can be used to finance either special or GC collateral, also has customer and inter-dealer segments. The latter uses FICC as a central counterparty.



Overnight Treasury GC repo rates became less volatile following the introduction of ON RRP operations, which market participants cite as forming a hard floor on rates (Figure 6). Treasury tri-party repo volumes declined significantly following the financial crisis, but generally stabilized by the end of 2009. Of note, Treasury repo volumes have increased modestly since January 2015, but all participant commentary ignores this trend and instead focuses on the dynamics of a repo market that is volume constrained.



Several market participants described customer GC repo as an “allocated market” in which price plays only a secondary role as a market clearing mechanism. Dealers report trying to keep tight control on their overall repo activity, seeking to maximize repo’s role of enhancing customer service while minimizing potential fall-out from regulatory compliance metrics. Dealers’ desire for stability has translated into “allocating repo capacity” for customers. Respondents pursue a strategy of maintaining a steady financing book for customers and using the inter-dealer market to offset inherent volatility arising from their outright desk activities. Within the inter-dealer segment of the GC repo market, GCF volumes have decreased, suggesting that the DvP inter-dealer, FICC-novated market is being used to offset daily changes in repo dealer activity, both in sourcing and financing collateral. Of note, market participants report that the implementation of strict controls on daylight overdrafts and protocols around repo maturities that were implemented early in 2015 has reduced the desirability of GCF for some dealers (see Appendix 4 for details).

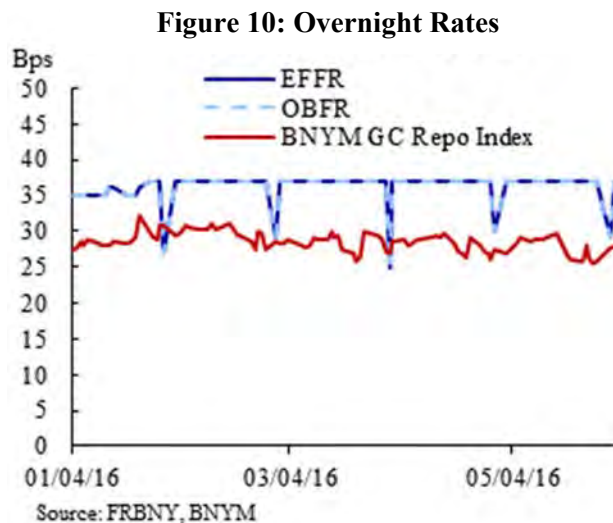


The Treasury GC repo market has already undergone significant changes in response to regulatory reforms with all dealer respondents mentioning the benefit of rationing customer repo activity. It remains to be seen if Treasury GC repo volumes will maintain recent growth rates as banks and dealers continue to make adjustments to the new regulatory environment. Stricter

regulatory standards, such as global daily averaging, would likely reduce arbitrage activities in the repo market and may weaken the connection between secured vs. unsecured wholesale funding rates.

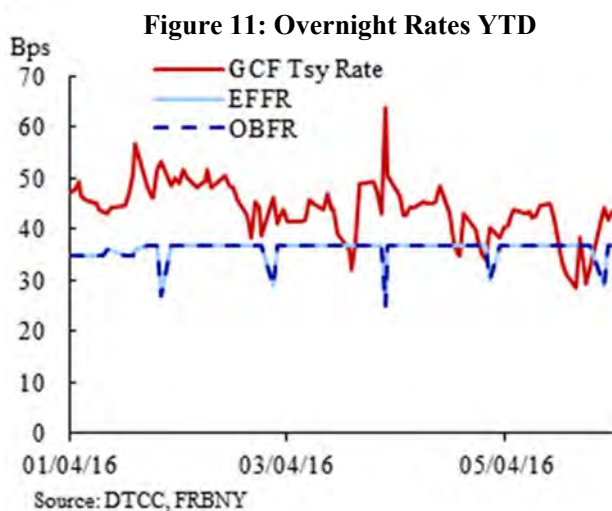
#### IV. Inter-connectedness and Comparator/Reference Rates

Most respondents report that domestic money markets are well connected. The majority of respondents representing the re-investment areas of securities lending operations, MMFs, Commercial Paper dealers and banks active in wholesale funding support this view. However, the sentiment of well-connected markets is not universal. Of note, GC repo dealers and the FHLBs see markets as relatively disconnected. The latter report some degree of segmentation in the money markets as rigidity in dealer repo positions precludes the FHLBs from investing funds, at the margin, in the GC repo markets, leaving them more or less captive to fed funds market investments. Some FHLBs reported feeling like a “price taker” in fed funds, despite having a significant presence in this market. GC repo dealers broadly felt that unsecured and secured markets were rather bifurcated, an observation that is somewhat borne out in the data. Per the chart below, broad tri-party rates as measured by the BNYM Treasury Repo index, vary considerably more than unsecured rates, although year-to-date overnight Treasury GC rate fluctuations have still been rather modest.



Respondents report an array of relevant comparator rates that are helpful references for current money market conditions. That said, participants broadly commented that there is relatively little need for comparator rates from a price discovery perspective, given the price stability evidenced in overnight funding markets YTD in 2016. Responses are summarized in bullets below:

- Many respondents noted that overnight Treasury repo rates were the best comparator rate for money markets. This answer was particularly prevalent among Commercial Paper and GC repo dealers.
- Responses are very mixed regarding the relevance of on-the-run Treasury bill rates. Some respondents stated that Treasury bills were an important foundation rate across all money markets, while others cited idiosyncratic rate behavior in the bill market. Appendix 4 discusses relative bill rate behavior in some detail.
- Participants note the fundamental importance of IOER and its key role in the fed funds and Eurodollar markets.
- Participants note that the ON RRP offered rate has become a very important reference rate for domestic money markets. It was widely stated that the ON RRP offered rate has become a firm floor since the target range moved off zero in December 2015. As an aside, some participants think that the FOMC may have some difficulty in completely eliminating the ON RRP facility, given its importance in money market functioning.
- Participants who are frequent repo market investors note that overnight Treasury GCF prints have become somewhat idiosyncratic (Figure 11). Some respondents, particularly those without consistent access to the repo market, note the oddity of having secured rates trade above unsecured. Others state that GCF rates were good comparators for directional moves only, noting that GCF has become very volatile relative to broader tri-party rates because of increased frictions in the inter-dealer market. From the disparity of responses it is apparent that repo market dynamics are not universally understood, as some respondents failed to grasp the notable differences between broad tri-party repo and GCF rates. Note that broad tri-party repo rates have been consistently below EFFR and OBFR prints (Figure 10) while inter-dealer rates, such as the GCF Treasury Index have been consistently above EFFR and OBFR prints. (See Appendix 3 for more discussion of the GCF repo market).



## V. Conclusion

There are several interesting conclusions to be drawn from this outreach effort. While participants generally view money markets as well connected, a more granular view exposes several vulnerabilities noted by respondents. A general lack of dealer willingness to arbitrage away price discrepancies could lead to pronounced pricing differences in different segments of the money markets. Further, all major money market segments exhibit some degrees of fragility.

- In the fed funds market, FHLBs comprise 95% of all fed funds sales.
- The Eurodollar market, while much larger and more robust than the fed funds market, is dominated by FBOs, whose willingness to arbitrage leads them to borrow far more than their underlying need to fund USD assets.
- In seeking stability in their repo books, dealers routinely turn away investors, which limit the availability of GC repo as an investment vehicle, at the margin. Further, dealer focus on netting balance sheet items could lead to trading patterns that may distort market functioning by encouraging trades that would otherwise be uneconomical (See Appendix 1).

The stability of rates and the degree of market connectedness that currently prevail depend heavily on apparent arbitrage activity by one set of participants—FBOs. Their willingness to arbitrage could change along with regulatory requirements. In this regard, the inclusion of reserves in the leverage ratio and FDIC fee assessment calculations presents some challenges to rate stability and the interconnectedness of money markets.

## **Appendix 1**

### **Logistics of Market Participant Interviews**

Over a three month period from February through May 2016, the team conducted 26 interviews with a variety of money market participants. Interviews were conducted with 2 corporate Treasurers, 4 GC repo dealers, 3 GSE funding desks, 4 MMF portfolio managers, 3 market mutual funds, 3 banks who are active issuers of negotiable CDs, 3 banks who engage in IOER arbitrage and 4 securities lending reinvestment desks. Generally speaking, we had a pre-discussion of the topics we wanted to cover but specific questions were not sent in advance. The average interviews lasted about one hour. To follow is an example of the types of questions that were asked of participants:

#### **Investors**

##### **Money Market Activity**

Which money markets are you involved in and are you predominantly a lender, a borrower, or both, in each? Can you provide a ballpark estimate of your typical investment activity broken out by the asset classes below? How has this changed in recent years?

##### **Asset Allocation Optimization:**

- A. Maturity optimization:
  - a. How do you decide on the maturity structure of your money market investments? What factors influence these decisions? (e.g, the slope of the yield curve, characteristics of an offsetting liability, regulatory constraints or requirements?)
  - b. How much of your investment activity typically has an overnight tenor? Why? Is a portion of your overnight investments price elastic? If so, how much yield pick-up is necessary for you to extend your investments beyond the overnight tenor?
  - c. What other tenors do you actively invest in? Do you frequently follow a “bar-bell” strategy when investing your short term assets?
- B. Optimizing across different investment products:
  - d. How do you decide which specific instruments to purchase? What factors influence these decisions (e.g. rate differentials, liquidity differentials, differences in regulatory treatments, other)? Are you frequently constrained in becoming fully invested in any one product type?
  - e. Specifically, what is your preference for unsecured vs. secured investments? Do you have a relatively wide or narrow tolerance for investing in secured vs. unsecured?

##### **Miscellaneous Supply and Demand Factors:**

- A. How significant is foreign bank demand to hold US dollars in the FX basis swap market? Does this demand contribute significantly to pricing dynamics for short-term USD investments? Do you have any comments on the efficacy of the FX basis swap market?
- B. Is there an intra-day pattern of notable differences in either pricing or liquidity in the money markets that you routinely invest in? Do these or other considerations affect the time-of-day in which you make investment decisions?
- C. Do you have a distinct strategy for investing over month-end and quarter-end dates?
- D. Counterparty Management:
  - a. Do you have specific counterparty limits to which you have to adhere? Are there different limits for unsecured vs. secured exposure? How frequently are these limits reviewed or changed?
  - b. How are new counterparties approved? How long does it typically take to add a counterparty?
  - c. Has anything about this process changed significantly from before the crisis?
- E. To what extent does relationship management affect your investment decisions?
- F. Are there other non-price factors that influence your money market investment decisions?

**Regulatory Impact:**

- A. If not already covered, please explain how regulatory requirements influence any aspect of your money market activity – e.g. the tenors of your assets or liabilities, differential pricing for different markets/maturities/counterparties, etc. In particular, how have things changed with the adoption of new regulatory requirements (i.e. Basel III, SLR, etc.)?
- B. Which new regulatory requirements do you feel have had a pronounced impact on market participant behavior in the money markets? Has this affected your specific behavior?

**Monetary Policy Framework and Resiliency to Stress**

- A. How do you think IOER has impacted pricing for money market assets? How does it influence pricing in other markets?
- B. How do you think the ON RRP facility has impacted money market pricing? If you have access, how has it influenced your consideration of other markets? If you do not, how has it influenced the prices you see in the market? Any comments or concerns about the ON RRP facility?
- C. What does the phrase “inter-connected markets” mean to you? How inter-connected are different money market segments (e.g. CP, CDs, repo, overnight unsecured) now vs. pre-crisis conditions? Is this a cause for concern?
- D. Have you thought much about a world in which reserve balances were not abundant? If so, and this scenario comes to pass, how do you think it would affect money markets and your investment allocation decisions?
- E. Do you have any financial stability concerns or comments?

## **Borrowers**

### **Money Market Activity**

- A. Which money markets are you involved in and are you predominantly a lender, a borrower, or both, in each? Can you provide a ballpark estimate of your typical borrowing activity broken out by the asset classes below? How has this changed in recent years?

### **Liability Optimization:**

- A. Maturity optimization:
- a. How do you decide on the desired maturity structure of your money market liabilities? What factors influence these decisions? (e.g, the slope of the yield curve, operating liquidity needs, desire to accommodate customers, improve regulatory ratios, etc.?)
  - b. How much of your liability issuance typically has an overnight tenor? Please comment on how overnight liabilities fit into your optimal liability mix. How, if at all, has this changed over recent years?
  - c. If a Fed account holder, what is your most important consideration in holding end-of-day reserve balances at the Fed (i.e. do you try to minimize reserve holdings, do you target a specified reserve cushion, are you actively seeking reserves to conduct IOER arbitrage, are you holding reserves as part of an HQLA strategy for LCR compliance? etc.)
    - i. If you are conducting IOER arbitrage, do you have a minimum earnings rate in mind? Do you ever use the overnight proceeds to fund assets besides reserve balances?
  - d. In what other tenors do you actively issue money market instruments?
- B. Optimizing across different investment products:
- a. How do you decide which specific instruments to issue? What factors influence these decisions? (e.g. rate differentials, customer preferences, differences in regulatory treatments, etc. ?)
  - b. Do you have the option to issue on both a secured and unsecured basis? Do you ever conduct arbitrage between these two markets? How has this changed since before the financial crisis?

### **Miscellaneous Supply and Demand Factors:**

- A. How significant is foreign bank demand to hold US dollars in the FX basis swap market? Does this demand contribute significantly to pricing dynamics for short-term USD investments? Do you have any comments on the efficacy of the FX basis swap market?
- B. Is there an intra-day pattern of notable differences in either pricing or liquidity in the money markets that you routinely borrow in? Do these or other considerations affect the time-of-day in which you typically issue liabilities?
- C. Do you have a distinct strategy for issuing liabilities that will be outstanding over month-end and quarter-end dates?
- D. How do relationship management considerations affect your liability issuance patterns?
- E. Are there other non-price factors that influence your liability issuance decisions?



## Appendix 2

### Dealer Netting Behavior

The Basel III Leverage Ratio has focused dealers' attention on the share of their balance sheet dedicated to repo, as it is traditionally a low-margin, balance sheet intensive business. In order to continue to meet customers' demand for repo financing, dealers have expanded their use of repo netting to limit the impact on their balance sheets. Repo netting is simply offsetting a reverse repo with a repo, and vice versa; the offsetting transactions results in no change in the aggregate size of the dealer's balance sheet. While the ability to net is not a new post-Basel III development, dealers reportedly have substantially increased their use of netting and are actively educating their clients on how to structure their repo financing in order to enable netting.

U.S. dealers are able to net according to the Fin 41 rules in U.S. GAAP. The rules include several criteria to allow firms to net repo and reverse repos, including both transactions that: (1) are executed with the same counterparty, (2) have the same maturity date, (3) are under a master agreement that allows netting, and (4) use the same settlement system. As the underlying collateral may have different attributes, (e.g. 30-year bond vs. 3-month bill) this provision may allow dealers, under certain conditions, to facilitate client risk-taking without affecting the dealer's balance sheet. Standards for repo netting under the IFRS international standards are similar to those under U.S. GAAP accounting.

The most common repo netting transactions are conducted in the inter-dealer market, where the Fixed Income Clearing Corp. (FICC) is the central clearing counterparty (CCP). If the firms in a repo transaction are members of the Government Securities Division of FICC (approximately 150 broker/dealers and banks), then, after a trade is completed, the counterparty to the trade is novated to FICC. Once novated, trades between FICC members can be netted if other requirements are met. FICC repo netting can be conducted in tri-party via GCF or on a bilateral/deliver versus payment (DvP) basis. The Desk often hears that demand for FICC netting drives up inter-dealer repo rates over quarter end dates.

Not all dealer netting activity is through the FICC. Dealers may be able to net transactions with non-FICC members through the application of Fin 41 rules provided the dealer is able to establish offsetting long and short repo positions with the same counterparty to the same maturity date. For example, a dealer may be willing to finance a 30-year bond for a hedge fund for one month, provided the hedge fund is willing to take an offsetting reverse repo position for one month against another Treasury security, which could have a much shorter maturity date. In general, dealer contacts continue to report that netting with non-dealer/bank clients remains a learning process and that they continue to refine their netting techniques.

### Appendix 3

#### Impact of the Committed Credit Requirement on the Tri-party Repo Market

Several respondents noted that tri-party repo reform efforts have increased the “stickiness” of tri-party repo transactions, including those settling on the GCF platform within tri-party, which are discussed later in this appendix. Respondents noted a change in the provision of intra-day credit (also known as “daylight overdrafts”) as being particularly impactful.

Recall that prior to the financial crisis, clearing banks would routinely mature, or “unwind”, all tri-party repo transactions each morning by “unlocking” the repo trade “shells” to send the pledged collateral back to the dealer’s account and the cash back to the investor’s account. In this regard, the clearing banks effectively became large, secured creditors to the dealer community on an intra-day basis, replacing the end investor’s credit with their own for most hours of the business day. Following the morning unwind, the clearing banks’ intra-day credit would remain in place until investor cash, and the dealer securities, would become “locked up” again each evening.

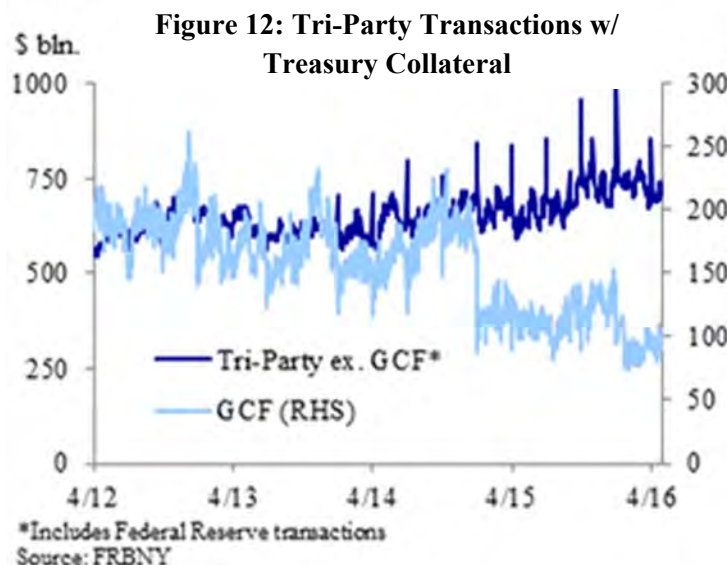
Reducing the provision of intra-day credit on the tri-party platform has been a long-standing goal of the tri-party repo reform effort. A major milestone was reached in April of 2015 when BNYM joined JPMC in no longer unwinding maturing tri-party repo transactions unless the maturing proceeds were already cash funded or the amount of maturing proceeds were covered by a committed line of credit. With this change, dealers face the following scenarios with maturing tri-party repo trades:

- a. Roll-over maturing trade with the same customer – which has no intra-day credit impact.
- b. Replace maturing trade with a new customer
  - i. Customer sends funds to clearing bank by 3:30 – which has no intra-day impact
  - ii. Customer does not send funds by 3:30:
    1. Dealer finds substitute funds or draws down on its line of credit with the clearing bank to allow for timely unwind of the maturing tri-party trade.
    2. Dealer does not have sufficient access to intra-day credit and the unwind of the maturing tri-party trade is delayed, posing reputational risks to the dealer.

Anecdotal reports indicate that the cost of obtaining committed credit capacity to unwind tri-party transactions can be substantial. As a result, dealers are reportedly focused on minimizing their need for intra-day credit capacity and have worked with their customers to encourage stable balances and rolling over maturing repo trades to the extent practical.

### GCF Volumes Decline along with Committed Credit Implementation

Some smaller dealers have reported that GCF has become a less attractive funding option after the implementation of the committed credit requirement. As GCF settles on tri-party, this means that when a dealer decreases its GCF funding level, it effectively increases its need for cash funding (to repay maturing repo trades) at the clearing bank by 3:30 pm. For example, if a dealer replaces GCF funding with tri-party customer funding, the dealer must remit the cash necessary to unwind the maturing GCF trade (or use its committed credit line) before they will receive the funding from the customer's tri-party account, assuming the latter is using maturing tri-party proceeds to fund the new transaction. The increased friction due to the covered credit requirement may be hitting GCF volumes particularly hard as many of the dealers who were relying on GCF for funding were relatively less credit-worthy. Hence the intra-day credit constraint may be particularly binding for the subset of dealers who were relatively reliant on GCF funding.

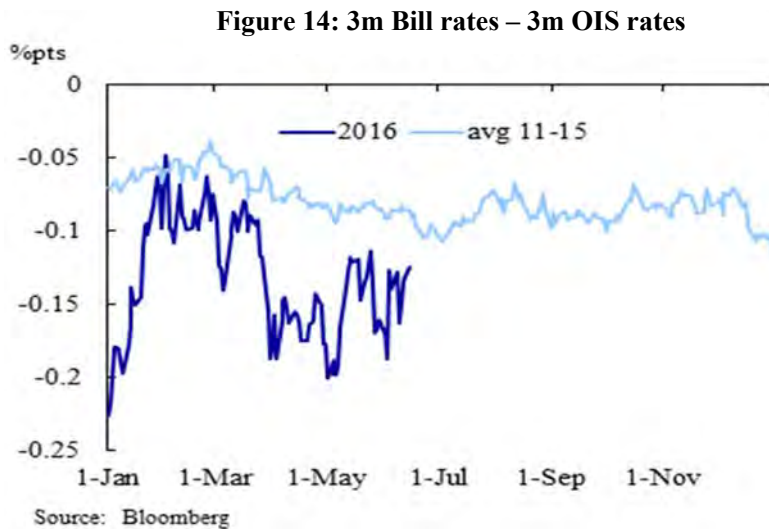
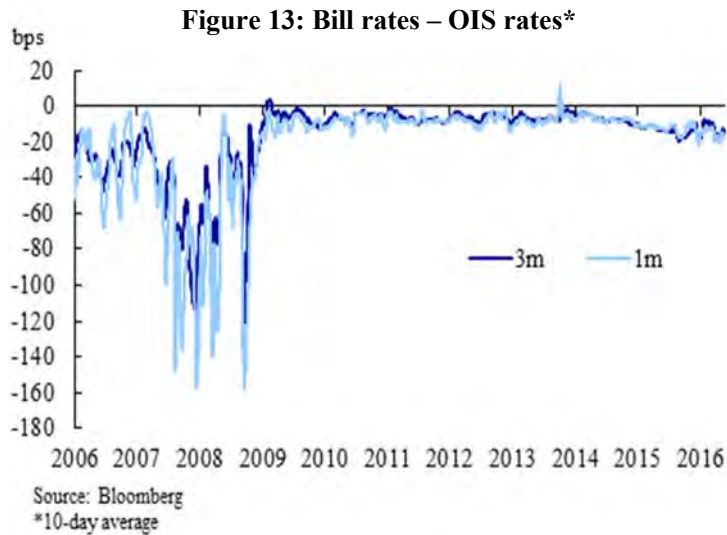


Of note, recent quarter-end dates have seen considerable firming of overnight secured funding rates, particularly GCF. In some instances, quarter-end episodes of firmness have been particularly pronounced in GCF, but not necessarily for Delivery vs. Payment (DvP) settlement. A possible explanation for this pricing discrepancy between repo markets is a dealer's marginal consideration of taking advantage of high funding rates in GCF vs. DvP settlement. With a GCF reverse repo position, the funds are due at the clearing bank by 3:30 pm, ET and any shortage goes against the dealer's committed line of credit at the clearing bank. The DvP reverse repo position also has to be funded by 3:30 pm, ET (the close of the Fedwire securities wire) but any potential shortage would not be applied to the dealer's committed funding line, thus giving the dealer greater flexibility in managing its account on an intra-day basis.

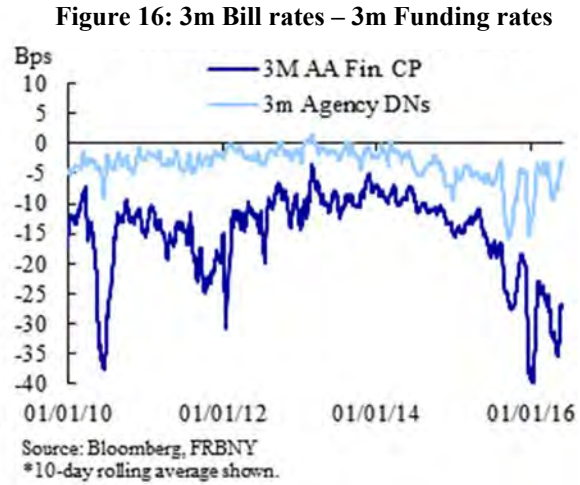
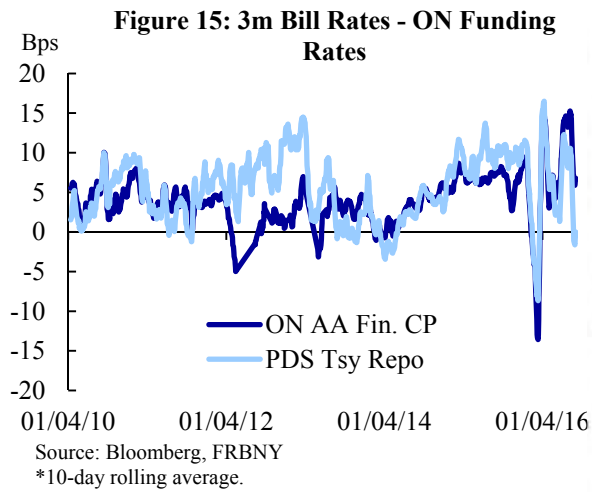
## Appendix 4

### Treasury Bills as a Relevant Comparator Rate

Some respondents noted that Treasury bills were an important comparator rate across all domestic money markets, while others stated that Treasury bill rates were becoming less relevant comparator rates as demand for short term HQLA assets has had an outsized impact on the Treasury bill market. In this Appendix we present some charts that suggest the latter view may be prevailing. While Treasury bill rates are currently much more in line with other money market rates than they were during the crisis period, a review of recent price action reveals that Treasury bills have been trading considerably below other money market rates with the same tenors. Further, the spread between Treasury bill rates and other money market instruments may have become more volatile.



Although 3-month Treasury bill rates are fairly steady relative to overnight rates (the Desk's Primary Dealer repo survey and overnight Commercial Paper), they recently have not been that well connected to other money market instruments with similar tenors (Agency discount notes and AA Financial Commercial Paper).



Relatively low Treasury bill rates may persist, even amid increases in Treasury bill supply, until at least mid-October 2016, the implementation date for money fund reform, which some market participants expect will prompt a significant increase in Treasury bill demand. It is worth noting that the recent, relatively low, Treasury bill rates have occurred even as Treasury has intentionally kept larger balances at the Fed by increasing the outstanding supply of Treasury bills.