

THE FINANCIAL PLUMBING OF THE GCF REPO[®] SERVICE

1. INTRODUCTION

General Collateral Finance Repo (GCF Repo[®]) is a popular, well-established service for securities dealers.¹ Its structure provides a way for dealers to exchange government securities for cash among themselves in an anonymous way. Further, the Fixed Income Clearing Corporation, which offers the GCF Repo service, provides netting services and acts as a central counterparty. These benefits have led dealers to enter into a large number of GCF Repo contracts; for example, in the first quarter of 2013, average daily trading was almost \$500 billion and average daily net settlement exceeded \$250 billion.

GCF Repo trades are cleared and settled on the books of the two large clearing banks, JPMorgan Chase (JPMC) and Bank of New York Mellon (BNY Mellon), with each bank using its own tri-party repo settlement platform. During the 2007-09 financial crisis, weaknesses were revealed in both banks' tri-party repo settlement procedures, and thus in GCF Repo. After the financial crisis, regulators and market participants formed the Tri-Party Repo Reform Task Force, with the aim of producing recommendations to improve the stability of the two banks' tri-party repo settlement platforms (Task Force 2010).²

¹ GCF Repo[®] is a registered service mark of the Fixed Income Clearing Corporation.

² For more details on the Tri-Party Repo Reform Task Force and its work, see http://www.newyorkfed.org/banking/tpr_infr_reform.html.

Most of the task force's recommendations focused on reducing the settlement systems' reliance on intraday credit to settle trades. Prior to reform, these systems depended heavily on the clearing banks providing unlimited intraday credit to the institutions entering into tri-party repo and GCF Repo contracts. One of the main goals of the reforms was to develop settlement systems where much smaller amounts of intraday credit are provided and where it is provided in a less discretionary way.

The pre-reform systems were worrisome for two reasons. First, as long as a dealer had securities at the clearing bank to serve as collateral, the clearing bank was willing to extend intraday credit to that dealer to settle tri-party repo trades. Given the size of the larger dealers (with tri-party books of easily more than \$100 billion), there was potential for each of the clearing banks to extend an enormous amount of intraday credit relative to its capital base. This situation raised the risk that a clearing bank that could not absorb the impact of a failing dealer would itself be destabilized, leading to an interruption of funding and payment services for all of its other clients. The task force recommended that clearing banks limit intraday credit extensions to no more than 10 percent of the value of a dealer's total tri-party book. With these limits in place, market participants and regulators can be more confident that a clearing bank can handle the default of a large dealer on its tri-party repo obligations.

Second, the discretionary nature of the clearing banks' extension of credit was problematic. In times of stress, a clearing bank

Paul Agueci and Leyla Alkan are senior associates, Adam Copeland an officer, Kate Pingitore a former senior bank examiner, Caroline Prugar a former bank examiner, and Tyisha Rivas a former payments policy analyst at the Federal Reserve Bank of New York. Correspondence: adam.copeland@ny.frb.org

To view the authors' disclosure statements, visit https://www.newyorkfed.org/research/author_disclosure/ad_epr_primer-on-the-gcf-repo.html.

The authors thank Vic Chakrian, Antoine Martin, and Denise Schmedes for their comments. The views expressed in this article are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System.

might be unwilling to take on the risk of extending intraday credit to a troubled dealer. Such a move, however, would effectively push the dealer into bankruptcy because it would lose access to planned-for funds. The task force recommended the removal of this discretion. With the reforms, clearing banks' credit extensions are now committed, capped, and collateralized.

Although the clearing banks have made progress in reducing dealers' reliance on intraday credit, most of the improvements have been aimed at the settlement of tri-party repo trades, and not GCF Repo trades. As a result, GCF Repo trades are still settled under systems that rely heavily on the provision of unlimited intraday credit to function.

In this article, we describe in detail the settlement of GCF Repo and the reliance of the settlement process on intraday credit. First, we provide an overview of how GCF Repos are negotiated and cleared. Then we describe how GCF Repo trades were settled up until the first quarter of 2012, the pre-reform state. Since the first quarter of 2012, however, a number of changes have been made to the settlement process as part of the aforementioned reforms to tri-party repo; and so, lastly, we describe the current settlement process. We start with the pre-reform settlement process because an understanding of the former process is important to appreciating how and why the settlement process is changing with the reforms.

The task force also raised concerns about the risk of fire sales. A fire sale is the rapid sale of securities in amounts large enough to cause a temporary decrease in the market prices of those securities. Fire sales are particularly problematic because of the externalities they impose on other dealers. A dealer that is forced to sell its securities in a fire sale faces the difficulty that its actions decrease the prices of the securities, reducing their value. However, other dealers may also be affected if the price declines force those dealers to mark down the same securities on their balance sheets (for example, through mark-to-market accounting practices) or provide more securities as collateral. Such actions may even lead these dealers to sell securities, further depressing prices and reinforcing the fire-sale effect. Little progress has been made on this issue within tri-party repo, however, reflecting both the focus on other objectives and the difficulty in mitigating this risk.³

In the latter part of our discussion on the current settlement process, we use the framework presented in Begalle et al. (2013) to discuss the risks of fire sales in GCF Repo. We argue that fire-sale risks in GCF Repo are substantially mitigated by

³ See the February 13, 2014, statement "Update on Tri-Party Repo Infrastructure Reform," by the Federal Reserve Bank of New York.

the role of FICC as the central counterparty. An important assumption underlying this argument, however, is the ability of FICC to adequately manage dealer defaults.

2. OVERVIEW OF GCF REPO

Repos are essentially a pair of related transactions between two entities: an agreement to buy a security now (which constitutes the opening leg of the repo), joined with an agreement to sell back the same security in the future at a specified price (which constitutes the closing leg of the repo). Often, repos effectively serve as collateralized loans, where the difference in the price of the security across the two legs of the transaction translates into an interest rate.

GCF Repo is a service offered by the Fixed Income Clearing Corporation (FICC) and used by dealers that are netting members of FICC's Government Securities Division. The GCF Repo differs from a standard repo in that the trade is completed on a blind-brokered basis, where dealers negotiate their trades through interdealer brokers (IDBs) and thus preserve their anonymity. These repos are general collateral repos, meaning that dealers agree that the securities to be posted as collateral are only required to be in a specific asset class, as opposed to being specific securities. FICC defines ten collateral classes that can be used by dealers, the most popular of which are U.S. Treasuries with maturities of thirty years or less and Fannie Mae and Freddie Mac fixed-rate mortgage-backed securities.⁴

FICC provides two additional types of services for those dealers trading GCF Repos. First, it acts as a central counterparty, absorbing all counterparty risk in these trades. Second, it provides netting services, allowing dealers to offset their repo and reverse repo positions for trades where the securities posted as collateral are of a similar type.⁵ These features make the GCF Repo service attractive to dealers, compared with a standard bilateral repo (Fleming and Garbade 2003).

Below, we describe how GCF Repo trades are negotiated and cleared. The details of settlement are then discussed in Sections 3 (the pre-reform state) and 4 (the current state).

⁴ For a list of the collateral classes, see Table 1 of "A Primer on the GCF Repo[®] Service: Introduction" in this volume.

⁵ From the perspective of a dealer, repos are trades in which that dealer has promised to deliver securities against cash, whereas reverse repos are trades in which that dealer has promised to deliver cash against securities.

2.1 How Dealers Trade through IDBs

At a high level, dealers enter into a trade by working through an IDB to negotiate with one another anonymously (see the top panel of Exhibit 1, “Trading”). A dealer states its trading terms to the IDB, which then helps the dealer execute a trade by finding another dealer willing to take the other side, all the while masking the dealers’ identities. IDBs offer two basic platforms to help execute trades: electronic and voice.

An electronic platform allows a dealer to see and accept the bid/offer rates that dealers have posted that day according to collateral class and tenor. Further, these platforms have a variety of features that help dealers keep their positions hidden and enable them to manage large orders. Typically, these platforms are used to execute trades quickly on a take-it-or-leave-it basis.

A voice platform involves communicating with a person, namely a broker, at an IDB. Although dealers still may be able to see information about other dealers’ bid/offer rates, executing a trade on the voice platform requires going through a broker. An advantage of the voice platform over its electronic counterpart is the ability for a dealer, through a broker, to negotiate the terms of trade. A disadvantage is the slower speed at which trades are executed. Market participants report that electronic platforms are typically used in the morning, when most of the GCF Repo trading occurs and execution speed is highly valued. Voice platforms are typically used in the afternoon, when there is less trading overall and dealers value the ability to negotiate terms.

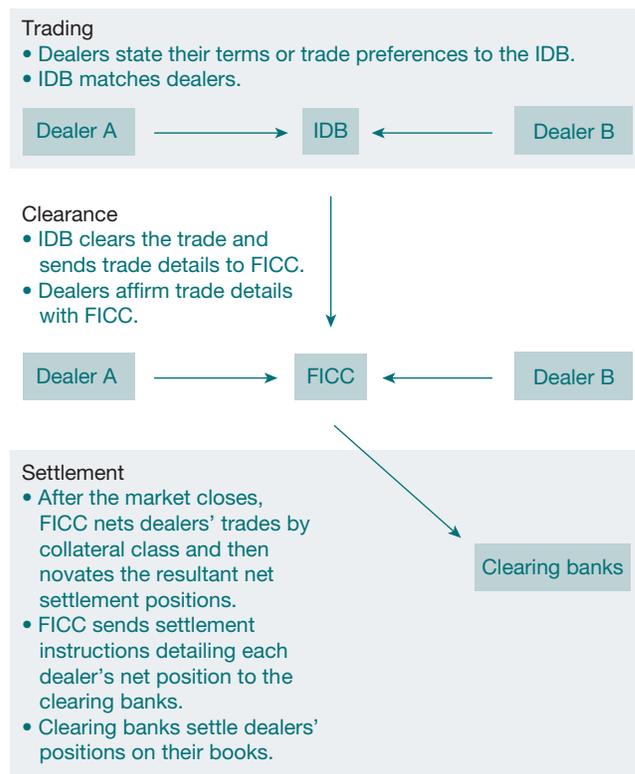
2.2 The Clearance of Trades

Once two dealers have booked a trade, the IDB becomes the legal counterparty to each dealer. The IDB begins the clearance process by reviewing and confirming the trade details with the dealers (see the middle panel of Exhibit 1, “Clearance”). The IDB, for example, corrects data entry errors that are identified through the confirmation process. The IDB then sends the trade details to FICC and the two dealers. FICC accepts GCF Repo trade details between 7 a.m. and 3 p.m. eastern time.

Once FICC receives the trade details from the IDB, it guarantees the trade, limiting the risk faced by the IDB as the legal counterparty to the trade. As part of the clearance process, dealers are supposed to affirm the details of the trade to FICC. After a trade is affirmed, changes to that trade can only be made if both dealers agree to cancel and rebook the trade. The IDB remains the counterparty to both sides of the trade until the netting process is completed and the resulting net

EXHIBIT 1

Overview of GCF Repo Clearance and Settlement



Notes: IDB is independent broker-dealer. FICC is Fixed Income Clearing Corporation.

settlement positions are novated, after which FICC becomes the legal counterparty to each dealer for settlement purposes (and the IDB’s settlement obligations are eliminated through the netting process).

After two dealers agree to a trade, it takes an IDB only about ten minutes to clear the trade and send the trade details back to the dealers and FICC. In contrast, dealers may take much longer to affirm a trade to FICC. Typically, IDBs will contact dealers if trades are not affirmed within two hours. Dealers can delay only so long; after 3 p.m., FICC automatically affirms all trades it has received from IDBs.⁶

After 3 p.m., when FICC stops accepting trade details from the IDBs, FICC nets down each dealer’s trades in a collateral class into a net position. As a consequence of netting, a dealer that promised to deliver and receive securities within the same collateral class over the course of the day only has to settle its net position at the end of the day. FICC then sends settlement

⁶ FICC encourages dealers to affirm trades before the 3 p.m. deadline.

instructions to the clearing banks (see the lower panel of Exhibit 1, “Settlement”). Finally, dealers’ net positions are settled on the books of the clearing banks at the end of the day.

3. SETTLEMENT OF GCF REPO TRADES— PRE-REFORM

In this section, we describe the GCF Repo settlement process as of the first quarter of 2012, or the pre-reform state. We focus on two main processes: the end-of-day settlement and the morning unwind. The end-of-day settlement is the process by which all outstanding GCF Repo positions are settled. The morning unwind is the process whereby the clearing banks return the securities held as collateral for all GCF Repo positions to the repo dealers and return the cash amount to the reverse repo dealers. An advantage of the morning unwind is that it provides dealers with full and unimpeded access to their securities during the business day.

As described above, the clearing banks receive instructions from FICC to settle dealers’ net positions, where a net position is the difference between the value of repos and the value of reverse repos that a dealer has traded for a particular collateral class. Dealers have either a zero or nonzero net position for each collateral class. For the nonzero net positions, the dealer has an obligation either to deliver securities that fall within the acceptable class of collateral to FICC and receive cash, or to deliver cash and receive securities.

The clearing banks begin the settlement process by creating “shells,” which specify dealers’ net repo positions for each of the collateral classes in the GCF Repo service. From the dealer’s perspective, a repo shell represents an obligation to deliver securities against cash.

With the creation of these shells, the collateral allocation process begins. In the following section, we describe this process under the simplifying assumption that both dealers involved in the GCF Repo settlement process use the same clearing bank. For this intrabank case, both the securities and cash payments are moving on the books of a single clearing bank. We then detail the extra steps needed to settle GCF Repo allocations that are interbank (settlement between the two clearing banks) in a separate section.

It is important to re-emphasize that the settlement processes described below and illustrated on the accompanying exhibits reflect the pre-reform case (in other words, as of March 2012). With the tri-party reforms, the clearing banks have instituted changes to their settlement processes for GCF Repo trades. These changes are described in Section 4.

3.1 Intrabank GCF Repo Settlement— Pre-Reform

We begin by describing the settlement process for GCF Repo positions when both the repo dealer and the reverse repo dealer use the same clearing bank. We break the settlement process into two parts: First, the end-of-day settlement on day t , when the securities are delivered in exchange for cash. Second, the morning unwind on day $t+1$, when the cash and collateral are returned to the reverse repo and repo dealers, respectively. For overnight trades, end-of-day settlement is the opening leg of the repo and the morning unwind is the closing leg. For trades of longer maturity, the unwind is a mechanism that allows dealers easy and unconstrained access to their securities during the business day. From the perspective of the clearing banks, the term of the GCF Repo trade is irrelevant because all trades are unwound every morning.

End-of-Day Settlement

At the end of the trading day, the clearing banks receive instructions from FICC detailing how to settle dealers’ net positions in GCF Repo. For each clearing bank, the settlement process begins with the bank informing dealers of their GCF Repo obligations and creating the appropriate repo shells.⁷ The repo dealers then start to allocate collateral from their securities accounts at the clearing bank to the repo shells. A repo shell is said to be “filled” once a dealer has allocated enough securities to fulfill its collateral obligations for that shell. Once all dealers have filled their GCF Repo shells for a specific collateral class—say, Treasuries with a maturity of thirty years or less—the clearing bank moves all of these allocated securities to FICC’s securities account at that clearing bank (see Exhibit 2 for a schematic of this process).⁸ Simultaneously, the clearing bank credits the relevant dealers’ cash accounts and debits FICC’s cash account. Because FICC does not typically have cash in its account at the clearing bank, the clearing bank extends intraday credit to FICC to enable this leg of the settlement process, backed by the securities posted as collateral for the GCF Repo positions (see Stage 1 in Exhibit 2).

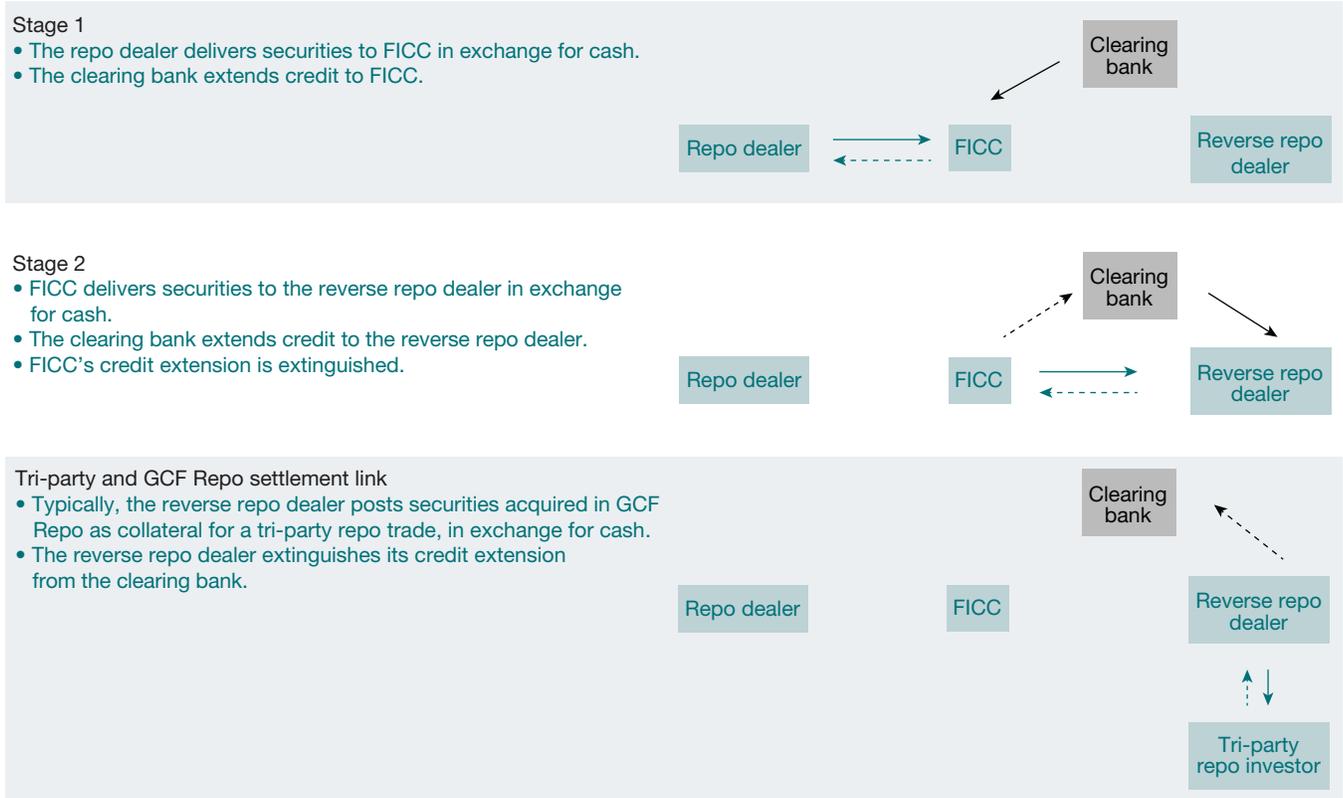
⁷ Copeland et al. (2012) provide details of how dealers allocate collateral to tri-party repo trades. The same methods can be used to allocate collateral to GCF Repo trades because both types of trades are settled on the same tri-party repo settlement platform.

⁸ Both clearing banks have the operational capability to move the allocated securities from the dealer to FICC on a shell-by-shell basis. For operational efficiency, however, the clearing banks wait until all the dealers have filled their GCF Repo shells for a specific collateral class, and then move these allocated securities to FICC’s account.

EXHIBIT 2

Intrabank GCF Repo End-of-Day Settlement

→ Flow of securities - - → Flow of cash → Extension of intraday credit - - → Extinguishment of intraday credit



Notes: This exhibit describes the pre-reform settlement process. FICC is Fixed Income Clearing Corporation.

The clearing bank then allocates this set of securities from FICC's securities account into the repo shells characterizing FICC's obligations to deliver collateral to the reverse repo dealers. Note that because of the netting process, the allocation of these securities is not preordained by the day's trading activity. Simultaneously, the clearing bank credits the FICC cash account and debits the reverse repo dealers' cash accounts (see Stage 2 in Exhibit 2). To enable this leg of the settlement process, the clearing bank extends intraday credit to the reverse repo dealers. This credit extension is backed not only by the GCF Repo-related securities posted as collateral, but also by all the unencumbered securities the reverse repo dealers hold at the clearing bank.

The flow of cash from the reverse repo dealers to FICC allows FICC to extinguish its credit extension from the clearing bank. The end result of this process is that securities have moved from the repo dealers' accounts to the reverse repo dealers' accounts, through FICC's account. Simultaneously, there is

a corresponding reverse flow of cash. While the movement of securities and cash through FICC's account is a crucial step in the settlement process, typically neither the securities nor cash reside in FICC's account for a significant amount of time.

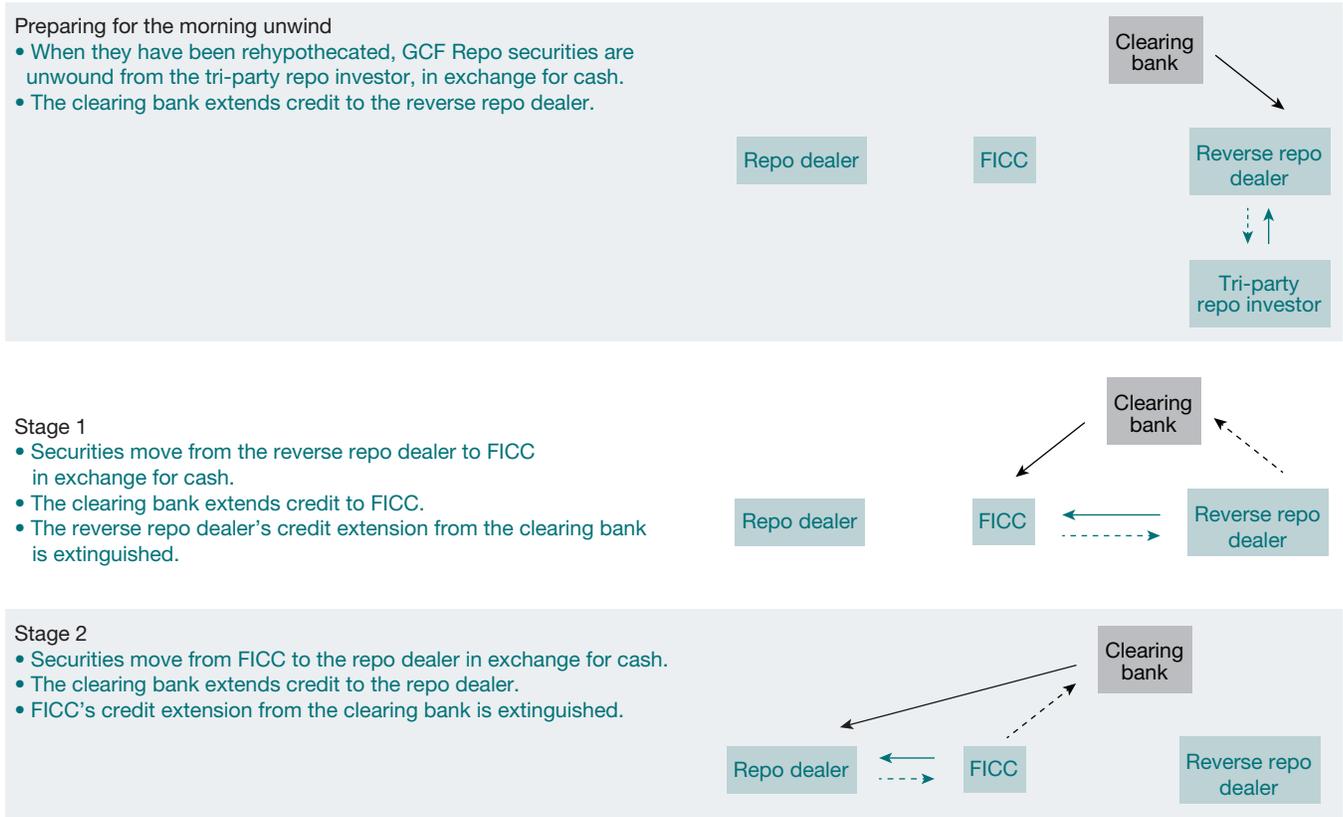
This settlement process requires the extension of credit by the clearing bank to both FICC and the reverse repo dealers. We label the extension of credit to FICC as *frictional*, because it is extinguished once the end-of-day settlement leg of the GCF Repo position is settled. In comparison, the extension of credit to the reverse repo dealers is extinguished only after the dealers source funds elsewhere—for example, from an investor in the tri-party repo market (see the bottom-right-hand corner of Exhibit 2).⁹

⁹The rehypothecation of GCF Repo-obtained collateral into a tri-party repo trade will not, by itself, generate enough cash to fully pay off the clearing bank's credit extension to the reverse repo dealer, because there are margin requirements for tri-party repo trades. The dealer, then, would need to post more collateral in a tri-party repo trade in order to acquire the necessary amount of cash.

EXHIBIT 3

Intrabank GCF Repo Morning Unwind

→ Flow of securities - -> Flow of cash → Extension of intraday credit - -> Extinguishment of intraday credit



Notes: This exhibit describes the pre-reform settlement process. FICC is Fixed Income Clearing Corporation.

Morning Unwind

Every morning, at approximately 6:30 a.m., the clearing banks begin to unwind all GCF Repo positions, returning collateral to the repo dealers and cash to the reverse repo dealers. Unwinding a GCF Repo position essentially follows the same steps as the end-of-day settlement, but in reverse order. Hence, the first step to the unwind is to ensure that all GCF-related securities are back with the reverse repo dealers (see Exhibit 3 for a schematic of this process). If these securities have been used as collateral in other transactions (for example, rehypothecated to tri-party repo), then the clearing bank extends credit to the reverse repo dealers and recalls the GCF Repo-related securities by substituting cash in place of the desired securities (see “Preparing for the morning unwind” at the top of Exhibit 3). With the securities back in the reverse repo dealers’ accounts, the clearing bank begins unwinding the GCF Repo positions. Intraday credit

is extended to FICC and the securities are sent to FICC’s account in exchange for cash (see Stage 1 of Exhibit 3). With this transfer, the clearing bank’s extension of credit to the reverse repo dealers is extinguished (except for the possible differences in margin requirements).

Once the securities are in FICC’s account, the clearing bank extends credit to the repo dealers. The securities are then returned to the repo dealers in exchange for cash. The cash is used to extinguish the clearing bank’s credit extension to FICC (see Stage 2 of Exhibit 3).

At the end of the unwind, collateral and cash have been returned to the repo and reverse repo dealers, respectively. Dealers now have full access to their portfolios of securities, which they can use for regular trading purposes. In facilitating this unwind, the clearing bank extended intraday credit to both FICC and the repo dealers. As in the end-of-day settlement case, the extension of credit to FICC is frictional. In contrast,

the clearing bank extends intraday credit to the repo dealers for the duration of the day. (See Appendix A on net free equity for more details on how the clearing banks manage their credit risk to dealers.) Usually, the dealers wait to extinguish this credit extension until the end of the day, when they are settling their tri-party repo and GCF Repo trades. A straightforward way to extinguish this credit extension at the end of the day is to simply execute an offsetting GCF Repo or tri-party repo trade.

3.2 Interbank GCF Repo Settlement— Pre-Reform

We now extend the above description for the case where the repo and reverse repo dealers use different clearing banks. A key feature of interbank GCF Repo settlement is that the securities posted as collateral by the repo dealer never leave the books of that dealer's clearing bank. This feature forces the clearing banks to coordinate their settlement processes to ensure that all cash flows and credit extensions are properly collateralized. The securities remain on the book of the repo dealer's clearing bank because the system of transferring government securities between institutions, Fedwire® Securities Service, closes at 3 p.m., before GCF Repo settlement begins.¹⁰ Furthermore, it would not be operationally efficient to move securities back and forth across the clearing banks when they unwind each morning.

End-of-Day Settlement

Mirroring the intrabank case, we begin with end-of-day settlement. Suppose that there is a repo dealer at clearing bank 1 (CB1) and a reverse repo dealer at clearing bank 2 (CB2). As in the intrabank case, the repo dealer starts the settlement process by allocating securities to its GCF Repo shell. Once the repo dealer has filled its GCF Repo shell for a specific collateral class, clearing bank 1 moves these securities to FICC's account, extends credit to FICC, and deposits cash into the repo dealer's account (see Exhibit 4 for a schematic of this process). These securities are then moved to a segregated account, which serves as FICC's CB2 account on the books of clearing bank 1. Because the credit extension is secured by the underlying securities, clearing bank 1's credit extension is redirected to this segregated account (see Stage 1 of Exhibit 4).

A message is then sent from clearing bank 1 to clearing bank 2 listing the securities in this segregated account.

¹⁰ Fedwire® is a registered service mark of the Federal Reserve Banks.

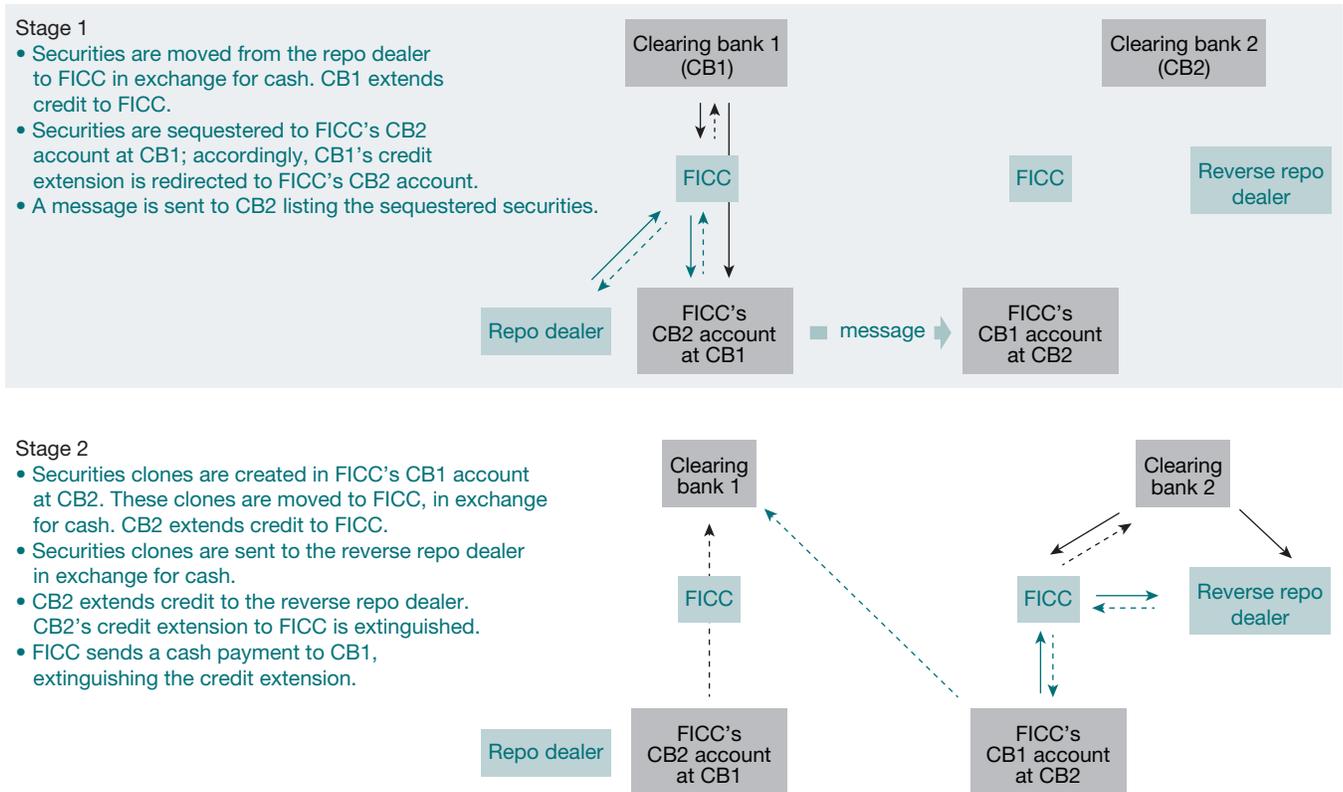
Clearing bank 2 then creates copies of these securities, called *securities clones*, in FICC's CB1 account at clearing bank 2, and a cross-clearing bank lien is placed on the securities residing in FICC's CB2 account on the books of clearing bank 1 (ensuring that these securities are not used elsewhere). On clearing bank 2's books, these securities clones are then allocated to FICC's account. To facilitate this transfer, clearing bank 2 extends credit to FICC and deposits cash into FICC's CB1 account at clearing bank 2. The clones are then allocated to the repo shells characterizing FICC's obligations to deliver collateral to the reverse repo dealer. Clearing bank 2 extends credit to the reverse repo dealer and the credit extension to FICC is extinguished (see Stage 2 of Exhibit 4). At this point, FICC has received an intraday credit extension from clearing bank 1 (secured by the securities residing in FICC's CB2 account at clearing bank 1) and has a positive cash balance at clearing bank 2 (residing in FICC's CB1 account at clearing bank 2). To extinguish the credit extension from clearing bank 1, FICC requests that clearing bank 2 wire the cash from FICC's CB1 account at clearing bank 2 to clearing bank 1, using the Fedwire® Funds Service (which is open until 6:30 p.m.). With this cash movement, FICC is once again "flat," in that neither clearing bank is extending intraday credit to it.

At the end of this process, securities (or their clones) have moved from the repo dealer to the reverse repo dealer through FICC, with cash flowing in the opposite direction. Similar to the intrabank case, the clearing banks have extended intraday credit to FICC and the reverse repo dealer to facilitate settlement. The credit extension to FICC is frictional but complicated, owing to its reliance on cross-clearing bank liens. The reverse repo dealer is left with an intraday credit extension from clearing bank 2. As before, this dealer can extinguish this credit extension in a number of ways, including by using the securities it received through GCF Repo to obtain cash in tri-party repo.

While the above example considers one repo dealer at one clearing bank and one reverse repo dealer at the other clearing bank, in reality there are often a number of interbank allocations with repo dealers (in other words, dealers obligated to deliver securities and receive cash) at both clearing banks. This means that, in practice, the clearing banks send information to one another about the securities being delivered by repo dealers. A crucial component of the interbank GCF Repo settlement system is this flow of information. In the pre-reform process, the clearing banks communicate with one another once in the settlement cycle. Specifically, only after repo dealers have filled their GCF Repo shells for all securities classes and these securities have been allocated to the other clearing bank's FICC account does one clearing bank send a message to the other clearing bank with the details necessary to complete settlement of the GCF Repo trades.

Interbank GCF Repo End-of-Day Settlement

→ Flow of securities - - → Flow of cash → Extension of intraday credit - - → Extinguishment of intraday credit



Notes: This exhibit describes the pre-reform settlement process. FICC is Fixed Income Clearing Corporation.

Having repo dealers at both clearing banks obligates FICC to send cash payments from JPMC to BNY Mellon, and vice versa. For operational efficiency, however, FICC sends only one payment between the clearing banks, where this payment is equal to the net flow of cash between the two clearing banks.

Morning Unwind

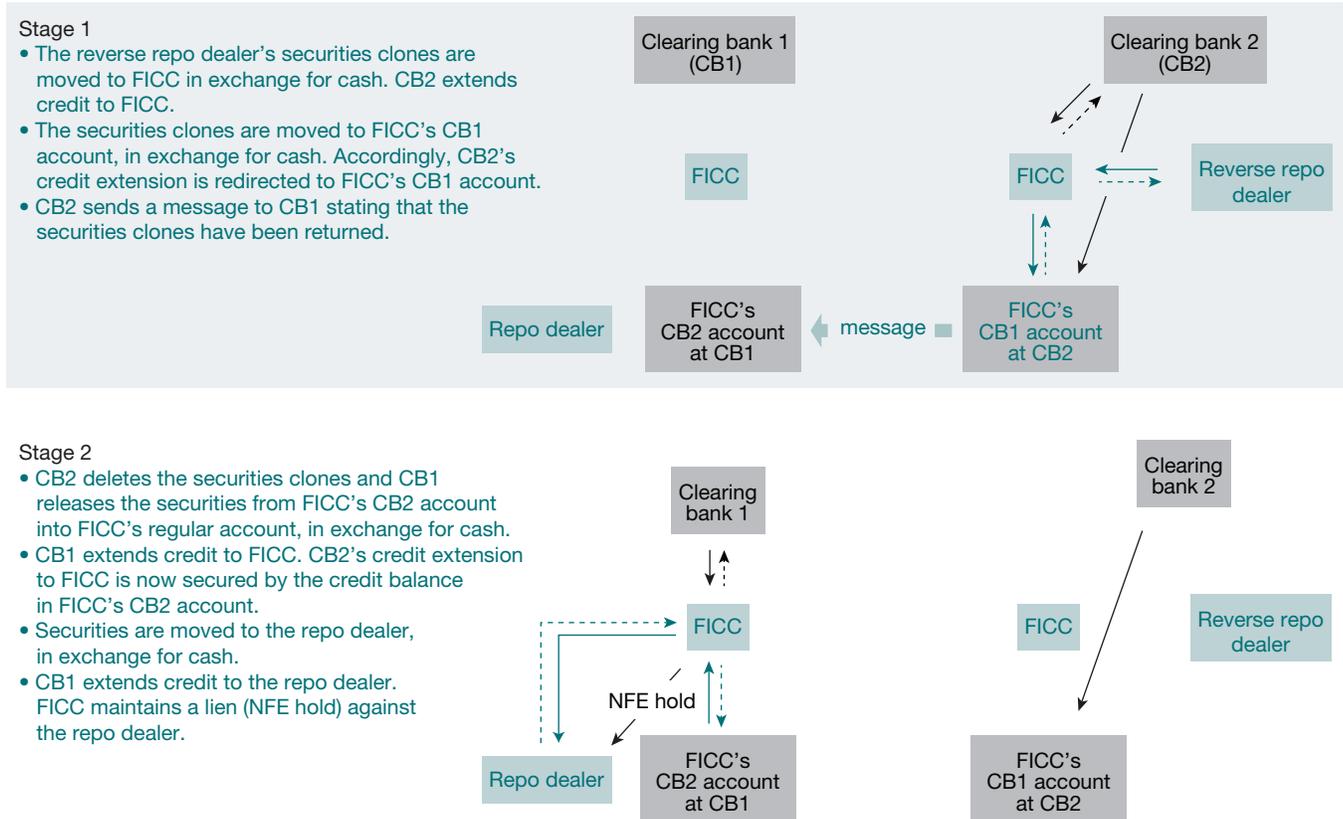
We now turn to the interbank GCF Repo unwind (see Exhibit 5 for a schematic of this process). Continuing from the example above, suppose that the repo dealer is at clearing bank 1 and the reverse repo dealer is at clearing bank 2. Recall that the actual securities reside on the books of clearing bank 1, in a segregated account (FICC's CB2 account at clearing bank 1) and clearing bank 2 uses clones of these securities on its books.

In most cases, clearing bank 2 begins the unwind by first extending credit to the reverse repo dealer and pulling back all GCF Repo-related securities that have been rehypothecated through tri-party repo using a securities-for-cash substitution mechanism (not shown in Exhibit 5).¹¹ Clearing bank 2 then extends credit to FICC and moves the securities clones from the reverse repo dealer to FICC's account. The corresponding movement of cash from FICC to the reverse repo dealer enables the dealer to extinguish the credit extension from the clearing bank (ignoring possible differences in margin requirements). The securities clones are then moved to FICC's CB1 account at clearing bank 2. Because clearing bank 2's credit extension to FICC is collateralized by the securities clones, the credit extension to FICC's CB1 account is redirected, as shown in Exhibit 5.

¹¹ This step is not necessary if the reverse repo dealer has not rehypothecated the securities.

Interbank GCF Repo Morning Unwind

→ Flow of securities - -> Flow of cash → Extension of intraday credit - -> Extinguishment of intraday credit



Notes: This exhibit describes the pre-reform settlement process. FICC is Fixed Income Clearing Corporation. NFE is net free equity.

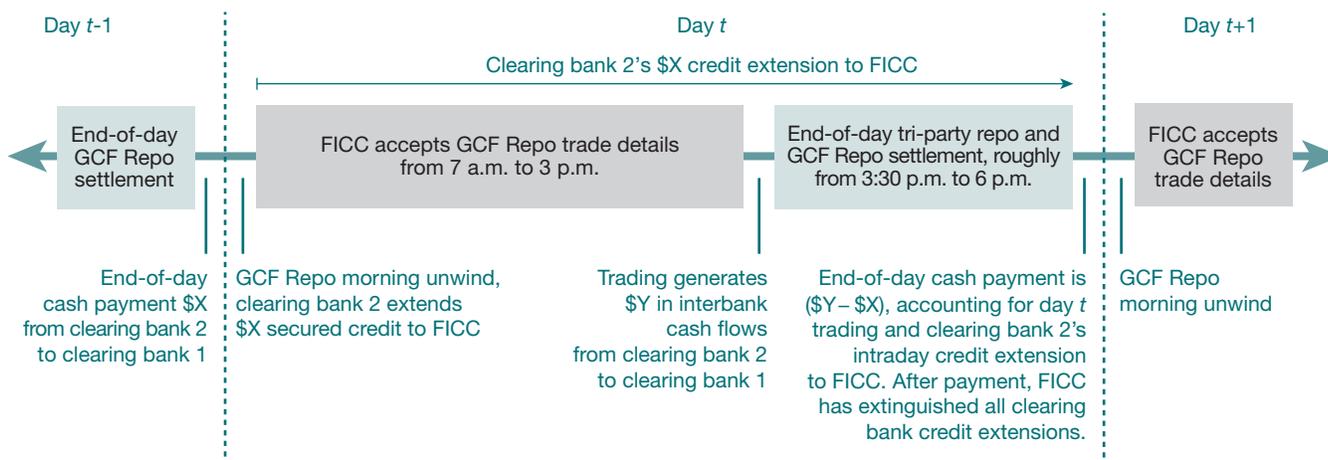
Clearing bank 2 then sends a message to clearing bank 1 stating that all the securities clones have returned to FICC's CB1 account, and these clones are deleted. This enables clearing bank 1 to unwind the securities from FICC's CB2 account on clearing bank 1's books (see Stage 1 in Exhibit 5). Clearing bank 2's credit extension to FICC continues to be collateralized, using a cross-clearing bank lien, by the securities in FICC's CB2 account.

After receiving the message, clearing bank 1 moves the securities from FICC's CB2 account (the special segregated account) to FICC's account. Concurrently, clearing bank 1 debits FICC's account and credits FICC's CB2 account. The securities are then moved from FICC to the repo dealer. To facilitate this movement, clearing bank 1 extends credit to the repo dealer, where this credit extension is secured by a lien that FICC maintains on the repo dealer's unencumbered securities residing at clearing bank 1. This lien, or the net free equity (NFE) hold, is explained further in Appendix A.

So, at the end of the unwind, the securities have been fully unwound to the repo dealers and are available to be used by the dealers for other purposes. The repo dealers at clearing bank 1 have granted FICC a security interest in the unencumbered securities in their accounts, known as the NFE hold. Clearing bank 2 has also extended intraday credit to FICC, which is secured by clearing bank 2's cross-clearing bank lien on the credit balance in FICC's CB2 account at clearing bank 1. FICC is liable for extinguishing the credit extension at clearing bank 1. In the event the repo dealer fails to repay FICC, FICC would liquidate the NFE hold collateral to meet its obligation to clearing bank 1. The intraday credit extensions to FICC and to the repo dealers at clearing bank 1 are not frictional but rather last throughout the day, until the end-of-day settlement process.¹²

¹² With the completion of the unwind, both clearing banks have extended credit to FICC. Clearing bank 2's credit extension is secured by the cash

GCF Repo Timeline (Pre-Reform)



Note: FICC is Fixed Income Clearing Corporation.

The repo dealer typically extinguishes the credit extension from clearing bank 1 (and so lifts FICC's lien on the repo dealer's securities) at the end of the day, when it settles all of its tri-party repo and GCF Repo trades. As mentioned before, it is straightforward for the dealer to raise the necessary cash through another GCF Repo trade. The credit extension by clearing bank 2 to FICC is also extinguished during the end-of-day settlement of interbank GCF Repos.

3.3 Review of the Chronology of GCF Repo Trading, Clearance, and Settlement—Pre-Reform

To facilitate a better understanding of the interactions between trading, clearance, and settlement, in this section we illustrate the chronological flow of activity throughout the day. For GCF Repo, the day starts with the morning unwind, where collateral and cash are returned to the repo and reverse repo dealers, respectively, beginning at around 6:30 a.m. (see Exhibit 6). FICC begins accepting trade details from IDBs at 7:00 a.m.

The majority of trading is completed in the morning, with more than half of trades (in terms of volume) being completed within the first hour of trading. By 10 a.m. on a typical day,

Footnote 12 (continued)

sitting in FICC's CB2 account in clearing bank 1. Clearing bank 1's credit extension is secured by FICC's NFE hold on the relevant repo dealers.

three-quarters of trading has been completed. FICC stops accepting trades from IDBs at 3 p.m., and shortly thereafter FICC begins the netting process. Dealers' net positions in GCF Repo are typically settled between 3:30 p.m. and 5:30 p.m.

Exhibit 6 illustrates the clearing banks' credit extensions to FICC that facilitate the unwinding of interbank GCF Repo positions. Suppose that, at the end of day $t-1$, dealers' trading strategies have resulted in dealers at clearing bank 1 sending, on net, $\$X$ of securities to dealers at clearing bank 2 in exchange for cash. Consequently, for the morning unwind on day t , clearing bank 2 needs to extend $\$X$ of intraday credit to FICC (see Stage 1 in Exhibit 5). As illustrated in Exhibit 6, this extension of credit by clearing bank 2 to FICC lasts throughout the day (roughly nine hours).

Now suppose that, on day t , trading results in dealers at clearing bank 1 sending, on net, $\$Y$ of securities to dealers at clearing bank 2 in exchange for cash. Rather than dealing with the $\$X$ and $\$Y$ credit extensions separately, FICC and the clearing banks settle the net amount $(\$Y - \$X)$. To see how this works, consider when $\$X = \Y . To settle the $\$Y$ in net trading for this interbank case at the end of the day, FICC needs to deliver $\$Y$ in cash (in exchange for securities) to the group of day t repo dealers at clearing bank 1. Because $\$X = \Y , this cash is supplied entirely by the group of day $t-1$ repo dealers at clearing bank 1, which need to extinguish the credit extension from clearing bank 1 and so release FICC's lien on the $t-1$ repo dealers' securities. (Recall that these dealers received their collateral back in the morning of day t .) FICC then delivers the securities from the day t repo dealers at

clearing bank 1 to the group of reverse repo dealers at clearing bank 2, in exchange for cash. The \$Y in cash that FICC receives is then used to extinguish clearing bank 2's \$X credit extension (because $\$X = \Y) from that morning's unwind process.

For the special case of $\$X = \Y , no payments need to be made between the two clearing banks. When \$Y is not equal to \$X, however, FICC will end up with a credit at one clearing bank and an offsetting debit at the other clearing bank. In this case, a payment needs to be sent between the clearing banks to extinguish FICC's credit at the end of the day.

Typically, the payments by FICC to settle the net amount are small relative to the net amount of GCF Repos settled in the interbank case. Nevertheless, it is not uncommon for this net payment to be quite large. For example, when the net flow of cash across the clearing banks changes direction, a payment equal to the absolute value of X plus the absolute value of Y is required to extinguish the intraday credit extension to FICC.

4. TRI-PARTY REPO SETTLEMENT REFORMS AND GCF REPO

Having described the clearance and settlement of GCF Repo (as of the first quarter of 2012), we now turn to concerns with this financial plumbing. We focus on two potential issues: the heavy reliance on intraday credit to settle GCF Repo positions, including the unwind, and fire-sale risks related to this financial service.

4.1 Use of Intraday Credit to Settle GCF Repos

As reported in Section 1, a main focus of the tri-party repo reforms is to move the clearing banks from a settlement system in which unlimited and discretionary intraday credit is extended, to a settlement system in which intraday credit is capped and committed.

The concerns over clearing banks extending unlimited and uncapped credit continue to exist with the settlement procedures of GCF Repo.¹³ During end-of-day settlement, the clearing banks are extending credit to the reverse repo dealers in both the intrabank and interbank cases (see Exhibits 2 and 4). Further, for the intrabank case, the clearing banks extend intraday credit to the repo dealer to facilitate the morning unwind (see Exhibit 3).

¹³ See the February 13, 2014, statement "Update on Tri-Party Repo Infrastructure Reform" by the Federal Reserve Bank of New York, available at http://www.newyorkfed.org/newsevents/statements/2014/0213_2014.html.

The clearing banks also extend intraday credit to FICC to settle GCF Repo positions. For the end-of-day settlement in the intrabank and interbank cases, as well as during the morning unwind for the intrabank case, the clearing banks extend frictional credit to FICC. In Exhibits 2, 3, and 4, the frictional aspect of this credit extension is illustrated by the extinguishment of the credit extension to FICC at the end of that particular settlement process. The clearing banks also extend credit to FICC that is nonfrictional—this is done during the morning unwind in the interbank case (see Exhibit 5).

Alongside the tri-party repo reforms, FICC and the clearing banks have implemented (or plan to implement) changes that will reduce the amount of credit extended by the clearing banks to facilitate settlement of GCF Repo positions. In this section, we review these changes in the settlement process and explain the consequent reduction in the amount of credit extended by the clearing banks. We then highlight steps in the settlement process that still require the clearing banks to extend large amounts of intraday credit.

Updates to GCF Repo for the Intrabank Case

For the intrabank case, FICC and both clearing banks are in the process of making changes to GCF Repo that will reduce the amount of credit extended to dealers on typical days. One improvement to the settlement process that has already been implemented is the delay of the unwind from 6:30 a.m. to 3:30 p.m. (mirroring the tri-party repo reforms implemented in August 2011). The advantage of delaying the unwind is that credit extensions to the repo dealer, although still large, are for a much shorter length of time because they are extinguished with the end-of-day settlement process, which begins shortly after the unwind is completed.

Along with the delay of the morning unwind, the clearing banks implemented an intrabank collateral-substitution mechanism that enables dealers to access their securities held as collateral. This mechanism provides access by allowing dealers to replace securities being held as collateral with other securities of equal or greater value that satisfy the terms of the relevant repo contract. Recall that one of the main economic impetuses of the morning unwind is to allow dealers unimpeded access to their securities during the business day. With the collateral-substitution mechanism, dealers can continue to access their securities despite the lack of a morning unwind.¹⁴

¹⁴ The delay of the morning unwind and the concurrent introduction of a collateral-substitution mechanism mirror what was done for tri-party repo trades as part of the tri-party repo reforms. A description of the delay in the unwind and new collateral-substitution mechanisms can be found in FICC's

A planned improvement to the settlement process is the use of rolling dealers' positions in GCF Repo, or switching to a "Net-of-Net" settlement process. Rolling positions requires the calculation of the net change from one day to the next for each dealer's position in each collateral class. The clearing bank then only settles the daily difference (see Appendix B for a detailed explanation of the rolling position settlement process). If dealers' net GCF Repo positions do not change much from day to day, this process could significantly reduce the amount of securities and cash required to flow among dealers to settle positions. FICC reports that fully implementing the new Net-of-Net process would result in an average reduction in amount settled of 76 percent.¹⁵

This proposed change in settlement would be both operationally efficient and beneficial in reducing the amount of intraday credit required to settle positions. A potential issue, however, is that if dealers change their trading strategies with the consequence that their net positions fluctuate considerably, the benefits gained through rolling positions, in terms of reducing the amount of credit necessary to settle trades, would be somewhat lessened.

Updates to GCF Repo for the Interbank Case

Less progress has been made on the interbank case than on the intrabank case. The current settlement system for interbank GCF Repo positions still requires the extension of nonfrictional credit to FICC. Reducing or eliminating the extension of intraday credit to settle these positions requires active engagement from the clearing banks, FICC, and the set of dealers that use the GCF Repo service.

For these interbank cases, a planned improvement to settlement is to partially, rather than fully, unwind in the morning.¹⁶ Under the pre-reform system, securities are unwound to the repo dealers and cash is returned to the reverse repo dealers. Under the proposed new arrangement, securities will be unwound to FICC and the repo dealers will access their securities through a collateral-substitution mechanism.

Footnote 14 (continued)

proposed rule change to the Securities and Exchange Commission, SR-FICC-2011-05, available at <http://www.sec.gov/rules/sro/ficc/2011/34-65213.pdf>.

¹⁵ See the September 17, 2013, Depository Trust and Clearing Corporation newsletter article "DTCC Improves GCF Repo® End-of-Day Processing to Mitigate Risk and Enhance Efficiencies," by Randy Spencer, available at <http://www.dtcc.com/news/2013/september/27/dtcc-improves-gcf-repo-end-of-day-processing.aspx>.

¹⁶ The details of this proposed settlement change are given in FICC's proposed rule change to the SEC, SR-FICC-2011-05, cited above. In particular, see section II.B.4, "Substitution on Interbank GCF Repos," on pp. 10-11.

This proposed settlement change impacts the nature of the intraday credit extended by clearing banks, but not the amount. Specifically, the pre-reform, or full, unwind is facilitated by the extension of credit to FICC by the reverse repo dealer's clearing bank and by FICC maintaining a NFE hold on the other clearing bank's repo dealer (see Stage 2 in Exhibit 5 for an illustration of this credit extension). The total amount of credit extended equals the total net position of all interbank GCF Repo trades (see Exhibit 6).

Under the proposed settlement changes, the clearing banks will continue to extend intraday credit to FICC but the credit will be secured by cross-clearing bank liens. These liens will be against specific securities or cash residing in FICC's account at the repo dealer's clearing bank. Importantly, the size of the credit extension will not be changed with these updates to the settlement system.

Where Does That Leave Us?

The GCF Repo settlement process remains overly reliant on intraday credit extensions by the clearing banks. As detailed above, these credit extensions are to dealers and FICC. Below, we analyze the current state of these credit extensions for the intrabank and interbank cases, laying out the difficulties in determining a solution.

For the intrabank case, the proposed process of rolling dealers' positions will require the clearing banks to extend relatively small amounts of credit to dealers under normal circumstances. As previously mentioned, as part of the tri-party repo reforms, the clearing banks plan to establish committed intraday credit lines to dealers. These facilities could be used to provide credit to repo dealers in the GCF Repo intrabank case. A potential problem, however, is that these credit extensions are capped and may be insufficient.¹⁷

Intrabank settlement also requires frictional credit to FICC. Compared with extending credit to dealers, extending credit to FICC involves different counterparty risks. Specifically, FICC is a financial market utility that has been designated as systemically important. How the clearing banks will handle extending intraday credit to FICC has not yet been determined. But it is important to avoid having a system in which dealers are provided with capped and committed lines of credit to facilitate settlement while FICC has unlimited and uncommitted credit. Such asymmetry in treatment could provide incentives to shift the costs of providing intraday credit from

¹⁷ See <http://www.jpmorgan.com/pages/jpmorgan/is/products/clearing/bds/resourcecenter/finishline> for mention of JPMC's plan to set up a committed and secured credit facility.

the dealers to FICC. For example, for end-of-day settlement, dealers obligated to deliver securities to GCF Repo could perform this action first, and receive cash from FICC, where this cash would be the result of an extension of credit from the clearing banks to FICC. Furthermore, dealers obligated to deliver cash to FICC could delay until the conclusion of the end-of-day settlement process. As a consequence, there would be an infusion of cash into dealers' accounts that could then be used by dealers to facilitate the settlement of their tri-party repo trades.¹⁸ This result, however, effectively shifts the costs of providing intraday credit to settle tri-party repo and GCF Repo trades from dealers to FICC, a result that does little to enhance the stability of the tri-party repo settlement platform in times of stress.

There are many options available to the clearing banks, two of which side-step the issue by eliminating the extension of credit to FICC for the intrabank case. One approach is simply to require the reverse repo dealers to provide the necessary cash up front. A second approach is for the clearing bank to explicitly link the flows of securities and cash between the repo and reverse repo dealers, and so treat the movement of cash and securities through the FICC account (which stands between the repo and reverse repo dealers) as a temporary and intermediary step. With this second approach, the securities would only leave the repo dealer's account when the clearing bank has verified that the reverse repo dealer could provide the necessary amount of cash. With this settlement procedure, credit would not need to be extended to FICC to settle the trade.

For the interbank case, clearing banks extend credit to FICC to unwind all interbank GCF Repo positions. The proposed settlement change outlined earlier does not address this basic issue. There are two unusual aspects to this intraday credit extension to FICC. First, the amount of credit necessary to unwind these transactions is equal to the total net amount of interbank GCF Repo, which can be quite large. In recent years, this amount has been quite variable and has occasionally reached the tens of billions of dollars. Second, the amount of credit extended to FICC is not a result of FICC's actions, but rather of dealers' trading. Consequently, any restrictions on the amount of credit extended to FICC could only be enforced if constraints were placed on dealers' trading behavior. How the clearing banks will handle the intraday credit extensions to FICC to settle interbank GCF Repo trades has not been determined.

¹⁸This type of strategic behavior with respect to minimizing the costs of intraday credit can be seen with financial institutions using Fedwire Securities. In this security settlement system, the institution sending the security (and receiving cash) initiates the transaction. Given the obligation to deliver a security on a particular day, institutions may send the security early in the day in order to build up their cash balance at the Federal Reserve and so lower the probability of incurring intraday liquidity charges (Mills and Nesmith 2008).

4.2 Fire-Sale Risks

A main objective of tri-party repo settlement reforms is to reduce the risk of fire sales in tri-party repo (Task Force 2010). Little progress has been made on this issue, however, reflecting both the focus on other objectives and the difficulty in mitigating this risk. Borrowing the terminology of Begalle et al. (2013), we highlight two types of fire sales in tri-party repo that concern regulators.

First, there is the pre-default risk of fire sales. Stressed dealers may face difficulties raising funds in tri-party repo because investors may be uncomfortable with the counterparty risk. Losing funding in tri-party repo will cause stressed dealers to delever, selling securities in a bid to raise funds and meet their obligations. The sale of securities will likely cause prices to drop, making it even more difficult for the stressed dealer to raise enough cash to cover its obligations. Further, the fall in prices will impact the entire dealer community through mark-to-market accounting. In particular, the clearing banks use the latest set of prices to value the securities provided as collateral in tri-party repo trades. Falling prices will force all dealers to post more collateral in order to raise the same amount of cash. Enough of a price decline may cause more dealers to become stressed.

Second, there is post-default risk. When a dealer defaults in tri-party repo, its investors receive the securities posted as collateral. Given the large number and wide variety of securities posted, investors are unlikely to coordinate the sales of these securities. Instead, they will likely try to sell them quickly—and this disorderly rush to sell will likely lead to a fire sale.

Fortunately, the role of FICC as a central counterparty in GCF Repo should, in theory, mitigate both types of fire-sale risk. Pre-default risk arises because the entity lending cash is uncomfortable with counterparty risk. But GCF Repo trades are blind-brokered, with FICC standing in as the legal counterparty. With GCF Repo, then, the entities lending cash are not bothered by the possibility of trading anonymously with a stressed dealer.

An important caveat to the above discussion is that dealers must remain confident in FICC and its ability to manage its counterparty risk and absorb the default of a dealer. Conditional on FICC properly managing its counterparty risk (and dealers perceiving that FICC is doing so), there is no pre-default fire-sale risk associated with the GCF Repo service.

Post-default fire-sale risk is also likely to be less of a factor with GCF Repo than with tri-party repo. This is because the structure of the GCF Repo service means that only one entity, FICC, will liquidate the collateral received from a defaulting dealer. Hence, unlike in the tri-party repo market, where cash investors will likely sell the securities held as collateral in an uncoordinated fashion, FICC has the potential to liquidate

collateral in an orderly fashion. This control does not completely neutralize the risk of post-default fire sales, however, because FICC faces constraints to quickly sell the securities held as collateral. But the risk is lower relative to the tri-party repo case (all else being equal) because FICC could potentially sell its securities in a coordinated way.

5. CONCLUSION

Given the popularity and widespread use of GCF Repo among securities dealers, it is important for market participants, regulators, and academics to fully understand the financial infrastructure underpinning this service. This article provides a detailed look at the clearance and settlement of GCF Repo trades, highlights the risks associated with a heavy reliance on intraday credit to settle GCF Repo trades, and discusses how FICC's role as a central counterparty reduces the risk of fire sales associated with this product.

By the end of 2014, both clearing banks had implemented a new settlement system for tri-party repo trades.¹⁹ Some of these planned changes also reduced the reliance on intraday credit for the settlement of intrabank GCF Repo trades. There are, however, open issues regarding how GCF Repo trades will settle for the interbank case. The clearing banks and FICC need to further improve the settlement of interbank GCF Repo trades to minimize the use of intraday credit. Furthermore, whether and how the clearing banks extend intraday credit to FICC to facilitate settlement needs to be decided. These financial plumbing decisions are important because they will likely influence the extent to which dealers rely on intraday credit from the clearing banks and perhaps impact dealers' ability to conduct interbank GCF Repo trades. As such, all parties—the clearing banks, FICC, and the dealers that use GCF Repo—need to remain actively engaged in these issues.

¹⁹ Links to each clearing bank's plans can be found on the Tri-Party Repo Infrastructure Reform webpage, available at http://www.newyorkfed.org/banking/tpr_infr_reform.html.

APPENDIX A: HOW THE CLEARING BANKS MANAGE INTRADAY CREDIT RISKS (PRE-REFORM)

Net free equity (NFE) is a risk management tool used by both clearing banks to ensure that the intraday credit a clearing bank extends to dealers is secured by collateral to which that clearing bank has a right of offset in the case of default. A dealer's NFE is the difference between the value of cash and collateral the dealer holds in various accounts at the clearing bank, taking into account "haircuts," and the amount of intraday credit (overdrafts) the clearing bank is currently extending to it. (The haircut is the value of the collateral in excess of the value of the cash exchanged in a repo.)

Not all of a dealer's accounts are included in its NFE; for example, a dealer's segregated client accounts are excluded. Thus, NFE refers to the total value of cash and collateral to which a dealer has title and which is unencumbered by existing obligations to the clearing bank or others. As part of their risk management processes, the clearing banks continuously monitor each dealer's NFE to ensure that their extension of intraday credit does not push any dealer's NFE below zero.

GCF Repo allocations between two dealers that use different clearing banks create two main risk management challenges for FICC and the clearing banks. The first risk management obstacle occurs with the end-of-day settlement of GCF Repo, and the second occurs with the GCF Repo morning unwind. The solutions to these two risk management problems are different.

Starting first with the end-of-day settlement, the underlying problem is that the securities posted as collateral are not transferred across the clearing banks. This is because the Fedwire Securities system closes at 3 p.m., which is about the time that the GCF Repo settlement process begins. Even if Fedwire Securities were to remain open, it is operationally inefficient to move large numbers of securities across the two clearing banks every day.

As illustrated in Exhibit 4, the difficulty lies in the fact that one clearing bank (clearing bank 2 in the exhibit) has to extend credit to the reverse repo dealer in order to facilitate settlement of the reverse repo leg of the transaction. This securities-for-cash exchange, however, relies on securities residing on the books of the other clearing bank (clearing bank 1 in the exhibit).

The solution is to create a cross-clearing bank lien, whereby the relevant securities are placed in a segregated account on the books of clearing bank 1 (labeled "FICC's CB2 account" on the books of clearing bank 1 in Exhibit 4). Clearing bank 2 then creates copies of its securities (called securities clones) that serve as proxies for the securities sequestered in FICC's CB2

account at clearing bank 1. Under this arrangement, clearing bank 2 can now execute, on its books, the securities-for-cash exchange between FICC and the reverse repo dealer.

The second risk management problem occurs with the GCF Repo morning unwind. Recall that the goal of the unwind is to return securities to the repo dealer so that the dealer can use the securities throughout the trading day for other transactions. To facilitate the unwind, the reverse repo dealer's clearing bank (clearing bank 2 in Exhibit 5) extends intraday credit to FICC so that FICC can deliver cash to the reverse repo dealer in return for the securities collateralizing the GCF Repo position.

Initially, this credit extension is secured by the securities underlying the GCF Repo position (which are sequestered at FICC's CB2 account on the books of clearing bank 1). The goal of the unwind, however, is to transfer these securities back to the repo dealer. To accomplish this while still maintaining a secured intraday credit extension from clearing bank 2 to FICC, FICC and the clearing banks implement a lien called the "NFE hold." The NFE hold is a legal arrangement whereby FICC has a lien on dealers' NFE at each clearing bank, in this case the repo dealer at clearing bank 1. This means that FICC has a lien on all of a dealer's unencumbered securities in various accounts at the clearing bank.¹ The total amount of the lien is equal to the previous day's interbank net funds borrowed. The lien is placed only on those dealers at the net borrowing clearing bank and is allocated proportionately based on those dealers' net repo amounts.

Consider the example laid out in the table below. Here, the clearing bank 1 dealers have borrowed \$6 billion more than they have loaned (see the last row of the upper panel of the table). This cash comes from clearing bank 2 dealers and is the amount of interbank GCF Repo on day t . With the unwind on the morning of day $t+1$, FICC will impose a NFE hold on dealers A through E, proportionate to their total repo activity. The NFE hold on dealer A, for example, is equal to $(2/28) \times \$6,000,000,000 = \$428,571,429$.

As explained in Section 4.1, a proposal has been made to replace the NFE hold with a cross-lien legal arrangement as part of a series of reforms aimed at improving the settlement of GCF Repo positions.

¹ FICC's lien is on all of a dealer's unencumbered securities, a set of assets that includes securities that are not eligible for GCF Repo.

APPENDIX A (CONTINUED)

Example Calculation of the NFE Hold (Pre-Reform)

Panel A: Clearing Bank 1 Dealers' GCF Repo Positions on Day t

Dealer	Total Repo Amount (Billions of Dollars)	Percentage of Total	Total Reverse Repo Amount (Billions of Dollars)	Net Position (Repo – Reverse Repo) (Billions of Dollars)
A	2	7	6	(-4)
B	4	14	3	1
C	9	32	1	8
D	7	25	7	0
E	6	21	0	6
F	0	0	5	(-5)
Total	28	100	22	6

Panel B: Clearing Bank 1 Dealers and the NFE Hold on the Morning of Day $t+1$

Dealer	NFE Hold (Dollars)
A	428,571,429
B	857,142,857
C	1,928,571,429
D	1,500,000,000
E	1,285,714,286
F	0
Total	6,000,000,000

Notes: NFE is net free equity. The “NFE hold” is equal to the dealer’s repo amount as a percentage of total repo activity on the clearing bank multiplied by the net amount of interbank funds (\$6 billion, in this example).

APPENDIX B: HOW THE SETTLEMENT PROCESS OF ROLLING DEALERS' POSITIONS WORKS

Consider the case in which a dealer increases from \$10 billion to \$11 billion its net position in GCF Repo backed by Treasuries with maturities of 30 years or less. With the rolling positions process, the dealer is obligated to deliver only \$1 billion in Treasuries to complete the end-of-day settlement process. Recall that under the previous system, the clearing bank would unwind the entire \$10 billion GCF Repo position in the morning and then settle \$11 billion later that day. To unwind the position in the morning, the clearing bank would need to extend \$10 billion in intraday credit.

The use of rolling positions dramatically reduces the reliance on intraday credit, for most cases. Dealers only need credit when they reduce a repo position or increase a reverse repo position. In both instances, the dealer will receive securities from FICC, against which the dealer must deliver cash.

Importantly, for these two instances, the dealer only needs credit for the change in its net position (hence, this type of settlement is referred to as Net-of-Net). Historically, dealers have maintained similar net positions from day to day, a pattern that suggests that rolling positions will dramatically reduce the amount of intraday liquidity needed to settle GCF Repo positions. When there are large changes to a dealer's net position, however, this rolling process does not significantly improve upon a complete unwind and rewind of a dealer's position, from the perspective of the use of intraday credit. In particular, if a dealer switches from being a net lender to a net borrower (or vice versa) for a particular collateral class in GCF Repo, then rolling positions uses the same amount of intraday credit as a full unwind and rewind approach.

REFERENCES

Begalle, B., A. Martin, J. McAndrews, and S. McLaughlin. 2013. "The Risk of Fire Sales in the Tri-Party Repo Market." Federal Reserve Bank of New York STAFF REPORTS, no. 616, May.

Copeland, A., D. Duffie, A. Martin, and S. McLaughlin. 2012. "Key Mechanics of the U.S. Tri-Party Repo Market." Federal Reserve Bank of New York ECONOMIC POLICY REVIEW 18, no. 3 (November): 17-28.

Fleming, M., and K. Garbade. 2003. "The Repurchase Agreement Refined: GCF Repo®." Federal Reserve Bank of New York CURRENT ISSUES IN ECONOMICS AND FINANCE 9, no. 6 (June).

Mills, D. C., and T. Nesmith. 2008. "Risk and Concentration in Payment and Securities Settlement Systems." JOURNAL OF MONETARY ECONOMICS 55, no. 3 (April): 542-53.

Tri-Party Repo Infrastructure Reform Task Force. 2010. "Task Force on Tri-Party Repo Infrastructure: Report." Payments Risk Committee, sponsored by the Federal Reserve Bank of New York. Available at http://www.newyorkfed.org/banking/tpr_infr_reform.html.

The views expressed are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System. The Federal Reserve Bank of New York provides no warranty, express or implied, as to the accuracy, timeliness, completeness, merchantability, or fitness for any particular purpose of any information contained in documents produced and provided by the Federal Reserve Bank of New York in any form or manner whatsoever.