

Current Issues

IN ECONOMICS AND FINANCE

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The Repurchase Agreement Refined: GCF Repo[®]

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One of the largest and most important of the money markets is the market for repurchase agreements. In a repurchase agreement, a borrower of money effectively agrees to provide securities as collateral to the lender to mitigate credit risk. GCF Repo is a recent innovation in this market that reduces transaction costs, enhances liquidity, and facilitates the efficient use of collateral.

Repurchase agreements (“repos” or “RPs”) play a crucial role in the efficient allocation of capital in financial markets. They are widely used by dealers to finance their market-making and risk-management activities and they provide a safe and low-cost way for mutual funds, depository institutions, and others to lend surplus funds. The importance of the repo market is suggested by its immense size: dealers with a trading relationship with the Federal Reserve Bank of New York—so-called primary dealers—reported financing \$2.48 trillion in Treasury, agency, mortgage-backed, and corporate securities at the end of 2002 with RPs.¹

GCF (General Collateral Finance) Repo was introduced in 1998 by the Fixed Income Clearing Corporation (FICC) and two large dealer clearing banks, JPMorgan Chase Bank (JPMC) and Bank of New York (BoNY), to reduce transaction costs and enhance liquidity in the repo market.² Its success in achieving these objectives is suggested by its rapid growth and current market share. Average daily net settlement volume in GCF Repo rose from \$11.3 billion in 2000 to \$101.3 billion in 2002, and GCF Repo was recently

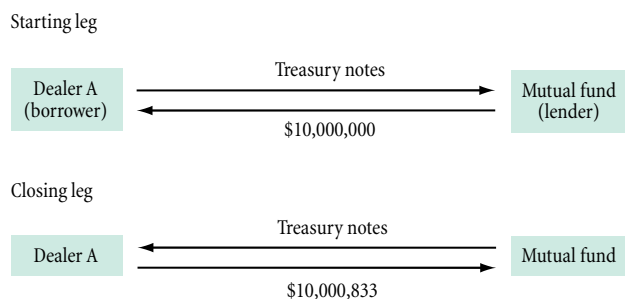
estimated to account for 54 percent of inter-dealer repo transactions on Treasury collateral (Bockian 2002).³

This edition of *Current Issues* explores why GCF Repo has become so popular. We start by describing conventional repurchase agreements and identifying the transaction costs that limit liquidity in the conventional repo market. We then explain how GCF Repo works and how it reduces transaction costs by allowing for netting in the settlement process and by facilitating the efficient use of collateral.

Repurchase Agreements Defined

A repurchase agreement is a sale of securities coupled with an agreement to repurchase the same securities at a higher price on a later date. A repo is thus broadly similar to a collateralized loan. As shown in Figure 1, for example, dealer A can borrow \$10,000,000 overnight at an interest rate of 3 percent per annum by selling Treasury securities to a mutual fund and simultaneously agreeing to repurchase the securities the following day for \$10,000,833

Figure 1
Settlement of the Starting and Closing Legs
of a Repurchase Agreement



(\$10,000,000 + $1/360 \cdot 3$ percent of \$10,000,000). The payment from the initial sale is the principal amount of the loan; the excess of the repurchase price over the sale price is the interest paid on the loan. As with a collateralized loan, the lender has possession of the borrower's securities during the term of the loan and can sell them if the borrower defaults on its repurchase obligation.

A *general collateral* RP is a repurchase agreement in which the lender of funds is willing to accept any of a variety of Treasury and other related securities as collateral. The class of acceptable collateral might be limited to Treasury securities maturing in less than ten years or it might include all Treasury and agency securities. The lender is concerned primarily with earning interest on its money and having possession of assets that can be sold quickly with minimal transaction costs in the event of a default by the borrower.


Direct Trading and Settlement

In the "textbook" description of a general collateral RP, the borrower and lender negotiate directly between themselves the principal amount, term, and interest rate, as well as the class of acceptable collateral. Sometime before 11 a.m., the borrower identifies to the lender the securities within the agreed-upon class of acceptable collateral that it will actually deliver, and then—as shown in Figure 1—delivers those securities against payment of the principal amount of the loan.⁴ Securities deliveries must be completed by 3:30 p.m., the closing time for transfers over the securities Fedwire, an electronic transfer system operated by the Federal Reserve.⁵ At the end of the loan, the lender of funds delivers the securities back to the borrower against repayment of principal and payment of interest at the negotiated rate.

Trading and Settlement in the Inter-Dealer Market

Some dealers make markets in RPs, quoting offer rates at which they are prepared to lend money for different periods as well as bid rates at which they are prepared to borrow.⁶ Additionally, they transact amongst themselves to adjust their net borrowings, and the term structure of their net borrowings, to desired levels. However, the largest dealers do not, as in the textbook description, negotiate and settle repos directly when they transact with their competitors. Instead, they use inter-dealer brokers (IDBs) to disseminate their bids and offers anonymously over electronic communication systems and they settle their transactions through the IDBs and through FICC.

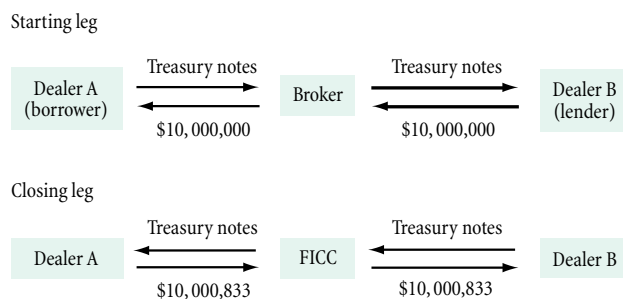
Settlement of an RP that is arranged by a broker between two FICC members differs from the textbook description of a repo settlement in two important respects. First, the broker is involved in the settlement at the start of the repo. As shown in the top panel of Figure 2, the borrowing dealer delivers its securities to the broker, rather than directly to the lender, against payment of the principal amount of the

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borrowing. The broker then redelivers the securities to the lender against payment of the same principal amount. This more costly, two-step settlement process is necessary to preserve the anonymity of the borrower and lender.⁷

Second, the settlement at the end of the RP goes through FICC. FICC nets the settlement obligations of each of the three parties—the borrower, the lender, and the broker—with other obligations of each of those parties to receive and deliver the same securities on the termination date of the RP. If, for example, the lender (dealer B in Figure 2) happens to be a buyer (from another FICC member) of \$7 million principal amount of the same series of Treasury notes, it would have a net obligation to deliver only \$3 million of the notes (\$3 million = \$10 million of notes due to be returned to dealer A, less \$7 million of the notes due to be received in settlement of its purchase). The

Figure 2
**Settlement of a Brokered Repurchase Agreement
 between Two FICC Members**



broker always drops out of the settlement process because it has offsetting obligations to receive \$10 million of the notes from dealer B and to deliver \$10 million of the notes to dealer A.

In the simple case in which the borrower and lender have no other obligations to receive or deliver the same securities on the same day, the lender delivers the securities that collateralized the RP to FICC against payment by FICC of the principal and interest on the borrowing, and FICC delivers the securities to the borrower against payment of the same sum. This is shown in the lower panel of Figure 2. When the borrower and lender do have other obligations, settling the closing leg of the RP through FICC is cheaper and more efficient than settling through the broker because of the efficiencies of net settlement (described in Fleming and Garbade [2002]). The starting leg of the RP is not settled through FICC because, outside of the GCF Repo facility described below, FICC does not provide for net settlement of transactions that settle on the day they are negotiated.

Transaction Costs of Inter-Dealer Trading

A variety of transaction costs limit the liquidity of the inter-dealer repo market and, therefore, the liquidity of the larger dealer-customer repo market. First, because the starting legs of inter-dealer RPs have to be settled on an individual, trade-by-trade basis, inter-dealer RPs are more costly to settle than transactions in which the parties have to settle only their net obligations. If a dealer agrees at 8 a.m. to borrow \$100 million overnight through broker X and at 9 a.m. agrees to lend \$100 million overnight through broker Y, it has to settle each

RP separately, delivering securities to broker X against receiving \$100 million and receiving securities from broker Y against paying \$100 million.

A second transaction cost is the relatively early (in the day) loss of the borrower's option to deliver any of a variety of securities. A dealer borrowing funds on a general collateral RP has to identify by about 11 a.m. the securities that it intends to deliver. As soon as it does so, it becomes obligated to deliver those specific securities. If the dealer identifies securities that it expects to receive later in the day but that ultimately fail to arrive, the dealer has to go back to the lender and request that it agree to accept different securities. The possibility that repo settlements may have to be renegotiated adds to the costs of making a two-way market in general collateral RPs.

A third transaction cost is the cost to a lender of accommodating a borrower's request to substitute collateral on a term, or multiple-day, repo. A dealer that borrows money on a term RP will sometimes request that it be allowed to provide different collateral if it identifies an opportunity to sell outright some or all of its original collateral at a favor-

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able price. Collateral substitution requires two settlements, one when the lender delivers the original collateral back to the borrower against payment, and the second when the borrower delivers the new collateral to the lender, also against payment. A dealer lending money on a general collateral RP bears additional expenses whenever a borrower substitutes collateral.

GCF Repo

GCF Repo was designed to reduce transaction costs and enhance liquidity in the inter-dealer repo market by allowing for netting in both legs of the settlement process, by extending the time interval before a borrower's delivery option is lost, and by reducing the cost of collateral substitution. This section explains how GCF Repo works and how it


accomplishes these objectives. For expository purposes, we will describe trading in GCF Repo on all Treasury bills, notes, and bonds (“all Treasury issues”) by dealers that clear through JPMC.⁸

Trading in GCF Repo

Trading in GCF Repo starts each morning at about 7:30 a.m. when dealers begin to submit bids and offers for money to inter-dealer brokers that are members of FICC. (There is no provision at this time for direct trading in GCF Repo between FICC members.) One dealer might, for example, bid 2.15 percent for money over a two-week term and another dealer might offer to lend for the same term at 2.20 percent. When a dealer signals to an IDB that it is willing to borrow or lend on the terms proposed by another dealer, the IDB brokering the transaction reports the details of the trade to FICC. Trading in GCF Repo stops at 3:30 p.m. when the securities Fedwire closes.

Settlement of GCF Repo

Settlement of GCF Repo transactions is designed to minimize costly movements of securities by allowing for netting in the settlement process. At 3:45 p.m., FICC computes the *net* obligation of each dealer to lend or borrow money

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for one business day or longer as a result of the GCF Repo contracts that it negotiated during the day and (as explained below) the continuing term GCF Repo contracts that it negotiated on earlier days. Each dealer is informed either that (a) it is a net borrower and is obligated to deliver Treasury collateral to FICC against payment of the aggregate principal amount of its net borrowing, or that (b) it is a net lender and is obligated to receive Treasury collateral against payment of the aggregate principal amount of its net loan.


Settlement of GCF Repo is also designed to preserve for as long as possible the borrower’s option to choose what collateral to deliver. A dealer that clears through JPMC and is a net borrower on GCF Repo on all Treasury issues has until 4:30 p.m. to deliver Treasury bills, notes, and/or bonds of its choosing to an FICC account at JPMC against pay-

ment of the principal amount of its net borrowing.⁹ JPMC is responsible for verifying that the securities are in fact Treasury securities and that they have a market value (including any accrued interest) at least as large as the principal amount of the dealer’s net borrowing. The borrower does not have to give any advance notification of the specific collateral that it plans to deliver, so its option to choose which securities to deliver survives well past the time when collateral is assigned for conventional repos.

The securities transferred to FICC’s account are redelivered to other dealers that also clear through JPMC and that are net lenders against payment of the principal amounts of their respective net loans. The transfers of securities from net borrowers to FICC’s account at JPMC, and the transfers of securities from FICC’s account to net lenders, occur entirely on the books of JPMC and do not require any Fedwire transfers. The aggregate net borrowing of all of the dealers that are net borrowers and clear through JPMC is identical to the aggregate net loan of all of the dealers that are net lenders and clear through JPMC because every GCF Repo transaction involves a borrowing and a loan of identical size by parties that clear through the same bank. Thus, the total payments received by FICC in its JPMC account equal the total payments disbursed by FICC from its JPMC account.¹⁰

Morning Reversal and Afternoon Recollateralization

All of the foregoing deliveries and payments are reversed before the opening of the securities Fedwire at 8:30 a.m. the next morning. Borrowed funds are returned to lenders and

The morning reversals [of GCF Repos] are important to dealers borrowing on continuing term RPs because they restore a borrower’s control over its collateral, giving it access to securities that might be needed to settle unrelated sales. 

collateral securities are returned to borrowers. Except for interest payments (described below), the reversals constitute final settlement of GCF Repos terminating that day.

The morning reversals are important to dealers borrowing on continuing term RPs because they restore a borrower’s control over its collateral, giving it access to securities that

Interest Payments and Mark-to-Market Payments on a GCF Repo

Suppose dealer A, acting through an IDB, enters into a two-day GCF Repo on Treasury collateral with dealer B for \$100 million at an interest rate of 2.10 percent, where the RP starts on June 1 and terminates on June 3. The total interest liability of dealer A is \$11,666.67 ($\$11,666.67 = 2/360 \cdot 2.10$ percent of \$100 million).

Sometime after 3:45 p.m. and before 4:30 p.m. on June 1, dealer A delivers \$100 million of Treasury securities to FICC against payment of \$100 million. Suppose that after the close of trading on June 1, FICC announces a “System Repo Rate” of 2.05 percent for GCF Repos terminating on June 3. (A System Repo Rate is FICC’s best estimate of where GCF Repos of a given maturity are trading at the close of business.)

On the morning of June 2, dealer A makes a \$5,833.33 payment to FICC for the accrued interest on its GCF Repo contract for one day at the contract rate of 2.10 percent ($\$5,833.33 = 1/360 \cdot 2.10$ percent of \$100 million) and a mark-to-market payment of \$138.89 for the value of the difference between the contract rate of 2.10 percent and the System Repo Rate of 2.05 percent over the one day remaining in the life of the RP ($\$138.89 = 1/360 \cdot 0.05$ percent of \$100 million). The total payment from dealer A to FICC is \$5,972.22 ($\$5,972.22 = \$5,833.33 + \138.89). Dealer B receives the same amount from FICC.^a At this point, dealer A is “current” with respect to its interest liabilities and it has offset the decline in the value of its side of the repo contract attributable to the decline in the repo rate

from 2.10 percent to 2.05 percent. This is why dealer A is allowed to recover its collateral on the morning of June 2 against payment of only the original principal amount of its borrowing.

Sometime between 3:45 p.m. and 4:30 p.m. on June 2, dealer A delivers \$100 million of Treasury securities to FICC against payment of \$100 million in satisfaction of its reinstated commitment to borrow.

On the morning of June 3, dealer A recovers its collateral from FICC against repayment of the \$100 million principal amount of its borrowing and also makes an interest payment to FICC of \$11,666.67, representing interest on the GCF Repo contract for two days at the contract rate of 2.10 percent. FICC pays the same amount to dealer B.

Additionally, dealer A receives back the \$5,972.22 that it paid the day before, plus interest at the overnight general collateral repo rate on that payment. (Dealer B pays an identical amount to FICC.) Receipt of interest on the \$5,972.22, as well as the return of the \$5,972.22 itself, means that dealer A’s payment of \$5,972.22 the previous day did not constitute a net economic burden for the dealer. In particular, the money was returned and the dealer was compensated for the time value of its money. The disbursement of the \$5,972.22 on June 2 merely served to facilitate the return of dealer A’s collateral against payment of only the principal amount of the RP on that day.

^aThese payments are included in each dealer’s daily “funds-only” settlement. See Fixed Income Clearing Corporation, Government Securities Division, Rulebook (January 14, 2003), Rule 13—Funds-Only Settlement. The Government Securities Division Rulebook is posted at <http://www.ficc.com/gov/other.docs/rules/rules.pdf>.

might be needed to settle unrelated sales. The morning reversals eliminate the costs of requesting and effecting specific collateral substitutions because borrowers regain control over *all* of their collateral through securities and funds transfers that take place entirely on the books of their clearing bank.

Of course, if a dealer committed to borrow on a term RP that is not terminating, its borrowing must be renewed, that is, the morning reversal must itself be reversed. Similarly, if a dealer committed itself to lend on a continuing RP, its loan must be renewed. Thus, FICC reinstates all continuing


borrowing and lending commitments immediately following each morning reversal. Any additional commitments negotiated during the day are combined with the reinstated commitments in the 3:45 p.m. calculation of each dealer’s net obligation to borrow or lend that day.

If the dealer is a net borrower at 3:45 p.m., it is obligated to deliver Treasury collateral to FICC against payment of the aggregate principal amount of its net borrowing. It does not, however, have to deliver the same securities that it received in the morning (assuming it had been a net borrower on the preceding day). If it needed some of those securities to settle

unrelated sales, it can continue its borrowing using other securities as substitute collateral. In this way, GCF Repo makes collateral substitution an entirely transparent process.

Accrued Interest and Mark-to-Market Payments

As explained earlier, interest on a textbook RP is included as part of the invoice price due upon return of the collateral at the close of the RP. Interest on GCF Repo is also paid at maturity but, in addition, there are daily accrued interest

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and mark-to-market payments associated with the reversals described above. These payments protect the financial interests of both borrowers and lenders. They are, therefore, a crucial aspect of GCF Repo.

In order to justify the return of a borrower's collateral against payment of only the original principal amount of the borrower's RP, FICC requires that the borrower pay accrued interest on its borrowing and make (or receive) a mark-to-market payment to account for the decline (or rise) in the market value of its contract due to changes in GCF Repo rates since the contract was negotiated. To preserve the convention that interest on GCF Repo is paid in full at maturity, both of the foregoing payments are returned the following day with interest at the overnight repo rate. The box presents a numerical example.

GCF Repo Compared with Conventional Repo

GCF Repo offers dealers several important advantages over conventional general collateral repo:

- GCF Repo transactions settle on a net rather than gross basis, reducing movements of funds and securities and thereby lowering settlement costs. In 2002, for example,

average daily net settlement volume of GCF Repo was \$101 billion while average daily gross settlement volume was \$721 billion.

- GCF Repo settles entirely on the books of the clearing banks and does not require movement of Treasury securities on Fedwire. GCF Repo can thereby accommodate settlement later in the day, allowing a borrower of money to defer deciding what securities to use as collateral until 4:30 p.m.
- GCF Repos are reversed every morning and renewed every afternoon. A borrower of money can therefore use collateral securities to settle unrelated transactions during the day and can easily change collateral securities without exceptional provisions for collateral substitutions.

Conclusion

GCF Repo is a recent innovation in the market for repurchase agreements that provides several advantages to dealers over conventional general collateral RPs. In particular, GCF Repo provides for netting in settlement, accommodates settlement later in the day, and allows collateral to be easily substituted. These features reduce transaction costs, enhance liquidity, and facilitate the efficient use of collateral. The benefits of GCF Repo have contributed to its rapid growth and explain why it has captured such a large share of the brokered general collateral repo market.

Notes

The authors are grateful to Thomas Brady, David Buckmaster, and Jeffrey Ingber for assistance in researching this article.

1. *Federal Reserve Bulletin* 89 (April 2003), p. A27, Table 1.43, "U.S. Government Securities Dealers, Positions and Financing." The repo financing is the sum of lines 33 and 34 for the column headed December 25, 2002.

2. Ingber (2003) recounts the development of GCF Repo; see also Taylor (1998) and Government Securities Clearing Corporation (1997, 1998). FICC is a wholly owned subsidiary of the Depository Trust & Clearing Corporation (DTCC), which also owns the Depository Trust Company. The Government Securities Division of FICC is the successor to the Government Securities Clearing Corporation (GSCC), which was acquired by DTCC in January 2002.

3. The figures double count the actual volume of transfers of funds and securities because they include the sum of daily net borrowings and daily net loans.

4. The Bond Market Association (1998) recommends that borrowers advise lenders by 11 a.m. of the collateral they will be delivering.

5. Fleming and Garbade (2002) describe the details of delivery and payment through Fedwire.
6. Dealers actually quote bid rates for (borrowing) collateral against lending money and offer rates for (lending) collateral against borrowing money. We reverse the bid and offer conventions for expositional clarity.
7. The broker's role in settling the starting leg of an RP was made possible by GSCC's decision in mid-1996 to guarantee broker payment and delivery obligations. This guarantee, as well as other aspects of repo settlements, is discussed in Fleming and Garbade (2002).
8. For reasons that will become evident shortly, dealers that clear through JPMC can trade GCF Repo only with other dealers that trade through JPMC. Dealers that clear through BoNY can trade only with other dealers that clear through BoNY. FICC sponsors GCF Repo trading in four other classes of collateral: (1) Treasury bills, notes, and bonds with less than ten years remaining to maturity, (2) fixed-rate unsubordinated non-mortgage-backed securities of the Federal Farm Credit Banks, the Federal Home Loan Banks, the Federal National Mortgage Association ("Fannie Mae"), and the Federal Home Loan Mortgage Corporation ("Freddie Mac"), (3) fixed-rate mortgage-backed securities issued by the Government National Mortgage Association, and (4) fixed-rate mortgage-backed securities issued by Fannie Mae and Freddie Mac.
9. A net borrower can deliver securities after 4:30 p.m. but it is then subject to penalties that escalate the later it makes delivery.
10. Between June 1999 and March 2003, FICC sponsored trading in GCF Repo that combined dealers that clear through JPMC with dealers that clear through BoNY (see Ingber [2003] and Government Securities Clearing Corporation Important Notice 051.99, "Implementation of the Interbank Phase of the GCF Repo Service," June 2, 1999, posted at <<http://www.ficc.com/gov/notices/GOV051.99.htm?NS-query=>>). Settlement problems led to the separation of the two dealer groups in March 2003 (see Fixed Income Clearing Corporation Important Notice GOV025.03, "Status of the GCF Repo Service," March 5, 2003, posted at <<http://www.ficc.com/gov/notices/GOV025.03.htm?NS-query=>>, *Dow Jones Newswire* [2003], and *Wall Street Journal* [2003]).

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Current Issues in Economics and Finance is published by the Research and Market Analysis Group of the Federal Reserve Bank of New York. Dorothy Meadow Sobol is the editor. Back issues of *Current Issues in Economics and Finance* are available at <http://www.newyorkfed.org/rmaghome/curr_iss/>.

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.

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