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11. Treasury Market Functioning and the Zero Bound¹

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Executive Summary

This memo examines the likely effects of very low interest rates on Treasury market functioning. General collateral rates in the repo markets have already been very low for some time and functioning in repo, cash, and derivative Treasury markets has deteriorated as a consequence. A further decline in interest rates would likely exacerbate already poor conditions.

The securities lending and repo markets are used by dealers, banks, and other leveraged investors to finance long and short cash market positions in Treasury securities. They are also used by money market funds and other cash investors to earn interest on cash balances and to earn fee income from lending securities. Disruptions in these financing markets has degraded liquidity in Treasury cash markets and may increase the cost of Treasury issuance (because investors generally demand higher yields on less liquid securities) at a time when government borrowing needs have increased and are expected to expand substantially. More broadly, investors depend on the Treasury market to price and hedge positions in other fixed income markets. Thus reduced liquidity and increased volatility in the Treasury markets affects investors' ability to predictably engage in other interest rate markets and could dampen lending behavior more generally. Dealer hedging of interest rate risk associated with large un-margined fails and increased related capital charges may limit already scarce balance sheet capacity.

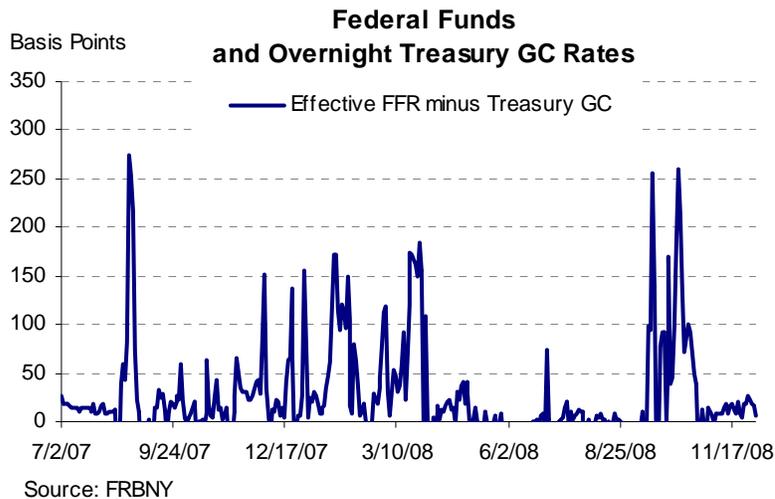
Current Interest Rate Environment

The level of the overnight general collateral Treasury repo rate ("Treasury GC") is more important for Treasury market functioning than either the target or the effective fed funds rate. Historically, distinguishing among the three rates mattered little because the rates traded in close proximity to each other. However, in times of financial market stress, such as after the Lehman bankruptcy and the subsequent "breaking of the buck" at the Reserve Fund money market fund, demand for safety from short-term investors

¹ This note draws on work by Michael Fleming and Kenneth Garbade, "When the Back Office Moved to the Front Burner: Settlement Fails in the Treasury Market After September 11," *Federal Reserve Bank of New York Policy Review* (November 2002) and "The Repurchase Agreement Refined: GCF Repo,," *Federal Reserve Bank of New York Current Issues in Economics and Finance* (June 2003) and Michael Fleming, memo, "The Repo Market and the Zero Bound, March 24, 2003."

² Fleming and Garbade: FRBNY Research; Keane: FRBNY Markets Group; Roush: Division of Monetary Affairs.

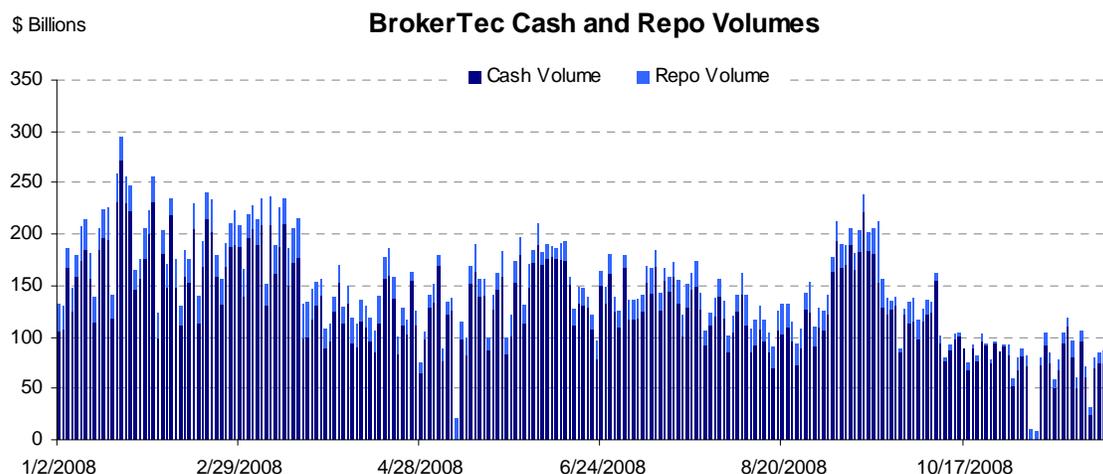
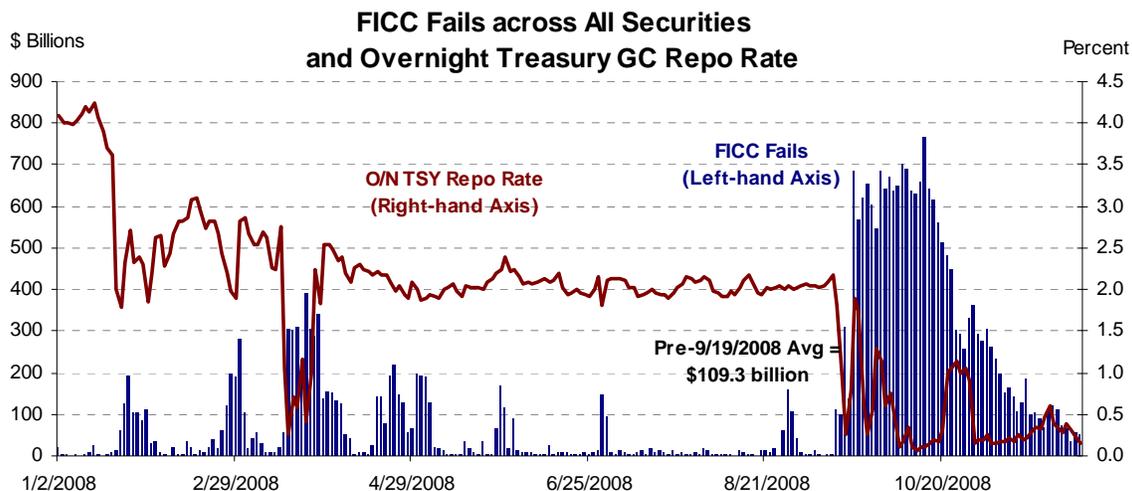
surged. In this instance, the Treasury GC rate traded below 25 basis points for an extended period even while the effective funds rate was around 1.0 percent and the target funds rate was at 1.50 percent. The spread between Treasury GC and the effective funds rate has narrowed recently, but the period from mid-September through mid-October period demonstrated that the two rates can diverge for a sustained period.



The recent experience provides a good indication of the potential for near-zero interest rates to disrupt Treasury repo, securities lending, and cash market functioning. In particular, the unusually low Treasury GC rate set the stage for an unprecedented volume of settlement fails. Chronic and persistent fails occur in an issue when the special collateral repo rate for the security is near zero for a prolonged interval of time thereby providing little economic incentive for sellers to borrow the security to cure their settlement fails.³ Because special collateral repo rates are bounded from above by the GC rate, the recent low level of the GC rate has compressed specials rates to near zero and created an environment conducive to widespread fails in a large number of issues. In recent weeks, some trades on nearly all Treasury issues have failed to settle on the originally scheduled settlement dates. Trades in some issues have failed for weeks. As a result of the widespread and persistent settlement fails, dealers and others have become reluctant to enter into transactions in Treasury securities, including outright purchases and sales as well as borrowing and lending money and securities on repurchase agreements.

The first chart below shows the relationship between low Treasury GC rates and increased settlement fails. The second chart documents the concomitant decline in transaction volumes in the cash and repo markets. The decline in trading volume is particularly remarkable given the recent increase in the pace of Treasury issuance, which would be expected to stimulate higher trading volumes.

³ As rates approach zero participants become indifferent between failing to make delivery and making delivery because the current market fails penalty rate is equivalent to an interest free loan or a repo rate of zero.

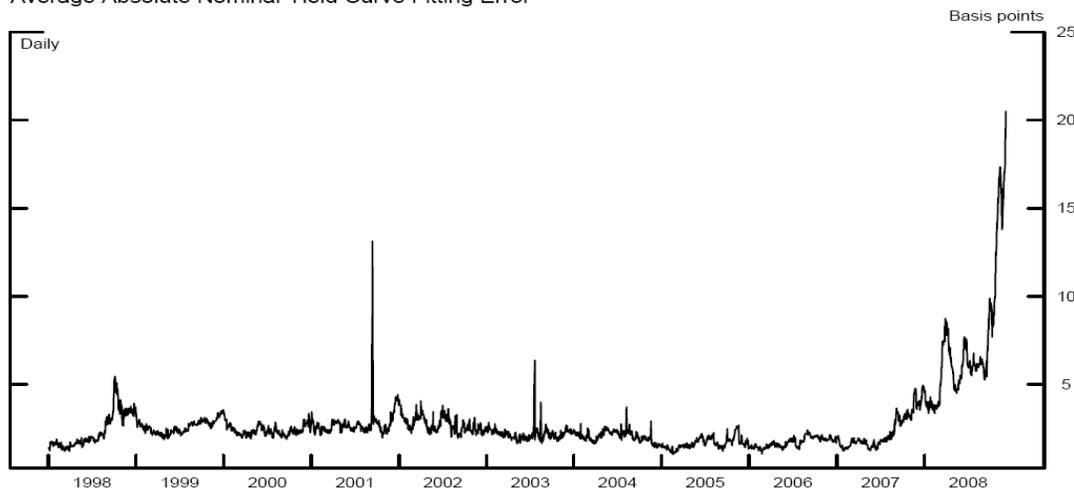


The deterioration in repo market liquidity has also led to significant price dispersion among similar maturity securities in the Treasury market. Under normal market conditions, such price differences are relatively small as arbitrageurs borrow securities to execute relative value trades, buying undervalued securities and selling overvalued securities short. However, this type of trading has reportedly been increasingly limited by poor functioning in repo markets (as well as other factors), leading to sharply higher fitting errors in models of the yield curve.⁴ As shown below, fitting errors from the Board’s yield curve have surged since mid-September from already elevated levels. This fragmentation of relative value relationships is important because it

⁴ There have also been reports that increased settlement fails in cash markets have raised concerns for futures and options market participants, as “futures basis trading” is one example of reduced relative value trading due to increased clearance risk in secondary cash markets, and futures basis trading ultimately involves trading in off-the-run Treasuries in secondary markets to satisfy contract obligations.

impairs the use of fitted yield curves for identifying forward interest rates and breakeven rates of inflation.

Average Absolute Nominal Yield Curve Fitting Error



Note. Calculated from securities with two to ten years until maturity, excluding on-the-run and first off-the-run securities.
Updated: December 4, 2008

Finally, problems entering, financing, and exiting short Treasury positions are believed to have reduced the ability of market participants to hedge the interest rate risk associated with positions in non-Treasury securities, including mortgage-backed securities, and may have contributed to the widening of interest rate spreads for such securities.

Interest Rates Near Zero

Recall that the crucial rate, for purposes of assessing the functioning of the Treasury market, is the Treasury general collateral rate, not the target funds rate. To the extent market participants are anxious about unsecured exposures and exposures secured with less liquid securities, we can expect a relatively wide spread between the target rate and the Treasury GC rate. Conversely, the spread will be tighter if market participants are more confident about such exposures.

Given the existing institutional arrangements (including the lack of a Treasury securities lending facility and the current market convention on settlement fails), we would anticipate that a Treasury GC repo rate of zero (or anything close to zero) would provide a fertile environment for major market dysfunction, including widespread, massive settlement fails on cash, repo, and securities lending trades. This would likely lead market participants to pull away from market making and related arbitrage activities, resulting in significant fragmentation of the yield curve on both an issue-by-issue and sector-by-sector basis. In addition, Treasury would have to expand its efforts to pull investors into the primary market, through direct auction participation, in order to insure against auction failure.

On the other hand, market functions are likely to continue at an acceptable level at a Treasury GC rate of 50 basis points (although there is no guarantee that a fed funds target rate of 50 basis points will be accompanied by a Treasury GC rate of 50 basis points). The biggest risk if the Treasury GC rate is 50 basis points would arise if investors come to feel at some point that the Fed is likely to tighten in the near future, with leveraged investors concurrently holding a large quantity of long-term securities. They may then want to aggressively short Treasury issues as hedge, leading to widespread, massive settlement fails. (This is essentially what happened in June 2003.)

Between 50 basis points and zero, it seems reasonable to posit a more or less steady degradation of market functionality. Limited experience to date does not allow the ready identification of any obvious discontinuities.

Potential Impact of Recent Market Practice Recommendations

Settlement fails occur primarily because of the market convention that a failing seller can deliver securities after the originally scheduled settlement date at the original invoice price and without any additional penalty. This treatment results in an interest free loan to the purchaser for the duration of a settlement fail, an implicit fail penalty to the seller which becomes costless when rates hit zero. The imposition of an *explicit penalty fee* on delivery failures could restore the incentive to borrow securities to accomplish delivery even when the special collateral repo rate is near or below zero.

On November 12, 2008 the Treasury Market Practices Group (“TMPG”) announced four new market practice recommendations, which included; (1) introduction of a fails penalty rate, (2) broad-based margining of fails, (3) encouragement of more active attempts to cash settle fails after five days, and (4) creation of a tool to cure round-robin fails.⁵ The TMPG also recommended discussing with Treasury officials the development of a securities lending facility. (<http://www.ny.frb.org/tmpg/PR081112.pdf>)

If the first recommendation is implemented, dealers would have an incentive to borrow securities to cure settlement fails even if special collateral repo rates fell below zero. The TMPG is currently working intensively with Securities Industry and Financial Markets Association and other market participants to analyze legal and operational issues associated with making the November 12 recommendations a reality. The participants are committed to publishing an implementation timeline by January 5, 2009 although when the TMPG recommendations will become operational remains unclear. And unforeseen developments could arise that would block implementation of some or all of these market practice recommendations.

The current TMPG initiatives are unlikely to be implemented before mid-2009, and may not be implemented until some time in 2010. They involve coordinated changes in back office systems that are extraordinarily complex and have been built up over several decades. Changing a single system would not be cheap or easy; coordinated

⁵ Round-robin settlement fails are settlement fail chains that can be collapsed with sufficient information across various clearing platforms that operate independently in the OTC Treasury market.

change will be tougher and more expensive. In the meantime, having now experienced two episodes of chronic fails (one in 2003 involving a single security, the other in the past few months involving virtually every Treasury security), it would be important to have other options to address the problems of persistent fails and unusually expensive single issues. The snap reopenings in October 2008 directed at four issues that exhibited these symptoms were widely viewed by market participants as having been ineffective and in some ways even counterproductive. An alternative way to address problems caused by massive settlement fails, either at the zero bound or from another cause, would be for Treasury to gain statutory authority to lend new temporary supply of Treasury securities. The recent TMP recommendations included support for this development, but it would require Congressional action to become a reality.

A More In-depth Discussion of the Repo Markets⁶

Most market participants borrow and lend money and Treasury securities through repurchase agreements. A participant executing an RP sells securities (typically for same-day settlement) and simultaneously agrees to repurchase the same securities from the buyer at a higher price on a future date. The transaction is tantamount to borrowing money using securities as collateral, where the proceeds of the initial sale is the principal amount of the borrowing and the excess of the repurchase price over the sale price is the interest paid on the borrowing. The counterparty to the transaction executes a reverse RP, borrowing (or “reversing in”) securities against lending money.

There are two types of RPs. A *general collateral* RP is an RP in which the lender of funds is willing to accept any of a variety of Treasury securities as collateral. The lender is concerned primarily with earning interest on its money and having possession of securities that can be sold quickly in the event of a default by the borrower. A *special collateral* repo is an RP in which the lender of funds wants to borrow a particular security. It is, consequently, a device for borrowing and lending securities rather than borrowing and lending money. The rate on a special collateral RP is commonly called a “specials” rate. The owner of a security may be induced to lend the security if a dealer offers the owner an opportunity to borrow money at a specials rate below which the owner can re-lend the same funds on a general collateral reverse repo. If the demand to borrow is particularly strong, or if the supply of the security available for lending is limited, the specials rate for the security may be materially below the general collateral rate; the security is then said to be “on special.”

GC Repo Market

General collateral RPs provide a safe and low-cost way for mutual funds, depository institutions, and others to lend out surplus cash on a short-term basis, and they simultaneously provide dealers, hedge funds, and others a way to finance long positions and thereby support their market-making, risk-management, and speculative activities.

⁶ Much of this section reflects repo market discussion by Michael Fleming in 2003 note.

At a fed funds rate of 25 basis points, or even 12.5 basis points, the GC repo market might very well keep operating. Long positions would still need to be financed and lenders might still prefer to lend money on a secured rather than an unsecured basis. But were the funds rate and short-term market rates in general to fall closer towards zero, the incentives institutions now have to continue lending in the GC repo market could erode to the point that they may prefer to maintain higher balances on deposit with their clearing banks, and banks themselves could prefer to hold risk-free excess reserves rather than lend to dealers and others in need of financing. The distinction between a GC repo market and a specials market would also become blurred, and the kinds of persistent and widespread settlement failures that occasionally mark the repo specials market could begin to occur more generally (as noted in the following section, we did begin to observe such widespread breakdown in market function in recent months).

Repo Specials

The largest impact of a near-zero fed funds rate could stem from the compression of special collateral repo rates towards zero. Near-zero specials rates can be expected to lead to increased, persistent, and widespread settlement fails, which in turn could limit activity in the secondary market for outright transactions, and ultimately increase issuer financing costs. Such reduced activity would likely be accompanied by a curtailment of dealers' positions, long or short, leading to reduced financing demand for long or short positions.

Chronic and widespread settlement fails have the potential to affect the functioning of the markets for outright transactions. A chronic fail increases the risk of loss in the case of counterparty insolvency.⁷ The prospect of loss will lead market participants to devote resources to monitoring such risks and could lead them to limit their secondary market trading. Concerns that settlement problems could affect secondary market liquidity led Treasury officials to sell 10-year notes on an unscheduled basis after September 11, 2001, and more recently (on October 8, 2008) to reopen four notes in snap offerings.

While the aggregate size of fails reached record levels earlier this fall, it was the widespread nature of the fails; with between 100 and 200 issues failing on any given day, that was most striking. Part of the reason for such widespread fails seems to have been the low Treasury GC rate and the resulting compression of special rates. Another factor was the pullback of securities lenders, who normally arbitrage the rate spread between the specials repo market and other wholesale repo markets, because of heightened counterparty credit concerns and market volatility on the reinvestment side of the business. More recently, fails have subsided significantly. On November 14, 2008, aggregate FICC fails were about \$110 billion, the lowest since September 19, 2008 and roughly equal to average levels for the year.

⁷ This risk is significantly mitigated by mark-to-market conventions (such as those followed by the Fixed Income Clearing Corporation).

As we have seen, a fed funds rates below 50 basis points has been associated with increased settlement fails for virtually all Treasury issues. Specials rates are sometimes observed to be close to zero for certain securities, showing that some dealers are willing to go to the trouble of borrowing securities when the incentive to do so appears exceedingly small.⁸ A fed funds rate of 50 basis points might therefore provide sufficient margin for those who are short to borrow and for those who are long to lend.

However, recent experience shows there is a risk of a sharp divergence between Treasury GC rates and the effective federal funds rate (and short-term funding rates in general), with the Treasury GC rate falling substantially below other wholesale funding rates during episodes of flight to safety (for example, at year-end or in response to elevated stock market volatility). At a 50 basis point target, a divergence smaller than what has been observed this fall would be sufficient to severely disrupt specials trading and cash markets, and such disruption might be more persistent than that observed this fall with the target rate at 1.50 and 1.00 percent.

At a fed funds rate of zero, if the TMPG initiatives have not been enacted, there would be no incentive to make delivery and fails could be expected to increase considerably and persist. Securities lending would likely cease and cash trading volumes decline further, as Treasuries became a “long only” market, with market makers unwilling to sell securities they did not already have in inventory.

⁸ Similarly, dealers will often borrow securities from the Federal Reserve at a fee close to the GC rate in order to avoid failing, even though the incentive to do so appears small. Both of these cases may be explained by a dealer not wanting to fail for reputational and/or other reasons.