



STP Advisory Services, LLC

Settlement Failures in Bond Markets

Susanne Trimbath, Ph.D.

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Comments welcome at Susanne@stpadvisors.com

**WWW.STPADVISORS.COM
2118 WILSHIRE BOULEVARD, #596
SANTA MONICA, CA 90403
(310) 285-8153**

Abstract

In this study, we estimate the value of settlement failures in the US bond markets, including trades in US Treasury, federal agency, mortgage-backed, corporate and municipal bonds. The total value of bonds outstanding is not well known: in fact we find three different estimates for municipal bonds outstanding. We further find the information on trading in bonds to be scattered and incomplete. The Federal Reserve Bank of New York (FRB) is the only source of data on settlement failures in bond markets. Although their data is limited to voluntary reporting by 22 “Primary Dealers” (those who have trading relationships with the FRB), statistics dating back to 1999 have been made available to the public since 2004.

Several explanations have been offered for settlement failures in capital markets. The market for US Treasury securities offers an opportunity to refute one possible explanation for settlement failures: the limited supply of shares available for lending. After extraordinary settlement failures occurred in September 2001, the Treasury issued additional bonds in an attempt to alleviate the problem by increasing the pool of available bonds. FRB research, however, indicates that settlement failures were not corrected as quickly as this theory would suggest. We conclude that further research is needed not only on the causes of trade settlement failures but also on the impact they have on investors.

Analyzing data from multiple sources, we estimate the total value of settlement failures in US bond markets to have been \$424 billion in bonds as of December 27, 2005. On average, nearly 8% of bond trades failed to settle on time in 2005. Statistics for 2006 were substantially better, with just under 5% of traded bond value failing to settle.

About the Author

Dr. Trimbath is a former manager of depository trust and clearing corporations in San Francisco and New York. She is co-author of *Beyond Junk Bonds: Expanding High Yield Markets* (Oxford 2003), a review of the post-Drexel world of non-investment grade bond markets. In addition to works cited in this study, Dr. Trimbath is author of “Bond Market Development in Select Asian Countries,” (with G. Pace, Milken Institute Working Paper 2003-02), which includes a comparison of the development of bond markets consistent with Islamic finance.

Introduction

There are two main sources for information about trade settlement failures: the National Securities Clearing Corporation (NSCC) and the Federal Reserve Bank of New York (FRB). From data they make public, we know the current-market value of settlement failures by NSCC Participants at the end of 2005: \$6 billion. We also know the trade-date value of bond settlement failures by the FRB Primary Dealers around the same time: \$246 billion. NSCC does not provide separate failure statistics for equities and bonds. The 22 Primary Dealers, who report only on bond activity, are less than 10% of the 263 Participants that use NSCC to settle bond activity.¹

There are several factors that account for the difference between the NSCC fail data and the FRB fail data. The first is that one is in current-market value and the other is in trade-date value. If, as is widely suspected, settlement failures put downward pressure on prices by artificially inflating the number of securities available for sale, then one could reasonably expect current market value to be less than trade date value. Second, the NSCC reports a “net” figure while FRB reports gross settlement failures. Therefore, NSCC does not age fails while the FRB data accumulates fails across the number of days that any one failure remains open.

Another subsidiary of DTCC, the Fixed Income Clearing Corporation (FICC), provides a range of clearing and settlement services for bond trades. A separate paragraph is provided in DTCC’s annual financial statements for contingent liabilities of FICC, similar to the paragraph provided on NSCC. Some bond settlement is passed to NSCC and some settlement services are provided by the Government Securities Division (GSD) of FICC for specific, limited bond types (see below for details, including the full description of FICC’s contingent liabilities).

Because reporting for bond market activity is fragmented, no one source provides a complete picture of either trade volume or settlement failures for all bonds. Reconciling multiple datasets requires some interpolation. This paper is an attempt to analyze

¹ In addition to the 263 Participants who subscribe to NSCC bond services, there are another 1,740 firms which have correspondent relationships with the subscribing Participants.

information from several sources and estimate the value of settlement failures in US bond markets.

Background

Despite the enormous size of the US bond market, these financial instruments are not well understood by the general investing public. For example, many people are only exposed to the concept of debt securities when voting for the bond financing used by many municipalities and school districts to fund buildings and construction. There are, in fact, at least 7 types of debt which are publicly traded (see table below). In contrast to stocks (equities) which pay dividends based on earnings, bonds pay a rate of interest which can be fixed at the time of issuance, hence the term “fixed income securities.”² The terms “bonds” and “fixed income securities” are often used interchangeably. For convenience, in this study we will refer to debt instruments in general as “bonds.” The exact size of the market is not accurately known. For example, according to SEC (2004), the amount of municipal bonds outstanding in 2000 was reported as \$2.0 trillion by Standard & Poor’s KennyBase Database Services, as \$1.6 trillion by the Flow of Funds Section at the Board of Governors of the Federal Reserve System and as \$1.5 trillion by the Census Bureau.

Outstanding U.S. Bond Market Debt

Bond	\$US billion*
Municipal	2,337.5
Treasury	4,283.8
Mortgage-Related	6,400.4
Corporate Debt	5,209.7
Federal Agency Securities	2,665.2
Money Markets	3,818.9
Asset-Backed	2,016.7
Total Bonds	\$26,732.2

*These figures are from the Securities Industry and Financial Markets Association as of September 30, 2006.

² Actually, significant amounts of publicly traded debt pay variable rates of interest. However, the term “fixed income” continues to be applied to these securities.

It is well known that there are \$6 billion in unsettled trades on the books of the National Securities Clearing Corporation (NSCC), which is the nation's only centralized clearing and settlement organization for stock trades and a subsidiary of the Depository Trust and Clearing Corporation (DTCC). DTCC is also parent to the Fixed Income Clearing Corporation (FICC) which is the nation's centralized clearing organization for bonds.³

NSCC "clears and settles all broker-to-broker equity, *corporate and municipal bond* trading in the U.S." so that some portion of the \$6 billion in settlement failures is relevant to bonds.⁴ There are 263 Participants (members) at NSCC who subscribe to bond clearing services.⁵ Two-thirds of those members use continuous net settlement services.⁶ NSCC also clears government agency bond trades executed on the New York Stock Exchange (NYSE). The Government Securities Division (GSD) of the FICC provides clearance and settlement services for transactions in U.S. government bonds, including Treasury securities and Federal Agency securities. Finally, the Mortgage Backed Securities Division of FICC provides separate services for 139 clearing members trading in mortgage-backed bonds.

The amount of bonds traded and the amount settled are not the same because of the process known as "netting." In netting trade obligations, NSCC uses bonds due to a participant to offset bonds due from the same participant in the same security. A similar process takes place for money settlement (except that money due to/from participants is netted regardless of which security was traded). This results in settlement obligations usually being less than the total amount traded. This process is believed to benefit the financial markets by simplifying final settlement. For example, of the approximately \$494 billion in trade obligations processed at NSCC on the peak activity day in 2004, only about \$12.5 billion actually changed hands. That is, after netting "due to" against

³ The Federal Reserve Bank of New York provides these services only for trades to which it is a party.

⁴ DTCC 2004, p. 16 (print version, emphasis added). Only 12.5% of municipal bond trades are broker-to-broker (SEC 2004).

⁵ These statistics are based on Participant accounts, not corporate entities; some companies have more than one Participant account. Twenty-five Participants use FICC services for only corporate bonds and 89 use municipal bond services only. The remaining 149 Participants use FICC services for both. In addition, there are 1,749 accounts which execute municipal bond trades on their own behalf but use another firm's account for clearing.

⁶ The other 84 specify trade-for-trade settlement in bonds.

“due from” for each Participant in each security, about 3% of the value remained to be exchanged.

Entity	Annual Settlement	Daily Settlement*
DTCC	\$1.1 quadrillion	
NSCC		\$398.4 billion
Equities		\$386 billion
Corp. Bonds and UITs		\$12 billion
FICC US Govt. and MBS		\$11.2 billion

*Estimated based on 252 settlement days per year in 2004

Currently, most US government securities are traded “ex-clearing” on the New York Stock Exchange (NYSE), i.e., the parties arrange for manual clearing and settlement. The NYSE has plans to change this arrangement in 2007 so that all bond trades executed there will clear and settle through (a subsidiary of) DTCC. NYSE recently received Securities and Exchange Commission (SEC) approval to allow trading of about 6,000 bonds that are not listed on NYSE. In any event, the amount of bond trading on the NYSE is currently minimal compared to the entire market. For example, on January 19, 2007, only 299 bonds were traded on the NYSE, with a value of just over \$300,000.⁷ In contrast, the Federal Reserve reports a daily average of \$22 million in corporate bond trades from just 22 dealers.⁸

NSCC’s Participants include the 22 Primary Dealers who have a trading relationship for US Treasury securities with the Federal Reserve Bank of New York (FRB). The Primary Dealers make reports to the FRB about their positions and transactions in most types of bonds, including corporate bonds. However, data “goes unreported if neither the buyer nor the seller is a primary dealer.”⁹ Bond market settlement failures are reported to the FRB on a cumulative basis using trade date values.¹⁰ Therefore, these settlement failure

⁷ One bond is equivalent to \$1,000 face value. Bond prices are quoted per \$100.

⁸ For the nine months from January through September, 2006.

⁹ Form FR2400 is used to report this information.

¹⁰ “Settlement fails are reported on a cumulative basis for each week, including nontrading (sic) days. For example, if a dealer fails to deliver \$50 million of securities to a customer as scheduled on a Thursday, but makes delivery on Friday, one day late, then the dealer reports \$50 million in fails. However, if the delivery

figures are not easily reconciled with the numbers released by DTCC. DTCC generally “re-nets” settlement failures, that is, failures are re-set to zero each morning and only the end of day fails are recorded. On the FRB reports, a settlement failure reported as \$10 billion could be a \$1 billion trade that remained failed for 10 days or a \$10 billion trade that failed for only one day. As a general convenience, FRB researchers divide total reported weekly fails by 7 to arrive at an average daily settlement failure statistic that is more closely comparable to the NSCC data.

It is difficult to determine how much of total bond trading (and therefore total bond settlement failures) are represented by these Primary Dealers because there is no one source for all the trading volume in bonds in the US. The FRB data includes financing and lending (repurchase agreements and reverse repurchase agreements) but the bond trade data available from other sources does not. Similarly, settlement failures reported to the FRB include restricted bonds (Rule 144A securities) but bond transaction data available from the National Association of Securities Dealers does not.¹¹ Furthermore, mortgage-backed bonds are included in the Primary Dealer reports, but are settled separately from NSCC’s continuous net settlement system.¹² Finally, NSCC settles municipal bond trades and the Primary Dealers do not report activity in those bonds.¹³

Importance of the Topic

According to Federal Reserve data, nearly three-fourths (73 percent) of Americans’ liquid financial assets are invested in securities-related products, such as stocks, bonds, and

is not made until Monday, four days late, then the dealer reports \$200 million in fails (\$50 million 4 days). Fails thus continue to be counted until settlement occurs.” Fleming and Garbade, 2005. In contrast, FICC introduced in 2006 a program for “re-netting” settlement failures. See “[TK]” section below.

¹¹ For example, in September 2006, NASD reported an average daily trading volume of \$14 billion for system-eligible bonds traded by their 2,205 reporting members (including all 22 primary dealers). The primary dealers, on the other hand, reported a daily average of \$25.1 billion in corporate bond trades for the same month. The difference is attributable to 1) the number of reporting entities which should make the figure higher for the NASD and 2) the number of eligible bonds being reported which would make the figure lower for the NASD.

¹² The Mortgage Backed Securities Division of FICC provides net settlement for 228 Participants. No settlement failure (or contingent liability) information is made available in the annual reports.

¹³ Also, according to Fleming and Garbade (2002): “If the dealer’s clearing bank and the investor’s custodian are the same depository institution, securities are transferred from the seller to the buyer, and funds are transferred from the buyer to the seller, on the books of the common custodian and without either Fedwire or depository activity.” Such activity may not be included in any reports.

mutual funds (with the balance in bank deposits and certificates of deposit). Shapiro (2006) describes the dangers that come from allowing settlement failures in equity markets. Many of the same dangers exist in the bond markets. The problem of “phantom shares” being created by share entitlements in customer investor accounts is explored in Shapiro (2006) and detailed in Trimbath (2006a). The bond market shares this problem. When there are more bonds in circulation than exist (i.e., more than were issued), there is a negative impact on market price, as well as damage done to the issuer’s on-going ability to access capital. There are some differences. For example, while shareholder voting rights are damaged in equity market settlement failures, bondholders do not have an equivalent right. Conversely, bondholders have some rights during bankruptcy that shareholders do not (see Wittie 1999).

One problem common to both equity and bond market settlement failures is the use of customer funds between the settlement date and the date when securities are eventually delivered (the close-out date). Fleming and Garbade (2004) explain it this way in the case where the trading is among dealers:

“Because the buyer does not pay the seller until the seller delivers the securities, the seller loses (and the buyer gains) the time value of the transaction proceeds over the fail interval. This time value can be quantified as the interest that could have been earned on the transaction proceeds in the overnight federal (fed) funds market or in the closely related market for general collateral (GC) repurchase agreements. The prospect of losing the time value of the transaction proceeds provides an incentive for the seller to make delivery on the settlement date or as soon as possible thereafter.”

Unfortunately, individual investors (customers) are not included in this reciprocal arrangement. Retail investors are charged the cash portion of their transaction on settlement date regardless of whether or not the seller fails to deliver securities to the buyer’s broker (Alsin 2006). The vast majority of bond trades involve non-dealers (customers). According to SEC (2004), 87.5% of trades in municipal bonds in 2000 involved customers. While the buyer’s broker may enjoy the proceeds of investing the purchase price of the bonds, the individual investor does not. Furthermore, industry practice, supported by the Uniform Commercial Code, allows the executing broker to credit the customer account with an “entitlement” so that the investor is not informed that

the broker is using the proceeds of the trade without compensation. Unlike securities lending, this does not require that the investor has a “margin” account agreement, whereby they are made aware when the account is opened that the broker may profit from funds and/or securities left in their account. Every customer account is vulnerable to this practice.

Unique to bond markets, bondholders have certain rights in bankruptcy proceedings that are not shared by stockholders. The peculiarity of book-entry-only bonds (where no certificates are issued other than a master certificate at DTCC) worked against bond holders in the 1994 Orange County bankruptcy proceedings. The County argued that the Uniform Commercial Code (section 8) did not provide protection for the bondholders because the notes were not certificated securities and, even if they were, the bondholders were not "holders" of those securities because the only certificate was registered to DTCC (Wittie, 1999). Under a scenario where failures to deliver result in multiple parties having claims to the same underlying securities, where certificates are not available the retail investor may not be able to press their claim to ownership.

These problems are not limited to the US, although that is the focus of this study. In a 2004 survey of banks' and investment firms' risk management practices, the Bank for International Settlements reported finding a range of practices for tracking unsettled trades among firms in the 10 largest countries:¹⁴

“Some firms do not track failed trades at all, some firms track all unsettled trades, and some firms track only certain types of trades that fail to settle (e.g. foreign exchange trades or those perceived to have heightened delivery risk. ... [O]ne firm tracks extended settlement trades beyond 45 days in its credit system. Some firms noted the role of the operations area in tracking failed trades, as many are due to operational problems rather than credit issues.” (BIS 2005)

In the US, we have to rely on two organizations that lack transparency for data on bond trades and settlement failures. Some data is only released by the DTCC through the SEC under Freedom of Information Act requests. Another source of data, the Bond Market Association, is now part of the Securities Industry Association, the authors of the April

¹⁴ These countries, commonly referred to as the G-10, are Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, Netherlands, Spain, Sweden, Switzerland, United Kingdom of Great Britain and Northern Ireland, and United States of America

2005 letter recommending that proxy votes be assigned to shareholders by lottery. The bright light among data sources is the FRB. Although the FRB has only been getting reports from a limited number of dealers since 1990, they began making aggregate settlement failure data public in 2004, including data from earlier periods.

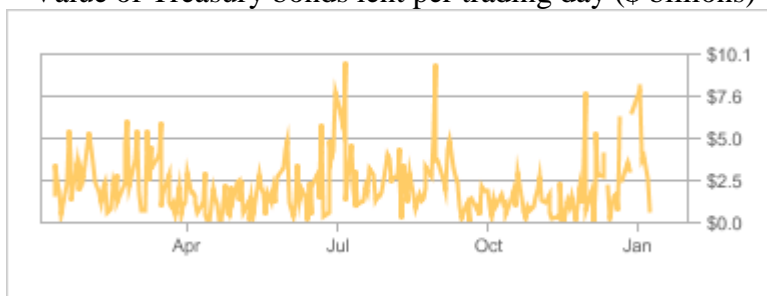
Federal Reserve Bank of New York

At a conference held in New York in October 2006 (Trimbath, 2006a), we expressed concern about the combination of short sales with stock lending and settlement failures. Staff members from the FRB who were in attendance described similar concerns in private comments about activity in the bond markets. According to data and staff research available from the FRB, settlement failures are prevalent in the market for US Treasury bonds. Transactions to which the FRB is a party are settled directly with them and not through any other clearing corporation. Therefore, the FRB has a great deal of control over that bond market activity because they are able to hold cash overnight without interest and assess penalty fees directly to the Primary Dealers. However, trades in Treasury bonds that do not involve the FRB may be settled at the DTCC. Operations staff at FRB suggested that the actual size of the problem in the bond markets could be many times the size of known equity market settlement failures.

The FRB provides a temporary source of bonds to cover settlement failures (and for other purposes) through a Securities Lending program. The program offers bonds for loan from the System Open Market Account. Bond loans are awarded to primary dealers based on competitive bidding in an auction held each business day at noon (ET).¹⁵ Loaned securities that are not returned on the maturity date prior to the close of business are extended an additional business day and re-priced at a rate typically equivalent to the prevailing general collateral rate.

¹⁵ Compare this to DTCC's Stock Borrow Program.

Value of Treasury bonds lent per trading day (\$ billions)



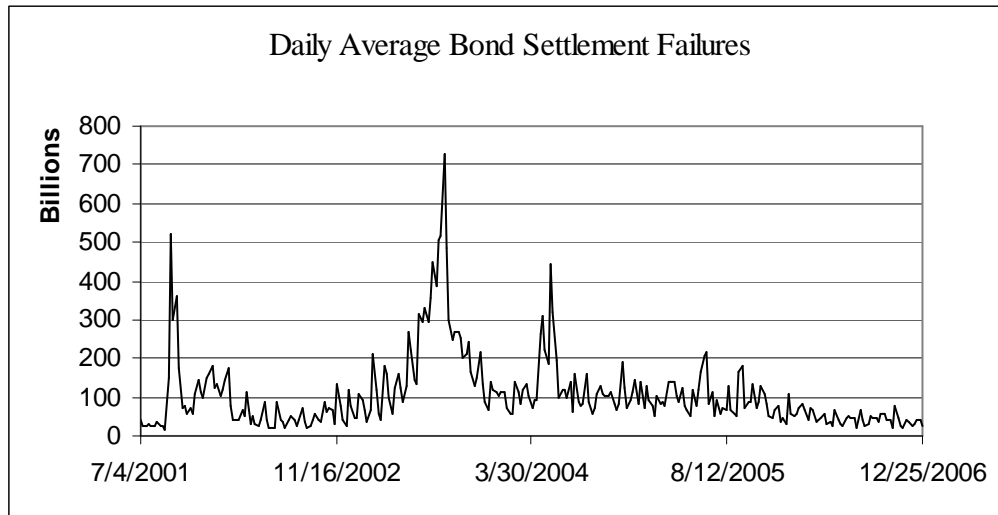
Twelve months to January 10, 2007.

Source: Federal Reserve Bank of New York

In September of 2001, the FRB noticed an extraordinary number of bond trades that failed to settle. On September 19, 2001, the reported value of unsettled bond trades peaked at \$3.6 trillion.¹⁶ An analysis by two FRB economists, published in 2002 (Fleming and Garbade), suggested that at least part of this was the result of records that were lost or destroyed during the September 11, 2001 attacks on the World Trade Center in Manhattan. Fleming and Garbade also attributed the extraordinary increase in failures to investment decisions similar to the “strategic failure” theory later put forth by Boni (2004) to explain settlement failures in the equity markets. In the case of bond market failures, interest rates and cyclical (quarterly) financing needs are statistically related to the rate of settlement failures.

In fact, in 2001 settlement was postponed for 3 or 4 days while lower Manhattan was closed. FRB settlement failure statistics data are accumulated so that some multiple of average failures would have been expected. The reported value of \$3.6 trillion includes failures to receive as well as failures to deliver, a statistic we use here so it is comparable to DTCC’s \$6 billion. (Neither statistic includes securities loaned to prevent failures to receive.) However, the FRB figure is only for trades by and among the Primary Dealers, i.e., it does not include trades to which at least one of them is not a party. In their subsequent report (Fleming and Garbade 2005) they offered further explanations, including the lack of clear incentives to avoid failing, such as the fees and penalties suggested in their earlier report.

¹⁶ This is only for the Primary Dealers who voluntarily submit form FR2400 to the FRB. It includes all settlement failures in US Treasury, Federal Agency, Mortgage-backed, and Corporate bonds.



Settlement failures in *corporate* bonds reached a maximum of \$117 billion on September 19, 2001. They matched their pre-September 11 high on October 3, 2001 (about \$71 billion) and the pre-September 11 low by January 2002 (about \$37 billion). After declining post 9/11/01, the upward trend of failures in corporate bonds peaked in May 2004.

Total bond settlement failures reported by the Primary Dealers surpassed the September 2001 total on August 20, 2003 and nearly matched it again on May 19, 2004 (see chart).¹⁷ There is little reason to blame settlement failures on paperwork and certificates for bond transactions which have been virtually all book-entry since the 1980s. Even equity certificates are next to nothing. According to a research study by the Securities Industry Association (SIA), certificates are involved in “just over one-tenth of 1% of all trade transactions processed daily” (cited in DTCC 2004, p. 23). In 1991, for example, about 40% of all municipal debt was issued exclusively in book-entry form. By 1999, that percentage had climbed to 88%, an indication of significant progress in DTCC’s drive to eliminate paper certificates (DTCC 1999, p. 27).

¹⁷ Settlement failures in corporate bonds reached a maximum of \$117 billion on September 19, 2001. They matched their pre-September 11 high on October 3, 2001 (about \$71 billion) and the pre-September 11 low by January 2002 (about \$37 billion). After declining post 9/11/01, the upward trend of failures in corporate bonds peaked in May 2004.

Contrary to suggestions presented by Lamont (2006), increasing the supply of bonds available for lending, as the FRB did in 2001, did not lead to a reduction in settlement failures. Post-9/11, the Treasury issued an additional \$6 billion of already outstanding 10-year notes “to help resolve an extraordinary volume of settlement fails precipitated by the attacks of September 11” (Fleming and Garbade 2002).¹⁸ Despite their suggestion that “[o]ne way to alleviate chronic fails in an issue is to increase the issue’s outstanding supply,” Fleming and Garbade noted that fails did not resolve quickly post-9/11. Given that the 2001 settlement failures turned out to have other, as yet undiagnosed, causes than the loss of paperwork and records from the World Trade Center destruction, the Treasury did not attempt a similar fix in 2003 or 2005.

The Fixed Income Clearing Corporation

The Fixed Income Clearing Corporation (FICC), a subsidiary of DTCC, provides matching for trades in corporate and municipal bonds and Units of Investment Trust (UITs). However, clearance and settlement is provided at NSCC for these trades. FICC’s Government Securities Division, on the other hand, offers Net Settlement Services for US Treasury securities.¹⁹ Transactions in Treasury bonds normally settle on a next-day basis.²⁰ Mortgage Backed Securities (MBS) are also processed separately by a division of NSCC.²¹

According to FRB, the FICC “is a net settlement organization with a trade comparison facility that limits fails attributable to miscommunication, and a netting and novation

¹⁸ Fortunately, no such cure can be attempted with corporate bonds, where the value outstanding is more tightly controlled as corporate capitalization and where the issuance of new securities would require time-consuming (and often expensive) registration with the Securities and Exchange Commission. Further, municipal bonds often require voter or legislative approval for issuance.

¹⁹ On a daily basis, FICC provides “centralized, automated clearance and guaranteed settlement for over \$2 trillion in buy/sell and repurchase agreement (Repo) trades” in Treasury bonds. Quote from DTCC website.

²⁰ For more background on settlement in Treasury bonds, see Fleming and Garbade (2002).

²¹ In 2004, DTCC allowed “FICC’s comparison and settlement processes to provide some support for many U.S. Government securities transactions executed by the institutional or ‘buy’ side.” Further to developing services for the buy-side, in 2005 FICC worked toward “providing central counterparty (CCP) capabilities to mortgage-backed securities. ...It will, ultimately, provide members with the ability to compare and net their MBS trades, allocate pools to net settlement obligations and subsequently net and settle pool obligations with FICC as guarantor and contra-side to all activity, as FICC does for the government securities world.” DTCC 2004.

facility that limits daisy chain and round robin fails among its members.”²² “Novation” is the process whereby a new legal obligation is substituted for an old one; in this case, FICC (or NSCC) steps in as the counterparty to every member’s settlement obligation. Therefore, DTCC is ultimately responsible for final settlement.²³

Of particular concern for the purpose of this study are the contingent liabilities of FICC which are described this way according to DTCC (2005):

“The GSD’s netting system interposes FICC between netting GSD participants for eligible trades that have been netted. The guarantee of net settlement positions by FICC results in potential liability to FICC. Guaranteed positions that have not yet settled are margined and marked-t-market daily. ... At December 31, 2005 the gross amount of guaranteed positions due from netting GSD participants to FICC, which are scheduled to settle on or before January 3, 2006, approximated \$445,415,299,000 and the amount scheduled to settle after January 3, 2006 approximated \$380,772,748,000. There is an equal amount due from FICC to certain other GSD participants after consideration of deliveries pending to FICC....”²⁴

We are less concerned about liabilities that have future due-dates, as these have not yet failed. Rather our interested is in how much of the \$445 billion resulted from settlement failures. In the Government Securities Division (GSD), failures to deliver should equal failures to receive in every security because GSD does not trade securities for its own account and does not have a program equivalent to NSCC’s “Stock Borrow Program.”²⁵

This detail appears in the same note to DTCC’s financial statements as the now well-known “\$6 billion in fails” (see Thompson 2005). The language is similar enough to suggest that the FICC figure reveals information about settlement failures in the bond markets.

²² Guide to FR2004 Settlement Fails Data, Federal Reserve Bank of New York. A daisy chain occurs when a seller is “unable to deliver securities because of a failure to receive the same securities in settlement of an unrelated purchase ... A daisy chain becomes a ‘round robin’ if the last participant in the chain is itself failing to the first participant.” (Fleming and Garbade 2002).

²³ The proper functioning of the system [financial markets] depends on the “guarantees of performance made by all the parties in the chain affirming that they will honor their obligations despite a default by another party in the system.” See Jackson v. Mishkin (In re Adler, Coleman Clearing Corp.), 263 B.R. 406, 476 n. 47 (S.D.N.Y. 2001).

²⁴ Note 10 Commitments and Contingent Liabilities in DTCC (2005).

²⁵ See section above for information on the FRB’s Securities Lending program.

In 2005, FICC processed \$678 trillion in transactions and made settlement for \$206 trillion, a 70% reduction in obligations due to netting. This is substantially less than the overall 97% reduction due to netting that NSCC achieves. Based on 252 business days, the reported daily average transactions are \$2,690 billion with \$807 billion settled. That is, after netting credits against debits for each Participant in each security, about 30% of the value remained to be exchanged. Primary Dealers reported daily average trades of \$184.2 billion in corporate bonds, \$251.6 billion in MBS, and \$78.8 billion in agency bonds for a total of \$514 billion. Therefore, we suggest that Primary Dealers may account for about 20% of FICC activity.

Other Sources of Data

Trade Reporting and Compliance Engine TRACE

TRACE was introduced in July of 2002 by the National Association of Securities Dealers in order to facilitate the disclosure of bond trade and price data, especially for below investment grade corporate bonds (“junk bonds”) which received less coverage than higher-grade bonds.²⁶ (See Trimbath 2004 for a discussion of the role of TRACE in price and volume disclosures in corporate bond markets.) TRACE consolidates transaction data for about 27,000 eligible corporate bonds reported by 2,153 reporting firms (NASD 2005). The 50 largest firms account for about 74% of all trade data reported to TRACE.²⁷ TRACE reported about \$16.5 billion in average daily trades in corporate bonds for 2005. Although NASD claims that this “public transaction information on OTC bond activity” represents “over 99 percent of total U.S. corporate bond market activity” the Primary Dealers alone reported average daily transactions of \$189 billion in 2005, a figure more than 10 times that reported to TRACE.²⁸

²⁶ See Trimbath (2004) for a discussion of the role of TRACE in price and volume disclosures in corporate bond markets.

²⁷ The top 50 TRACE reporting firms account for about 85% of all customer trades and about 72% of all inter-dealer trades.

²⁸ Transactions effected pursuant to Rule 144A are not disseminated by TRACE (NASD Trace Fact Book 2005). However, they are included in data reported to the FRB by the Primary Dealers.

*Municipal Securities Rulemaking Board (MSRB)*²⁹

MSRB provides statistical information on activity patterns in the municipal bond market. The statistics come from trade information submitted by dealers to the MSRB's Transaction Reporting System. According to this source, monthly trading in municipal bonds doubled from \$267 billion in June 2000 to \$538 billion in November 2006.

*Bond Market Association (BMA)*³⁰

BMA is the industry association for dealers in the bond markets. They claim to have membership representing “approximately 95% of the U.S. municipal bond underwriting and trading activity,” although our analysis shows that the activity in their reports is significantly shy of that mark. Now part of the Securities Industry and Financial Markets Association, BMA provides primarily bond price information. Through their companion website (www.investinginbonds.com) they provide information to investors interested in corporate, municipal, mortgage-backed and asset-backed bonds, plus all forms of federal government bonds.

Estimating Bond Settlement Failures

In this section, we bring together the various elements of data we've been able to gather on the size of the bond markets and the probability of settlement failures. To begin, in 2004, DTCC processed \$1.1 quadrillion of securities transactions. Less than 10% of those transactions settled at NSCC.³¹ Of the approximately \$402 billion settled at NSCC on an average day in 2004, about 3% represented matched and compared trades from FICC for corporate and municipal bonds and unit investment trust (UIT) trades. This would put the settlement value at about \$12 billion. By comparison, in 2004, the Primary Dealers

²⁹ “The Municipal Securities Rulemaking Board was established in 1975 by Congress to develop rules regulating securities firms and banks involved in underwriting, trading, and selling municipal securities – bonds and notes issued by states, cities, and counties or their agencies to help finance public projects.” www.msrb.org

³⁰ “The Bond Market Association® is the trade association representing the largest securities markets in the world, the estimated \$48 trillion debt markets. As the industry's voice, the Association speaks for the global bond industry, advocating its positions and representing its interests in New York; Washington, D.C.; London; Frankfurt; Brussels and Tokyo; and with issuer and investor groups worldwide.” www.bondmarkets.com

³¹ Based on 252 business days per year, that's about \$4.5 trillion per day at DTCC and about \$402 billion per day at NSCC. The remaining \$1 quadrillion of transactions settled would be at other DTCC subsidiaries, like the FICC's Mortgage Backed Securities Division or institutional transactions processed through the Depository Trust Company. DTCC's value-processed statistic increased 20-fold in the 5 years from 1999 to 2004.

reported average daily trades of nearly double that amount (\$21.2 billion) just in corporate bonds alone. Therefore, the statistics we base our settlement failure estimates on will encompass “ex-clearing” as well as transactions processed by DTCC.

FICC reports processing \$2 trillion per day in Treasury securities. By comparison, the Primary Dealers report an average of \$519.48 billion per day in transactions with an average fail rate in Treasury bonds of 3.2% (2006). That would indicate that the Primary Dealers represent about 25% of FICC activity in Treasuries. Extending the fail rate, we would expect to see about \$64 billion worth of Treasury bond settlement failures at FICC. These would be in addition to any other bond or UIT settlement failures for trades passed to NSCC for settlement.

In the week ending December 27, 2006, the Primary Dealers reported daily average bond transactions to FRB of \$698 billion with settlement failures of \$27 billion or 4%. The actual reported value of settlement failures for the week was \$189 billion, which counts settlement failures as accumulated over the number of days failed (aged), as explained in the earlier section.

In the section above on FICC, we estimated that the primary dealers represented about 25% of the bond transactions processed by FICC in corporate, municipal and federal agency bonds. For simplicity, we will use one factor to estimate the total trading activity in the various segments of the bond market under study. For this purpose, we choose to use a more conservative factor of 4 (i.e., as if the Primary Dealers represent 25% of bond activity) to estimate the market value of daily settlement failures in bond markets.

2006 Bonds	Daily Trades*	Fail Rate	est. Daily Fails
Municipal	\$ 12.2 billion	4.7%**	\$ 0.6 billion
US Treasury	\$1,951.7 billion	3.2%	\$ 62.5 billion
GSEs & Agencies	\$ 297.3 billion	3.0%	\$ 8.9 billion
Corporate	\$ 872.8 billion	3.7%	\$ 32.3 billion
Agency MBS	\$1,103.8 billion	8.9%	\$ 98.2 billion
Total	\$4,236.0 billion	Average 4.7%	\$202.5 billion

*estimated as 4 times average daily primary dealer transactions for 2006Q4; except Muni which was \$10.4 billion in 2000 (SEC 2004) that has been adjusted to 2006 dollars.

**estimated as average of known fail rates in other bond categories.

Fail rates were substantially higher in 2005, with an overall average of 7.7%. Despite only slightly higher transaction volume that year, the estimated daily fails were more than twice that of 2006.

2005 Bonds	Daily Trades*	Fail Rate	est. Daily Fails
Municipal	\$ 11.8 billion	7.7%**	\$ 0.9 billion
US Treasury	\$2,234.8 billion	9.3%	\$207.8 billion
GSEs & Agencies	\$ 332.1 billion	6.6%	\$ 21.9 billion
Corporate	\$ 782.2 billion	5.0%	\$ 39.1 billion
Agency MBS	\$1,033.4 billion	15.0%	\$155.0 billion
Total	\$4,394.3 billion	Average 7.7%	\$424.7 billion

*estimated as 4 times average daily primary dealer transactions for 2005Q4; except Muni which was \$10.4 billion in 2000 (SEC 2004) that has been adjusted to 2005 dollars.

**estimated from average of known bond categories

For Further Research

Settlement failures in bond markets should not be blamed on certificates and paper work, especially in bonds which have been virtually all book-entry since the 1980s. In 1991, for example, only about 40% of all municipal debt was issued exclusively in book-entry form. By 1999 that percentage had climbed to 88% an indication that the DTCC's drive to eliminate problems associated with paper certificates continued to make progress more than 20 years after its inception (DTCC 1999, p. 27). Even equity certificates are next to nothing. According to a research study by the Securities Industry Association (SIA), certificates are involved in "just over one-tenth of 1% of all trade transactions processed daily" (DTCC 2004, p. 23). More research is needed not only on the real causes of settlement failures but also on the real impact it has on investors.

A total of about \$7 billion remained unsettled at NSCC as of December 31, 2004, or about 58% of daily settlement in 2004. In 2006, DTCC referred to "\$6 billion" in settlement failures.³² This figure was revealed in DTCC's 2005 annual report (as of December 31, 2005) and was not revised throughout 2006. The DTCC Participants' funds (deposited to cover potential failures) stood at \$10.6 billion at year end. DTCC introduced changes recently to the risk calculations used to determine the amount of

³² "...fails to deliver and receive amount to about \$6 billion daily, again including both new fails and aged fails..." (Thompson 2006).

Participant fund deposits. The present research may aid in resolving questions about the sufficiency of those funds, given the fact that the rate of settlement failures differs across security types. Furthermore, the risk calculation should also include consideration of the possibility that obligations to the original investors may have to be met at trade-date value, not current-market value. In Appendix A we offer an estimate of the trade-date value of outstanding equity settlement failures at NSCC. This is only a very raw estimate since further work is needed to improve transparency in this area.

Effective September 22, 2006, DTCC established a process to automatically re-net settlement failures for all Government Securities Division members. At that time, DTCC's records "reflected that the failed obligations versus the GSD were no longer outstanding" because they had all been "resubmitted" for settlement. This process is already in place on the equity side where fails are re-netted and marked-to-market daily. While the most recently available financial statements reported \$380.8 billion due to and from FICC as of December 2005 (failed to deliver and failed to receive), the figure for 2006 will likely be reported as zero (i.e., not reported at all). However, according to the FRB the primary securities dealers alone had \$189.4 billion in settlement failures outstanding on December 27, 2006. Therefore, this study should be updated when DTCC's 2006 annual report becomes available.

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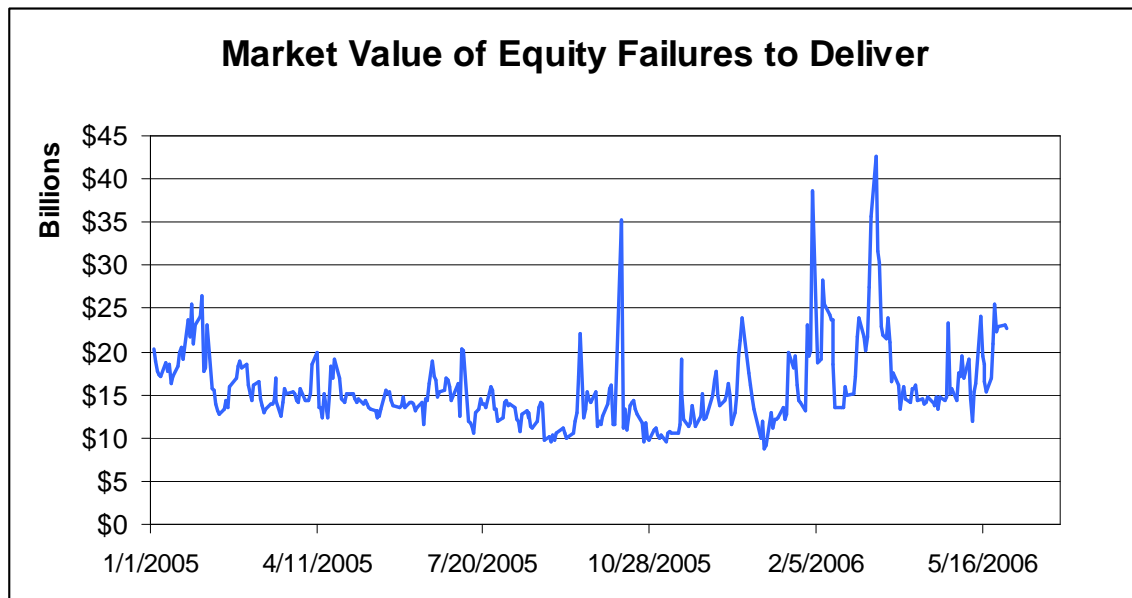
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Appendix A

Trade Date versus Marked-to-Market Value for Settlement Failures

The difference between trade date value and current market value (marked-to-market value) could be a critical piece of information for determining economic damages. The investor pays the trade date cost of securities when they make the initial purchase. In the typical settlement failure scenario, that trade would fail to settle when the seller does not deliver securities on settlement date. Various exchange, self-regulatory organization and Securities and Exchange Commission rules could be invoked to eventually prevail upon the seller to deliver the securities to the buyer. In a best-case scenario, after the seller fails to deliver, the securities would have to be replaced 13 days after the original settlement date which would be 16 days after the original trade date. Even under current rules, the seller could wait to purchase the securities at this later date, possibly at a lower price than the original buyer paid. Therefore, the seller would have gains equal to the difference between the trade date value and the later settlement date value. These gains (or losses) are in addition to any gains from having the use of customer funds as described earlier (see section on Importance of the Topic). Finally, it is well known that substantial numbers of shares are left undelivered well beyond the 16 day limit (Shapiro 2006).



The chart uses data obtained by Mr. David E. Patch through a Freedom of Information Act request to the Securities and Exchange Commission. We multiply the total number of shares reported as failed to deliver for NASDAQ issues by the average share price available from the National Association of Securities Dealers. The same method is used for New York Stock Exchange listed issues.

In contrast to the approximately \$3 billion in settlement delivery failures reported by NSCC as of December 31, 2005, we find the market value to be more than \$13 billion.