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**DOMESTIC OPEN MARKET OPERATIONS**  
**DURING 2008**

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A Report Prepared for the Federal Open Market Committee by  
the Markets Group of the Federal Reserve Bank of New York  
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FEDERAL RESERVE BANK OF NEW YORK, MARKETS GROUP

<b>I.</b>	<b>IMPLEMENTATION OF MONETARY POLICY IN 2008</b> .....	<b>1</b>
A.	INTRODUCTION .....	1
B.	OPERATIONAL PROCEDURES TO INFLUENCE THE FEDERAL FUNDS RATE .....	3
<b>II.</b>	<b>FINANCIAL ASSETS, OPEN MARKET OPERATIONS, AND LIQUIDITY FACILITIES</b> .....	<b>7</b>
A.	DIFFERENT TYPES OF OPEN MARKET OPERATIONS AND THEIR GENERAL USES.....	7
B.	REPOS AND REVERSE REPOS .....	8
C.	PURCHASES AND SALES OF U.S. TREASURY SECURITIES.....	13
D.	PURCHASES OF AGENCY DEBT SECURITIES.....	15
E.	TRADITIONAL STANDING FACILITIES.....	16
F.	NEW CREDIT AND LIQUIDITY FACILITIES .....	19
G.	INSTITUTION-SPECIFIC FACILITIES.....	25
<b>III.</b>	<b>CHANGES TO THE FEDERAL RESERVE BANK'S BALANCE SHEET</b> .....	<b>27</b>
A.	COMPOSITION OF THE BALANCE SHEET THROUGH SEPTEMBER 10, 2008.....	27
B.	COMPOSITION OF THE BALANCE SHEET AT THE END OF 2008 .....	27
<b>IV.</b>	<b>BANKS' DEMAND FOR RESERVE BALANCES</b> .....	<b>29</b>
A.	TOTAL BALANCE REQUIREMENTS.....	29
B.	EXCESS BALANCES .....	30
<b>V.</b>	<b>TRADITIONAL AUTONOMOUS FACTORS AFFECTING THE SUPPLY OF RESERVE BALANCES</b> .....	<b>32</b>
A.	FEDERAL RESERVE NOTES OUTSTANDING.....	32
B.	TREASURY'S BALANCE AT THE FED.....	33
C.	FOREIGN RP POOL.....	36
D.	FEDERAL RESERVE FLOAT .....	37
<b>VI.</b>	<b>TRADING IN THE FEDERAL FUNDS AND REPO MARKETS</b> .....	<b>38</b>
A.	THE FEDERAL FUNDS MARKET .....	38
B.	THE TREASURY AND AGENCY GENERAL COLLATERAL REPO MARKETS .....	41
<b>APPENDIX A:</b>	<b>AUTHORIZATION FOR DOMESTIC OPEN MARKET OPERATIONS</b> ...46	
<b>APPENDIX B:</b>	<b>GUIDELINES FOR THE CONDUCT OF SYSTEM OPEN MARKET OPERATIONS IN FEDERAL AGENCY ISSUES</b> .....	<b>48</b>

# DOMESTIC OPEN MARKET OPERATIONS DURING 2008

## I. IMPLEMENTATION OF MONETARY POLICY IN 2008

### A. Introduction

The Federal Open Market Committee's (FOMC) domestic policy directive prescribes that the Trading Desk (Desk) of the Federal Reserve Bank of New York (Federal Reserve) foster conditions in the market for Federal Reserve balances consistent with maintaining the overnight federal funds (fed funds) rate at an average around a specified target rate or within a range. Accordingly, the Desk arranges open market operations (OMOs) to keep the fed funds rate around the target rate and, as needed, to achieve other financial stability policy objectives of the FOMC.

This report reviews the conduct of open market operations during 2008. In the remainder of this section, the standard operating procedures that have been used by the Desk for many years to influence the fed funds rate are described, and key new developments in the policy implementation framework are summarized. In section II, the composition of financial assets held by the Federal Reserve, open market operations, and the various liquidity facilities that were implemented in 2008 are reviewed. In section III, changes to the Federal Reserve's balance sheet are examined. In section IV, the demand for balances at the Federal Reserve is presented, and in section V the behavior of the traditional autonomous factors – balance sheet items outside the direct control of the Desk – that affect the supply of these balances is reviewed. In section VI, the general behavior of the fed funds and repo markets in 2008 are presented.

#### *Impact of Financial Market Strains on Open Market Operations*

The financial market pressures that emerged in August 2007 intensified during 2008 and significantly impacted open market operations and other aspects of the monetary policy implementation framework. Balance sheets of financial institutions experienced extreme stress reflecting their holdings of an unprecedented quantity of structured products tied to underlying mortgages on the verge of default. As many of these formerly off-balance-sheet items and leveraged loans collapsed and were put back to the originators, their balance sheet pressures intensified. Many financial institutions were faced with the prospect of writing down the value of assets potentially depleting capital and driving leverage ratios higher. With a large number of institutions seeking to reduce the size of their balance sheets at the same time, downward price pressures on asset prices became even more extreme and many financial institutions found that they could sell troubled assets only at deeply discounted prices, if at all. As a consequence of resulting loss exposure from these troubled assets,

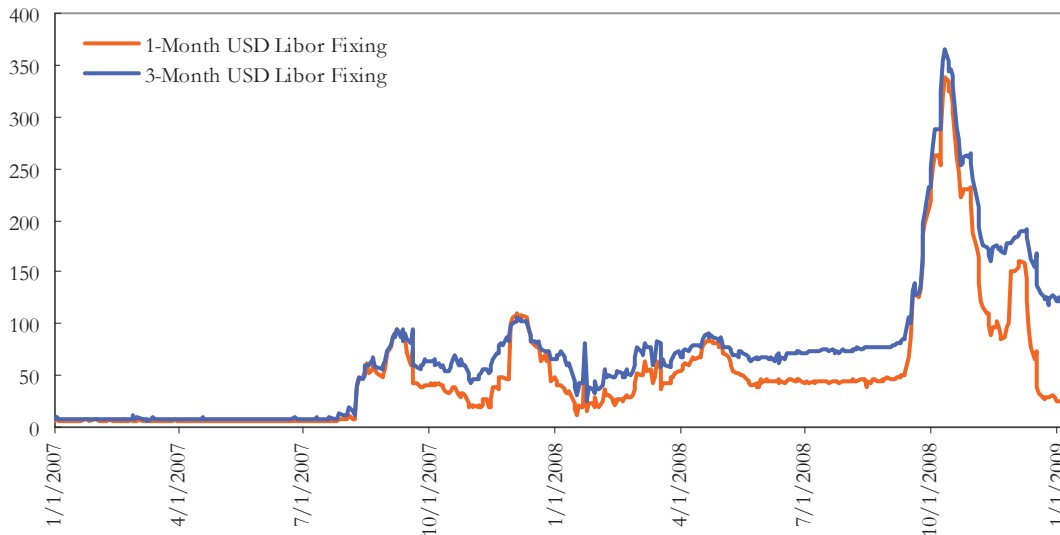
generalized counterparty credit concerns increased significantly and strained liquidity across financing markets.

An important indicator of the funding strains in the bank funding market was the spread between overnight and term unsecured interbank rates which reached record highs in 2008 (Chart 1) as risk-averse cash lenders shifted away from term to overnight lending. The elevated rates had direct effects on the overnight federal funds rate, and in turn on the Desk's conduct of open market operations.

Chart 1

Basis Point

**SPREAD OF LIBOR TO OVERNIGHT INDEX SWAP RATE**



*\*The Libor-OIS spread represents the difference between market rates and one measure of the expected path of the overnight effective rate for specific tenors. Historically, the spread had been narrow and relatively constant.*

This upward pressure on term bank funding rates was not only due to elevated counterparty credit concerns, but was also attributable to banks' heightened uncertainty about their own ability to secure appropriate funding. As a consequence, few market participants were willing to extend credit beyond one month and more typically would only trade on an overnight basis. During the year, a number of large, systemically-important financial companies failed, were acquired, or received liquidity support to remain going concerns. Spreads, as a measure of risk aversion, rose in the aftermath of Bear Stearns' acquisition by JP Morgan Chase in March, and spiked higher to new records in the fall following the Lehman bankruptcy in mid-September. These events underscored the perils of counterparty exposure in the current environment. The lack of liquidity in funding and credit markets, coupled with the deteriorating financial condition of numerous companies, began to impact

the real economy in the U.S. and overseas, prompting unprecedented policy actions from governments and central banks around the world in an attempt to maintain economic activity and stabilize fragile financial markets.

## **B. Operational Procedures to Influence the Federal Funds Rate**

### *Monetary Policy Changes in 2008*

The financial crisis that began in August 2007 intensified over subsequent months, posing a significant downside risk to the economic outlook. In this environment, the FOMC cut rates by 75 basis points and an unscheduled meeting on January 22 bringing the target federal funds rate to 3.50 percent. Eight days later, the FOMC cut the target rate an additional 50 basis points at its regularly scheduled meeting. The FOMC eased rates another 75 basis points at the March 18 meeting and an additional 25 basis points at the April 30 meeting, lowering the target rate to 2 percent. The FOMC kept the target rate at 2 percent for the next three policy meetings. However, the rapid deterioration of several financial institutions had such a profoundly negative impact on financial markets, liquidity, and sentiment that the FOMC cut the target rate 50 basis points during another unscheduled meeting on October 8. This rate cut was a coordinated policy action across a host of central banks.<sup>1</sup> As conditions continued to decline, the FOMC eased rates another 50 basis points to 1 percent on October 29. On December 16 (Table 1), the FOMC established a target range for the federal funds rate of 0 to ¼ percent.

*Table 1*

### **CHANGES IN FEDERAL FUNDS TARGET RATE and PRIMARY CREDIT RATE (percent)**

	<i>Federal Funds Target Rate</i>	<i>Primary Credit Rate</i>
December 11, 2007	4.25	4.75
January 22, 2008	3.50	4.00
January 30, 2008	3.00	3.50
March 17, 2008	3.00	3.25
March 18, 2008	2.25	2.50
April 30, 2008	2.00	2.25
October 8, 2008	1.50	1.75
October 29, 2008	1.00	1.25
December 16, 2008	0 to 0.25	0.50

Against the backdrop of a falling target fed funds rate, on Sunday, March 16, the Board of Governors (Board) further reduced the spread between the primary credit rate and the federal funds

<sup>1</sup> For full details, see [October 8 FOMC Statement](#).

target rate from 50 basis points to 25 basis points, and it maintained this spread over the remainder of 2008. Other important changes made to the administration of the primary credit facility during the year are described in Section II.E.

#### *The December FOMC Meeting*

During the fourth quarter of 2008, provisions of liquidity from new facilities added large amounts of reserve balances to the banking system, complicating the Desk's ability to maintain equilibrium in the fed funds market at the prevailing target rate. On December 16, with economic and financial markets continuing to deteriorate, the FOMC established a target range for the federal funds rate of 0 to ¼ percent, the lowest target for overnight fed funds trading in U.S. history.<sup>2</sup> The FOMC also noted that weak economic conditions would likely warrant exceptionally low fed funds rates for some time, and that policy going forward would be to support the functioning of financial markets and stimulate the economy through open market operations. The statement also noted that these measures would likely sustain the size of the Federal Reserve's balance sheet at a high level.

#### *Interest on Required and Excess Reserves*

Prior to mid-September, fed funds traded with some volatility but daily effective rates were relatively close to the target rate as the supply of and demand for reserve balances were generally aligned. After September 15, volatility increased and funds often traded well below the target rate as the banking system had large levels of excess balances. On October 8, the Board announced that it would begin to pay interest on depository institutions' required and excess reserve balances. The Financial Services Regulatory Relief Act of 2006 originally authorized the Federal Reserve to begin paying interest on balances held by or on behalf of depository institutions beginning October 1, 2011. In the face of financial market turmoil, however, legislative changes were made to allow the payment of interest on reserves effective October 9, 2008. In theory, the payment of interest on excess reserve balances allows the Federal Reserve to continue to use its lending programs to address conditions in credit markets while also maintaining the fed funds rate close to the target established by the FOMC.

In practice, a combination of circumstances prevented interest on reserves from working as designed. Several major participants in the fed funds markets, specifically Government Sponsored Entities (GSEs) and some of the Federal Home Loan Banks, are not depository institutions and thus not eligible to earn interest on reserves. As a consequence, they retained incentives to sell fed funds in

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<sup>2</sup> For full details, see [December 16 FOMC Statement](#).

the market at very low rates to earn some positive return. Perhaps more importantly, banks were not willing to arbitrage in the funds market to the extent necessary to keep the funds rate close to the target. Absent any balance sheet constraints, banks should be willing to purchase funds at a rate below that paid on excess reserves and earn a risk-free return by holding those balances in their accounts at the Federal Reserve. However, banks only marginally took advantage of this arbitrage as most viewed balance sheet flexibility to be more crucial. As a consequence, the funds rate regularly traded below the interest rate paid on excess reserves. This is discussed further in Section VI.A.

Initially, the interest rate on required reserves was set at the average target fed funds rate during a maintenance period less 10 basis points, and the interest rate on excess reserves was set at the lowest fed funds target rate during a maintenance period less 75 basis points (Table 2). As fed funds traded at rates well below the target rate in October, the Board narrowed the spread between the rate paid on excess reserves and the target rate to 35 basis points on October 22. On November 5, with funds trading close to zero, the spreads for each rate were set to zero, meaning that the rate paid on required reserves and the rate paid on excess reserves would generally be at the current target rate.

*Table 2*

**INTEREST PAID ON REQUIRED RESERVES AND EXCESS RESERVE BALANCES  
(percent)**

	<i>Interest on <u>Required Reserves</u></i>	<i>Interest on <u>Excess Reserves</u></i>	<i>Federal Funds <u>Target Rate</u></i>
October 9, 2008 to October 22, 2008	1.40	0.75	1.50
October 23, 2008 to November 5, 2008	1.11	0.65	1.50 and 1.00
November 6, 2008 to December 3, 2008	1.00	1.00	1.00
December 4, 2008 to December 16, 2008	0.89	0.25	1.00
Since December 17, 2008	0.25	0.25	0 to 0.25

*Implementation of Monetary Policy*

Historically, to influence the federal funds rate, the Desk conducts open market operations to align the supply of balances held by depository institutions at the Federal Reserve – or reserve balances – with banks’ demand to hold balances consistent with maintaining the fed funds rate around the target. Each morning, the Desk considers whether open market operations are needed based on estimates of the supply of and demand for reserve balances.

The average level of reserve balances that banks demand over a two-week reserve maintenance period has in large part been determined by requirements to hold reserve balances. While most large depository institutions generally demand balances equal to their requirements, many small institutions

demand some excess as a precaution against the risk of being overdrawn in their Federal Reserve accounts or incurring a penalty for a reserve requirement deficiency.

Depository institutions' holdings of reserve balances over the days within a reserve maintenance period are averaged to determine whether they meet their requirements, which provides reserve managers considerable leeway in day-to-day account management. This flexibility can absorb some volatility in the fed funds rate that might otherwise develop when reserve supply and demand are misaligned.

When assessing the implementation of monetary policy, the calendar year can loosely be divided into two time-frames: before and after September 15. Prior to mid-September, the Desk had been able to offset the effect of the additional reserve balances provided through new or expanded liquidity facilities, and it relied upon its traditional framework and operating procedures to control the federal funds rate. During this period, the Desk experienced considerable success in keeping fed funds trading around the target on average, although at times there was significant volatility in rates around the target. Even during this period, as the financial crisis intensified and put upward pressure on rates, the Desk occasionally suspended its normal approach of controlling the fed funds rate for brief periods in order to provide levels of excess reserves that were significantly above amounts typically demanded by banks, to prevent this bias from becoming deeply embedded in market expectations. As a result, rates often would be firm in the morning and drop precipitously at the end of the day. Perhaps more surprising was the occurrence of numerous days during the year when the Desk added what it deemed to be a high level of excess reserves and rates barely declined, or even firmed, over the course of the day.

After September 15, the magnitude of liquidity added to the system through various programs exceeded the Federal Reserve's ability to offset with draining operations. And from the point shortly afterwards when it began to pay interest on reserves up to the December FOMC meeting, the Federal Reserve adopted an entirely different framework and set of operating procedures to implement monetary policy. Under this new framework, it relied primarily on the level of interest paid on excess reserves to influence market rates, while largely accepting a generally very high and variable level of excess reserves. But despite the efforts described above to improve its control over rates by successively narrowing the spread between the rate paid on excess reserves and the fed funds target, the fed funds rate traded at levels significantly below-target.



## II. DOMESTIC FINANCIAL ASSETS, OPEN MARKET OPERATIONS, AND LIQUIDITY FACILITIES<sup>3</sup>

### A. Different Types of Open Market Operations and Their General Uses

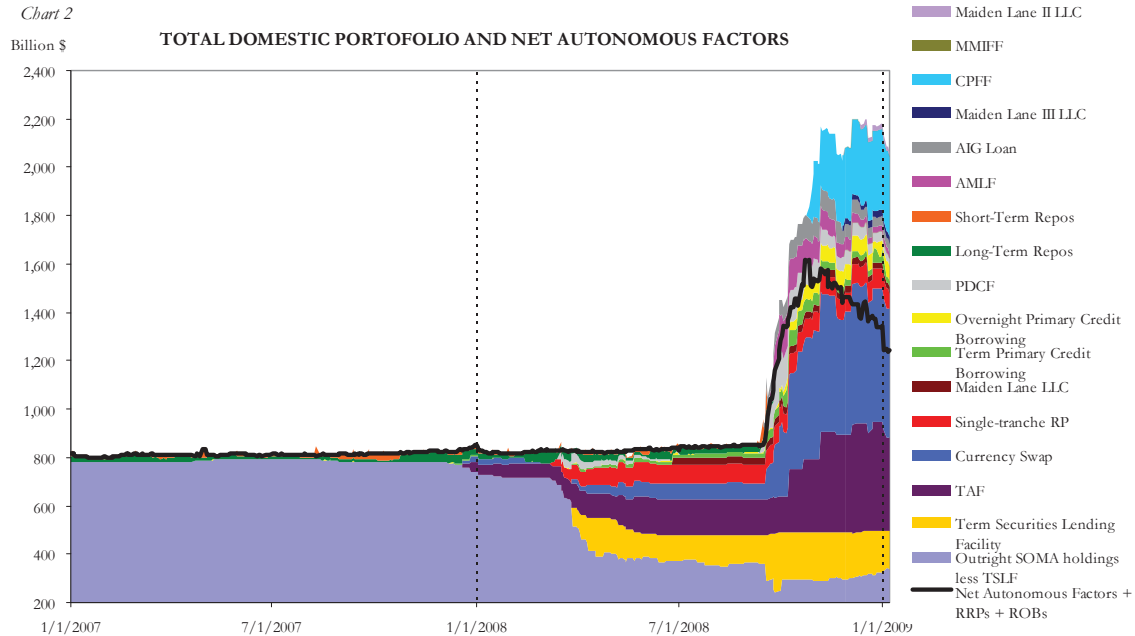
The Federal Reserve has generally engaged in two types of open market operations, permanent operations and temporary operations. Outright holdings of U.S. Treasury securities via purchases had traditionally accounted for the bulk of the portfolio. Temporary repurchase (RP) agreements had traditionally been used to address fluctuations that were perceived to be transitory in nature. For any given total size of the domestic financial portfolio, the Desk typically structures its outright holdings to maintain a need to add reserve balances routinely by arranging RPs. The targeted magnitude of this structural deficiency allows the Desk to respond to volatility in the supply of and demand for reserve balances and to forecasted autonomous factor forecast changes by adjusting the level of RPs outstanding. This approach avoids a routine need to drain reserves with reverse repurchases (RRP) agreements, or to reduce the permanent portfolio through securities sales and redemptions. The Desk typically addresses increases in the level of autonomous factor liabilities that are expected to be long lasting through outright purchases of U.S. Treasury securities for the System Open Market Account (SOMA). Maturing securities are routinely reinvested in new issues at auction.

However, as funding and credit markets deteriorated in 2008, the paradigm the Desk used for structuring the portfolio and conducting open market operations was adjusted. The creation of numerous liquidity facilities, the opportunity for both depository institutions and primary dealers to obtain term funding from the Federal Reserve, the sizable increases in the Term Auction Facility (TAF),<sup>4</sup> and drawings on reciprocal dollar swap lines often mitigated the need for conventional RPs and prompted the Desk to reduce much of its Treasury portfolio holdings through both redemptions and outright sales in the secondary market (Chart 2). Strains in the Agency and Agency mortgage-backed securities (MBS) repo and cash markets prompted the creation of the single-tranche RP program and SOMA purchases of Agency debentures.

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<sup>3</sup> For more details regarding the various liquidity facilities, see [the Board's website](#) and [Federal Reserve's website](#).

<sup>4</sup> The Term Auction Facility is a lending facility established by the Board of Governors at the end of 2007.



In addition, the Desk arranged record-sized RRP's late in the year. Although these RRP's did little to reduce the amount of reserves in the system, they provided much needed Treasury collateral to the repo market. Many of these changes to the domestic portfolio were designed to provide funding and support to fragile financial markets while maintaining an overall level of reserves consistent with achieving the operating objective for the overnight fed funds rate. However, the sheer level of reserves in the system made this exceedingly difficult later in the year.

## B. Repos and Reverse Repos

### *Short-Term and Long-Term RPs*

Short-term RPs (RPs with an original maturity of six days or less) are used to make daily adjustments to the supply of Fed balances. Short-term RPs may be quickly built up or drawn down via daily open market operations to offset short-term changes to net autonomous factors and reserve demand.

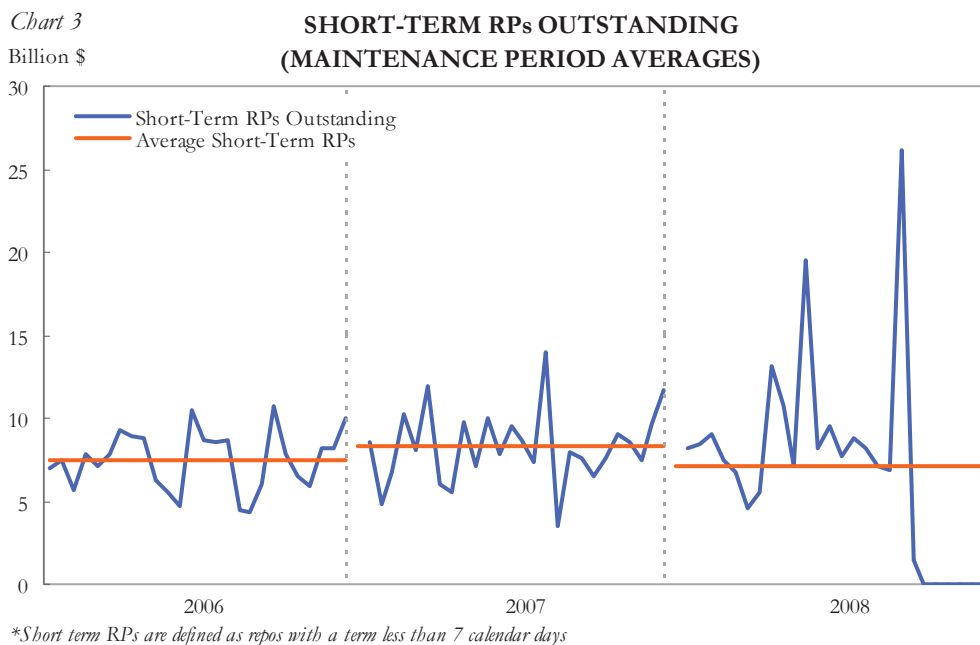
Long-term RPs (RPs with an original maturity of seven days or more) are arranged on a less frequent basis and their size is generally adjusted as needed to address seasonal volatility in autonomous factors or swings in demand for reserve balances that may be expected to last for a number of weeks or even months.

Short-term RPs are usually arranged at the Desk's normal operating time of 9:30 am ET, after reserve supply and demand projections are complete. Long-term operations may be conducted earlier in the morning when the financing market is more liquid, and before daily reserve supply and demand

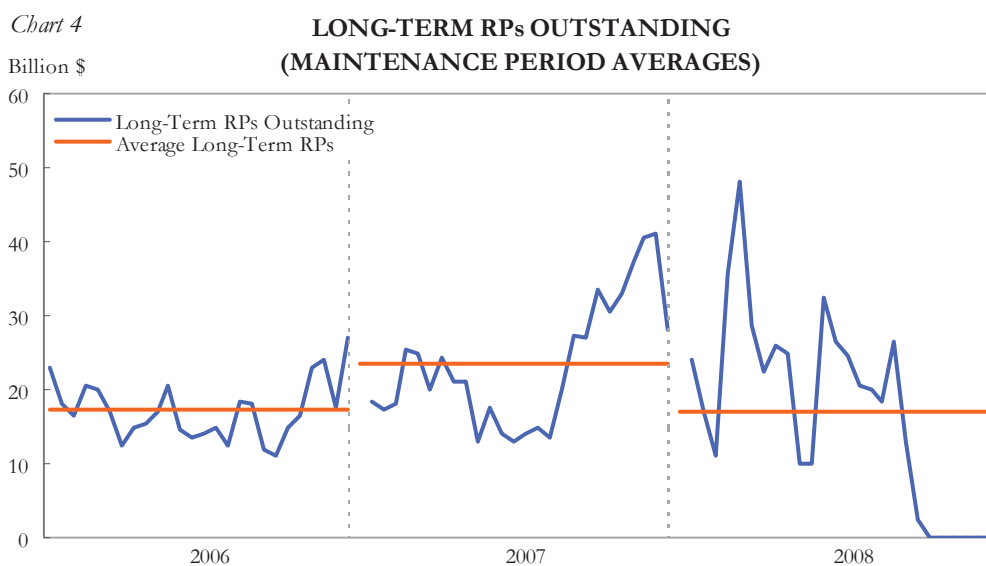
projections are complete. For several years, the Desk by convention has arranged 14-day RPs early each Thursday morning and continued to do so in 2008 until mid-September. The Desk also arranged 7-day RPs for much of 2008 at the Desk's normal operating time as the demand for funding remained high. These weekly operations also ceased in mid-September.

In mid-September, financial market strains escalated and the Federal Reserve responded by increasing the size of the TAF operations, increasing the number and size of reciprocal swap lines with foreign central banks, and developing new funding facilities for markets that had become particularly illiquid. The ensuing massive liquidity injections prompted the Desk to cease its overnight, 7-day, and 14-day RPs as excess reserve levels rapidly climbed and overnight fed funds traded well below the target until the FOMC's policy change on December 16.

The average outstanding level of short-term RPs was \$7.1 billion in 2008, down \$1.8 billion from the previous year. Outstanding amounts ranged between zero and \$26.1 billion on a maintenance period average basis, and between zero and \$100.0 billion on a daily basis (Chart 3). A total of 148 overnight RPs were arranged in 2008 (including those spanning a weekend or a holiday), and the Desk arranged 30 other short-term RPs. The average size of all short-term temporary operations during 2008 was \$9.1 billion, and individual amounts ranged between \$1.5 billion and \$50.0 billion.



The average level of outstanding long-term RPs was \$17.0 billion in 2008.<sup>5</sup> The average was much higher earlier in the year until the Desk eliminated 7- and 14-day RPs in mid-September amid extraordinarily high levels of excess (Chart 4). The average size of all long-term RP operations arranged in 2008 was \$9.5 billion, with individual operations ranging in size from \$5.0 billion to \$27.0 billion.



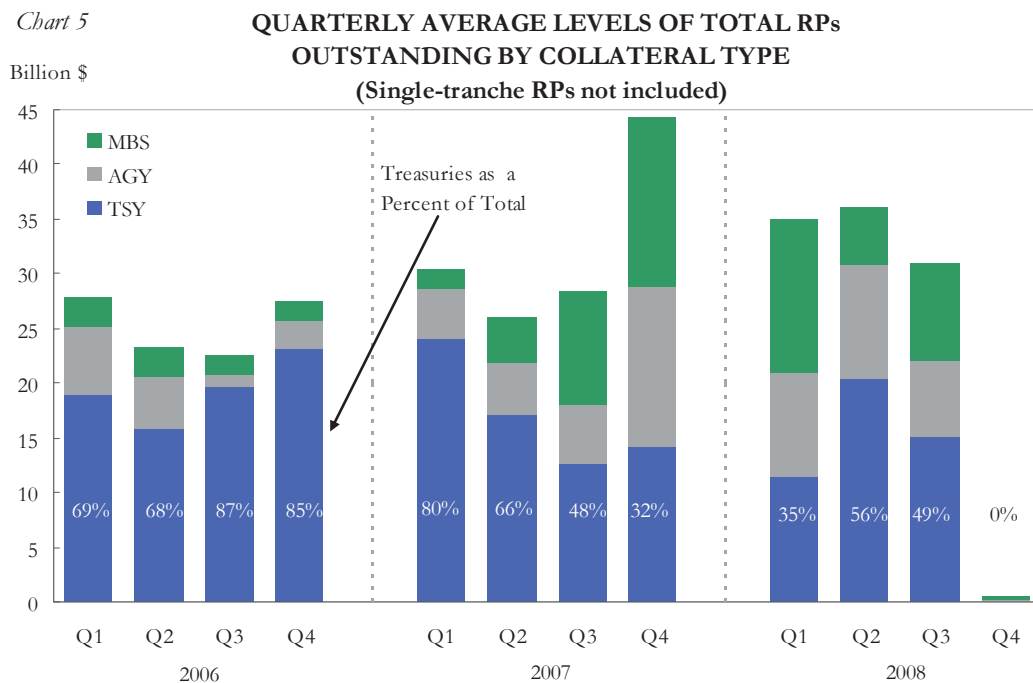
*\*Long term RPs are defined as repos with a term greater than or equal to 7 calendar days, with the exception of the 6-day RP on November 15, 2007, which is being categorized as a long term repo. Single-tranche RPs are not included.*

#### *Collateral Distribution in Repurchase Agreements*

The Desk accepts three types of collateral in its RPs, typically arranging the operations with three separate collateral tranches (aside from the single-tranche RPs mentioned above). In the first tranche, only U.S. Treasury securities are accepted; in the second, direct federal Agency obligations are also eligible (in addition to U.S. Treasury securities); and, in the third, Agency MBS are eligible in addition to the first two collateral types. The Desk selects from propositions across the three tranches according to the attractiveness of bids, measured relative to current rates in the financing market for each particular class of collateral. Benchmark rates for this purpose are based on an internal daily survey of financing rates paid by the primary dealers. In recent years the distribution by collateral tranche of outstanding RPs has been weighted heavily toward the Treasury tranche. This pattern continued to hold in 2007, until financial market strains appeared in short-term funding markets. At that point, high demand for Agency MBS financing prompted dealers to increase their submissions of these securities relative to the more liquid OMO collateral classes in the Desk's RPs.

<sup>5</sup> This does not include the single-tranche RPs.

The trend continued to a certain extent in 2008 although the percentage of Treasury collateral accepted was growing until the cessation of the Desk's regular RPs in the fourth quarter (Chart 5).



#### *Single-tranche RPs*

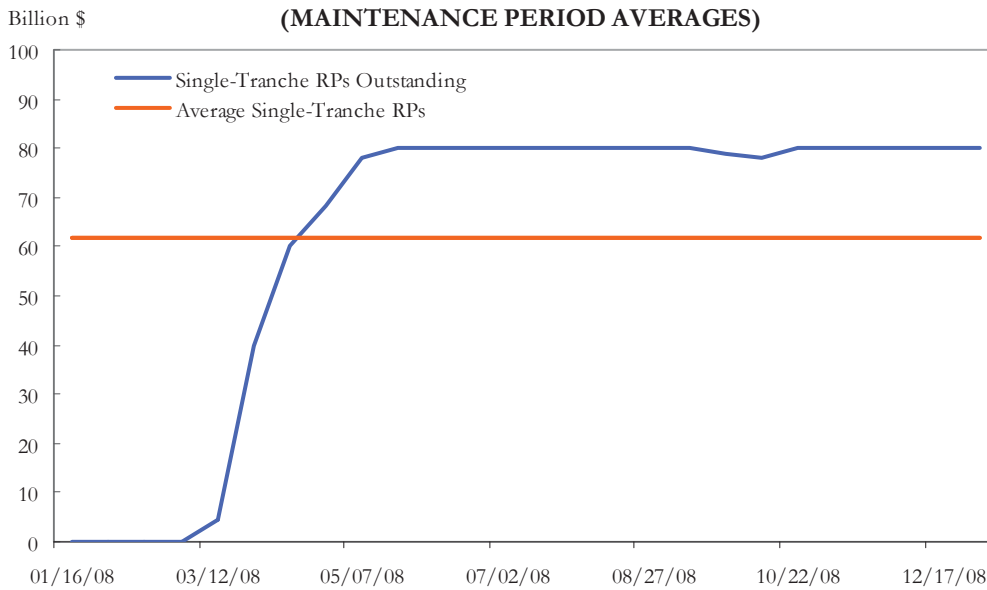
On March 7, with spreads between 1-month Treasury repo and 1-month Agency MBS repo having reached as high as 140 basis points, the Desk began to initiate a series of 1-day forward 28-day single-tranche RPs.<sup>6</sup> This 28-day RP book grew to \$80 billion over the course of the year (Chart 6). These operations were intended to narrow the 1-month repo spread between Treasury and Agency MBS collateral and provide the primary dealers a steady financing source for Agency MBS. In response, the spread eventually narrowed to about 20 basis points, close to historical norms. The 1-month spread again widened to above 100 basis points after September 15 and traded with some volatility before dipping below 40 basis points ahead of year-end.<sup>7</sup> In fact, demand for these operations waned over time with the last two \$20 billion operations of the year attracting scant interest with bid-to-covers of 1.11 and 1.05, respectively.

<sup>6</sup> In a single-tranche RP, Federal Reserve-approved U.S. Treasury securities, Agency debentures, or Agency MBS are all eligible to be pledged as collateral. Agency MBS will usually be the only collateral pledged as it generally is the cheapest to deliver.

<sup>7</sup> Examining data from October 8 to December 17 showed that 89 percent of the collateral submitted in the single-tranche RPs was Agency MBS.

Chart 6

**SINGLE-TRANCHE RPs OUTSTANDING  
(MAINTENANCE PERIOD AVERAGES)**



*Reverse RPs*

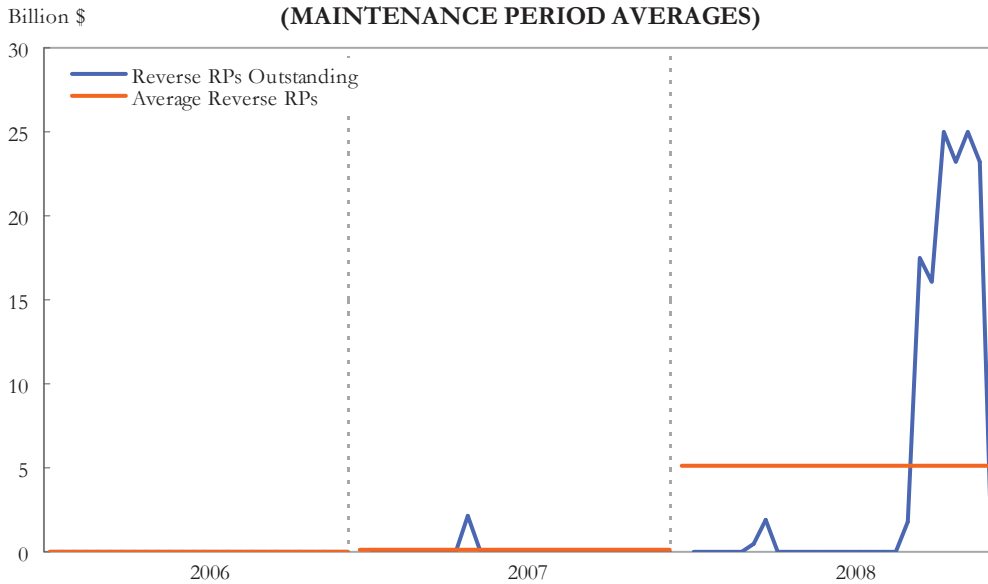
Although historically used infrequently, the Desk may arrange RRPs. Given the way the Desk generally manages the total portfolio, RRPs are apt to be used mainly to address unexpected reserve surpluses, usually of a short-term nature. With some rapid changes in reserve levels as the Desk grew its single-tranche RP book, the Desk arranged four RRPs in the first eight months of 2008, all overnight. These operations averaged \$5.5 billion in size.

However, at the end of September, the Desk arranged RRPs of unprecedented size as the increase in liquidity facilities supplied the banking system with significant levels of reserves. The first of these large RRPs was on September 24 for \$25 billion. The Desk arranged several more RRPs in the subsequent week and a half ranging in size from \$2 billion to \$25 billion. With the level of excess reserves rising to hundreds of billions, the Desk arranged an RRP every day from October 14 to December 16 ranging in size from \$15 billion to \$25 billion (Chart 7). While these operations paled in comparison to the massive levels of excess reserves, they did provide the market with much needed Treasury collateral and drained reserves at the margin.<sup>8</sup>

<sup>8</sup> Reverse RPs are not typically arranged to provide Treasury collateral to primary dealers. This was an ancillary benefit considering the high demand for Treasury collateral during 2008. The Desk did not arrange larger RRPs as many of the U.S. Treasury securities in the SOMA portfolio were committed to other financing facilities.

Chart 7

**REVERSE RPs OUTSTANDING  
(MAINTENANCE PERIOD AVERAGES)**



**C. Purchases and Sales of U.S. Treasury securities**

During 2008, the value<sup>9</sup> of the permanent holdings of U.S. Treasury securities in the SOMA portfolio decreased by \$265.7 billion, ending the year at \$470.0 billion (Chart 8).<sup>10</sup> The contraction comprised \$114.7 billion in redemptions, \$151.6 billion in sales, and \$0.6 billion in realized Treasury Inflation-Indexed Securities (TIIS) inflation compensation.<sup>11</sup> These sales and redemptions were largely arranged to drain reserves from the banking system to prompt fed funds to trade at the target rate. Redemptions consisted of \$1.9 billion in Treasury coupon securities and \$112.8 billion in Treasury bills. Sales in the open market consisted of \$55.0 billion in Treasury coupon securities and \$89.0 billion in Treasury bills.<sup>12</sup> Sales by the SOMA account to foreign central banks and other international institutions that hold accounts with the Federal Reserve consisted of \$7.6 billion in Treasury bills. There were no outright purchases conducted in the secondary market or purchases by the SOMA account from foreign central banks or other international institutions in 2008.

<sup>9</sup> All values cited in this section of the report represent par value.

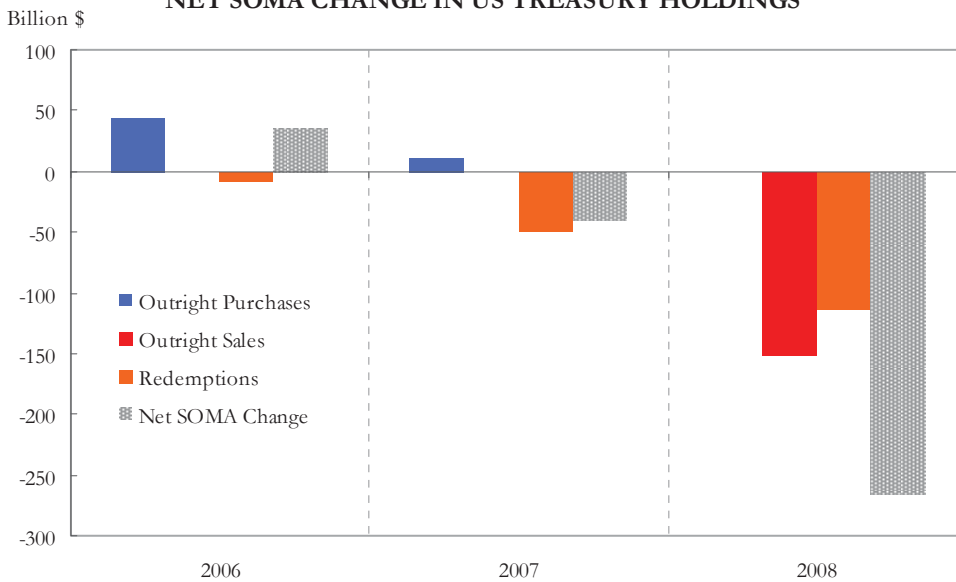
<sup>10</sup> This amount excludes \$5.9 billion in unrealized inflation compensation on TIIS.

<sup>11</sup> The SOMA portfolio realizes inflation compensation upon maturity of TIIS holdings.

<sup>12</sup> The outright sale of U.S. Treasury securities that commenced on March 7 were the first sales in nearly two decades.

Chart 8

**NET SOMA CHANGE IN US TREASURY HOLDINGS**



*Primary Market Activity*

Growth in the SOMA U.S. Treasury securities portfolio is achieved through outright purchases of U.S. Treasury securities in the secondary market. The size of the portfolio is sustained by replacing maturing holdings with newly issued debt at Treasury auctions. The auction rollover process differs slightly between bills and coupons. For coupons, the Desk rolls over maturing securities by placing add-on bids for the SOMA, noncompetitively at auction, equal to the lesser of (a) its maturing holdings on the issue date of a new security or (b) the amount that would bring the SOMA holdings as a percentage of the issue to the percentage guideline limits. For bill rollovers, generally, the maturing amount is allocated across newly issued bills to maintain roughly an equal percentage amount of ownership in each security settling on the same date. Due to the large decline in SOMA bill holdings, in July the Desk began consolidating remaining bill holdings into 4-week bills.

Of the 18 redemptions in 2008, one, totaling \$1.9 billion, was due to rollover guideline constraints, as the size of maturing coupon securities exceeded the percentage guideline limits for holdings of specific issues. The other 17 redemptions were all conducted in the Treasury bill sector to drain reserves.

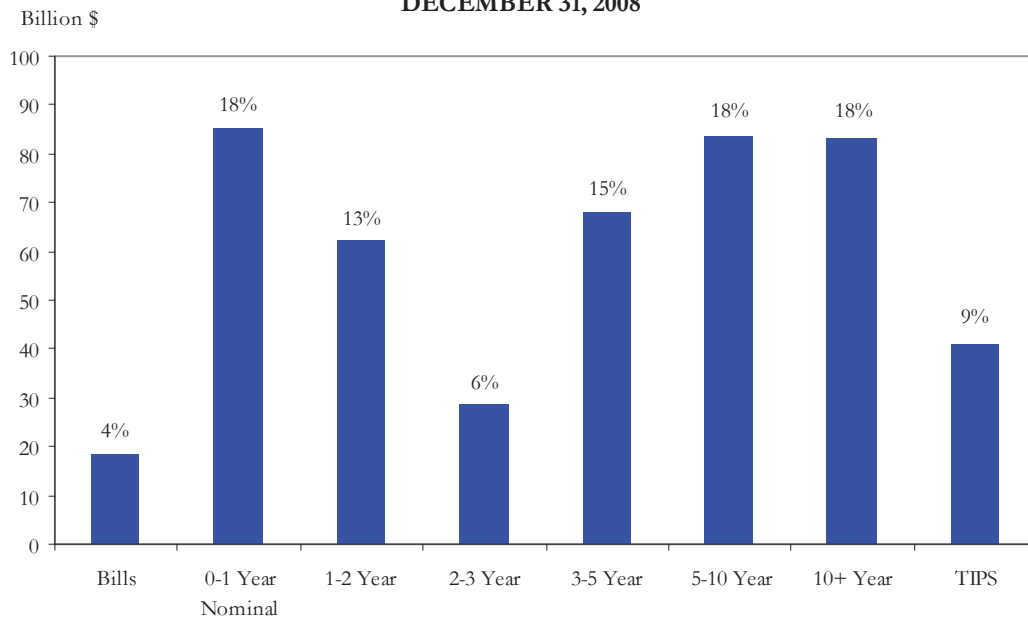
The Treasury announced a “call” of one coupon security held in the SOMA portfolio in 2008, totaling \$3.1 billion. The Desk rolled over the entire amount into newly issued securities with matching settlement dates.



*General Characteristics of the SOMA at Year End*

The distribution of the SOMA holdings of U.S. Treasury securities by remaining maturity at the end of 2008 is shown in Chart 9. The average remaining maturity of the SOMA portfolio was 82.7 months at the end of the year, compared to an average remaining maturity of 49.9 months on all outstanding marketable Treasury debt. At the end of 2007, the average remaining maturities of the SOMA portfolio and of outstanding Treasury debt had been 49.0 months and 55.7 months, respectively. The increase in the average remaining maturity of the SOMA portfolio relative to that of all outstanding marketable Treasury debt is largely explained by the SOMA reduction in Treasury bill holdings and sales of other shorter-dated Treasury coupon securities at the same time that issuance of Treasury bills increased. At the end of 2008, 8.1 percent of total outstanding marketable Treasury debt was held in the portfolio, down from 16.2 percent one year earlier.

*Chart 9*  
**SOMA HOLDINGS OF TREASURY SECURITIES BY SECTOR AS OF  
DECEMBER 31, 2008**



**D. Purchases of Agency Debt Securities**

In 2008, the Desk began purchasing U.S. Agency debentures in the open market on behalf of the SOMA for the first time since 1981.<sup>13</sup> Prior to 2008, the last SOMA Agency holding matured in

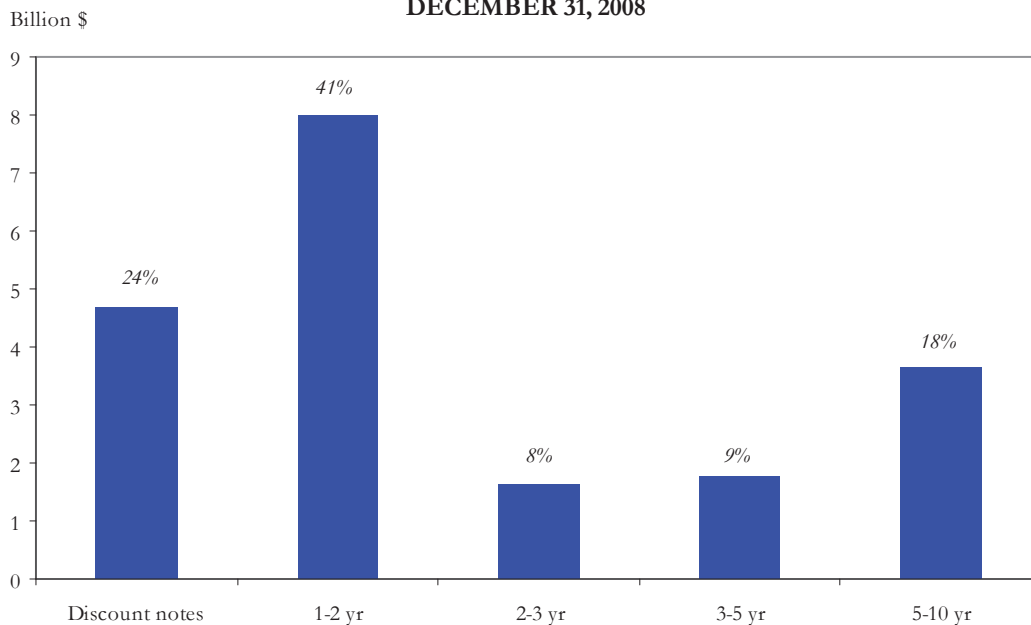
<sup>13</sup> In this document, U.S. Agencies refer to Fannie Mae, Freddie Mac, Ginnie Mae, and the Federal Home Loan Banks.

December 2003. In September, the Desk conducted three Agency discount note purchases for a total of \$14.5 billion.<sup>14</sup> Discount note yields declined up to 60 basis points ahead of the first operation and spreads to comparable U.S. Treasury securities narrowed. Over the course of 2008, \$9.8 billion of these securities matured without reinvestment, resulting in SOMA Agency discount note holdings of \$4.7 billion at the end of the year.

In November, with strains still evident in Agency securities markets, the Federal Reserve announced that the Desk would begin purchasing Agency coupon and Agency MBS on behalf of the SOMA portfolio. The announcement indicated that these new purchases would total up to \$100 billion in direct obligations of Fannie Mae, Freddie Mac, and the Federal Home Loan Banks and up to \$500 billion in MBS guaranteed by Fannie Mae, Freddie Mac, and Ginnie Mae. At year-end, the Desk had purchased a total of \$15.0 billion of Agency coupon securities over five operations and purchases of Agency MBS were announced to commence in early January 2009 (Chart 10).

Chart 10

**SOMA HOLDINGS OF AGENCY SECURITIES BY SECTOR AS OF  
DECEMBER 31, 2008**



**E. Traditional Standing Facilities**

Facilities that have been available for use prior to the beginning of the credit crunch in August 2007 include the primary credit facility and the regular SOMA securities lending program.

<sup>14</sup> All values cited in this section of the report represent par value.

### *Primary Credit Facility (PCF)*

The Federal Reserve's primary credit facility (PCF) serves as a backup source of short-term liquidity for depository institutions in generally sound financial condition and with appropriate collateral. The use of the facility is initiated at the discretion of depository institutions. This facility is a critical component of the monetary policy implementation framework, one that helps the Desk to achieve its operating objective for the overnight federal funds rate by relieving upward rate pressures when there is a net reserve shortage. Demand to borrow from the PCF can be attributable to a reserves shortage across a host of institutions or could be attributable to one institution in need of funds, typically late in the trading session.

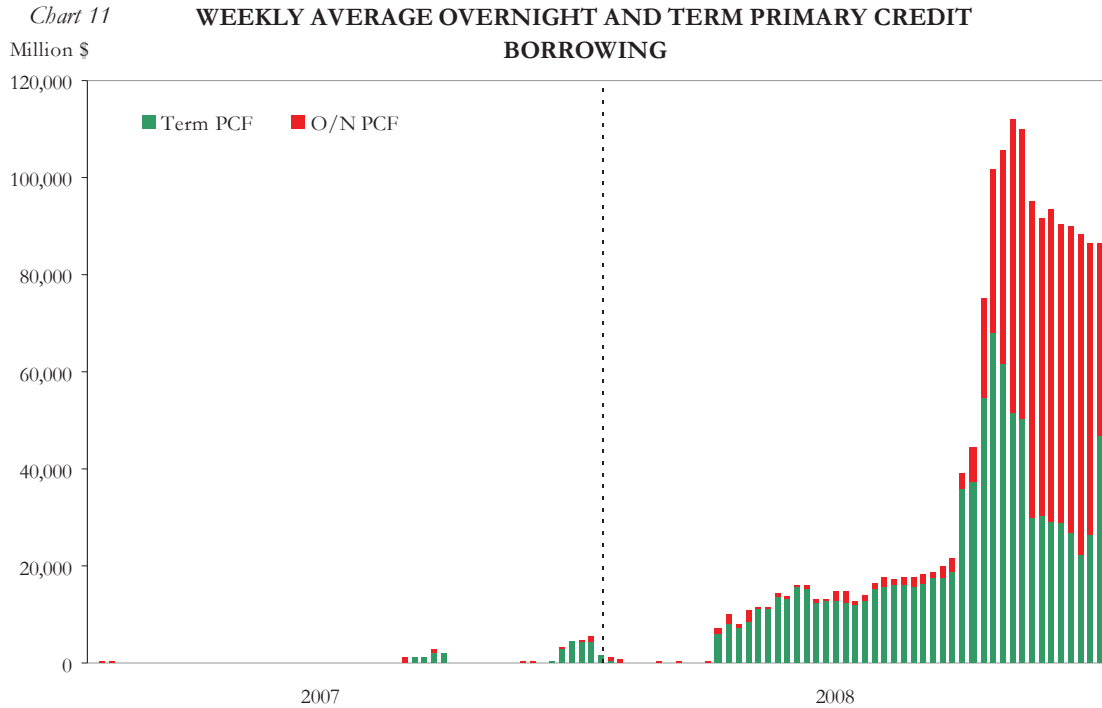
On March 16, Reserve Banks began to extend primary credit at a rate 25 basis points above the fed funds target rate down from the 50 basis points established in August 2007, so that on days when a reserve shortage necessitated some degree of borrowing, market rates would not have to rise by as much as they had previously to induce banks to borrow from the facility. The Federal Reserve also approved an increase in the maximum maturity of primary credit loans to 90 days from 30 days at this time. The lower spread on the primary credit rate combined with the ability to borrow on a term basis sometimes induced banks to borrow even on days when the overnight rate did not come under upward pressure. Evidently, the lower cost of funds offset to some degree the previously reported fears of some institutions to lend to a bank that borrowed from the primary credit facility. During the first eight months of the year, in arranging its open market operations, the Desk attempted to anticipate the degree to which banks might borrow on a term basis, or the extent to which outstanding term primary credit loans might be terminated early. The Desk's estimates of primary credit borrowing remained subject to error, the effects of which were akin to errors made in projections of autonomous factors in terms of their impact on total reserve levels, the behavior of the federal funds rate, and the ability of the desk to hit the fed funds target.

Ultimately, as strains persisted in financial markets, daily borrowing in excess of \$50 billion became more frequent (Table 3). While some banks continued to show a preference to pay a higher rate in the market, at least for relatively small amounts, an increasing number of depository institutions found the facility a cost efficient funding vehicle. Despite the sizable excess levels in the banking system at the end of the year, borrowing levels remained relatively high (Chart 11).

Table 3

**AVERAGE PRIMARY CREDIT BORROWING**

	<u>2006</u>	<u>2007</u>	<u>2008 Before March 17</u>	<u>2008 Since March 17, Before September 15</u>	<u>2008 Since September 15</u>
Daily Averages, \$ million	59	552	599	13,701	85,814



*SOMA Securities Lending Activity*

To promote the smooth clearing of U.S. Treasury securities, the Federal Reserve provides a U.S. Treasury securities lending program. The program offers securities for loan, on an overnight basis, in accordance with specified terms and conditions.<sup>15</sup> Securities are awarded to primary dealers based on competitive bidding in an auction held each business day at noon. Securities loans are collateralized with U.S. Treasury securities rather than cash so there is no effect on reserve balances.

In 2008, the Desk implemented a number of changes to the program’s terms and conditions in order to provide greater support to market liquidity and, in one instance, reversed an earlier change that presented operational difficulties.<sup>16</sup> The remaining changes represented further liberalization of the

<sup>15</sup> For terms and conditions of the Federal Reserve’s securities lending program, see: [Program Terms and Conditions](#).

<sup>16</sup> On August 22, due to the risk that a counterparty could fail to return a security through its maturity date, the Desk increased the minimum maturity of securities available to borrow from 7 days to 14 days. This change

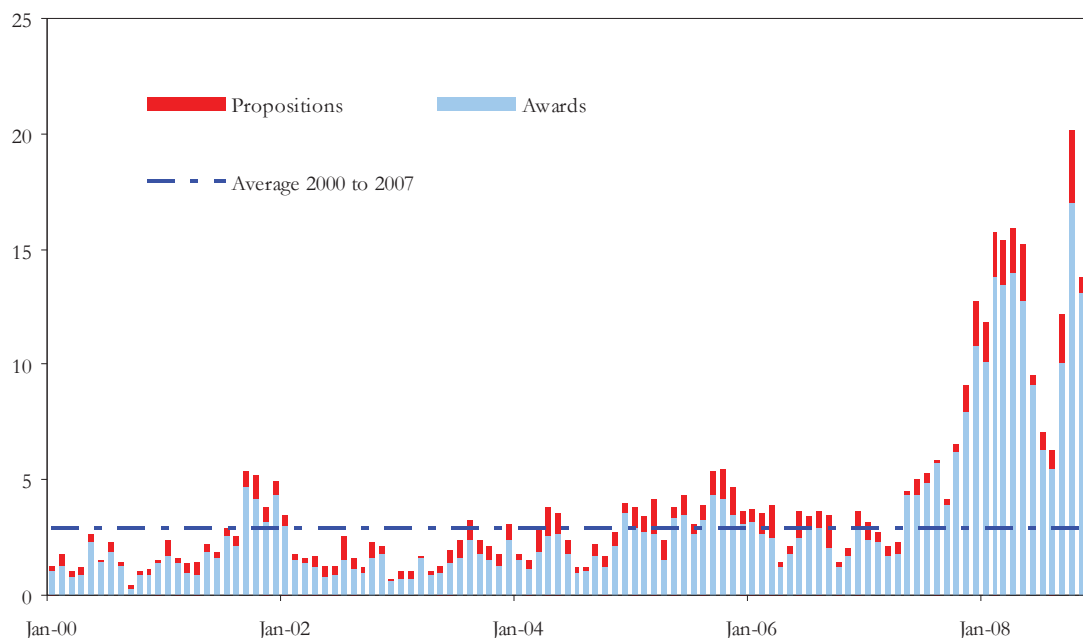
program in response to declining financing rates and deteriorating liquidity conditions in the Treasury financing market. On September 23, the aggregate dealer limit was increased from \$3 billion to \$4 billion. This limit was later increased to \$5 billion on October 8, along with a reduction in the minimum fee rate that dealers could bid in the auction from 0.50 percent to 0.10 percent. The minimum fee rate was further reduced to 0.01 percent on December 17.

Average monthly securities lending volume rose to \$10.9 billion in 2008, from \$4.7 billion in 2007. This is the highest monthly average since the program was overhauled in April 1999, and well above the previous record set last year (Chart 12). Prolonged “specialness” of certain securities, low minimum rates, high levels of fails, and the adjustment to borrowing limits, contributed to this year’s record lending activity.

Chart 12

**AVERAGE MONTHLY SOMA SECURITIES LENDING AWARDS**

\$ Billions



**F. New Credit and Liquidity Facilities**

In order to support financial markets and economic conditions more generally, a number of facilities were announced or introduced in 2008 to provide liquidity to specific markets and institutions. These were the Primary Dealer Credit Facility (including the transitional credit arrangements

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reversed the reduction in the minimum maturity limit that had been implemented on November 26, 2007,

established for dealers transitioning to banking organizations), the Term Securities Lending Facility, the Term Securities Lending Facility Options Program, the Asset-Backed Commercial Paper Money Market Mutual Fund Lending Facility, the Commercial Paper Funding Facility, the Money Market Investor Funding Facility, and the Term Asset-Backed Securities Loan Facility. The TAF and reciprocal dollar swap lines with foreign central banks, both instituted in 2007, were also expanded in size and scope in 2008.<sup>17</sup>

#### *Primary Dealer Credit Facility (PDCF)*

On March 16, the Federal Reserve approved the creation of the Primary Dealer Credit Facility (PDCF) to provide a backstop source of liquidity to primary dealers, and the facility was available for business the following day. The interest rate charged on such credit was the same as the primary credit rate, and a broad range of securities were accepted as collateral. The facility was set to last six months, till September, but was extended twice. The first, on July 2, extended the program through January 2009. The second, on December 2, extended it through April 2009. To maintain investor confidence in the viability of the triparty repo framework, and to mitigate the risk of sudden, broad-based investor flight out of triparty repo, the range of acceptable collateral was broadened on September 14 to include all eligible triparty repo collateral.

On the first day, borrowing from the PDCF totaled \$34.5 billion. Dealers initially seemed very comfortable borrowing from the facility, particularly considering the challenging financial environment. Borrowing continued through midyear albeit in declining amounts. Eventually, borrowing from the PDCF fell, reportedly in part because of a perception that borrowing from the facility would signal poor conditions of the borrower. However, after September 15, borrowing from the PDCF quickly rose again, peaking at \$155.8 billion on September 29 before dipping to below \$40 billion at year-end (Chart 13).

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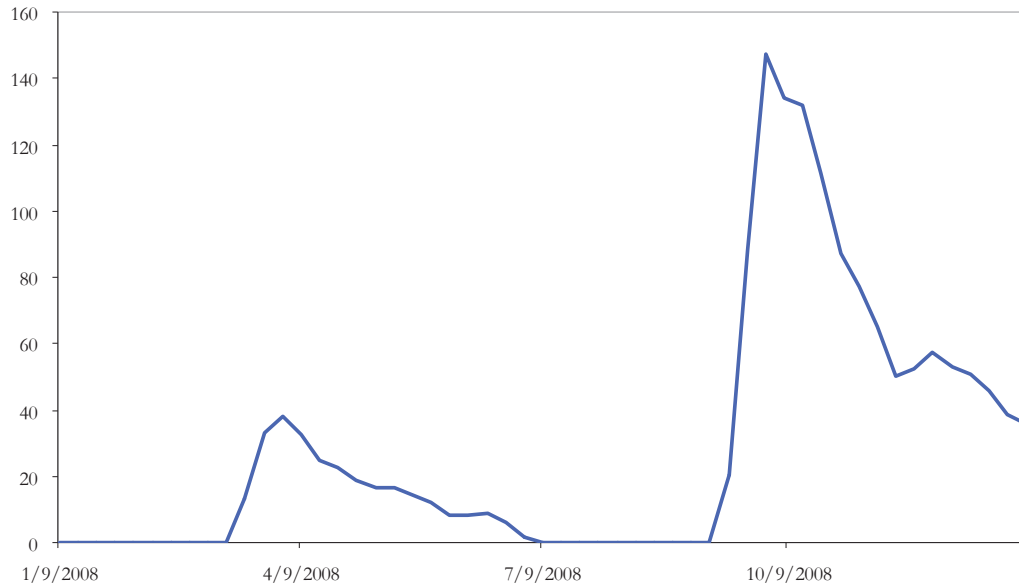
which had originally addressed strained liquidity conditions in the shortest-dated U.S. Treasury securities.

<sup>17</sup> Forms of Federal Reserve lending to financial institutions can be found in this [table](#).

Chart 13

**WEEKLY AVERAGE PRIMARY DEALER CREDIT BORROWING**

Billion \$



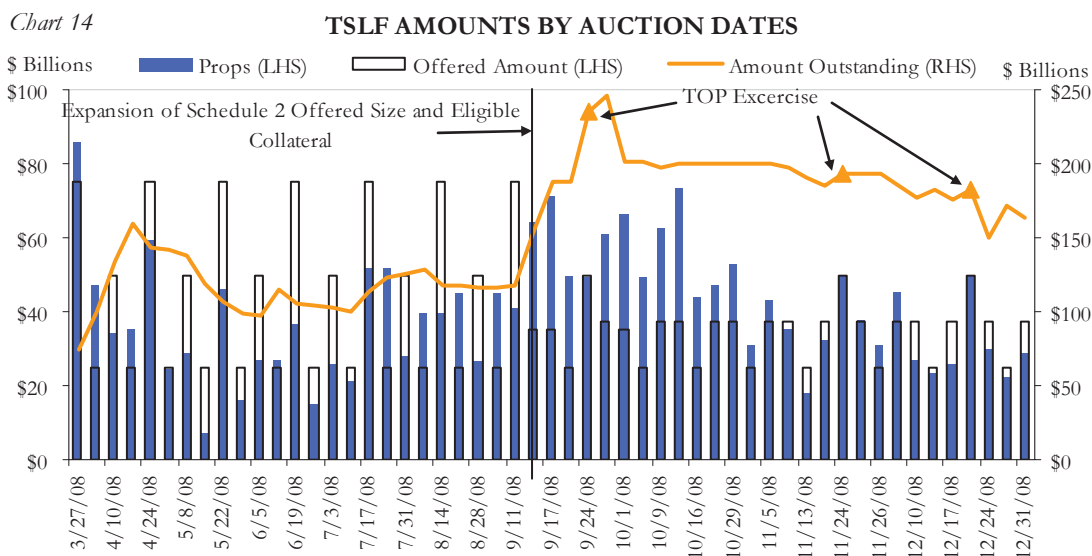
On September 21, the Board authorized the Federal Reserve to extend PDCF credit to the broker-dealer subsidiaries of Goldman Sachs and Morgan Stanley as they transitioned to become bank holding companies. In order to facilitate its acquisition by Bank of America, this transitional credit arrangement was also made available to the broker-dealer subsidiary of Merrill Lynch. Although these broker-dealers could only borrow from the PDCF, they could pledge any collateral that was eligible at either the PCF or PDCF. The London-based broker-dealer subsidiaries of these three firms were also granted the ability to obtain credit against PDCF-eligible collateral. Of note, the weeks following this announcement coincided with the highest levels of borrowing from the PDCF as shown above.

*Term Securities Lending Facility (TSLF)*

On March 11, the Federal Reserve announced an expansion of its securities lending program by establishing a new Term Securities Lending Facility (TSLF), through which up to \$200 billion in general collateral U.S. Treasury securities would be lent to primary dealers for a one-month term against a range of collateral. The facility was implemented to promote liquidity in the financing markets for Treasury and other collateral and to improve the functioning of financial markets more generally. The facility offers two loan types, distinguished by the list of eligible collateral. Schedule 1 auctions have an eligible collateral list that includes OMO-eligible U.S. Treasury securities, Agency debt, and Agency MBS, and the minimum fee was set to 0.10 percent. The eligible collateral list for

Schedule 2 auctions included everything acceptable in Schedule 1 auctions plus AAA-rated private-label residential and commercial mortgages, and Agency collateralized mortgage obligations. The Schedule 2 eligible collateral list was twice broadened to increase the support to financing markets. On May 2, the collateral list was broadened to include AAA-rated asset-backed securities (ABS). Then, on September 14, the collateral list was further expanded to include all investment grade debt securities. The minimum fee rate for Schedule 2 auctions was set at 0.25 percent.

Demand in the initial TSLF auctions was robust, and peaked following the expansion of the Schedule 2 collateral list to include all investment grade securities. At that point, bid-to-cover ratios rose to as high as 2. Since the last expansion of the collateral list, demand, as measured by bid-to-cover ratios, has declined, interrupted only by the expansion of eligible collateral and the seasonal increases in demand for auctions covering financial reporting dates (quarter-end increases in outstanding balances also reflect participation in the TSLF Options Program, discussed in the following section). The current balance outstanding as of December 31 was approximately \$165 billion, versus the \$200 billion allocated to the program (Chart 14, includes both Schedule 1 and Schedule 2).



Note: Shaded area outside each bar indicates the level of oversubscription.  
Degree of white space inside each bar indicates the level of undersubscription.

#### *TSLF Options Program (TOP)*

On August 8, the Federal Reserve announced a \$50 billion expansion of the TSLF to facilitate the creation of an options program. Through this program, the Federal Reserve offers options on fixed-rate TSLF loans spanning periods when strains in the secured financing markets tend to be



magnified. The first such option auctions were executed on August 27 and September 10, each offering \$25 billion in options on a 7-day TSLF loan, extending from September 25 to October 2, at a fixed fee rate of 25 basis points. Both auctions were fully subscribed, with bid-to-cover ratios greater than 2 and option premium stop-out rates of 2 and 3 basis points, respectively. On September 24, the options exercise date, dealers exercised more than \$47 billion, or 96 percent, of \$49 billion in option sold. Subsequent TOP option auctions were conducted ahead of November month-end and year-end and, in both cases, were oversubscribed. However, the rate of exercise was much lower than that of the first cycle, with exercise rates in November and December at 16 percent and 14 percent, respectively.

*Commercial Paper Facilities (Asset-Backed Commercial Paper Money Market Mutual Fund Lending Facility (AMLF), Commercial Paper Funding Facility (CPFF), Money Market Investor Funding Facility (MMIFF))*  
With widening counterparty credit concerns during 2008, strains in the commercial paper market intensified. Money market mutual funds and other investors, themselves facing liquidity pressures, became increasingly reluctant to purchase commercial paper, particularly at longer-dated tenors. These same money funds had difficulty selling assets to satisfy redemption requests and meet portfolio rebalancing needs. As a consequence, commercial paper yields increased, the level of outstanding commercial paper decreased, and issuers faced increasing uncertainty regarding their ability to roll-over maturities with investors.

To foster liquidity in the commercial paper market and to ensure that these financial intermediaries could accommodate the credit needs of businesses and households, the Board and the Federal Reserve created three separate facilities. The Asset-Backed Commercial Paper Money Market Mutual Fund Lending Facility (AMLF), the Commercial Paper Funding Facility (CPFF), and the Money Market Investor Funding Facility (MMIFF) were announced on September 19, October 7, and October 21, respectively. The AMLF, which provides funding to U.S. depository institutions to finance their purchases of high-quality asset-backed commercial paper from money market mutual funds, initially extended as much as \$152 billion in loans, but the amount outstanding has since contracted to \$24 billion by the end of the year. The CPFF provides a liquidity backstop to U.S. issuers of commercial paper through a special purpose vehicle that purchases eligible unsecured and asset-backed commercial paper from eligible issuers using financing provided by the Federal Reserve. Following its inception on October 27, the CPFF grew to \$334 billion by year end. The facility grew quickly at first but growth slowed by the end of 2008 with only modest additional borrowing each day. Under the MMIFF, the Federal Reserve provides senior secured funding to a series of special purpose vehicles to facilitate an industry-supported private-sector initiative to finance the purchase of

eligible commercial paper and certificates of deposit from eligible U.S. money market mutual funds. As of December 31, no investors had taken advantage of the MMIFF.

*Term Asset-Backed Securities Loan Facility (TALF)*

On November 25, the Board announced the creation of the Term Asset-Backed Securities Loan Facility (TALF). This funding facility is intended to help market participants meet the credit needs of households and small businesses by supporting the issuance of ABS collateralized by student loans, auto loans, credit card loans, and loans guaranteed by the Small Business Administration. Under the TALF, the Federal Reserve plans to lend up to \$200 billion on a non-recourse basis to holders of certain AAA-rated ABS backed by newly and recently originated consumer and small business loans. The Treasury, under the Troubled Assets Relief Program (TARP), will provide \$20 billion of credit protection to the Federal Reserve in connection with the TALF. The facility is expected to begin operations in February of 2009.

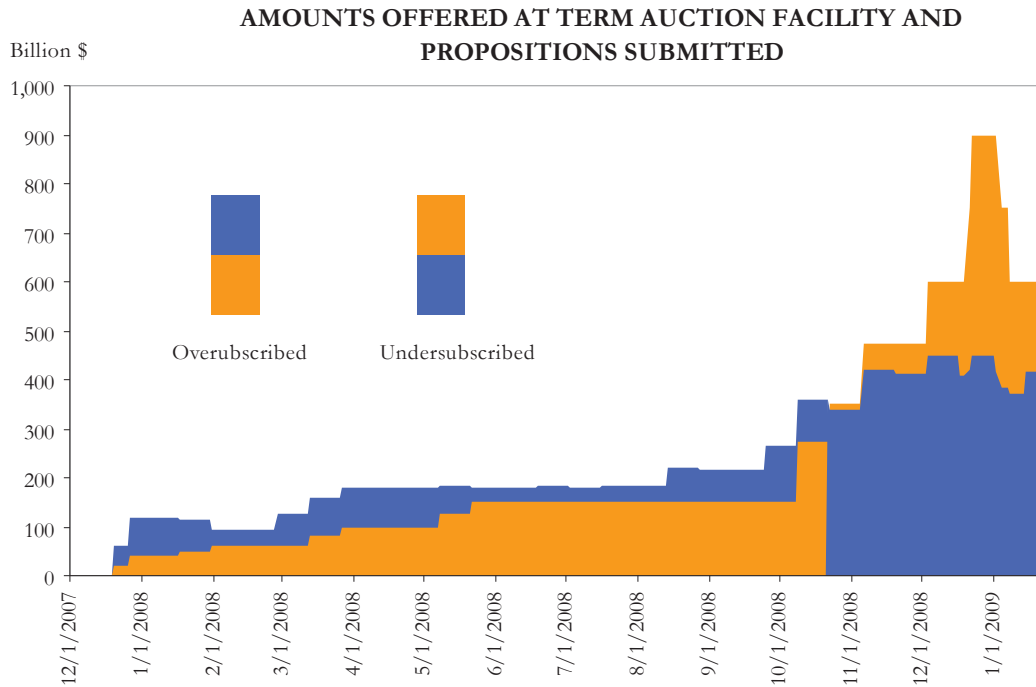
*Term Auction Facility (TAF)*

TAF Auctions, which began on December 12, 2007, continued to expand in size and scope in 2008.<sup>18</sup> The size of the TAF operations was increased several times to meet the rising demand for term dollar funding. As funding difficulties persisted throughout the summer, on July 30, the Federal Reserve established 84-day TAF auctions in addition to the existing 28-day auctions. Ultimately, the size of both the 28- and 84-day auctions was increased to \$150 billion. In addition, two forward TAF auctions were conducted in November for \$150 billion each to provide credit over the year-end and enhance market confidence. The aggregate amount of TAF credit made available over year-end across the 28-day, 84-day and year-end-spanning auctions was \$900 billion. Ultimately, all of the operations were undersubscribed, particularly the forward-settling operations (Chart 15). Despite the low funding costs, market participants noted that the TAF auctions late in the year were undersubscribed as many depository institutions had either satisfied their funding needs over year end or did not have enough unencumbered collateral to pledge to increase their participation. TAF credit outstanding over year-end totaled \$450 billion.

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<sup>18</sup> The TAF has been widely praised as a way for depository institutions to directly receive credit from the Federal Reserve as the Desk's OMOs are transactions arranged only with primary dealers. The TAF also has not suffered from the stigma that has at times been associated with the PCF and PDCF.

Chart 15



*Reciprocal Currency Arrangements (Swap Lines) with other Central Banks*

At the start of 2008, only the European Central Bank (ECB) and the Swiss National Bank (SNB) had established reciprocal currency arrangements with the Federal Reserve. After September 15, market conditions deteriorated rapidly and the ensuing high demand for dollar funding in overseas markets prompted numerous central banks to establish dollar swap lines with the Federal Reserve.

Ultimately, swap lines would be established with the Reserve Bank of Australia, the Banco Central de Brazil, the Bank of Canada, the Danmarks Nationalbank, the Bank of England, the Bank of Japan, the Bank of Korea, the Banco de Mexico, the Reserve Bank of New Zealand, the Norges Bank, the Monetary Authority of Singapore, and the Sveriges Riksbank. The draws on the swap lines increased in number, size, and tenor as conditions in overseas funding markets worsened. As a consequence, the outstanding amount of currency arrangements rose from \$14 billion to \$554 billion over the year.

**G. Institution-Specific Facilities**

*Bear Stearns, JP Morgan Chase, and Maiden Lane LLC*

On March 24, subsequent to the announcement that Bear Stearns would be acquired by JP Morgan Chase, the Federal Reserve announced, after consultation with the U.S. Treasury, that it would provide term financing to facilitate the merger. The Federal Reserve Bank of New York formed a limited liability company, Maiden Lane LLC, to control of a portfolio of assets valued at \$30 billion

as of March 14, financed by \$29 billion in term financing from the Federal Reserve Bank of New York and \$1 billion in subordinated financing from JP Morgan Chase. The financing was extended on June 26 on a non-recourse basis. The latest estimated fair value of the portfolio of assets was \$27 billion.

*AIG, Maiden Lane LLC II, and Maiden Lane LLC III*

In September, a disorderly failure of American International Group (AIG) was deemed a risk that could materially exacerbate financial market fragility and volatility and lead to substantially higher borrowing costs, reduced household wealth, and materially weaker economic performance. After consultation with the U.S. Treasury, the Federal Reserve Board of Governors authorized up to \$85 billion to AIG in the form of a secured loan. The extension of credit would help AIG to meet its obligations and facilitate an orderly sale of certain business lines. On October 8, the Federal Reserve authorized a securities borrowing transaction in which the Federal Reserve would lend cash to AIG in return for up to \$37.8 billion in investment-grade, fixed-income securities.

A modification of the financial support was necessary on November 10 to facilitate AIG's restructuring process. As part of this modification, the Treasury announced that it would purchase \$40 billion of newly issued preferred AIG shares under the TARP. This allowed the Federal Reserve to reduce the credit extended from \$85 billion to \$60 billion. The interest rates for the Fed loans were substantially reduced and the terms of the loans were extended from two to five years. Two new lending facilities were also created. Maiden Lane LLC II was established to fund the purchase of residential-MBS from AIG's securities lending portfolio. When this was funded with a \$19.5 billion loan from the Federal Reserve and \$1 billion from AIG through a contingent purchase price adjustment on December 12, the original securities borrowing facility established on October 8 was terminated. Maiden Lane LLC III was established to purchase collateralized debt obligations on which AIG had written credit default swaps. This program began on November 25 and has received \$23.4 billion in credit from the Federal Reserve and \$5 billion from AIG. Consequently, AIG's credit default swap exposure decreased significantly. The latest estimated fair value of the assets held by Maiden Lane LLC II and Maiden Lane LLC III was \$20 billion and \$27 billion, respectively.

*Citigroup*

Citigroup's financial position deteriorated significantly in 2008 amid a declining share price and loss of liquidity. Given Citigroup's widely recognized importance to the maintenance and restoration of financial market stability, on November 23, the U.S. government entered into an agreement with Citigroup to provide a package of guarantees, liquidity access, and capital. As a part of the

agreement, the Treasury, the Federal Deposit Insurance Corporation (FDIC), and the Federal Reserve provided protection against the possibility of unusually large losses on an asset pool of approximately \$306 billion of loans and securities that will remain on Citigroup's balance sheet. In conjunction with this arrangement, Citigroup issued preferred shares to both the Treasury and FDIC. The Treasury and FDIC are providing loss protection ahead of the Federal Reserve. However, if necessary, the Federal Reserve stands ready to backstop residual risk in the asset pool through a non-recourse loan. In addition, Treasury agreed to invest \$20 billion in Citigroup from the TARP in exchange for preferred stock.

### **III. CHANGES TO THE FEDERAL RESERVE BANK'S BALANCE SHEET**

#### **A. Composition of the Balance Sheet through September 10, 2008**

In many ways the Federal Reserve's balance sheet at the end of 2007 was very similar in composition as in prior years. Federal Reserve notes outstanding were the largest liability on the balance sheet, largely offset by U.S. Treasury securities held outright by SOMA on the asset side. However, the advent of the TAF and reciprocal dollar swap agreements with the ECB and SNB late in 2007 added \$34 billion in assets. To offset the reserve balances provided through these facilities, the Desk redeemed \$39 billion in Treasury bills during December 2007.

Through mid-September 2008, the size of the Federal Reserve's balance sheet only increased by about \$30 billion. The composition, however, changed notably as the Federal Reserve sold or redeemed \$275 billion in U.S. Treasury securities to accommodate increases in TAF and reciprocal currency swaps, and the inception of single-tranche RPs. These actions allowed the Federal Reserve to maintain a relatively normal level of excess balances in the system.

#### **B. Composition of the Balance Sheet at the End of 2008**

The creation or expansion of the aforementioned programs after September 15 prompted the Federal Reserve's balance sheet to grow to nearly \$2.3 trillion by the end of the year. The magnitude of these programs and their corresponding impact on the Federal Reserve's balance sheet meant that the Desk could not offset the increase in reserve balances, which rose to nearly \$840 billion (Table 4). Not surprisingly, fed funds traded very soft to the target until the December FOMC meeting.

<b>Statement of Condition of All Federal Reserve Banks</b>								
<b>(\$ billions)</b>								
<i>Assets</i>	Dec 26, 2007	Sep 10, 2008	Dec 31, 2008	<i>Liabilities</i>	Dec 26, 2007	Sep 10, 2008	Dec 31, 2008	
Securities	755	480	496	Reserve Balances of Banks	11	32	860	
Treasuries	755	480	476	Excess Balances	-3	18	838	
notes and bonds, nominal	471	412	410	Required Op Balances	14	14	22	
notes and bonds, inflation indexed	37	40	41					
bills	242	22	18					
inflation compensation	5	6	6					
Federal Agencies	0	0	21	Federal Reserve Banknotes	792	798	853	
memo item:								
securities earmarked for TSLF & TOP	-	200	200	Treasury Balances at FRB	5	5	106	
Repos	43	127	80	Treasury SFP	-	-	259	
Conventional	43	47	0	Foreign RP Pool	41	44	88	
Single-tranche 28-day	-	80	80	Reverse RPs	0	0	0	
Swap Agreements	14	62	554					
Loans	25	173	644	Other Deposits	0	0	21	
TAF	20	150	450	Other Liabilities	8	4	34	
Other Credit (AIG)	-	-	39					
PDCF	-	0	37	Capital	37	40	42	
PCF/SCF	5	23	94					
AMLF (Boston/ABCP)	-	-	24					
Maiden Lane LLC	-	29	27					
Maiden Lane LLC II	-	-	20					
Maiden Lane LLC III	-	-	27					
CPFF	-	-	334					
MMIFF	-	-	0					
Other Assets	58	52	81					
<b>Total Assets</b>	<b>894</b>	<b>923</b>	<b>2,263</b>	<b>Total Liabilities and Capital</b>	<b>894</b>	<b>923</b>	<b>2,263</b>	

Note: Components may not sum to totals because of rounding.

### *Assets*

The increase in assets during the latter part of the year was largely attributable to growth in the TAF, outstanding reciprocal dollar swap agreements, and CPFF, which combined to total about \$1.3 trillion.

In order to offset some of the new assets created on the balance sheet, the Desk reduced the size of its RP book by only arranging one RP operation in the fourth quarter aside from the regular single-tranche RPs. This decline in the size of the RP book was in addition to the reduction in the Treasury portfolio mentioned above.

### *Liabilities*

To help manage the balance sheet impact of the Federal Reserve's liquidity initiatives, the Treasury announced the establishment of a temporary Supplementary Financing Program (SFP) on September 17. The program consists of a series of Treasury bills issued by Treasury, the proceeds of which are deposited in an account at the Federal Reserve, draining reserve balances from the banking sector. By the end of October, balances in the SFP account peaked at \$559 billion. However, amid concern about the potential for approaching a debt ceiling constraint, Treasury allowed many of the bills to mature and the account fell to \$259 billion by the end of the year.

#### **IV. BANKS' DEMAND FOR RESERVE BALANCES**

Total demand for Fed balances can be broken down into two components: the portion needed to satisfy reserve requirements and the portion held in excess of these requirements.

##### **A. Total Balance Requirements**

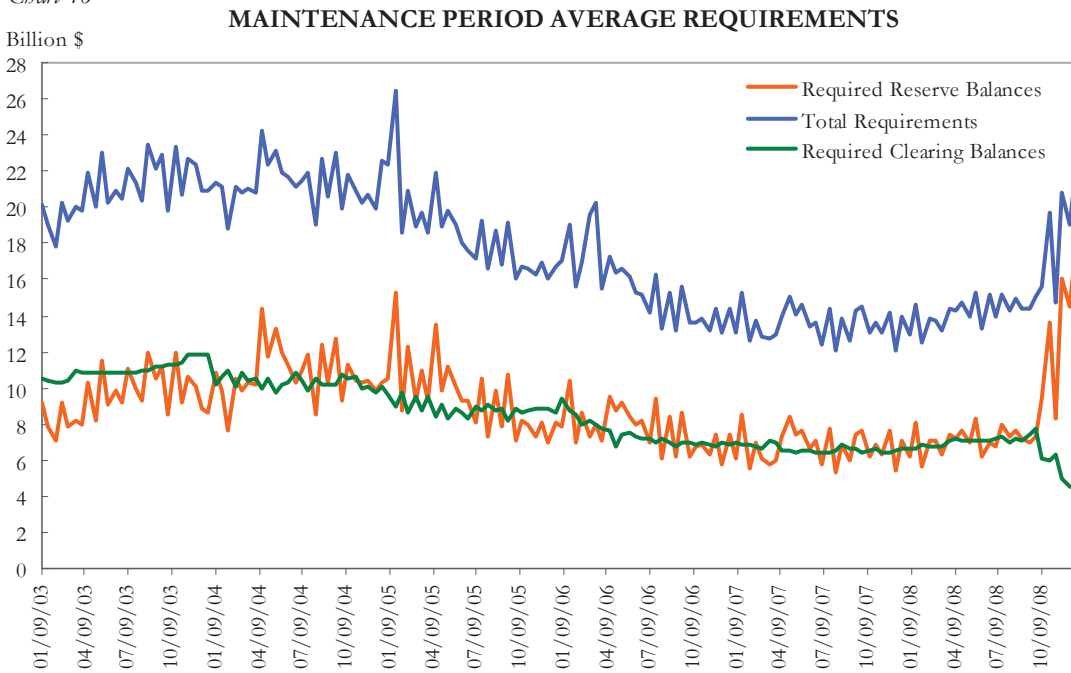
A bank's total balance requirement is the average level of balances it must hold at its Reserve Bank over a two-week maintenance period to meet reserve requirements and contractual clearing balance requirements. Required reserve balances equal the portion of reserve requirements not met with vault cash. Contractual clearing balances are balances that the institution agrees to hold at the Federal Reserve for payment clearing purposes. The balance requirements may be affected by the application of "as-of" adjustments. Such adjustments may be made to correct Reserve Bank accounting transaction errors, to correct reporting errors (including deposit reporting errors), to recover float incurred by an institution, or to address other circumstances. Required reserve balances, contractual clearing balance requirements, and most as-of adjustments are known at the start of each maintenance period, which facilitates the Desk's estimation of the overall demand for Fed balances.

After stabilizing in 2007, both required reserve balances and clearing balance requirements increased only slightly during the first three quarters of 2008, and their combined total fluctuated between \$13.5 billion and \$15.0 billion. However, in the last quarter when severe market strains reappeared, required reserve balances spiked dramatically as demand deposit accounts increased (Chart 16). This rise was only marginally offset by a decline in required clearing balances in the fourth quarter.<sup>19</sup>

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<sup>19</sup> The explicit interest paid on reserves was higher than the implicit interest garnered from clearing balances, hence the decline.

Chart 16



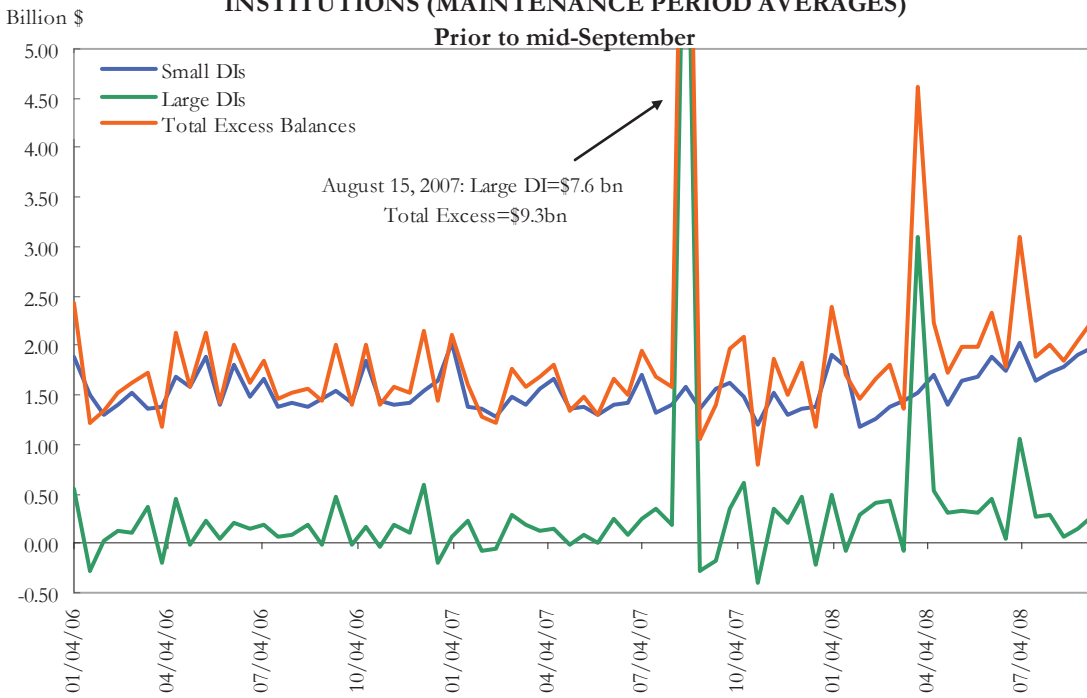
### B. Excess Balances

Balances held by institutions over a maintenance period that are above the level needed to meet their total requirements are considered excess balances. In the past, excess balances earned no interest and therefore represented a lost investment opportunity. However, many institutions, especially small banks, routinely held a modest amount of balances above the level of their requirements each day in a maintenance period to mitigate the potential for end-of-day overdrafts. Prior to mid-September, period-average excess levels fluctuated in a range around \$2 billion (Chart 17).



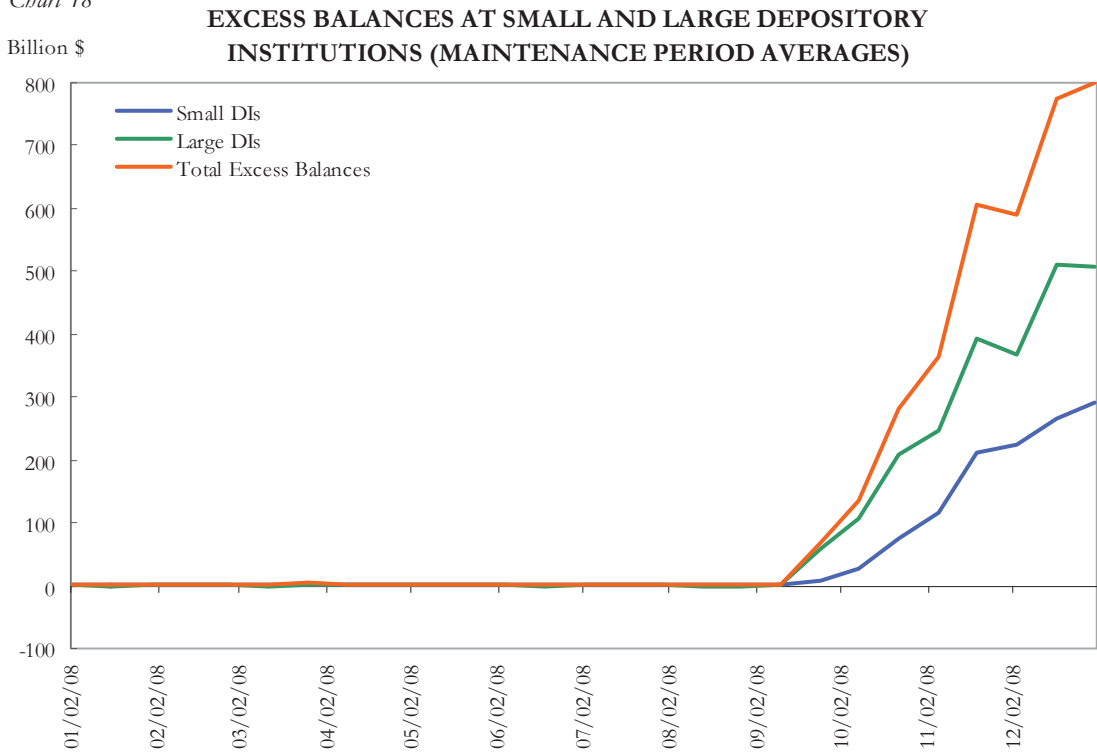
Chart 17

### EXCESS BALANCES AT SMALL AND LARGE DEPOSITORY INSTITUTIONS (MAINTENANCE PERIOD AVERAGES)



Subsequent to September 15, the rapid expansion of the Fed's balance sheet resulted in period-average excess levels that skyrocketed to nearly \$800 billion during the maintenance period ending December 31, 2008 (Chart 18).

Chart 18



## V. TRADITIONAL AUTONOMOUS FACTORS AFFECTING THE SUPPLY OF RESERVE BALANCES

The supply of Fed balances is determined by the size of the Federal Reserve’s assets and the levels of the various autonomous factors on the Federal Reserve's balance sheet over which the Desk has little or no control. The currency liabilities of the Federal Reserve (Federal Reserve notes) comprise the largest of these traditional autonomous factors. Other factors are not as large, but can contribute significantly to changes in net autonomous factor levels and volatility. Among these other items are the Treasury’s general account balance, the Foreign RP pool, and Federal Reserve statement float. Together these four traditional autonomous factors drained \$197 billion during 2008. However, this year, the numerous Fed-based liquidity programs that appear on the asset side of the balance sheet have dwarfed the draining impact of traditional autonomous.

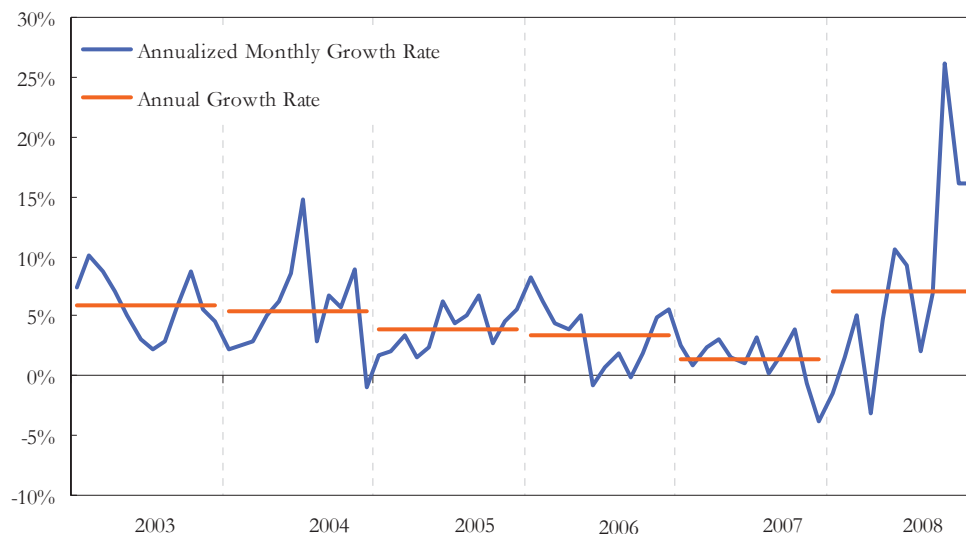
### A. Federal Reserve Notes Outstanding

The quantity of Federal Reserve notes outstanding increased by \$61.1 billion during 2008 despite slow growth early in the year. The annual growth rate for 2008 (7.4 percent) was the highest since 2001.

The slow growth early in the year was in keeping with longer-term deceleration in the growth of Federal Reserve notes dating back to 2003. This deceleration can be seen in Chart 19, which shows annualized monthly growth rates obtained from a closely related series (the seasonally adjusted currency component of M1).

Chart 19

**SEASONALLY ADJUSTED CURRENCY COMPONENT OF M1  
GROWTH RATES**



Circumstances began to change in May, by which time stronger demand for Federal Reserve notes had materialized abroad. Based on staff estimates, much of that demand was centered in Latin America. Growth continued to accelerate during the second half of the year, particularly in Eastern Europe. Greater demand within the U.S. also appeared to contribute to the acceleration of growth during the second half of 2008.

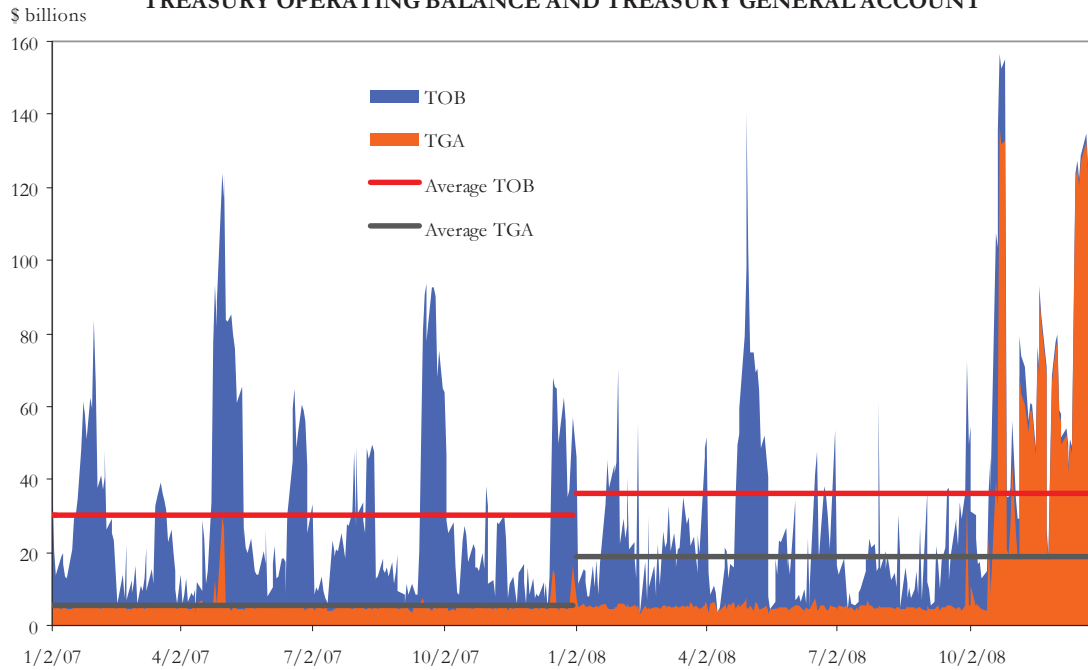
**B. Treasury’s Balance at the Fed**

Treasury’s total operating balance (TOB) was about \$6.3 billion higher on average in 2008 than in 2007 mainly because of a change in the management of Treasury’s balances that occurred in mid-October (Chart 20).<sup>20</sup> TOB figures provided here exclude funds held in the SFP Account and the Financial Institution Account shown on the Daily Treasury Statement.

<sup>20</sup> Treasury’s TOB is defined as funds held in the Treasury’s account with the Federal Reserve (the Treasury General Account or TGA) plus balances held in Treasury Tax and Loan (TT&L) note accounts at commercial banks, which includes the term investment option (TIO) and reverse repurchase (repo) programs.

Chart 20

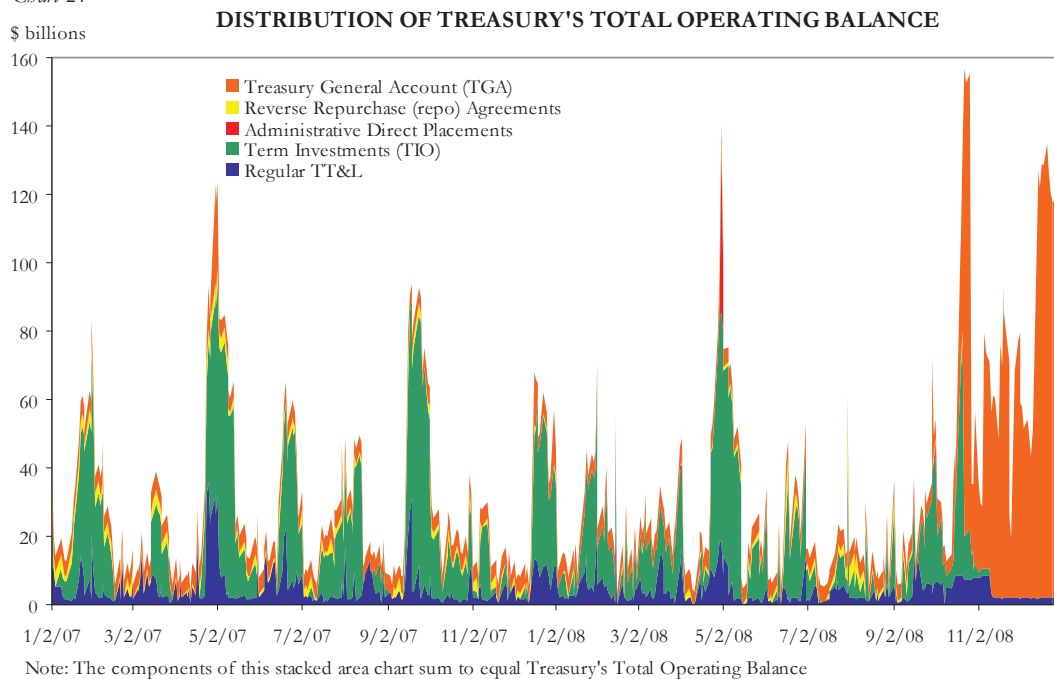
TREASURY OPERATING BALANCE AND TREASURY GENERAL ACCOUNT



For the first 10½ months of 2008 the TOB averaged about \$7 billion lower than 2007. Higher Treasury spending lowered the TOB, and was partially offset by larger and more frequent issuance of securities, which allowed for better TOB management. On most days during this period, the TGA was close to the usual \$5 billion target level despite lower TT&L capacity. The Treasury managed the TGA mainly by layering TIO auctions and making large administrative direct placements<sup>21</sup> during periods when it was flush with cash. Note that the Treasury was able to maintain a \$5 billion target during late April 2008 even though the TOB spiked to \$140 billion (Chart 21).

<sup>21</sup> Treasury made several large direct administrative placements during 2008 with TT&L depositories. The rate and timing of these placements were arranged with several TT&L banks that agreed to hold additional collateral to back these placements.

Chart 21



In October 2008, Treasury began experiencing difficulty maintaining the usual \$5 billion TGA target as the TOB swelled in anticipation of TARP-related payments, while TT&L banks' appetite for Treasury investments waned. As shown in the graph above, Treasury stopped making most investments in late October and kept almost all of its funds in the TGA. There are several major reasons why Treasury began keeping a high TGA in late 2008.

1. Large and variable payments related to TARP required a larger TGA than usual to accommodate these outflows and minimize the risk of overdraft.
2. Treasury earned a higher implicit return on its funds by keeping a high TGA than it could earn explicitly by placing the funds at the rates available using TIO, repo, directive investments or administrative direct placements. A high TGA reduces the level of excess reserves and reduces the payment of interest to banks, thereby implicitly earning (or saving) the Treasury money. For example, the rate Treasury earned on direct investments (the TT&L rate) was zero or close to zero during November compared to a one percent implicit rate (excess reserves rate) earned on a marginal increase in the TGA. The TT&L rate which is equal to the weekly average effective federal funds rate less 25 basis points plummeted during the last few months of 2008, paralleling the decline in the effective federal funds rate.

3. Maintaining the usual \$5 billion target for the TGA was not as critical to reserve management as it once was given the high level of excess reserves in the banking system.

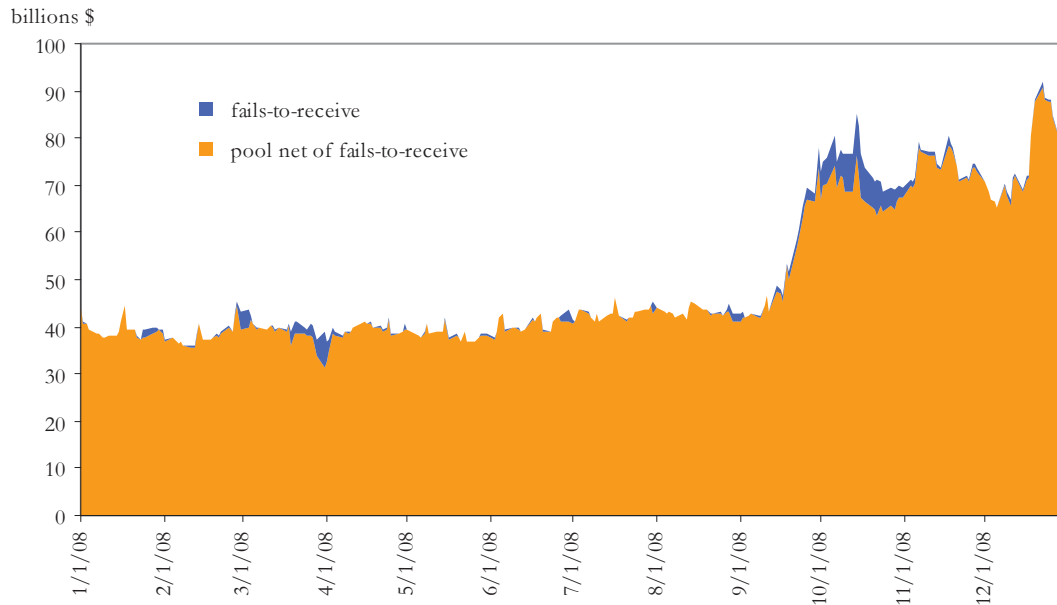
### **C. Foreign RP Pool**

The Foreign RP pool (the pool) comprises overnight repurchase agreements between the Federal Reserve System and its foreign central bank and international account customers. Access to the pool is offered to customers as an overnight investment vehicle to help meet daily liquidity needs, with SOMA holdings used as collateral. An increase in the pool drains reserve balances from the banking system as foreign central bank and international account customers move money from a depository institution to the Federal Reserve. The size and variability of the pool increased significantly in mid-September as seen in Chart 22, which shows daily pool levels for 2008.

One issue that impacted pool levels in 2008 were increases of delivery failures in the Treasury financing market. Since pool participants often keep funds in the pool that otherwise with which they intend to settle securities purchases, if the securities are not delivered, then cash balances in the pool will be higher. Highlighted in Chart 22 are increases in daily pool levels caused by fails, which increased from negligible amounts in early September to \$10.9 billion by October 15. Fails volumes decreased in November, but pool levels nonetheless remained well above their pre-September levels throughout the rest of the year.

Chart 22

2008 DAILY POOL LEVELS (\$ billions)



Increased risk aversion and low short-term interest rates contributed to the elevation of pool levels during the final three months of the year. A number of pool participants responded to market conditions by returning to the pool funds that had circulated in the banking system, by ending their participation in the Desk's late-day fed fund sales, or by doing both. The Desk historically has used late-day funds sales to mitigate the reserve impact of unanticipated inflows of funds, and so the lack of interest in such sales likely added to both the size and the variability of the pool. Declines in the yields of alternative short-term dollar investments late in the year also might have impacted pool levels by reducing the opportunity cost of maintaining pool balances.

#### D. Federal Reserve Float

Federal Reserve statement float levels have continued to stabilize through 2008, exhibiting the steadiest average weekly levels seen in the last ten years. The significant decrease in volatility is largely attributed to the growing number of institutions willing to receive electronic presentment of checks enabled by the Check 21 Act and the continued improvements made to such systems. Float now runs contradictory to its namesake as this autonomous factor actually now drains reserves from the system due to checks being processed in advance of crediting the depositors.

## VI. TRADING IN THE FEDERAL FUNDS AND REPO MARKETS

### A. The Federal Funds Market

Volatility in the federal funds market remained high in 2008 compared to historical norms but had eased since the onset of the crisis. Trading ranges in the brokered fed funds market and deviations of the effective rate from the target rate were elevated but declined notably from the end of 2007 (Table 5). Market participants attributed the improved trading conditions to the passage of the 2007 year-end and the increased opportunities to obtain dollar funding through the TAF or reciprocal currency swaps.

Table 5  
FEDERAL FUNDS RATE BEHAVIOR (BASIS POINTS)

	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u> <u>Prior to</u> <u>August 9</u>	<u>2007</u> <u>Since</u> <u>August 9</u>	<u>2008 Prior to</u> <u>March 17</u>	<u>2008 Since</u> <u>March 17, Prior</u> <u>to September 15</u>	<u>2008 Since</u> <u>September 15</u>
<b>All Days</b>									
<i>Intraday Standard Deviation</i>									
Median	4	3	4	5	5	20	15	20	22
Average	5	4	7	7	7	30	20	24	40
<i>Daily Trading Ranges</i>									
Median	25	19	38	50	50	200	150	175	113
Averages	33	30	55	77	79	241	174	190	183
<i>Absolute Deviation of Effective Rate from Target</i>									
Median	2	1	2	2	1	9	3	4	58
Averages	4	3	5	3	2	14	8	7	52
<b>High Payment Flow Days*</b>									
<i>Intraday Standard Deviation</i>									
Median	6	4	7	7	8	40	35	32	24
Average	8	7	9	12	10	44	35	35	66
<i>Absolute Deviation of Effective Rate from Target</i>									
Median	6	4	7	3	4	10	10	9	64
Averages	8	4	9	5	5	21	9	14	57

\*High payment flow dates include the first and last business days of each month, and the first business day after the 14th of each month.

After March 17, to improve market functioning, the Federal Reserve increased the sizes of TAF and currency swaps and established the single-tranche RPs, the TSLF, and the PDCF. These programs provided the market with much needed liquidity and allowed many participants the opportunity to finance asset-backed collateral. Nevertheless, the market remained skittish and trading conditions in the fed funds market were generally characterized as choppy with foreign institutions routinely bidding aggressively in the morning (Charts 23 and 24). During this time, the Desk consistently provided ample reserves to combat the morning pressures and had some success at driving rates towards the target despite the volatile trading conditions.



Chart 23

**SPREAD BETWEEN MORNING RATE AND FED FUNDS TARGET RATE**

Basis Points

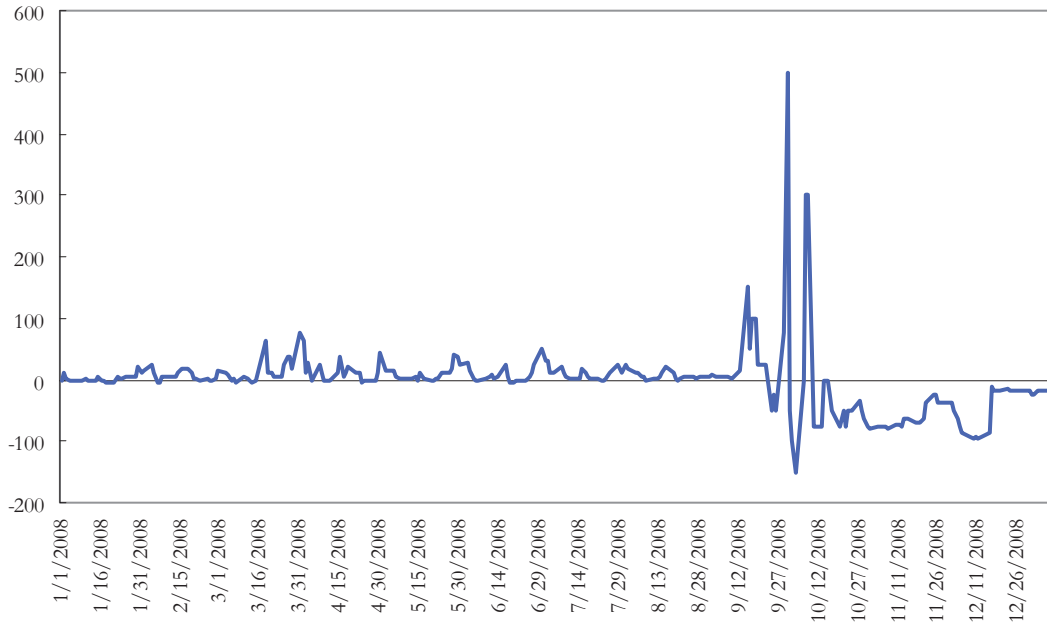
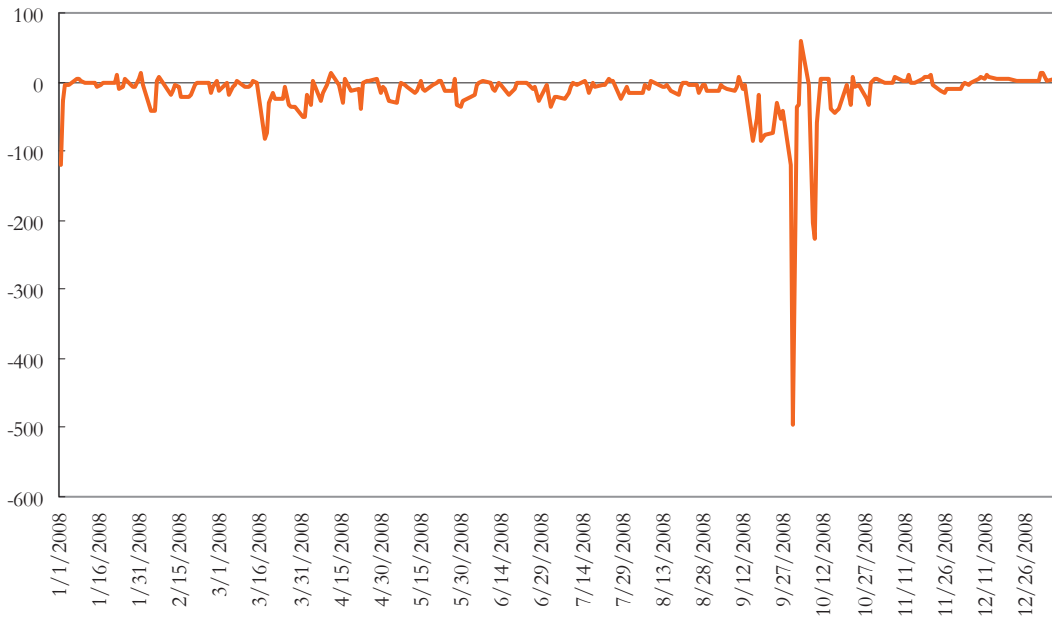


Chart 24

**SPREAD BETWEEN FED FUNDS EFFECTIVE RATE AND MORNING RATE**

Basis Points

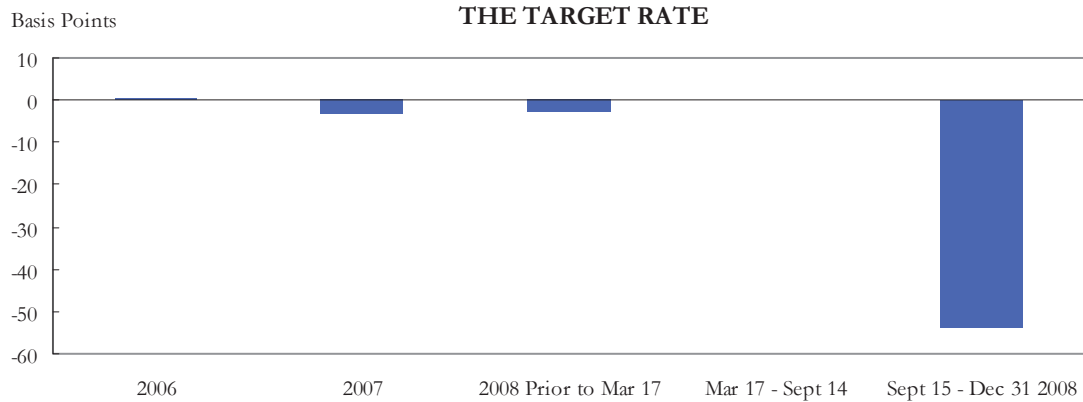


Severe pressures arose across a host of markets including the fed funds market in mid-September.

Traders at depository institutions began to bid for overnight fed funds well above the target rate to

ensure that their companies were adequately financed, but trading in term markets was limited. After the Federal Reserve established several facilities to ensure that the banking system had sufficient liquidity, however, rates in the fed funds market were routinely below the target (Charts 25 and 26) with volatility far exceeding levels exhibited earlier in the year (Chart 27). Even with the Federal Reserve paying interest on required and excess reserves, fed funds traded well below the target with many market participants noting that GSEs were not able to earn interest on reserves and as a consequence were willing to sell fed funds at very low levels. On December 16, the FOMC eased the target to a range between zero and twenty-five basis points. Subsequent daily effective rates have all fallen within this range reaching historical lows of 9 basis points on December 26 and December 30.

*Chart 25* **AVERAGE DEVIATION OF THE FED FUNDS EFFECTIVE RATE FROM THE TARGET RATE**



*Chart 26* **AVERAGE ABSOLUTE DEVIATION OF THE FED FUNDS EFFECTIVE RATE FROM THE TARGET**

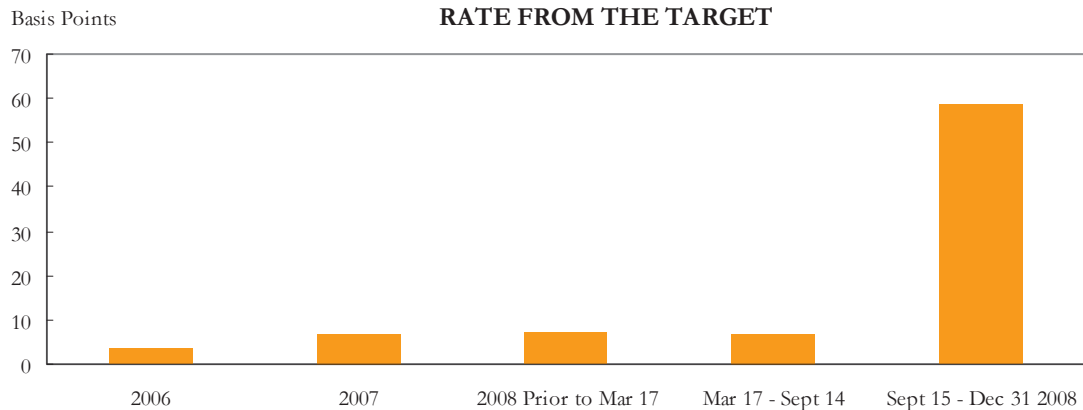
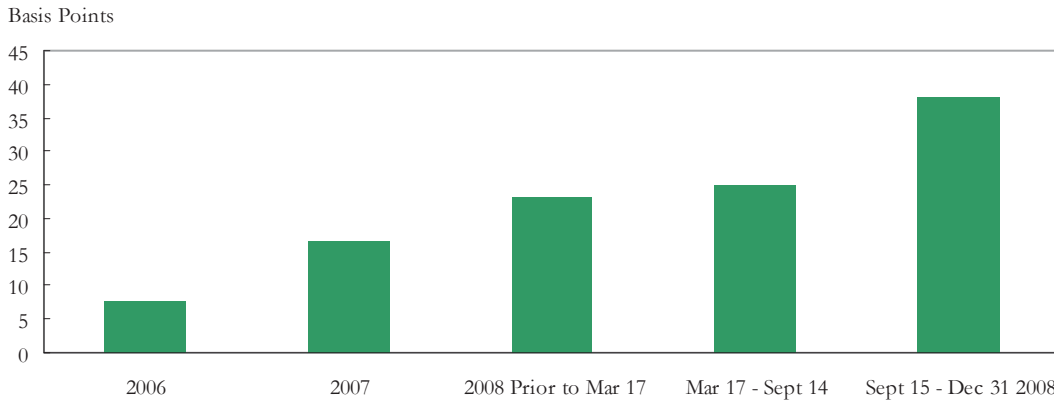


Chart 27

**AVERAGE STANDARD DEVIATION OF BROKERED FED FUNDS**



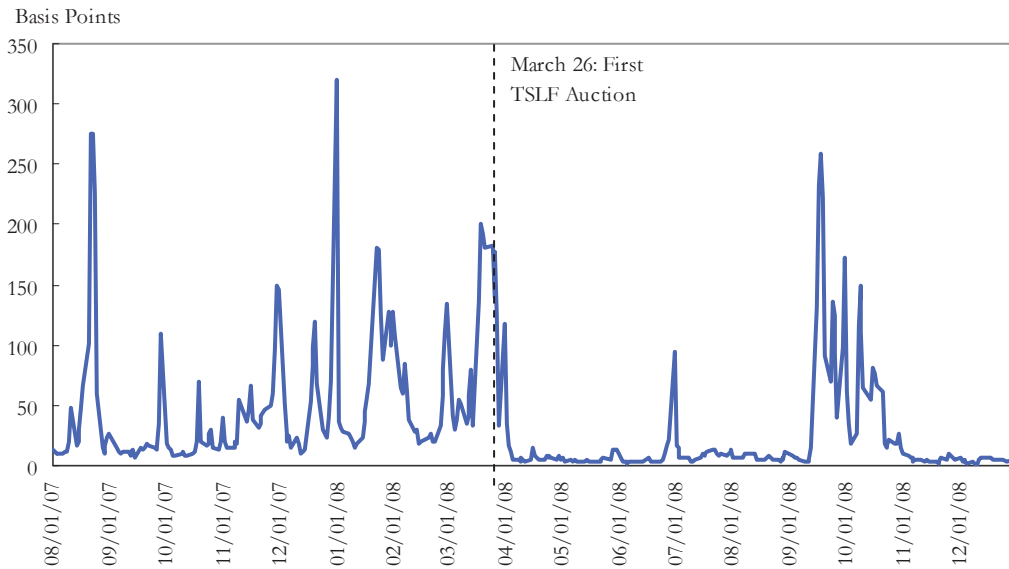
**B. The Treasury and Agency General Collateral Repo Markets**

The problems in bank funding markets were also evident in the Treasury, Agency, and Agency MBS financing markets during 2008. Amid ongoing concerns about counterparty credit risk and increased risk aversion, demand for Treasury collateral was extremely elevated during several episodes throughout the year. Liquidity conditions were generally characterized as poor with limited trading in term markets beyond one month. This occurred in spite of the sizable amount of Treasury collateral that was available in the market through primary issuance, the SFP, and other programs geared towards improving functioning in Treasury markets. As a consequence, there were several instances where spreads between Treasury repo collateral and Agency MBS repo collateral widened dramatically. However, there were also periods of relative stability with spreads nearly returning to levels witnessed before the crisis started.

Trading in the repo market during the year can be divided into four distinct periods. At the start, confidence was poor and most market participants were very defensive as concerns about counterparty credit risk intensified. The spread between overnight Treasury repo and Agency MBS repo was at 320 basis points at the end of 2007 (Chart 28). As a point of comparison, the average year-end premium for overnight Treasury repo was about 68 basis points from 2004 to 2006. The volatile trading conditions carried over into 2008 with investors demanding only the highest quality collateral.

Chart 28

**OVERNIGHT AGENCY MBS LESS U.S. TREASURIES**

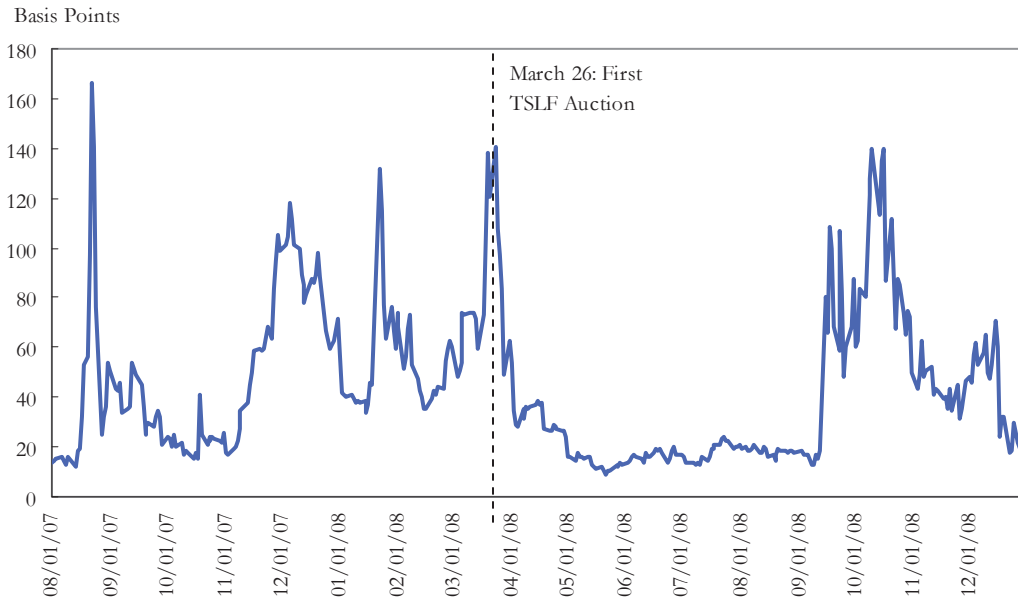


Source: FRBNY Dealer Survey

With liquidity conditions worsening and the financial performance of individual companies rapidly deteriorating, the Fed began to establish or upsize many of its facilities in March. Increases in the TAF and easing of the terms in the regular SOMA securities lending facility coupled with new programs such as the single-tranche RPs, TSLF, and PDCF provided the market with much needed funding and Treasury collateral that was in very high demand. Additionally, redemption and sales of U.S. Treasury securities from the SOMA portfolio provided the market with billions of dollars of high quality collateral. The single-tranche RPs and TSLF were mentioned particularly by market participants as helping to drive term spreads between Treasury and Agency MBS collateral narrower (Chart 29).

Chart 29

**1-MONTH AGENCY MBS LESS 1-MONTH U.S. TREASURIES**



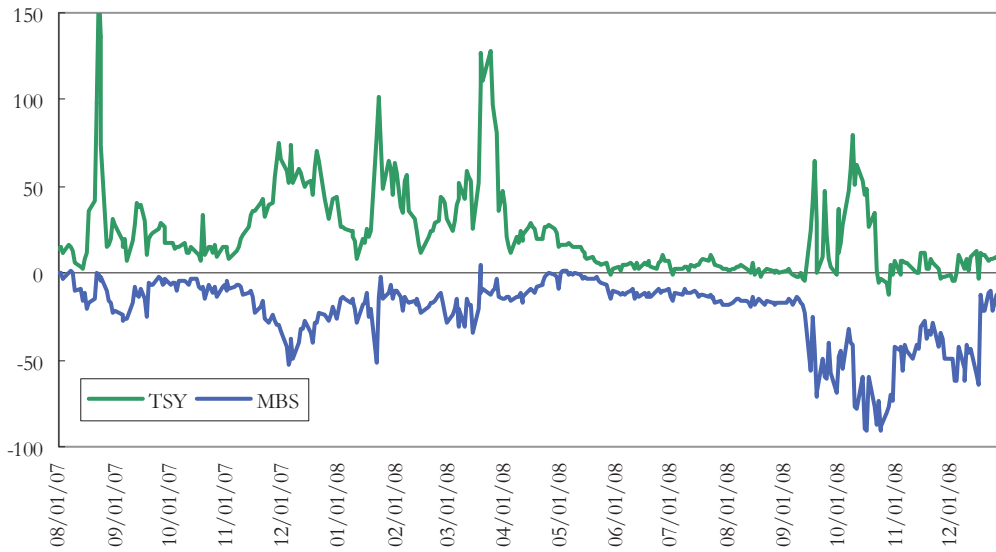
Source: FRBNY Dealer Survey

Although market participants remained concerned about counterparty risk and the fragile financial markets, trading in the repo market was relatively stable from May to mid-September. Sentiment had improved on the margin, with some market participants noting the numerous actions taken by Federal Reserve after mid-March as a possible impetus. However, renewed counterparty credit concerns in September strained liquidity, and demand for U.S. Treasuries again skyrocketed with spreads of OIS over Treasury repo widening (Charts 30 and 31). Both term unsecured and secured financing markets ground to a halt. Many traders reported a pull-back in lending activity from market participants with long positions, which contributed to a notable decline in the overnight Treasury GC rate. Additionally, Lehman’s sizable repo book was effectively locked following its bankruptcy, which created not merely significant uncertainty but also resulted in a considerable drain in floating supply available to be borrowed, leading to record high levels of failures to deliver securities (Chart 32).

Chart 30

**SPREAD BETWEEN 1-MONTH OIS AND 1-MONTH OMO  
COLLATERAL**

Basis Points

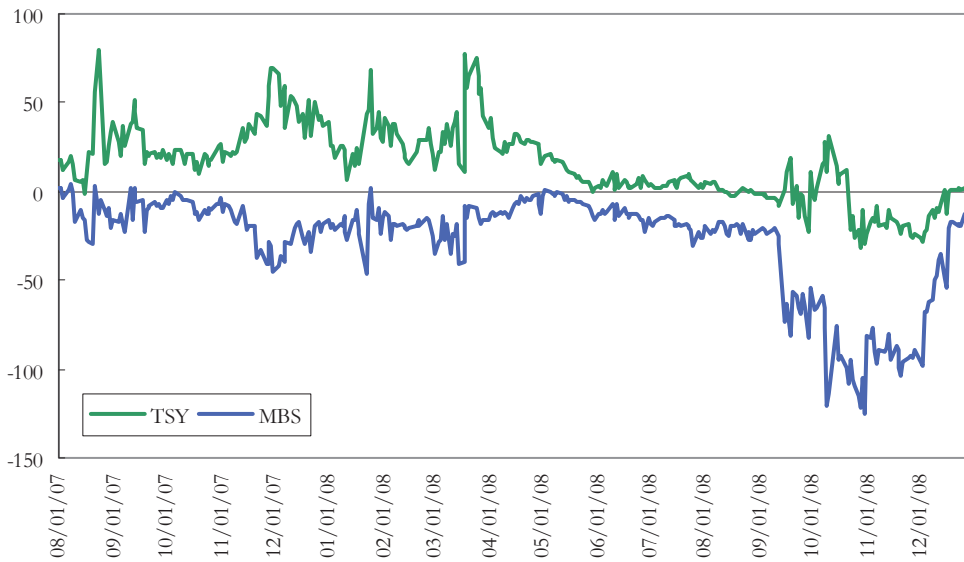


Source: FRBNY Dealer Survey

Chart 31

**SPREAD BETWEEN 3-MONTH OIS AND 3-MONTH OMO  
COLLATERAL**

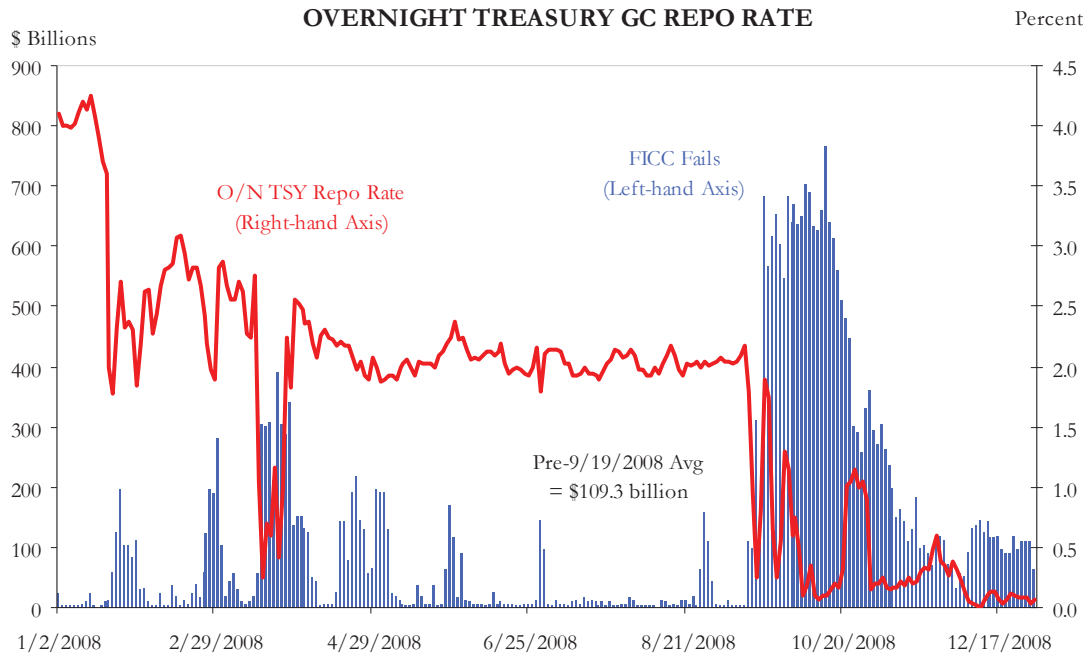
Basis Points



Source: FRBNY Dealer Survey

Chart 32

**FICC FAILS ACROSS ALL SECURITIES AND  
OVERNIGHT TREASURY GC REPO RATE**



To combat these new developments, the Federal Reserve established many of the aforementioned liquidity facilities which added an abundance of reserves to the banking system. By November, repo market participants noted that overnight financing had improved and term funding was slowly starting again. Dealers noted that trading over year-end was very quiet with rates and spreads at seemingly normal levels.

## **APPENDIX A: AUTHORIZATION FOR DOMESTIC OPEN MARKET OPERATIONS**

(Reaffirmed January 29, 2008)

1. The Federal Open Market Committee authorizes and directs the Federal Reserve Bank of New York, to the extent necessary to carry out the most recent domestic policy directive adopted at a meeting of the Committee:

(a) To buy or sell U.S. Government securities, including securities of the Federal Financing Bank, and securities that are direct obligations of, or fully guaranteed as to principal and interest by, any agency of the United States in the open market, from or to securities dealers and foreign and international accounts maintained at the Federal Reserve Bank of New York, on a cash, regular, or deferred delivery basis, for the System Open Market Account at market prices, and, for such Account, to exchange maturing U.S. Government and Federal agency securities with the Treasury or the individual agencies or to allow them to mature without replacement;

(b) To buy U.S. Government securities, obligations that are direct obligations of, or fully guaranteed as to principal and interest by, any agency of the United States, from dealers for the account of the System Open Market Account under agreements for repurchase of such securities or obligations in 65 business days or less, at rates that, unless otherwise expressly authorized by the Committee, shall be determined by competitive bidding, after applying reasonable limitations on the volume of agreements with individual dealers.

(c) To sell U.S. Government securities and obligations that are direct obligations of, or fully guaranteed as to principal and interest by, any agency of the United States to dealers for System Open Market Account under agreements for the resale by dealers of such securities or obligations in 65 business days or less, at rates that, unless otherwise expressly authorized by the Committee, shall be determined by competitive bidding, after applying reasonable limitations on the volume of agreements with individual dealers.

2. In order to ensure the effective conduct of open market operations, the Federal Open Market Committee authorizes the Federal Reserve Bank of New York to lend on an overnight basis U.S. Government securities held in the System Open Market Account to dealers at rates that shall be determined by competitive bidding. The Federal Reserve Bank of New York shall set a minimum lending fee consistent with the objectives of the program and apply reasonable limitations on the total amount of a specific issue that may be auctioned and on the amount of securities that each dealer may borrow. The Federal Reserve Bank of New York may reject bids which could facilitate a dealer's ability to control a single issue as determined solely by the Federal Reserve Bank of New York.

3. In order to ensure the effective conduct of open market operations, while assisting in the provision of short-term investments for foreign and international accounts maintained at the Federal Reserve Bank of New York and accounts maintained at the Federal Reserve Bank of New York as fiscal agent of the United States pursuant to Section 15 of the Federal Reserve Act, the Federal Open Market Committee authorizes and directs the Federal Reserve Bank of New York (a) for System Open Market Account, to sell U.S. Government securities to such accounts on the bases set forth in paragraph l(a) under agreements providing for the resale by such accounts of those securities in 65 business days or less on terms comparable to those available on such transactions in the market; and (b) for New York Bank account, when appropriate, to undertake with dealers, subject to the conditions imposed on purchases and sales of securities in paragraph l(b), repurchase



agreements in U.S. Government and agency securities, and to arrange corresponding sale and repurchase agreements between its own account and such foreign, international, and fiscal agency accounts maintained at the Bank. Transactions undertaken with such accounts under the provisions of this paragraph may provide for a service fee when appropriate.

4. In the execution of the Committee's decision regarding policy during any intermeeting period, the Committee authorizes and directs the Federal Reserve Bank of New York, upon the instruction of the Chairman of the Committee, to adjust somewhat in exceptional circumstances the degree of pressure on reserve positions and hence the intended federal funds rate. Any such adjustment shall be made in the context of the Committee's discussion and decision at its most recent meeting and the Committee's long-run objectives for price stability and sustainable economic growth, and shall be based on economic, financial, and monetary developments during the intermeeting period. Consistent with Committee practice, the Chairman, if feasible, will consult with the Committee before making any adjustment.

**APPENDIX B: GUIDELINES FOR THE CONDUCT OF SYSTEM OPEN MARKET OPERATIONS IN FEDERAL AGENCY ISSUES**

The FOMC has established specific guidelines for operations in Agency securities to ensure that Federal Reserve operations do not have undue market effects and do not serve to support individual issuers. The guidelines are reprinted below.

*Guidelines for the Conduct of System Open Market Operations in Federal Agency Issues*

1. System open market operations in Federal Agency issues are an integral part of total System open market operations designed to influence bank reserves, money market conditions, and monetary aggregates.
2. System open market operations in Federal Agency issues are not designed to support individual sectors of the market or to channel funds into issues of particular agencies.