Term Securities Lending Facility (TSLF)

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March 20, 2019

Abstract

The 2007-09 financial crisis reached a critical stage in March 2008. Amid falling house prices and downgrades of mortgage-related securities, financial markets became severely disrupted. The Federal Reserve (Fed)—the U.S. central bank—became increasingly concerned about the inability of the 20 primary dealers, including the five largest U.S. investment banks, to fund themselves in short-term funding markets, such as the repurchase agreement (repo) market, then estimated at $10 trillion. In response, the Fed created several emergency lending facilities to restore market liquidity that required the Fed to invoke Section 13(3) of the Federal Reserve Act. The Term Securities Lending Facility (TSLF) authorized the Federal Reserve Bank of New York to lend to primary dealers up to $200 billion of highly liquid U.S. Treasuries against collateral that was particularly illiquid at the time. Eligible collateral initially included triple-A private-label mortgage-backed securities but was later broadened. In July 2008, an additional $50 billion was allocated for a TSLF Options program. The TSLF operated between March 27, 2008 and February 1, 2010. Usage peaked at $236 billion in October 2008. Overall, 18 of the 20 primary dealers participated and the Fed collected $781 million in fees.

Keywords: Federal Reserve, central bank, financial crisis, lending facilities, lender of last resort, market liquidity

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Term Securities Lending Facility (TSLF)

At a Glance

In March of 2008, financial markets became severely disrupted amid falling house prices and downgrades of mortgage-related securities. Particularly distressed was the repurchase agreement (repo) market, then estimated at $10 trillion. The Federal Reserve (Fed)—the U.S. central bank—concerned about the inability of primary dealers to obtain funds, invoked the emergency powers of Section 13(3) of the Federal Reserve Act, last used during the Great Depression, to act as lender of last resort to non-depository institutions. The Term Securities Lending Facility (TSLF) was the first of many emergency lending facilities during the crisis.

Summary of Key Terms	
Purpose: "To promote liquidity in the financing markets for Treasury and other collateral and thus to foster the functioning of financial markets more generally."	
Announcement Date	March 11, 2008
Operational Date	March 27, 2008
End of Issuance Window	February 1, 2010
Legal Authority	Sections 13(3) and 14 of the Federal Reserve Act
Peak Utilization	$236 billion on October 1, 2008
Participants	Primary dealers of the Federal Reserve Bank of New York
Administrator	Federal Reserve Bank of New York

The Federal Reserve Bank of New York used the TSLF to lend to the 20 primary dealers, including the largest five U.S. investment banks, up to $200 billion of highly liquid U.S. Treasuries against collateral that was relatively illiquid at the time. In view of the great demand for U.S. Treasuries as a "safe haven," the TSLF consisted of weekly auctions and was intended to restore market liquidity, particularly for the repo market.

The list of eligible collateral initially included triple-A private-label mortgage-backed securities but was later expanded. In July 2008, an additional $50 billion was allocated for a TSLF Options program. In September 2008, a day prior to the collapse of Lehman Brothers—the largest bankruptcy in U.S. history—the Fed greatly expanded TSLF eligible collateral to include any investment-grade securities (BBB- or higher). TSLF utilization intensified, reaching its peak of $236 billion in October 2008. The TSLF operated until February 1, 2010. Overall, 18 primary dealers participated and the Fed collected $781 million in fees.

Summary Evaluation

Since the TSLF was one of many emergency lending facilities during the 2007-09 financial crisis, it is hard to evaluate its direct impact on financial markets generally. The effect of the TSLF announcement on market participants was mixed. While Fed Chairman Bernanke (2015) thought it calmed the markets, U.S. Treasury Secretary Paulson (2010) thought that "the opposite happened." Fleming et al (2010) and Hrung and Seligman (2011) argued that the TSLF contributed to the reduction of stress on repo markets. Recently, Carlson & Macchiavelli (2018) conducted further analysis of the TSLF.

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I. Overview

Background

The financial crisis that started in the second half of 2007 entered a critical stage in March 2008. Financial markets became severely disrupted and credit was scarce and expensive. Amid falling house prices and downgrades of mortgage-related securities, lenders limited their exposure to only the safest securities. Bear Stearns, the fifth largest investment bank with $400 billion in assets teetered on the brink of collapse (GAO 2011, Geithner 2014).

Primary dealers[2] such as Bear Stearns were particularly vulnerable as they relied on the repurchase agreement (repo) market for funding (Gorton & Metrick 2012). A repo transaction is basically a short-term loan in which a firm sells a security to another firm with the agreement to buy it at a later date for a slightly higher predetermined price. These transactions occur on a very short-term basis, typically overnight.

By March of 2008, the repo market, estimated at around $10 trillion at the time, had become illiquid (Gorton & Metrick 2010). Primary dealers struggled to obtain financing, as they could no longer sell a large portion of their securities (Geithner 2014). Rates for overnight borrowing of securities such as Treasury securities, agency debt securities, and agency mortgage-backed securities (MBS) rose from an average of less than 10 basis points (bps), to over 60 bps (Fleming et al 2010). The Federal Reserve (Fed)—the U.S. central bank—became concerned about market liquidity and the functioning of financial markets (Fed 2008).

On March 7, 2008, the Fed introduced the Single-Tranche Term Repurchase Agreement program[3] which allocated up to $100 billion to conduct term (28-day) repurchase agreements with primary dealers. This program excluded private-label mortgage-related securities and only accepted high quality collateral, eligible in the Fed's regular open market operations (OMOs) in which the Federal Reserve Bank of New York (FRB-NY) trades overnight securities with its primary dealers. The Fed, through the FRB-NY crafted a new and larger program, the Term Securities Lending Facility (TSLF) intended to support primary dealers. In view of the great demand for U.S. Treasury securities as a "safe haven," and to reduce the need to fire sale illiquid assets, the FRB-NY would lend highly liquid U.S. Treasury securities at a 28-day term—much longer than the typical overnight term—and against a broader range of collateral (Fed 2008, Geithner 2014). Throughout the crisis, the

[2] Primary dealers are about 20 securities firms that the Federal Reserve Bank of New York has designated to trade U.S. government securities on a regular basis. Most primary dealers are affiliated with banks. However, this doesn't give them access to the Fed's Discount Window. The Discount Window is only available to legal entities that are depository institutions. U.S. securities firms had limited ability to source liquidity from their bank affiliates during the crisis. For that reason, the Fed believed it needed to create programs like TSLF to promote market liquidity by lending directly to securities firms.

[3] For info on the Single-Tranche Term Repurchase Agreement program, see: https://www.federalreserve.gov/monetarypolicy/bst_tranche.htm

Fed created multiple emergency lending facilities intended to restore market liquidity, such as the TSLF.[4] [5]

Program Description

On March 10, 2008, a week prior to a scheduled regular meeting of the Federal Open Market Committee (FOMC), Fed Chairman Bernanke convoked an emergency conference call. Financial market disruptions rushed the Fed to speed up the creation of emergency lending facilities. That same day, with a unanimous vote of the five sitting Board Governors of the Federal Reserve System and a 9-0 vote of the FOMC, the TSLF was approved. The Fed invoked the emergency powers of Section 13(3) of the Federal Reserve Act that permitted it to lend to non-depository institutions "in unusual and exigent circumstances" (Fed 2009). The TSLF was announced a day later, on March 11, 2008, although without any reference to Section 13(3) or emergency authority. The Fed "worried that trumpeting the invocation of emergency powers last used in the Depression would deepen the panic" (Bernanke 2015).

Under the TSLF, the FRB-NY was able to lend primary dealers as much as $200 billion in highly liquid U.S. Treasury securities such as Treasury bills, notes, bonds and inflation indexed securities. The facility took advantage of existing infrastructure and had some similarities in design to the FRB-NY's open market operations. The FRB-NY would pull out U.S. Treasury securities for the operation of this facility from the System Open Market Account (SOMA) (Fed 2009). However, it took two weeks for the facility to become operational. In the meantime, JP Morgan Chase acquired Bear Stearns for $2 per share with emergency assistance from the Fed.[6]

The FRB-NY offered to lend U.S. Treasury securities at a 28-day term (in some cases adjusted for holidays) against a broader range of collateral. Initially, the list of eligible collateral included illiquid collateral at the time, such as triple-A private-label residential MBS and commercial MBS, as well as agency collateralized mortgage obligations (CMO) (FRB-NY 2008a). By awarding loans through auctions, the Fed intended to encourage broad participation and avoid any stigma in using this facility. The TSLF consisted of weekly auctions (Thursdays at 2PM ET) in which bids represented the fee dealers intended to pay to loan the offered U.S. Treasury securities. At the end of the auction, the FRB-NY awarded loans at a uniform fee, based on the "stop-out rate," which was the lowest accepted bid.

TSLF auctions started on March 27, 2008 and were classified into two categories: Schedule 1 and Schedule 2. While Schedule 1 auctions accepted all collateral eligible in the FRB-NY's open market operations, Schedule 2 auctions offered a larger amount of U.S. Treasury securities, accepted a much broader and less liquid range of collateral, and required a higher minimum bid. The two different schedules were intended "to better calibrate the interest rate on TSLF loans to the level of risk associated with the collateral" (GAO 2011).

[4] For a crisis timeline and info on Fed's actions, see https://www.stlouisfed.org/financial-crisis/full-timeline

[5] For TSLF info: www.federalreserve.gov/regreform/reform-tslf.htm and www.newyorkfed.org/markets/tslf

[6] The price settled at $10 per share. The Fed facilitated a $30 billion emergency loan to JP Morgan Chase. Between March 10, and March 13, Bear Stearns had experienced a depletion of its cash reserves from $18 billion to $2 billion.

Section 14 of the Federal Reserve Act already allowed the FRB-NY to trade securities eligible for Schedule 1 for purposes of open market operations. However, the TSLF required 13(3) approval because, in expanding the collateral for Schedule 2, to include types of securities that were not authorized in the FRB-NY's open market operations, it was lending to non-depository institutions (the primary dealers) for the purpose of acting as their lender of last resort.

The Fed used the clearing services of the existing clearing banks in the tri-party repo market, JP Morgan Chase and Bank of New York Mellon. The clearing banks acted as intermediaries and provided the daily services of custody and valuation of collateral. The services of the clearing banks came at no charge to the Federal Reserve or borrowers (Fed 2009).

Participation in the TSLF was voluntary and undisclosed. In July 2010, however, the U.S. Congress passed the Dodd-Frank Wall Street Reform and Consumer Protection Act ("Dodd-Frank") which requires the Fed to disclose information about open market operations (OMOs) and discount window borrowers, two years after transactions occur. For emergency lending facilities under Section 13(3) authority, the Fed is required to disclose information of borrowers a year after the facility ends (Fed 2010).[7]

The day before a TSLF auction, the FRB-NY would announce the amount of U.S. Treasury securities offered which ranged between $25 billion and $75 billion. TSLF auctions lasted for thirty minutes and the results on awards and stop-out rates were communicated shortly thereafter (Fed 2008).

Schedule 1 auctions imposed a minimum bid of 10 bps while Schedule 2 required a higher minimum of 25 bps. There was no cost to place a bid. Dealers could place up to two bids, with a minimum amount of $10 million and a maximum of 20% of the total offered amount. In case of two bids, they could only be in increments of $10 million. The FRB-NY awarded loans in full for bids above the stop-out rate and on a pro-rata basis for bids at the stop-out rate. It held the right to refuse any bid at its own discretion. Dealers were not allowed to terminate a loan early (FRB-NY 2008).

The FRB-NY imposed margins (haircuts)[8] on all collateral. The TSLF terms and conditions stipulated the daily revaluation of collateral by the clearing banks to make sure the specified margins were applied. Every day, the clearing banks conducted the valuation of collateral. In case the value of the collateral decreased, the FRB-NY could ask for substitutions. On the other hand, primary dealers could also substitute collateral for other eligible collateral if needed. To value the pledged collateral, clearing banks used the lowest price available in their valuation systems. This reduced the risk for the Fed in case of bankruptcy of a borrowing primary dealer. The loans were recourse. That is, in case of default, the Fed could come after the primary dealer's assets to claim for the difference between the liquidation of the pledged collateral and the value of the loan.

With the escalating strains on financial markets, on July 24, 2008, the FOMC arranged a conference call and voted to extend the TSLF until January 30, 2009. The FOMC also

[7] For Fed's disclosures, see www.federalreserve.gov/newsevents/reform_quarterly_transaction.htm

[8] A margin or haircut requires the pledged collateral to be of greater value than the securities borrowed.

approved the TSLF Options Program (TOP) as an extension to the TSLF.[9] The TOP was announced on July 30, 2008. It required administrative changes pursuant to Schedule 2 auctions and not another Section 13(3) authorization (Fed 2009). The new program authorized the FRB-NY to offer through auctions the option to borrow U.S. Treasury securities for a 7-day term, two to three weeks after the auction date and at a fixed rate. The TOP intended to provide primary dealers some relief during periods of "heightened collateral market pressure, such as quarter-end dates" (Fed 2008). TOP auctions started in late August 2008 and required a minimum bid of one basis point and all Schedule 2 collateral was eligible. The facility was limited to $50 billion in U.S. Treasury securities, on top of the $200 billion of Schedule 1 and Schedule 2 auctions. The day before each TOP auction, the FRB-NY announced the terms and conditions, including the fixed rate of the loans.

On September 14, 2008, a day prior to the failure of Lehman Brothers—the fourth largest investment bank and largest bankruptcy in U.S. history—the Fed took another expansionary step.[10] With financial markets in disarray, TSLF Schedule 2 eligible collateral was expanded to include all investment-grade debt securities (BBB- or higher) and auctions increased from $125 billion to $150 billion per month. Schedule 2 auctions started to run weekly, instead of bi-weekly, until the end of April 2009, when they returned to a bi-weekly basis. In the January 2009 FOMC meeting, the TSLF was extended until October 2009 (Fed 2009).

By June 2009, financial markets showed significant signs of improvement. Effective July 1, 2009, the Fed suspended TSLF Schedule 1 and TOP auctions. The TSLF size was reduced to $75 billion for Schedule 2 auctions, which decreased from bi-weekly to once a month. After July 16, 2009, auctions received no participation. The last auction took place on January 7, 2010. While the TSLF was in operation, the Fed published information on the total amount of propositions, awards, stop-out rate, bid-to-cover ratio of each auction, but did not disclose the identity of the participant primary dealers or the bid propositions (FRB-NY 2008).

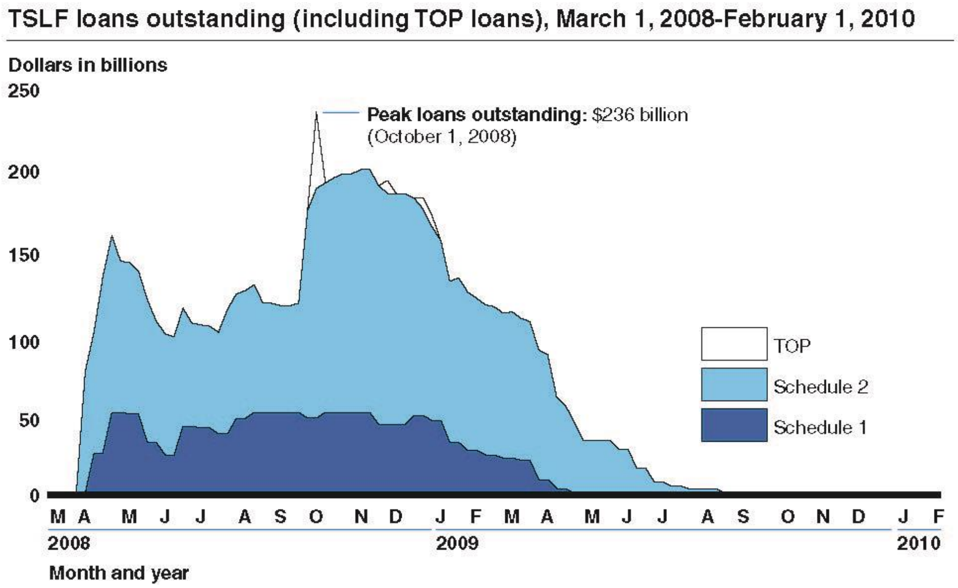
Outcomes

The TSLF operated between March 27, 2008 and February 1, 2010. Overall, 18 of the 20 primary dealers participated in the TSLF and 11 participated in the TOP as well. All TSLF loans were paid in full and with interest. The Fed collected a total of $781 million in fees (Fed 2010). The TSLF reached its peak utilization of $236 billion on October 1, 2008.

[9] Only Governor Plosser dissented. He considered "the net benefit of the TSLF options as being insufficient to justify adding them to the support already being provided to market liquidity."

[10] Lehman Brothers had been an active participant of the TSLF up until the September 11, 2008 auction. The investment bank received 18 TSLF loans. Its total borrowing peak was $19 billion.

Figure 1: TSLF Utilization



Source: (GAO 2011)

Figure 2: List of Primary Dealers of the Federal Reserve Bank of New York

	Primary Dealer	Schedule 1	Schedule 2	TOP	TSLF loans Total	Borrowing Peak (Dollars in millions)
1	Credit Suisse Securities (USA) LLC	11	42	1	53	$38.510
2	Morgan Stanley & Co. Incorporated	6	28	3	34	$36,000
3	Goldman Sachs & Co.	15	38	2	53	$34,500
4	Deutsche Bank Securities Inc.	20	32	1	52	$34,284
5	Citigroup Global Markets Inc.	20	45	2	65	$34,100
6	RBS Securities Inc.	14	44	1	58	$32,200
7	Barclays Capital Inc.	21	44	1	65	$26,200
8	UBS Securities LLC.	4	17	0	21	$23,823
9	Merrill Lynch Government Securities Inc.	5	34	1	39	$21,777
10	Lehman Brothers Inc.	5	13	0	18	$19,000
11	Banc of America Securities LLC	8	15	1	23	$17,203
12	J.P. Morgan Securities LLC	7	16	2	23	$13,000
13	BNP Paribas Securities Corp.	9	12	2	21	$11,500
14	Countrywide Securities Corporation	5	5	0	10	$3,600
15	Bear Stearns & Co., Inc.	0	2	0	2	$2,000
16	Dresdner Kleinwort Securities LLC	2	0	0	2	$850
17	Cantor Fitzgerald & Co.	4	5	0	9	$700
18	HSBC Securities (USA) Inc.	0	11	0	11	$500
19	Daiwa Securities America Inc.	-	-	-	0	
20	Mizuho Securities USA Inc.	-	-	-	0	
21	Jefferies & Company, Inc. (*)	-	-	-	0	
22	RBC Capital Markets Corporation (*)	-	-	-	0	
	TOTAL	156	403	17	559	

(*) The institution became primary dealer in June or July 2009. Source: Author's analysis of the Federal Reserve data.

The FRB-NY held a total of 97 TSLF auctions: 58 Schedule 2, 33 Schedule 1, and 6 TOP. Overall, the FRB-NY awarded a total of 559 TSLF loans; 156 Schedule 1 and 403 Schedule 2. Of the 403 Schedule 2 collateral loans, 17 were TOP. Schedule 2 auctions received the most demand. The highest stop-out rates occurred in the Schedule 2 auctions of September 17, October 9, and October 15, at 300, 305, and 322 bps respectively.[11]

TSLF auctions started on March 27, 2008 and ran weekly, alternating between Schedule 1 and Schedule 2, until September 11, 2008. In these first months of operation, the Fed offered $175 billion of the available $200 billion; $50 billion for Schedule 1 auctions and $125 billion for Schedule 2 auctions. Schedule 1 auctions offered $25 billion on each auction, while Schedule 2 auctions alternated offering amounts between $50 billion and $75 billion.

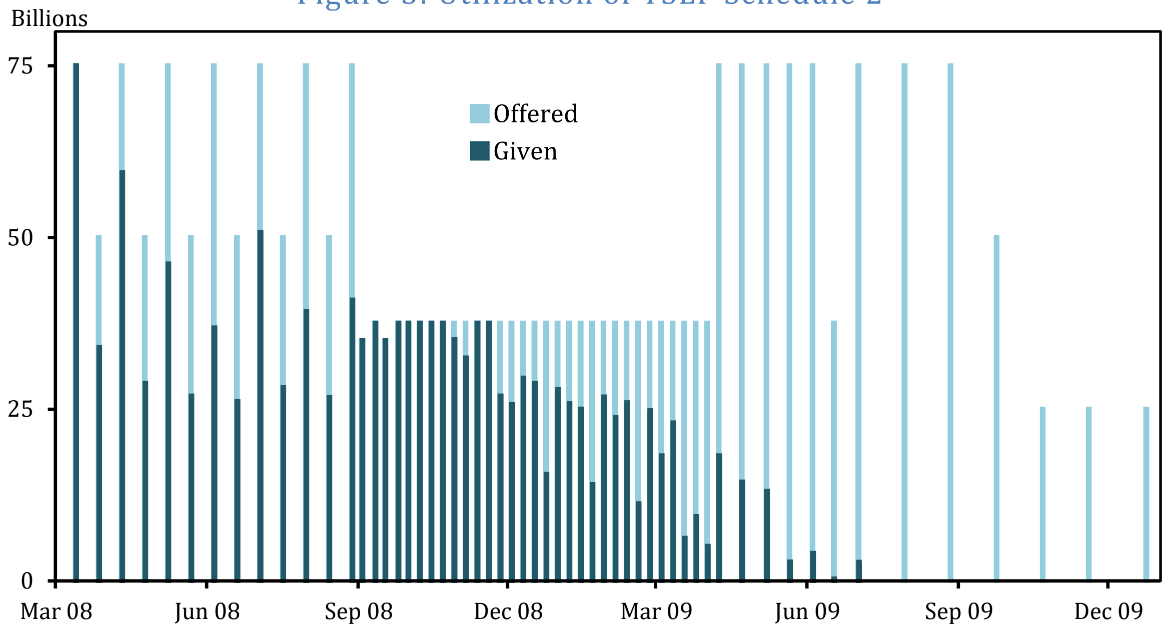
The initial TSLF auction on March 27, 2008 was Schedule 2. It offered $75 billion in U.S. Treasury securities and was oversubscribed. The FRB-NY awarded loans to 15 dealers at a stop-out rate of 33 bps. Schedule 2 auctions offered a significantly larger amount of U.S. Treasury securities compared to Schedule 1 which offered $25 billion in all its auctions. TSLF. With the exception of the first Schedule 2 auction of March 27, 2008, all Schedule 2 auctions until September 11, 2008 were undersubscribed. Following the collapse of Lehman Brothers on September 15, 2008, Schedule 2 auctions ran weekly, instead of bi-weekly and the Fed increased its offerings from $125 billion to $150 billion per month. From September 17, 2008, until April 15, 2009, all Schedule 2 weekly auctions offered $37.5 billion (only three $35 billion).

On September 17, 2008, $70 billion in U.S. Treasury securities were split into two auctions of $35 billion each. The first auction introduced a relative shorter term of 14-days (term only offered once), while the one later the same day, offered the regular 28-day term. Both of the September 17, 2008 auctions were fully subscribed at stop-out rates of 250 and 300 basis points respectively. All Schedule 2 auctions from September 17, 2008 until November 5, 2008 were oversubscribed.

Starting on April 22, 2009, Schedule 2 auctions returned to a bi-weekly basis and offered $75 billion each. From December 10, 2008 until July 16, 2009, auctions were undersubscribed. Thereafter, participation stopped completely and Schedule 2 auctions started to phase out, eventually ending on January 7, 2010.

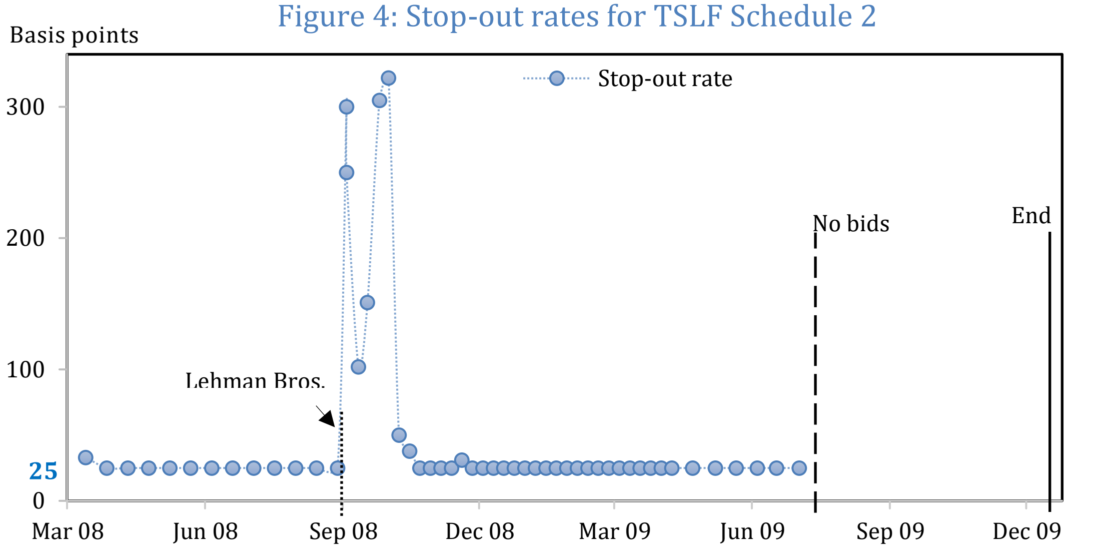
[11] For TSLF data and statistics, see www.federalreserve.gov/regreform/reform-tslf.htm and https://apps.newyorkfed.org/markets/autorates/tslf/historical/search

Figure 3: Utilization of TSLF Schedule 2



Each bar represents a Schedule 2 auction. In total, there were 58 between March 27, 2008 and January 7, 2010.
Source: Author's analysis of FRB-NY data.

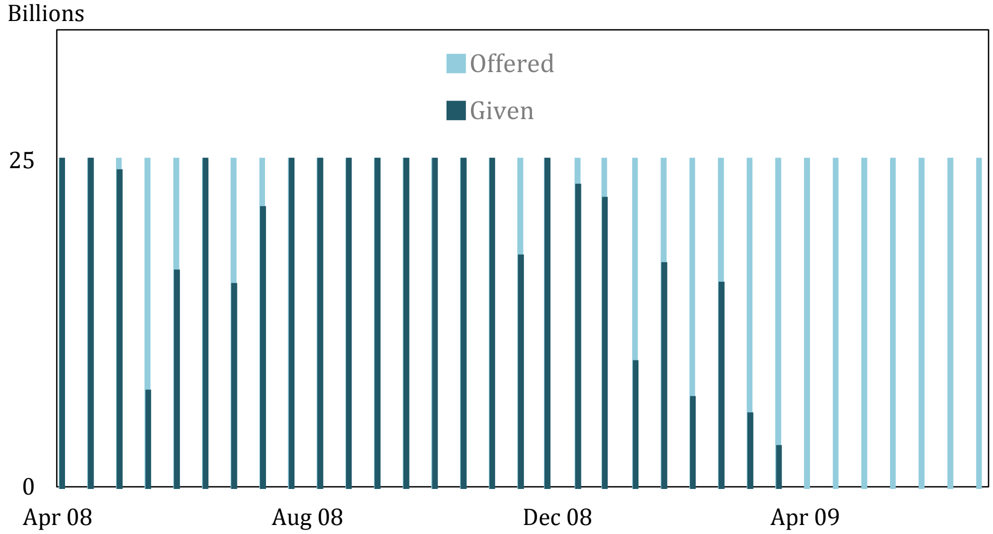
Figure 4: Stop-out rates for TSLF Schedule 2



The minimum bid rate was 25 bps. No bids after July 16, 2009. The last auction was held on January 7, 2010.
Source: Author's analysis of FRB-NY data.

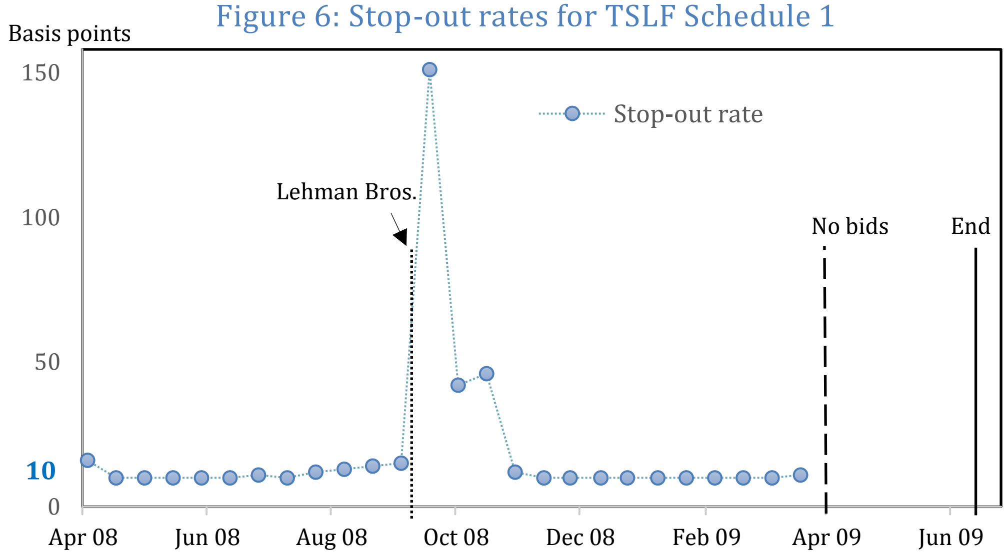
There were 33 bi-weekly Schedule 1 auctions between from April 3, 2008 and June 25, 2009. Each offered $25 billion. After March 19, 2009, there was no participation. From the 26 auctions with participation, 14 were undersubscribed. Only 3 consecutive Schedule 1 auctions in the fall of 2008—following Lehman's bankruptcy—saw a considerable hike in the stop-out rate. These were on September 18, October 2, and October 16, with stop-out rates of 151, 42, and 46 bps respectively. Overall, 15 auctions awarded loans at a stop-out rate of 10 bps (the minimum bid) and 8 awarded loans within 6 bps of the minimum bid.

Figure 5: Utilization of TSLF Schedule 1



Each bar represents a Schedule 1 auction. In total, there were 33 between April 3, 2008 and June 25, 2009.
Source: Author's analysis of FRB-NY data.

Figure 6: Stop-out rates for TSLF Schedule 1

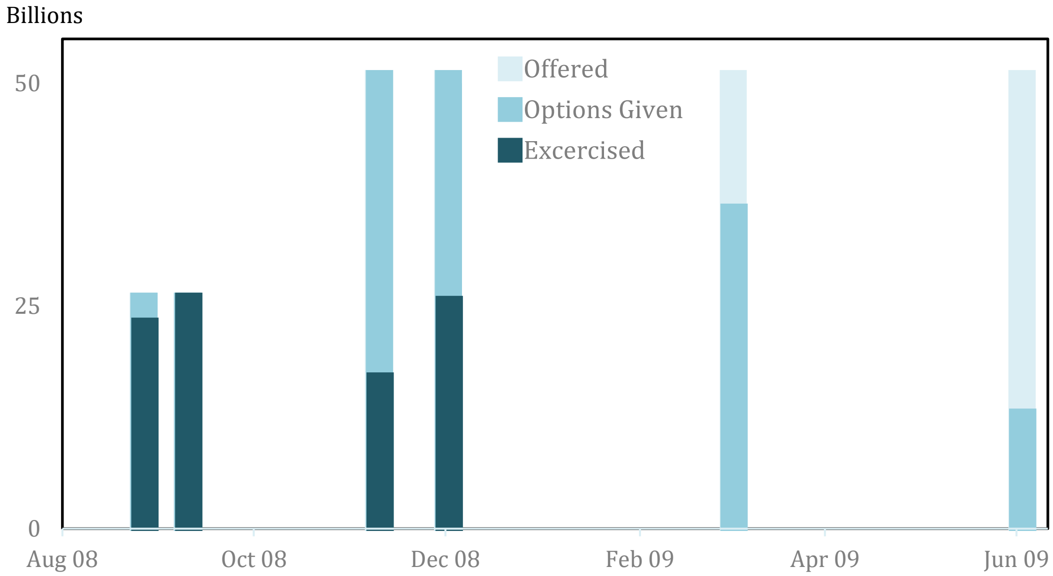


The minimum bid rate was 10 bps. No bids after March 19, 2009. The last auction was held on June 25, 2009.
Source: Author's analysis of FRB-NY data.

The FRB-NY held 6 TOP auctions between August 27, 2008 and June 3, 2009. The initial two auctions of August 27 and September 10 offered $25 billion of U.S. Treasury securities with a fixed rate of 25 bps. Both of these auctions were fully subscribed, and dealers were awarded the options to borrow U.S. Treasury securities on September 24, at stop-out rates of 2 and 3 bps respectively. The remaining 4 TOP auctions offered $50 billion in options.

These were held in the end of 2008, on November 10, and December 2. And in 2009, on March 3, and June 3. The two auctions in 2009 were undersubscribed and the options awarded were not exercised. The TSLF TOP ended in July 2009 in view of low demand and improved market conditions.

Figure 7: Utilization of TSLF TOP



Each bar represents a TSLF TOP auction. In total, there were 6 between August 27, 2008 and June 3, 2009. Of notice was that Cantor Fitzgerald & Co. did not exercise a $2 billion option received in the first auction. Source: Author's analysis of FRB-NY data.

Figure 8: Stop-out rates for TSLF TOP options

Date	Aug 27	Sep 10	Nov 10	Dec 2	Mar 3	Jun 3
Basis Points	2	3	2	5	1	1

The FRB-NY auctioned options to loan U.S. Treasury securities at a fixed rate, about two to three weeks after the auction date. Source: FRB-NY data

Figure 9: Fixed rates of U.S. Treasury securities under TSLF TOP

Date	Aug 27	Sep 10	Nov 10	Dec 2	Mar 3	Jun 3
Basis Points	25	25	50	50	25	25

Source: FRB-NY data

II. Key Design Decisions

1. The Federal Reserve invoked the emergency powers under Section 13(3) to establish the Term Securities Lending Facility (TSLF).

In March 2008, the 2007-2009 financial crisis reached a critical stage. Amid falling house prices and downgrades of mortgage-related securities, financial markets became severely disrupted. In response, the Federal Reserve Board, in order to act as lender of last resort to primary dealers, invoked the emergency powers of Section 13(3) of the Federal Reserve Act, last used during the Great Depression in the 1930s. Under Section 13(3), the Board could decide to lend to non-depository institutions in "unusual and exigent circumstances." The approval of a majority vote of the FOMC was also required because the action would affect open market operations. On March 10, 2008, with a unanimous vote of the five sitting Board Governors of the Federal Reserve System and a 9-0 vote of the FOMC, the TSLF was approved (Bernanke 2015).

2. The TSLF was administered by the Federal Reserve Bank of New York (FRB-NY).

The Fed, primarily through the Federal Reserve Bank of New York (FRB-NY) crafted the TSLF. In the open market operations (OMOs), the FRB-NY trades U.S government securities with designated primary dealers (securities firms) on a regular basis. The TSLF took advantage of existing infrastructure and some similarities in design with the open market operations (Fed 2009, Geithner 2014).

3. The FRB-NY was authorized to lend up to $200 billion in U.S. Treasury securities.

In view of the great demand in the markets for U.S. Treasury securities as a "safe haven," the FRB-NY lent highly liquid U.S. Treasury securities such as Treasury bills, notes, bonds and inflation indexed securities, at a 28-day term—much longer than the overnight term—and against a broader range of collateral. Initially, the list of eligible collateral included collateral that was illiquid at the time, such as triple-A private-label residential mortgage-backed securities (MBS) and commercial MBS, as well as agency collateralized mortgage obligations (CMO). The FRB-NY drew the U.S. Treasury securities from the System Open Market Account (SOMA). When financial markets improved in June 2009, the Fed reduced its size to $75 billion. The TSLF ended in February 2010 (Fed 2009, Fed 2010).

4. The TSLF lent highly liquid U.S. Treasury securities, not cash.

While other Fed lending facilities involved cash, the TSLF only involved securities. Through the TSLF, primary dealers settled repurchase agreements in which they received highly liquid U.S. Treasury securities in exchange for less liquid securities.

Officials from the FRB-NY have stated that the TSLF, as a securities-for-securities lending program, did not affect the supply of bank reserves and that "the benefit was that the Fed was not adding more cash to the economy and therefore did not have to take offsetting actions to manage the fed funds rate. This was a key difference in TSLF from the Single-Tranche repo program and from the PDCF, and meant it could be scaled up or down more quickly" (Logan, Nelson and Parkinson 2018).

5. TSLF loans were recourse.

The loans were recourse. That is, in case of default, the Fed could come after the primary dealer's assets to claim for the difference between the liquidation of the pledged collateral and the value of the loan (GAO 2011).

6. Participation was limited to the 20 primary dealers of the FRB-NY.

Only the 20 primary dealers of the FRB-NY, including the five largest U.S. investment banks and the U.S. securities arms of major foreign financial institutions, were eligible to participate in the TSLF (Fed 2008).

7. The FRB-NY awarded loans through weekly auctions.

With an auction mechanism, the Fed intended to encourage broad participation and avoid any stigmatization in using this facility. The upper limits for primary dealers on the share of the auction that they could get guaranteed that multiple of them would be awarded TSLF loans. The TSLF consisted of weekly auctions that lasted for thirty minutes. The day before an auction, the Fed would announce the amount and securities offered. Participation was voluntary and bids represented the fee dealers intended to pay to loan the offered U.S. Treasury securities. Auction results were communicated shortly thereafter (Fed 2008).

8. The auctions were classified into two categories, including a Schedule 2 for relatively illiquid assets.

Auctions were classified into two categories: Schedule 1 and Schedule 2. While Schedule 1 auctions accepted all collateral eligible in FRB-NY open market operations, Schedule 2 auctions accepted a much broader and less liquid range of collateral, and required a higher minimum bid. The two different schedules were intended "to better calibrate the interest rate on TSLF loans to the level of risk associated with the collateral" (GAO 2011).

Schedule 1 eligible collateral included: Treasury securities, agency debt securities, and agency MBS. Whereas Schedule 2 collateral included: all Schedule 1 eligible collateral, plus triple-A private-label residential MBS and commercial MBS, and agency collateralized mortgage obligations (CMO) (FRB-NY 2008a). On April 29, 2008, Schedule 2 collateral was expanded to include triple-A asset-backed securities (Fed 2008b). And on September 14, 2008, a day prior to the collapse of Lehman Brothers, the Board and the FOMC broadened the list to include all investment-grade debt securities (BBB- or higher) (Fed 2008c).

9. The TSLF weekly auctions alternated between Schedule 1 and Schedule 2 collateral and the timing was revised shortly before Lehman Brothers failed.

TSLF auctions started on March 27, 2008 and ran weekly, alternating between Schedule 1 and Schedule 2, until September 11, 2008. In these first months of operation, the Fed offered $175 billion of the available $200 billion; $50 billion for Schedule 1 auctions and $125 billion for Schedule 2 auctions. Schedule 1 auctions offered $25 billion each, while Schedule 2 auctions alternated offering amounts between $50 billion and $75 billion.

On September 14, 2008, one day before Lehman filed for bankruptcy, the Fed revised the timing of Schedule 2 auctions to run weekly, rather than bi-weekly. It also increased the size from $125 billion to $150 billion per month. From September 17, 2008, until April 15, 2009, all Schedule 2 weekly auctions offered $37.5 billion (only three $35 billion). As financial conditions improved in 2009, the size and timing of Schedule 2 auctions was decreased, eventually ending on January 7, 2010.

10. Margins (haircuts) were imposed according to the type of collateral.

The FRB-NY determined margin requirements. These did not change throughout the crisis. Haircuts aimed to reduce the Fed's risk in case of bankruptcy of a primary dealer (Fed 2009). Additionally, collateral on review for downgrade was not accepted. For securities posted as collateral that were on review for downgrade, the Fed could demand that they be replaced with other eligible securities (Fed 2008).

11. Two clearing banks provided the custody and valuation of collateral.

The FRB-NY relied on the clearing services of the existing clearing banks in the tri-party repo market, JP Morgan Chase and Bank of New York Mellon. They functioned as intermediaries and provided the services of custody and valuation of collateral. Their services came at no charge to the Federal Reserve or borrowers.

The clearing banks conducted daily revaluations of collateral to make sure the specified margin was applied. The U.S. Treasury securities awarded remained in the clearing banks but dealers could use them to settle repo contracts. In case the value of the collateral decreased, the FRB-NY could ask for substitutions. On the other hand, primary dealers could also substitute collateral for other eligible collateral if needed. To value the pledged collateral, clearing banks used the lowest price available in their valuation systems (Fed 2009).

12. Minimum bids were set at levels considered low during the crisis but high during normal times.

The minimum bid for Schedule 1 auctions was 10 bps while for Schedule 2 was higher at 25 bps. There was no cost to place a bid (Fed 2008). Many of the Fed's lending programs during the crisis were intended to be self-liquidating as markets improved. Minimum bid rates and collateral requirements were set to be attractive when markets were disrupted but unattractive when markets functioned well (Kohn, 2008).

13. Primary dealers had a limit on borrowing.

Primary dealers could place up to two bids, with a minimum amount of $10 million and not higher than 20% of the total offered amount. In case of two bids, they could only be in increments of $10 million. Primary dealers could only be awarded a maximum of 20% of the total offering amount, regardless if the auction was undersubscribed. The Fed set limits "to ensure that the lending [was] distributed across multiple institutions" (Logan 2009). The FRB-NY held the right to refuse any bid at its own discretion (Fed 2008). Awards were determined on a pro-rata basis and dealers were not allowed to terminate a loan early (Fed 2008).

14. Loans were awarded at a uniform fee, based on the lowest accepted bid—the "stop-out rate."

At the end of the auction, the uniform fee was set based on the stop-out rate, which was the lowest accepted bid (Fed 2008).

15. The TSLF Options Program (TOP) was an extension to the TSLF.

The TOP was approved on July 24, 2008, and announced on July 30, 2008. It was an extension to the TSLF and required administrative changes pursuant to Schedule 2 auctions and not another Section 13(3) authorization. The TOP intended to provide primary dealers some relief during periods of "heightened collateral market pressure, such as quarter-end dates."

The new program authorized the FRB-NY to offer "options" to loan U.S. Treasury securities for a 7-day term, two to three weeks after the auction date and at a fixed rate. In some way, the TOP was a pre-auction that gave primary dealers the guarantee that they could have access to liquid assets at a later date, without the commitment to exercise the options. The TOP was limited to $50 billion in U.S. Treasury securities, on top of the $200 billion of Schedule 1 and Schedule 2 programs. The minimum bid rate was one basis point and all Schedule 2 collateral was eligible. The day before each TOP auction, the FRB-NY announced the terms and conditions, including the fixed rate of the loans. The TOP held its first auction on August 27, 2008 (Fed 2008).

16. While the TSLF was operational, the identity of the borrowers was undisclosed.

While the TSLF was in operation, the Fed published information on awards, stop-out rates, and bid-to-cover ratios, but did not disclose the identity of the participant primary dealers or the bid propositions.

In July 2010, the U.S. Congress passed the Dodd-Frank Wall Street Reform and Consumer Protection Act ("Dodd-Frank"). The measures included to promote transparency required the Fed to disclose certain information on their emergency lending programs. In regards to the TSLF, on December 1, 2010, the Fed disclosed detailed information about borrowers between December 1, 2007, and July 21, 2010. The information included the identity of the borrowers, dates, type and amounts of financial assistance provided, the interest charged, and pledged collateral.

III. Evaluation

The nature of the TSLF as one of many temporary emergency lending facilities makes it hard to evaluate. However, it would be useful to consider at least three different components: 1) the effects the announcement had on financial markets, 2) the effectiveness of the TSLF in providing relief to primary dealers or the repo market, and 3) the auction design and legislative tools.

The effect of the TSLF announcement is unclear. While Fed Chairman Bernanke (2015) was of the opinion that "market participants applauded," U.S. Treasury Secretary Paulson (2010) thought that "… the opposite happened. It was an indication of the markets' jitters that some took the move as a confirmation of their worst fears: things must be very serious indeed for the Fed to take such unprecedented action."

Fleming et al (2010) and Hrung and Seligman (2011) have argued that the TSLF contributed in the reduction of stress on repo markets. Acharya, Fleming, Hrung, and Sarkar (2017) using proprietary data, concluded that primary dealers that possessed less liquid collateral, lower equity returns and greater leverage prior to the crisis, were more inclined to borrow and at higher bidding rates.

The Fed's emergency lending facilities under Section 13(3), such as the TSLF, raised concerns among the public for the lack of transparency on the valuation of pledged collateral and the undisclosed identity of the borrowers. In May 2008, a Bloomberg News reporter requested the Fed Board, under the Freedom of Information Act (FOIA) and via e-mail, detailed information with respect to securities posted as collateral for multiple emergency lending facilities, such as the TSLF. In the court case Bloomberg L.P. v. Board of Governors of the Federal Reserve System, Fed officials cited adverse effects to the disclosure of the detailed information such as stigma and the potential reluctance of borrowers to use the facilities in the future. In addition, they added that the disclosure of "highly sensitive" information could cause "substantial competitive harm." Furthermore, the "public disclosure of information regarding specific securities pledges as collateral for individual TSLF loans would significantly harm the Government's monetary functions or commercial interests" (Logan 2009, Madigan 2009). Ultimately, in 2011, the court ruled that the Fed was required to release some of the information solicited.

In July 2010, the U.S. Congress passed the Dodd-Frank Wall Street Reform and Consumer Protection Act ("Dodd-Frank"). Measures to promote transparency required the Fed to disclose information on their emergency lending programs between 2007 and 2010. In regards to the TSLF, on December 1, 2010, the Fed disclosed detailed information about borrowers between December 1, 2007, and July 21, 2010. The information included the identity of the borrowers, dates, type and amounts of financial assistance provided, the interest charged, and pledged collateral.[12] It appears that the TSLF as a temporary emergency lending facility had an implicit agreement that specific information on participants was going to remain undisclosed. However, the outcome of the case Bloomberg L.P. v. Board of Governors of the Federal Reserve System and the Dodd-Frank Act required the Fed to be more transparent. These outcomes have set a precedent which could change the perceptions of the Fed and primary dealers in designing a similar facility in the future.

[12] For the Fed's disclosure, see www.federalreserve.gov/newsevents/reform_transaction.htm

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VI. Appendices

Appendix A: TSLF Timeline

Date	Event
Mar/11/2008	TSLF announced. Auctions of highly liquid U.S. Treasury securities to primary dealers of up to $200 billion per month.
Mar/20/2008	TSLF details and eligible collateral for each type of auction announced: **Schedule 1**: $50 billion per month. Auctions of $25 billion each. Treasury securities, agency debt securities, and agency mortgage-backed securities (MBS). **Schedule 2**: $125 billion per month. Alternating auctions of $50 billion and $75 billion. All Schedule 1 eligible collateral, triple-A private-label residential MBS and commercial MBS, and agency collateralized mortgage obligations.
Mar/27/2008	First TSLF auction: Schedule 2 for $75 billion.
Apr/29/2008	**Schedule 2:** eligible collateral expanded to include triple-A asset-backed securities (ABS).
Jul/24/2008	TSLF Option Program (TOP) of $50 billion approved. TSLF extended until January 30, 2009.
Aug/27/2008	First TOP auction.
Sep/14/2008	**Schedule 2**: size increased from $125 billion to $150 billion per month. Auctions to run weekly for $37.5 billion (most cases). Eligible collateral expanded to include all investment-grade securities (BBB- or higher).
Sep/15/2008	Lehman Brothers collapsed. The largest bankruptcy in U.S. history.
Oct/01/2008	TSLF reaches its peak usage of $236 billion.
Dec/02/2008	TSLF extended until April 30, 2009.
Jan/27/2009	TSLF extended through October 30, 2009.
Jun/03/2009	Last TSLF TOP auction
Jun/23/2009	TSLF extended until February 1, 2010 but only for Schedule 2 auctions. **Schedule 2**: size decreased to $75 billion per month. Auctions to run once a month.
Jun/25/2009	Last Schedule 1 auction.
Jul/16/2009	Last Schedule 2 loans given.
Sep/22/2009	**Schedule 2**: size decreased to $50 billion for October and $25 billion thereafter.
Jan/07/2010	Last Schedule 2 auction.
Feb/01/2010	TSLF ended.