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# United States: Term Auction Facility<sup>1</sup>

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Yale Program on Financial Stability Case Study

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## Abstract

Following the announcement on August 9, 2007, by BNP Paribas that it was suspending redemptions for three of its open-end investment funds that had invested heavily in mortgage-backed securities, liquidity in the American interbank and short-term funding markets tightened considerably. On August 17, the Federal Reserve lowered the cost of borrowing from the discount window. However, usage remained low, due largely to the perception that such borrowing implied weak financials. In December, the Fed launched the Term Auction Facility (TAF), which used single-rate auctions to mitigate this stigma. The TAF offered discount-window credit of 28 days, and later, 84 days. Although the TAF avoided the stigma of the discount window, it relied heavily on the discount window's infrastructure, and the same banks were eligible for both programs. Foreign banks could access TAF funds via their US branches or subsidiaries and ultimately accounted for about two-thirds of the program's usage. The TAF provided USD 493 billion at its peak in March 2009 and was one of the Fed's most-used programs during the Global Financial Crisis of 2007-09. A rich body of literature mostly concludes that the TAF reduced interbank funding stress.

**Keywords:** Discount window, Federal Reserve, interbank funds market, liquidity risk premium, TAF

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## Overview

On August 9, 2007, BNP Paribas, France's largest bank, suspended redemptions on three investment funds because it was temporarily unable to value the private-label mortgage-backed securities that they held (BNP Paribas 2007). Many other banks and asset managers sustained losses in private-label mortgage-backed securities, and spreads between secured and unsecured overnight funding spiked, stressing America's interbank funding market (Taylor and Williams 2009). Around the world, central banks provided large amounts of liquidity to quell the crisis (Borio and Nelson 2008). In the US, the Federal Reserve Board lowered the rate for primary credit<sup>4</sup> at the discount window—its main lending channel—from 6.25% to 5.75% on August 17 (Fed 2007). In doing so, the Fed reduced the spread between its primary credit rate and the targeted federal funds rate from 100 to 50 basis points, effectively halving the interest rate penalty for discount-window borrowing (FOMC and Fed 2007a). On August 16, the Federal Reserve Board also extended the maximum term on discount-window loans to 30 days, rather than the traditional overnight term. Despite these actions, discount-window usage lagged behind that of similar facilities at other major central banks (Borio and Nelson 2008; Armantier, Krieger, and McAndrews 2008). In the US, market observers historically considered discount-window loans a sign of weak balance sheets and efforts to keep borrowing confidential

## Key Terms

Purpose: "to provide liquidity that would help normalize money markets, particularly term money markets, and would allow banks to make use of the enormous amount of collateral they have at the discount window, but would avoid the stigma" (FOMC and Fed 2007b)

Launch Dates	Announcement: December 12, 2007 First settlement: December 20, 2007
Expiration Dates	Last settlement: March 11, 2010 Last maturity: April 8, 2010
Legal Authority	FRA §10(B)
Peak Outstanding	USD 493 billion in March 2009
Participants	US banks and US branches of foreign banks eligible for primary credit
Rate	Single-price auction
Collateral	Discount-window eligible/ overcollateralization
Loan Duration	28-day or 84-day
Notable Features	Program designed to combat discount- window stigma
Outcomes	All loans repaid

<sup>4</sup> The discount window offered banks three different types of credit—primary, secondary, and seasonal—depending on their financial soundness. Primary credit was available to generally sound institutions and carried a rate of 100 basis points (bps) above the Federal Open Market Committee's target rate for federal funds prior to the Global Financial Crisis. Secondary credit, which required a greater degree of administration and carried a rate 50bps higher than primary credit, was available to banks considered too risky for primary credit. Seasonal credit offered credit to banks with seasonal variation in liquidity, such as those with clients concentrated in agriculture or tourism (Armantier, Krieger, and McAndrews 2008; Gilbert et al. 2012).

were inadequate (Duke 2010; Armantier et al. 2015; 2011).

In response to continued stress in the interbank market, on December 12, 2007, the Fed announced its first program of what would become the Global Financial Crisis (GFC) (Fed 2007b). The Term Auction Facility (TAF) was the result of the Fed's efforts to provide discount-window funding to banks without stigmatizing borrowers (FOMC and Fed 2007b). The auction mitigated stigma by increasing the number of borrowers and tweaking features of the discount window that facilitated adverse selection. The TAF allowed a bank to bid through its local Federal Reserve bank for a loan at an interest rate determined by auction (Fed 2009a). The TAF "inject[ed] term funds through a broader range of counterparties and against a broader range of collateral than open market operations," which were only available to primary dealers (Fed 2007b).

The Federal Reserve Board authorized the TAF on December 10, 2007, under section 10B of the Federal Reserve Act (FOMC and Fed 2007d). Section 10B empowered the Reserve Banks to make a secured loan of not more than four months to a member bank, consistent with rules and regulations enacted by the Board, and as long as the loan was "secured to the satisfaction" of the lending Reserve Bank (Federal Reserve Act 1913, vol. 12, sec. 10B).<sup>5</sup>

The Fed relied on much of the discount window's infrastructure for the TAF, and the program originally shared many characteristics with the discount window. TAF loans were offered to depository institutions against the same wide set of collateral that the discount window accepted. And all banks that were eligible for primary credit at the discount window were eligible for the TAF, subject to local Reserve Bank scrutiny (Fed 2007b).

However, some TAF terms were distinct from the discount window. For example, most discount-window loans were overnight, although the Fed had introduced 30-day discount-window loans in August 2007 at the beginning of the crisis and 90-day loans in March 2008 after the failure of Bear Stearns. TAF loans were initially for 28 days; an 84-day loan was added in July 2008. Longer maturities gave borrowers more options and helped ease stress on interbank markets. The TAF also prohibited early repayment of loans, which the discount window allowed for term loans (Fed 2006).

With the longer lending terms, the Fed introduced an additional *collateral cushion* beyond what its haircut schedule specified. This cushion was initially equal to 100% of the value of collateral after haircuts were applied, effectively doubling the amount of collateral borrowers needed, but, in July 2008, the Fed reduced the size of the collateral cushion to 33% (FOMC and Fed 2008b; Fed 2008a).

The TAF auctioned a preannounced amount using a single-rate mechanism. Prospective borrowers submitted bids through their local Federal Reserve bank. They requested an amount of funds and offered a rate they would pay. The Federal Reserve Bank of New York,

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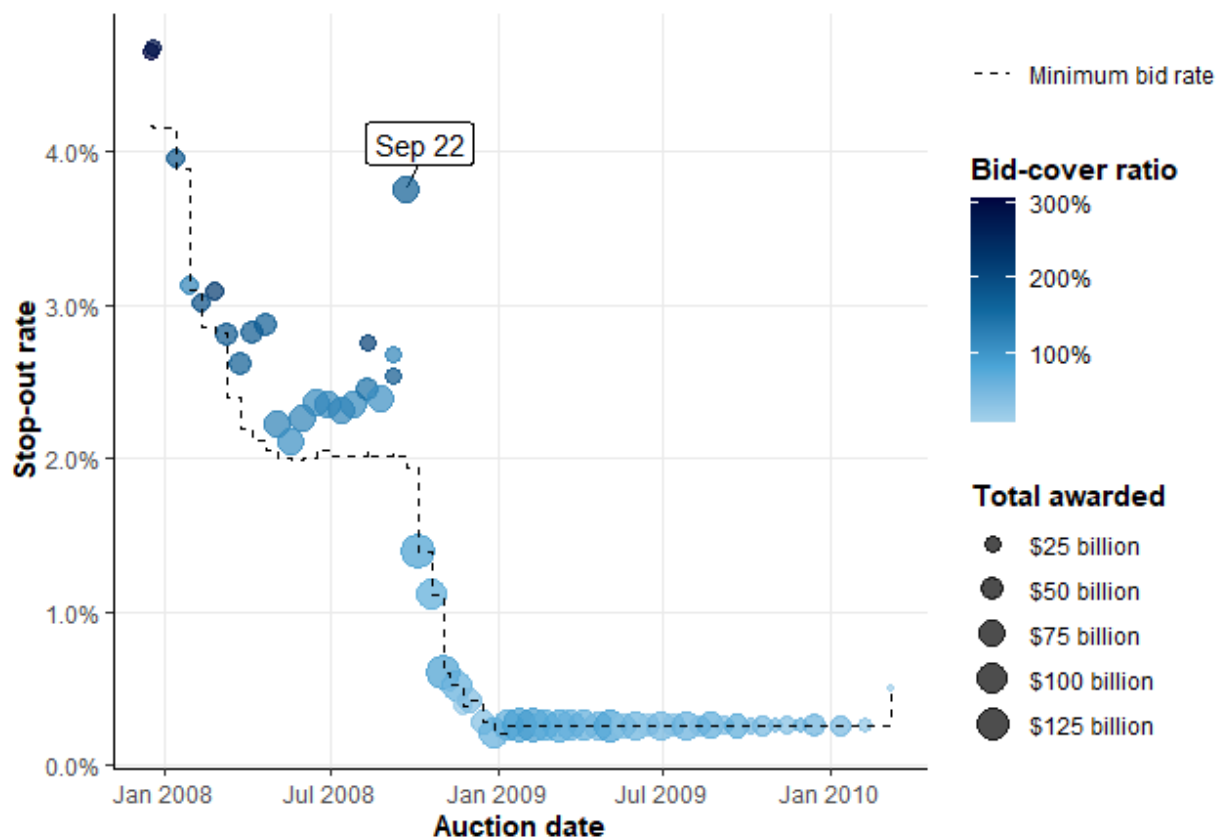
<sup>5</sup> Many other programs implemented by the Fed to address the GFC were implemented under its emergency lending authority, which required the Fed to demonstrate "unusual and exigent" circumstances (Federal Reserve Act 1913, vol. 12, sec. 13[3]). Since the TAF was an exercise of the Fed's core lender-of-last-resort function, it was not required to meet such a standard.

which managed the auctions, charged the *stop-out rate*—just low enough that the amounts requested by bids above that rate exhausted the amount offered—to bidders whose bids were higher than or equal to the stop-out rate and an announced minimum bid rate (Fed 2007b). Bid sizes were subject to a preannounced minimum bid level (originally USD 10 million) and a maximum bid level (10% of the auction amount).

The Fed conducted 60 auctions between December 20, 2007, and March 11, 2010. Until September 2008, the Fed offered between USD 20 billion and USD 75 billion per auction. When Lehman Brothers collapsed on September 15, 2008, interbank funding spreads spiked to their highest levels during the GFC. The Fed offered USD 150 billion in each of the following 22 auctions, providing enough liquidity to satisfy all demand. As a result, the TAF functioned like a standing facility since bids consistently settled at the minimum bid rate. Figure 1 depicts TAF operations, their ultimate sizes, and the *bid-cover ratio*, which measures total bids as a percentage of the amount offered. Outstanding TAF funds peaked at USD 493 billion in March 2009 and the aggregate amount lent under the program totaled USD 3.8 trillion (Government Accountability Office 2011; Fed 2007–2010a).

Foreign banks, which faced acute dollar funding pressures due to lost returns on dollar-denominated mortgage products and other interbank funding pressures inextricable from US markets, accessed TAF funding through their US branches, which were eligible for the discount window and, thus, also for the TAF (Bernanke 2015, 185). American branches of foreign banks borrowed a large amount from the TAF, approximately two-thirds of the total, or USD 2.5 trillion in aggregate over time (Government Accountability Office 2011; Fed 2007–2010a). Foreign banks also accessed dollar liquidity through foreign central banks that participated in the Fed's swap lines; these swap lines, in turn, sometimes coordinated the timing and pricing of US dollar funds with TAF operations (Goldberg, Kennedy, and Miu 2011).

Early discussions of the TAF left open the possibility that it could become a permanent facility (Mishkin 2008; FOMC and Fed 2007c). However, by December 2008, FOMC transcripts show that members were anxious about the growing size of the Fed's balance sheet (FOMC and Fed 2008d). By summer 2009, bids had decreased but still totaled more than USD 10 billion per auction (Fed and Runkel 2007–2010b). The Fed decided to phase out first the 84-day auctions and then, on March 8, 2010, 28-day auctions (FOMC 2010). The Fed suffered no losses on TAF loans.

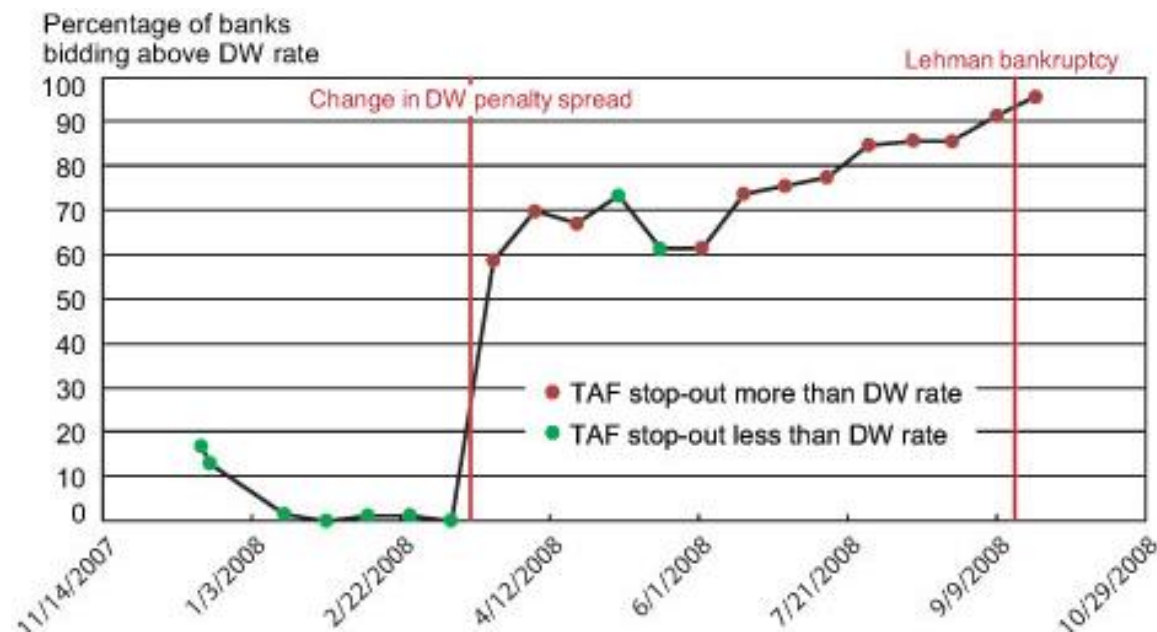
**Figure 1: Term Auction Facility Operations**

Source: Fed and Runkel 2007–2010b.

### Summary Evaluation

The Fed designed the TAF as a lending facility that banks could use for term loans without incurring the discount-window stigma. Its critical feature was that it determined the interest rate through a single-rate auction. Most analysts concluded that the Fed achieved its goal. TAF lending was substantial and far outpaced discount-window lending during the crisis, although the latter did increase despite the perceived stigma (Gilbert et al. 2012, 228–29). For the first three months of the program, TAF borrowing was cheaper than discount-window borrowing. But, after the Fed lowered the costs of discount-window borrowing in March 2008, many banks that were eligible for both were still willing to borrow from the TAF at a premium rather than use the discount window (Armantier et al. 2011). This is illustrated in Figure 2, which shows that, prior to the Lehman bankruptcy in September 2008, the TAF stop-out rate was usually higher than the discount rate.

**Figure 2: Percentage of Banks Bidding above the Discount Window Rate at TAF Auctions**



Note: On March 16, 2008, the Fed narrowed the spread of the primary credit rate over the target federal funds rate to 25bps.

Source: *Armantier et al. 2011.*

The Fed was successful in managing the risks associated with crisis lending, reporting no losses (Government Accountability Office 2011). Its risk-management measures—the solvency requirement for participants, the haircuts, the collateral cushion, and the seniority of Federal Reserve credit—protected the central bank from counterparty risk throughout the program’s duration (Carlson, Duygan-Bump, and Nelson 2015).

But academic studies disagree on how the TAF affected the interbank term loan rate, specifically its credit-risk and liquidity-risk premia. Taylor and Williams (2009) used an arbitrage-free model that regressed the LIBOR-OIS spread on several explanatory variables. They found no evidence that the TAF significantly affected the liquidity premium. McAndrews, Sarkar, and Wang (2017) argue that Taylor and Williams’ results were invalid since they considered only the absolute level of the LIBOR-OIS spread. By using the change in that spread, McAndrews, Sarkar, and Wang found that the TAF significantly lowered the liquidity premium.

Christensen, Lopez, and Rudebusch (2009) obtain similar results to McAndrews, Sarkar, and Wang using a completely different method. Instead of constructing a linear regression model, Christensen, Lopez, and Rudebusch construct a six-factor arbitrage-free model for decomposing Treasury, bond, and LIBOR yields. Their tests concluded that yields decreased after December 2007, when the TAF made its debut. A counterfactual simulation also found

that the three-month LIBOR rate would have been 70 basis points higher than the observed rate if the Fed had not introduced the emergency liquidity measures.

It is uncertain whether the Fed could use the TAF in a similar future crisis. Fed officials thought that the TAF could help diminish stigma because each bank would pay the market-determined rate, not a penalty rate. Also, with many banks participating, it would be less likely that others in the market could guess which banks had participated. However, regulations enacted after the GFC required the Fed to disclose borrower-level data one year after a facility's closure, potentially making banks less willing to participate (Dodd-Frank Act 2010, sec. 1103[b]). And, after the Fed released TAF borrower data in 2011, there were some critical reports regarding the fact that US branches of foreign banks borrowed 65% of TAF funds (Government Accountability Office 2011; Fed 2007–2010a). Meanwhile, the Fed also made discount-window borrowing harder to trace by combining discount-window loan amounts with other liabilities of banks and non-financial institutions at the Reserve-Bank level. These factors may lessen the value of an auction facility over the discount window.



<b>Context: United States 2007–2008</b>	
<b>GDP (SAAR, nominal GDP in LCU converted to USD)</b>	USD 14,681.5 billion in 2007 USD 14,559.5 billion in 2008
<b>GDP per capita (SAAR, nominal GDP in LCU converted to USD)</b>	USD 47,976 in 2007 USD 48,383 in 2008
<b>Sovereign credit rating (five-year senior debt)</b>	As of Q4, 2007: Fitch: AAA Moody's: Aaa S&P: AAA As of Q4, 2008: Fitch: AAA Moody's: Aaa S&P: AAA
<b>Size of banking system</b>	USD 9,231.7 billion in total assets in 2007 USD 9,938.3 billion in total assets in 2008
<b>Size of banking system as a percentage of GDP</b>	62.9% in 2007 68.3% in 2008
<b>Size of banking system as a percentage of financial system</b>	29.0% of financial system assets in 2007 30.5% of financial system assets in 2008
<b>Five-bank concentration of banking system</b>	43.9% of assets in 2007 44.9% of assets in 2008
<b>Foreign involvement in banking system</b>	22% of assets in 2007 18% of assets in 2008
<b>Government ownership of banking system</b>	0% of banks owned by the state in 2008
<b>Existence of deposit insurance</b>	100% insurance on deposits up to USD 100,000 for 2007 100% insurance on deposits up to USD 250,000 for 2008
<i>Sources: Bloomberg, World Bank Global Financial Development Database, World Bank Deposit Insurance Dataset.</i>	

## Key Design Decisions

- 1. Purpose: The Fed designed the TAF to provide domestic and foreign banks with liquidity through a fixed-price auction while circumventing the stigma associated with discount-window borrowing.**

At its September 2007 meeting, the Federal Open Market Committee (FOMC) discussed a staff proposal to create an auction-based facility to overcome banks' reluctance to use the discount window. They also recognized the possibility of creating currency swap lines with foreign central banks to channel dollars overseas to foreign banks with significant US dollar exposures, particularly in mortgage-related assets. FOMC participants expressed the concern that funding liquidity "appears genuinely to be a scarce valuable commodity," even as banks' borrowing from the discount window remained limited (FOMC and Fed 2007b). The Board understood that financial institutions had turned instead to the Federal Home Loan Banks<sup>6</sup> (FHLB) for funding, due to the lower cost, longer terms, and lack of stigma of FHLB advances. Some FOMC participants expressed skepticism that an auction would effectively reduce stigma (FOMC and Fed 2007b).

The TAF's advantage was that it targeted "direct credit to a market that [wa]sn't working" rather than pumping up credit to the macroeconomy (FOMC and Fed 2007b). Federal Reserve Chair Ben Bernanke also wanted the TAF to address the interbank market's inability or unwillingness to price risks, but other FOMC participants expressed skepticism that it could achieve this goal. He argued that encouraging loans against the TAF's wide set of collateral was "totally consistent with Bagehot and the traditions of central bank lending" because it was lending against "undervalued, hard-to-sell, or illiquid assets" that were nonetheless valuable collateral (FOMC and Fed 2007b).

The driving forces behind the TAF were also closely connected to the creation of US dollar swap lines, which are discussed further in Key Design Decision **Error! Reference source not found.** Chair Bernanke noted that "there seems to be an interest from our international partners in working with us with the swap, with activities in other countries, and this TAF seems to be the thing that makes them eager to participate" (FOMC and Fed 2007c). And when the Fed decided in September 2007 to table discussion of the TAF, it was "in light of the ECB's diffidence" as well as "modest improvements we were seeing in money market functioning," (Bernanke 2015, p. 163). But financial stress resumed in the fall, and the Fed revived discussion of the TAF. When the Board ultimately voted to create the TAF on December 12, 2007, it did so for the same reasons as it had discussed it in September: "to address elevated pressures in short-term funding markets" (Fed 2007b). The announcement also mentioned that the TAF might help "a broader range of counterparties" than its open-market operations with primary dealers would (Fed 2007b).

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<sup>6</sup> Like the Federal Reserve banks, the 12 FHLBs served banks within their geographic region and lent primarily against home mortgages, mortgage-backed securities, and US government securities to support the mortgage market (see Leonard 2022).

## **2. Legal Authority: The Federal Reserve Board relied on its authority under section 10B of the Federal Reserve Act for the TAF.**

The Fed created the TAF under section 10B of the Federal Reserve Act (1913), which provides authority for Federal Reserve banks to lend to member banks, consistent with enacted rules and regulations, provided that the Federal Reserve bank was “secured to its satisfaction.”

To authorize the use of an auction, the Board voted on December 7, 2007, to amend Regulation A, the federal regulation that established rules for Federal Reserve bank credit. Among other things, this amendment allowed the Board of Governors to set auction rules and set the interest rate on TAF funds as the result of that auction (Fed 2007a). This amendment was necessary because Reserve Banks technically held authority to set their own lending rates, subject to review and approval by the Board of Governors (FOMC and Fed 2007b; FOMC and Fed 2007d). For the same reason, every change in the primary and secondary credit rates required approval by the Board.

## **3. Part of a Package: The Fed announced the TAF alongside US Dollar swap agreements and changed its terms at the same time as other Fed facilities.**

When the Fed implemented the TAF in December 2007, it was responding to a financial crisis that had already infected the international financial system. Foreign banks’ dollar funding needs exceeded USD 1 trillion due to their substantial cross-currency financial activities before the crisis, particularly in US mortgage-related assets. A contraction in the US interbank market further strained foreign banks (Fender and McGuire 2010; Bernanke 2015, chap. 9). In September 2007, when the Board and FOMC first considered the staff’s proposal for an auction facility to address US market strains, they also discussed how best to get “dollars into European dollar markets” (FOMC and Fed 2007b). Chair Bernanke floated the notion of combining solutions to the two problems at a September joint meeting of the FOMC, which had authority over swaps and the Board:

Some conversations that I had, in particular with President Trichet of the European Central Bank [ECB], came up with the possibility of combining these two things, essentially having auctions simultaneously in the United States and in Europe, and then using the swap markets to provide the dollars to the extent that the ECB would like to have them. The Swiss National Bank [SNB] expressed interest in joining this as well. (FOMC and Fed 2007b)

As a result of further discussions, on the same December day that it announced the TAF, the Fed also announced new swap agreements with the ECB and SNB. Under the agreements, these central banks could swap their respective currency for an equivalent amount of US dollars, returning the same amount of dollars at a predetermined future date. The central banks then auctioned funds to banks in their respective jurisdictions (FOMC and Fed 2008b).

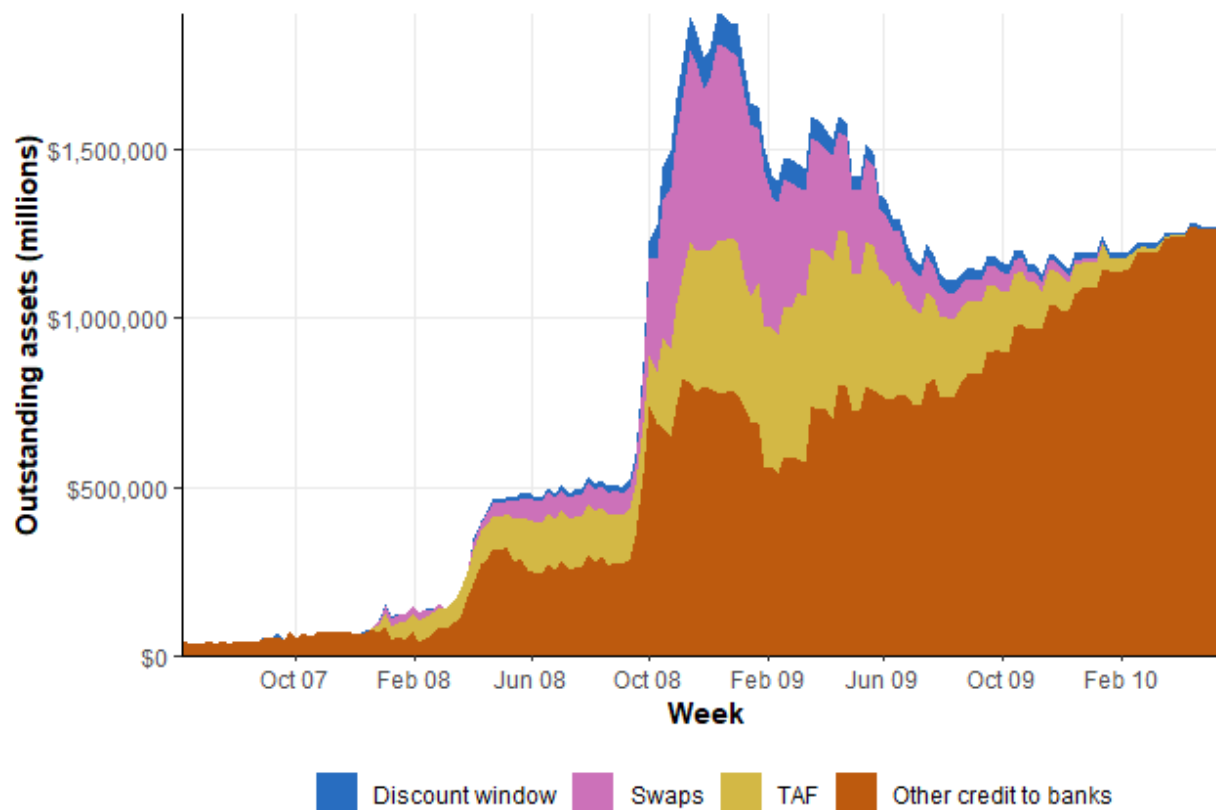
Keeping with the idea that swap lines were a “package deal” dependent on the Fed adopting the TAF, the ECB and SNB coordinated their dollar funding operations with the Fed (FOMC and Fed 2007c). The two central banks offered US dollars the day after TAF auctions, with

settlement on the same day as TAF settlements and for the same maturities. As shown in Figure 3, both the TAF and the US dollar swap lines were significant components of the Fed's response to the GFC (see Wiggins and Metrick 2020). In fall 2008, the Fed added swap agreements with other central banks; eventually the Fed had agreements with 14 central banks. In total, borrowings under the 14 swaps reached a peak of USD 695 billion on October 21, 2008, although the Fed had also committed to providing unlimited dollar liquidity to the ECB, SNB, Bank of England, and Bank of Japan (Wiggins and Metrick 2020).

Some of the swap counterparties also offered US dollar lending on the same days as TAF auctions (Wiggins and Metrick 2020). The ECB, SNB, Norges Bank, the Bank of Japan, and the Bank of Korea conducted swaps with settlement and maturity dates that matched 48 TAF operations (Fed 2007–2010c; Fed and Runkel 2007–2010b). Coordination extended to policy changes; when the TAF introduced 84-day loans, the ECB and SNB also introduced 84-day terms to their dollar-liquidity auctions (FOMC and Fed 2008b). The ECB sometimes charged participants a rate equal to the stop-out rate in TAF auctions, provided by the FRBNY before it was announced publicly (Goldberg, Kennedy, and Miu 2011; Fed and Runkel 2007–2010b; ECB 2021). When the coordination factors are considered in aggregate, the connection between the TAF and these auctions is clear. For example, on November 18, 2008, outstanding swap agreements with settlement and maturity dates matching those of TAF operations totaled USD 445 billion, rivaling the size of the TAF (Fed 2007–2010c; Fed and Runkel 2007–2010b).

However, it is important to acknowledge the different trajectories of the two programs. Any such coordination of actions was decided by the foreign central bank and not dictated by the Federal Reserve. Moreover, swap usage became less correlated with TAF operations over time (Fed 2007c; Fed 2007–2010c; Fed and Runkel 2007–2010b).

The Fed sometimes announced changes to domestic programs when it changed the TAF, but the changes did not interact with the TAF in the way that the swap lines did. These changes included rate cuts when the program was announced in 2007 and a slew of programs around the collapse of Lehman Brothers in fall 2008.

**Figure 3: Federal Reserve System Credit Allocation During the GFC**

Sources: Author's calculation; Fed 2007c.

#### **4. Management: Federal Reserve banks loaned funds to counterparties located in their respective districts.**

The TAF was authorized by the Fed Board and any changes to it other than purely operational matters, such as the introduction of 84-day credit, were also approved by the Board (Fed 2007b; Fed 2008f). Management of the TAF was split between the Board of Governors and the 12 Federal Reserve banks. Before each auction, the Board announced the amount offered, minimum bid rate, and other terms. Participants bid through their local Federal Reserve bank, which then sent the bids to the Markets Group of the Federal Reserve Bank of New York to be compiled and accepted (Fed 2008a). Disbursements were made through the local Reserve banks.

#### **5. Administration: The Fed awarded TAF funds using a single-price auction and repurposed existing discount-window infrastructure for its administration.**

The TAF auction process typically lasted a whole week; one FOMC participant noted that this extended timeline helped address the stigma problem, saying, "If you have to submit your bid on Monday to get awarded on Thursday, this is not the action of a bank that's desperate

for funding” (FOMC and Fed 2007b). A typical Friday started with the Board of Governors announcing the amount offered, minimum rate, and terms (Fed 2008a).

On Monday, participants then called their local Federal Reserve bank’s discount-window hotline to place bids, which were then relayed to the Federal Reserve Bank of New York. The New York team calculated the stop-out rate by accepting bids starting with those offering the highest interest rate, then the next highest rate, and so on, until either the accepted bid amounts exhausted the amount offered, or bid rates dropped below the minimum rate (Fed 2008a). The lowest accepted bid was the stop-out rate, paid by all bidders (Fed 2009a).

On Tuesday, the Fed announced the results of the auction, notified the successful bidders, and, on Thursday, Reserve Banks credited the accounts of successful bidders to settle (Armantier, Krieger, and McAndrews 2008; Fed 2009a). When loans matured, either 28 or 84 days after settlement, the borrower paid the stop-out rate as interest (Fed 2009a).

Before and after the auction, the TAF relied on the existing discount-window infrastructure. Discount-window staff were already in place to screen collateral, and the Reserve Banks had prior relationships with the banks in their district (FOMC and Fed 2007b). Participating banks agreed to the same borrowing terms, under Operating Circular 10 (OC-10), that were required for discount-window borrowing (Fed 2009a). By using much of the discount-window infrastructure, the Fed sought to make the program “simple” to counterparties facing a new facility yet “robust” enough for reliable operations of large loan amounts (FOMC and Fed 2007b).

**Figure 4: Sample Auction Results**

Date	Term (days)	Amount offered	Minimum bid rate	Stop-out rate	Amount bid	Bid-cover ratio
8/25/2008	28	USD 75 billion	2.01%	2.38%	USD 84 billion	1.12
9/8/2008	84	USD 25 billion	2.02%	2.67%	USD 32 billion	1.27
9/9/2008	28	USD 25 billion	2.01%	2.53%	USD 46 billion	1.85
9/22/2008	28	USD 75 billion	1.94%	3.75%	USD 133 billion	1.78
10/6/2008	85	USD 150 billion	1.39%	1.39%	USD 138 billion	0.92
10/20/2008	28	USD 150 billion	1.11%	1.11%	USD 113 billion	0.76
11/3/2008	84	USD 150 billion	0.60%	0.60%	USD 139 billion	0.93

Source: Fed and Runkel 2007–2010b.

**6. Eligible Participants: An institution was eligible for the TAF if it was eligible for primary credit at the discount window.**

Depository institutions that were “eligible for primary credit—that is, those determined by the lending Reserve Bank to be in generally sound financial condition”—were eligible to bid at TAF auctions (Krieger 2007). The Fed determined eligibility for primary credit based on

the bank's most recent examination, which resulted in a CAMELS<sup>7</sup> rating that the Fed could access even when it was not a bank's primary supervisor. The TAF, like the primary credit facility, accepted CAMELS ratings of 1, 2, or 3, the highest ratings (Armantier, Krieger, and McAndrews 2008). The Board considered and rejected a higher standard where a bank would need to be "well capitalized but also well managed" to qualify for the TAF (FOMC and Fed 2007b). However, such a standard would likely only have excluded a few banks. Moreover, the FOMC was concerned that, by excluding banks from the TAF, the Fed would inadvertently stigmatize them and worsen their liquidity problems (FOMC and Fed 2007b).

In total, 416 banks participated in the TAF. Their peak outstanding borrowings ranged from USD 1.4 million for First Merchant Bank, to USD 60 billion for Bank of America (Fed 2007–2010a).

### **7. Eligible Participants: US branches of foreign banks were eligible to participate in the TAF.**

The FOMC debated allowing US branches of foreign banks to participate in the TAF. Concern centered around two points, (i) possible *double-dipping*, whereby such a branch would borrow funds under the TAF while also benefitting from the Fed's US dollar swaps with various foreign central banks, and (ii) concern that the Fed could more accurately gauge whether a US bank was creditworthy, as opposed to a branch of a foreign one (FOMC and Fed 2007b).

The Board decided that US branches of foreign banks would be permitted to participate for several reasons, but primarily because excluding them from the TAF would have constituted "a huge change in" how the Fed treated foreign financial institutions (FOMC and Fed 2007b). Moreover, many US banks also had foreign subsidiaries that could participate in other central banks' liquidity facilities, which put the US banks in a similar position with respect to the possibility of double-dipping (FOMC and Fed 2007d).

Even with large liquidity swap lines, US branches of foreign banks borrowed 65% of all funds auctioned under the TAF (Government Accountability Office 2011). Acharya, Afonso, and Kovner (2013) argue that foreign banks with a presence in the US turned to the TAF because it was the only large source of liquidity open to them. Foreign banks saw a smaller increase in deposits than US banks, and foreign banks couldn't access advances from the FHLB (see Leonard 2022). Acharya, Afonso, and Kovner (2013) also connect foreign-bank liquidity problems to the pre-TAF period, suggesting that the TAF put foreign banks and US banks on more even footing to face the Global Financial Crisis. It is not clear how much of such funding was used by US branches for their own funding needs compared to the funding needs of their parents abroad.

No FOMC meeting transcripts going back to September 2007 mentioned opening eligibility to primary dealers, which already had access to open-market operations. Further, the Fed had, in 2007, already exempted specific banks from restrictions on funneling liquidity to

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<sup>7</sup> The CAMELS rating measured capital adequacy, asset quality, management, earnings, liquidity, and sensitivity to market risk on a scale of 1 (the best) to 5 (the worst) (Armantier, Krieger, and McAndrews 2008).

affiliated dealers (Omarova 2011). TAF recipients could, under this exemption, send funds to their affiliates while borrowing from the program.

### 8. Funding Source: The Fed funded TAF loans by creating reserves.

Successful TAF bidders received credits in the accounts they held at their local Federal Reserve bank (Fed 2008a).

### 9. Program Size: The Fed significantly increased the total program size and the amount of individual auctions during the program's duration.

The Fed increased the program total in response to market conditions. As shown in Figure 5, the TAF operated with a program total allocated across auctions held every two weeks. When the term was limited to 28 days, this program total equaled the sum of the authorizations of two consecutive auctions. Initially, the TAF was authorized to auction USD 20 billion every two weeks, for a total of USD 40 billion. Between December 2007 and April 2008, the amount offered for each auction increased to USD 75 billion, bringing the program's total authorization to USD 150 billion. When it added the 84-day loans in July and began alternating between auctions of 28- and 84-day loans, it modified the amount offered in 28-day auctions to maintain an authorized amount of USD 150 billion (Fed 2007–2010a; Fed 2008f).

**Figure 5: Total Authorizations and Offerings Per Auction for Selected Dates**

Announcement Date	Total Authorized	Maturities Offered	Individual Auction Amount
December 12, 2007	USD 40 billion	28 days	USD 20 billion
January 4, 2008	USD 60 billion	28 days	USD 30 billion
March 7, 2008	USD 100 billion	28 days	USD 50 billion
May 2, 2008	USD 150 billion	28 days	USD 75 billion
July 30, 2008	USD 150 billion	28 days	USD 75 billion*
		84 days	USD 25 billion
September 29, 2008	USD 300 billion	28 days	USD 25 billion
		84 days	USD 75 billion
October 6, 2008	USD 600 billion	28 days	USD 150 billion
		84 days	USD 150 billion
June 25, 2009	<i>none specified</i>	28 days	USD 125 billion
		84 days	USD 125 billion
July 24, 2009	<i>none specified</i>	28 days	USD 100 billion
		84 days	USD 100 billion
August 28, 2009	<i>none specified</i>	28 days	USD 75 billion
		84 days	USD 75 billion
September 24, 2009	<i>none specified</i>	28 days	USD 75 billion
		70 days	USD 50 billion

\* Amounts varied to stay within authorized amount.

Sources: Fed 2008b; Fed 2008c; Fed 2008e; Fed 2008f; Fed 2008g; Fed 2009c; Fed 2009d; Fed 2009e; Fed 2009f.



Every auction before October 2008 was oversubscribed—sometimes doubly so—which pushed out some bidders. Oversubscribed auctions were part of the Fed’s stigma strategy, since institutions could not ensure they would receive funds. The Lehman bankruptcy and the failure of several other major US institutions re-prioritized the size of the TAF over its effects on stigma. The Fed announced that, beginning with the October 6 auction, it would triple the amount offered in its 84-day auction to USD 75 billion (increasing to a total of USD 225 billion in that maturity) while maintaining the 28-day auctions at USD 25 billion. The Board said it was taking these steps to “reassure financial market participants that financing will be available against good collateral, lessening concerns about funding and rollover risk” (Fed 2008g). After total bids for the October 6 auction topped USD 130 billion, the Fed increased the auction offer to USD 150 billion for that auction and future auctions of both the 28-day and 84-day maturities (Fed 2007–2010a; Fed 2008g).

These increased offerings were able to provide full allotment to all bidders, effectively mirroring the strategy of the European Central Bank’s longer-term refinancing operations (known as LTROs) (FOMC and Fed 2008c; Runkel 2022). Offering amounts remained at USD 150 billion until July 2009 (Fed 2007–2010a). The tumultuous period between August and October 2008 is presented in Figure 4.

**10. Individual Participation Limits: The maximum bid amount was 10% of the amount offered, while the minimum bid was lowered from USD 10 million to USD 5 million.**

The final terms for the TAF set the maximum bid amount, aggregated across all US branches of a bank, to 10% of the amount offered (Fed 2008a; Fed and Runkel 2007–2010b). That is, a bank with branches or affiliates in other Federal Reserve districts could only bid up to a combined 10% of the total amount offered. The Fed’s original proposal was modeled on prior auctions for Treasury securities, which had maximum bid sizes of 35% (Krieger 2007; FOMC and Fed 2007b). Following this model, the Fed proposed a maximum bid amount of 20%, but FOMC participants expressed concerns that five risky institutions would take the entire allotment. This could cause political problems if the Fed was seen as propping up risky or foreign institutions instead of American markets (FOMC and Fed 2007b).

The original design of the TAF required a minimum bid of USD 50 million. FOMC participants expressed concerns that this would exclude small banks, giving large banks favorable financing (FOMC and Fed 2007b). Before the first TAF operation was announced, the Fed lowered the minimum bid to USD 10 million to accommodate “the desired bid sizes of smaller institutions” (FOMC and Fed 2007c). The Fed applied the same logic when it lowered the minimum bid to USD 5 million ahead of the February 11, 2008, operation (FOMC and Fed 2008a).

**11. Rate Charged: Successful bidders paid the stop-out rate, subject to a minimum bid rate.**

The Fed chose to use a single-price auction to simplify settlement and encourage aggressive bidding, since successful bidders paid the stop-out rate instead of the rate they bid (Armantier, Krieger, and McAndrews 2008). See Key Design Decision No. 5, Administration,

for more details on this. In this format, FRBNY compiled all bids and accepted them, starting with the highest rates bid, until the sum requested by accepted bids exhausted the total amount offered in the auction. Then, all bidders paid the single rate equal to the lowest accepted bid.

Minimum bid rates were set by the Board of Governors prior to each auction announcement. Originally the Fed used 10bps over the Overnight Index Swap (OIS)—which was approximately the one-month federal funds rate<sup>8</sup>—as the minimum bid rate (FOMC and Fed 2007b). The LIBOR-OIS spread had widened, so the TAF would allow banks to borrow at a rate above the OIS (to account for term and risk premia) but below the LIBOR, which had risen to prohibitive levels. As one FOMC participant said, “You could actually criticize a bank for not participating in this. They are somehow leaving money on the table by not taking advantage of” these low interest rates, which could encourage perfectly healthy banks to bid for funds (FOMC and Fed 2007b). With the amount of bidders—including healthy bidders—that bid for TAF funds, all auctions that were undersubscribed settled at the minimum bid rate.

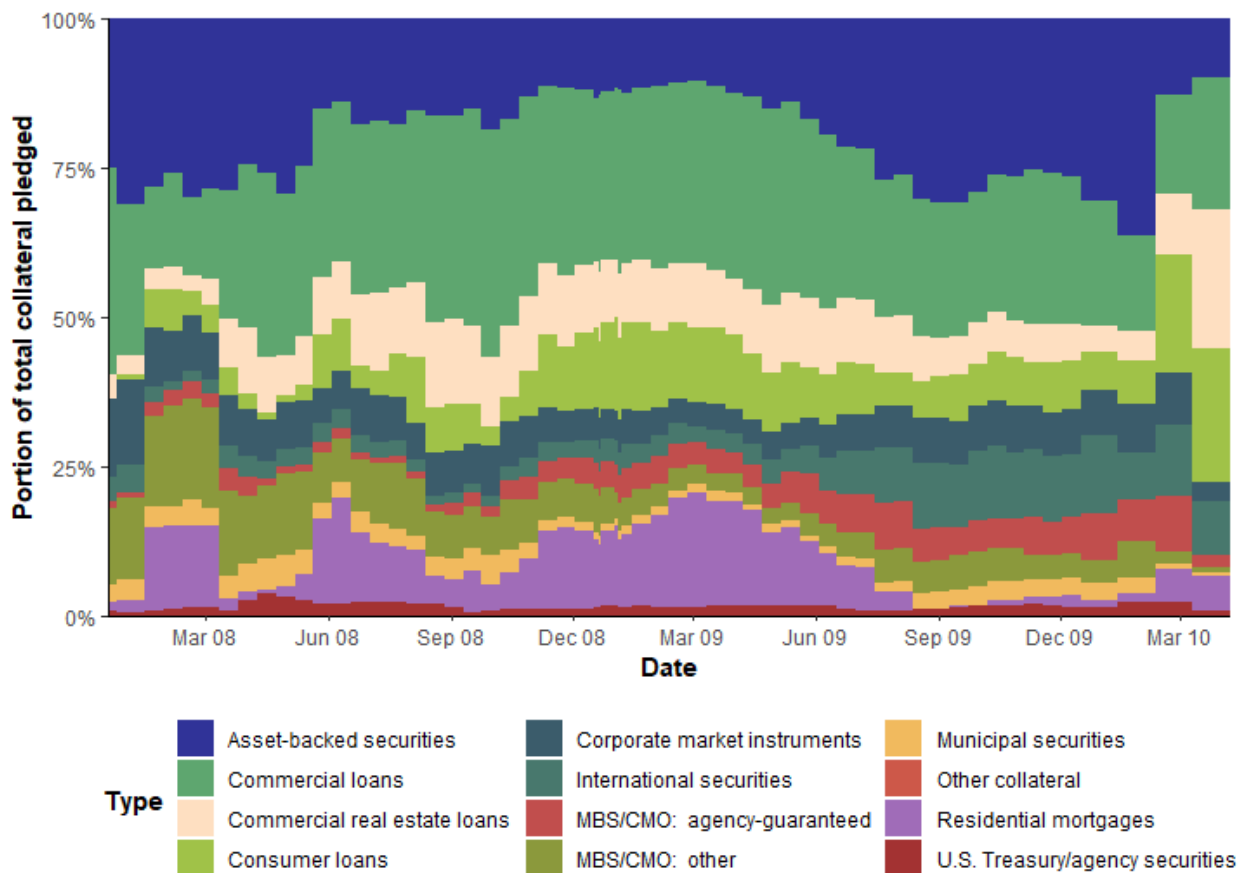
But this low minimum created an arbitrage opportunity. By December 2008, the Fed had begun paying 0.25% interest on excess reserve balances but the target federal funds rate had dropped to between 0 and 0.25% (FOMC 2008). Banks could borrow from the TAF and then lend the Fed its own money at a profit. To avoid such arbitrage, in January 2009 the Fed switched the minimum bid rate from the OIS to the interest rate on reserve balances (Fed 2009b).

## **12. Eligible Collateral: The TAF used the discount window’s collateral procedures and set of eligible assets but required larger amounts.**

The discount window accepted a wide set of collateral, as shown in the Appendix. Like discount-window borrowers, potential TAF borrowers had to deposit collateral with their local Federal Reserve bank before borrowing, and such collateral was subject to haircuts—shown in the Appendix—to determine a participant’s maximum bid. Because the Federal Reserve bank staff regularly administered the discount window rules regarding collateral, they could quickly and efficiently assess and value collateral deposited for TAF borrowings and implement TAF auctions (FOMC and Fed 2007b). In practice, nominal collateral value (i.e. before haircuts) averaged 513% of loan value. As shown in Figure 6, borrowers pledged large amounts of commercial loans, asset-backed securities, mortgage-backed securities, and residential mortgages. On the other hand, borrowers pledged small amounts of their safest assets: US Treasury bills and government bonds (Fed 2007–2010a).

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<sup>8</sup> Banks with reserves in excess of Fed requirements lent to other banks overnight in the federal funds market; the Fed’s target for that rate was one of its key monetary policy tools.

**Figure 6: Portion of Collateral Pledged by Asset Class**

Source: Fed 2007–2010a.

TAF required a *collateral cushion* on top of the standard haircuts. Originally, participants had to provide double the collateral normally required, but were only required to maintain that collateral for the term of the bidding process. This ensured borrowers some flexibility if they incurred overdrafts before settlement. The Fed did not apply the same cushion to term discount-window loans (FOMC and Fed 2008b).

In July 2008, when the Fed added 84-day loans, it decreased the size of the collateral cushion to 33% of the collateral value. In doing so, the Fed also required the cushion to remain on deposit for the term of the loan after it learned that some banks withdrew the collateral cushion after being awarded the TAF loan (FOMC and Fed 2008b; Fed 2008a). At the same time, the Fed stipulated that term discount-window loans would also bear the same cushion requirement. If the collateral value on deposit fell below 133% of the loan value, the borrowing bank was required to cover the shortfall within two business days (Fed 2009a). If it did not, the Reserve Bank could exercise its rights to recourse (Government Accountability Office 2011). The Fed also considered revising their haircut schedule but demurred after considering possible negative market consequences (FOMC and Fed 2008b).

### **13. Loan Duration: The TAF initially only auctioned 28-day loans. On July 30, 2008, the TAF added 84-day loans.**

The TAF initially only auctioned 28-day loans to backstop the interbank term lending market. Fed staff research connected the collapse of mortgage-backed and asset-backed products with increases in bid-ask spreads for term funding, specifically in one-month terms (FOMC and Fed 2007b). Setting the term at 28 days allowed the Fed to conduct auctions on the same weekday without increasing the program's total authorization. It also brought the maturity of the new facility close to the maximum term on discount-window loans.

In March 2008, the Federal Reserve Board extended the maximum term of discount-window loans from 30 to 90 days, amongst a package of measures following the near-failure of Bear Stearns (Fed 2008d). In July, the Fed extended the maximum term of TAF loans to 84 days. New York Fed President William Dudley explained:

The motivation for the maturity extension is to provide greater support to term funding markets. For some time, banks have asked for longer-term maturity TAF loans. This is attractive to them for two reasons: (1) almost all of these loans will extend over quarters—periods in which balance sheet stress is likely to be greatest—and (2) the longer maturity would also help banks extend the average maturity of their borrowings. This change will also put the maturity of TAF loans more on par with the ninety-day limit of the primary credit facility (FOMC and Fed 2008b, 5).

In July 2008, when Fed staff originally proposed extending the term of all TAF loans to 84 days, FOMC participants expressed concerns over increased credit risk to the Reserve Banks. These concerns ultimately led to the increased collateralization requirements discussed in Key Design Decision **Error! Reference source not found.**, but FOMC participants discussed augmenting the supervisory information that Reserve Banks had with information from other regulators as an alternative way of limiting credit risk in 84-day loans. Though Armantier, Krieger, and McAndrews (2008) noted that the Fed may hold an informational advantage over the creditworthiness of banks in crisis due to its access to information about a bank's fundamentals, FOMC officials were concerned about how risks increased with the length of maturity. FOMC participants expressed fears over fully relying on other regulators to assess banks after the FDIC failed to alert the Federal Reserve Bank of San Francisco of the health of an institution it nearly accepted for primary credit (FOMC and Fed 2008b).

With the introduction of the 84-day loans, the Fed continued biweekly TAF auctions but alternated between offering 28-loans and 84-day loans. It maintained the amount of liquidity outstanding at USD 150 billion—divided equally between the two maturities—until October 2008 when it significantly increased the size of the 28-day and 84-day loan auctions (Fed 2008f; FOMC and Fed 2008b). TAF loans of any term could not be paid off before maturity (Fed 2009a). TAF funds of 28- and 84-day duration aligned with reserve maintenance periods, over which the Fed calculated whether banks met the regulatory reserve requirement; periods began on a Thursday and ended two Wednesdays later.

**14. Other Conditions: The TAF imposed no other conditions on bidders.**

Documents surveyed do not indicate further restrictions on bidders.

**15. Impact on Monetary Policy Transmission: The Fed sterilized TAF funds by selling Treasury securities and conducting auctions rather than using a standing facility.**

The Fed chose an auction in part because it allowed the Fed to control when and how much it increased the supply of reserve balances (FOMC and Fed 2007c). By prohibiting early repayment and using fixed-term loans that were not subject to the rollover risks associated with discount-window lending, the Fed could also control when and how much it decreased the supply of reserves when TAF loans matured. This let the open-market desk face “minimal uncertainty” about the TAF’s effects on monetary policy implementation (Mishkin 2008). For example, to offset the injection of USD 75 billion of reserves into the financial system in the form of TAF loans, FRBNY could sell USD 75 billion of Treasury securities through its open-market operations to *sterilize* the increase in reserves (Government Accountability Office 2011). To further influence reserve balances, the Fed set the minimum bid rate equal to the rate offered for interest on excess reserves (see Key Design Decision No. **Error! Reference source not found.**, Rate Charged).

**16. Other Options: The Fed chose an auction format after changes to the discount window failed to stimulate borrowing.**

Before the TAF was authorized in December 2007, the Fed announced changes to make the discount window more attractive. In August, the Board reduced the penalty on discount-window loans—represented by the spread between the primary credit rate at the discount window and the federal funds rate—from 100bps to 50bps. It also extended the possible length of discount-window loans to 30 days plus a possible renewal (Armantier, Krieger, and McAndrews 2008). In March 2008, before the introduction of 84-day TAF funds, the Fed extended the possible length of discount-window loans to 90 days (Fed 2008d). Discount-window usage did not increase appreciably after these changes despite continued tightening in the interbank market (Fed 2007c).

In debating the TAF on December 6, FOMC participants also considered two alternatives: further reducing the discount-window penalty; or, adopting a term credit program that would allow banks to request credit at the discount window. Fed staff argued that the auction had several advantages. First, the TAF allowed the Fed to strictly control how much it increased the supply of reserve balances, whereas the discount window largely allows banks to determine how much they borrow. Second, an auction included several features that promised to reduce stigma over standing facilities. Third, by releasing funds at discrete intervals, the Fed could monitor if and how the auctions changed market conditions and respond before the next auction. A temporary TAF could also allow the Fed to explore the possibility of a permanent term auction credit facility (FOMC and Fed 2007c).

FOMC participants also raised the possibility of cutting discount-window borrowing rates and operating-term repurchases that covered only the end of 2007. They doubted the ability of the TAF to relieve pressure in ways that the FHLB and discount window had not. Further,

they wondered if the interbank market would quickly find a new equilibrium. But the Fed had received interest in the TAF from other central banks, and Chair Bernanke noted that they “were not interested, explicitly, in participating if we were involving only a discount rate cut or any other action” (FOMC and Fed 2007c).

**17. Similar Programs in Other Countries: The Bank of England revised its standing lending facility due to stigma, and the ECB expanded the range of maturities it offered.**

Many central banks expanded term-lending programs and at least one addressed stigma, but no other central bank successfully combined the two. In 2008, the Bank of England split its standing facility into two new standing facilities due to stigma. The Discount Window Facility (DWF) was most similar to the TAF, offering banks loans of up to 30 days (later increased to 364 days). Banks pre-positioned more than £265 billion of collateral with the DWF, but the facility was not used (Fulmer 2022).

As shown in Figure 7, large central banks used long-term open-market operations to combat the GFC, though only the DWF and TAF sought to overcome stigma issues (Borio and Nelson 2008). The Eurosystem, headed by the European Central Bank, expanded its term refinancing operations in both allotment and maturities. These operations used a multi-rate auction until October 2008, when it satisfied all bids at a policy rate. The term refinancing saw similar usage as the TAF, with more than €700 billion outstanding at their peak (Runkel 2022).

**Figure 2: Comparison of Crisis Policy Changes**

	AU	CA	EA	JP	CH	GB	US
Exceptional fine-tuning (frequency, conditions)	✓	✓	✓	✓	✓	✓	✓
Exceptional long-term open market operations	✓	✓	✓	✓	✓	✓	✓
Change in the standing lending facility							✓
Broadening of eligible collateral	✓	✓			✓ <sup>1</sup>	✓	✓ <sup>2</sup>
Change in banks' reserve requirements/target balances	•	•				✓	
Broadening of counterparties						✓ <sup>3</sup>	✓ <sup>2</sup>
See Table 1 for the mnemonics.							
<sup>1</sup> Entered into effect on 1 October, but not linked with the turmoil. <sup>2</sup> The collateral and counterparty rules did not change, but the discretionary operations under the Term Auction Facility utilise the broader lists pertaining to discount window credit compared to those for ordinary open market operations. <sup>3</sup> Only for four auctions of term funding for which, however, there were no bids.							
Source: Central banks.							Table 4

Note: The headers denote countries surveyed and are, from left to right, Australia, Canada, the eurozone/euro area, Japan, Switzerland, the UK, and the US.

Source: Borio and Nelson 2008.

### **18. Communication: The Fed coordinated some policy announcements with foreign central banks and, overall, increased their communication.**

Market participants anticipated that the Fed would create a facility aimed at the interbank market. When the Fed did not announce such a facility in the December 11 statement following its meeting, stocks slumped. But the Fed had been waiting to announce the TAF simultaneously with the central banks of England, Japan, Canada, the ECB, and the SNB. The Fed chair wrote that the ECB had requested participating central banks announce the currency lines and TAF simultaneously to emphasize their coordination rather than emphasizing the one-sidedness of dollars flowing from the Fed abroad (Bernanke 2015, 184). On December 12, 2007, the central banks of the UK, Japan, the eurozone, Canada, and Switzerland joined the Fed in announcing measures to increase liquidity (BoC 2007; Bank of England 2007). For the ECB and SNB, these announcements included the dollar swap lines and auctions (ECB 2007; SNB 2007). Later, these central banks would follow the TAF's lead and announce 84-day US-dollar loans (FOMC and Fed 2008b).

Bernanke (2015, 185) recognized the announcement of the TAF as the start of increased communication from the Fed. By doing so, the Fed intended to enlarge its role as a communicator and influence market reactions more frequently.

**19. Disclosure: The Fed publicized the auction parameters and disclosed auction results, but did not disclose identifiable, loan-level data until after the TAF expired.**

The Fed released aggregated results of each auction the following day. These notices included the amount awarded, the number of bidders, the stop-out rate, and the bid-to-cover ratio (Fed and Runkel 2007–2010b). Also, each Wednesday the Fed published outstanding TAF and discount-window loans in each Fed region, a practice it had long done for discount-window loans prior to the crisis (Fed 2007c).

The Fed did not release data about specific institutions and told banks that it would not release such data, “except as required by law” (Fed 2009a). Institutional data regarding TAF borrowings was only released in December 2010 after Bloomberg LP brought a Freedom of Information Act challenge against the Fed (Bloomberg L.P. v. Board of Governors of the Federal Reserve System 2009). The Fed then released data specifying institution, borrowing amount, and collateral supplied (Fed 2007–2010a). This disclosure revealed the heavy usage of the TAF by US branches of foreign banks.

**20. Stigma Strategy: The TAF eliminated the first-mover disadvantage of the discount window and delayed settlement.**

The TAF’s single-price auction format introduced several features to combat the discount window’s stigma. Since the Fed discouraged use of the facility throughout the 20<sup>th</sup> century, market participants began to view credit from Federal Reserve banks, which “in normal times is rare . . . as a sign of weakness” (Duke 2010; Armantier, Lee, and Sarkar 2015). Though discount-window loans were ostensibly confidential, banks could triangulate the borrower based on the size of the loan, the district, and information gathered from colleagues and friends at other banks (Duke 2010; Armantier et al. 2015). Knowing—or suspecting—that a bank borrowed from the discount window damaged a bank’s chances at securing private financing “as the market trie[d] to identify the weaker players” (Duke 2010).

TAF auctions did not give market participants this sort of knowledge. Since loans settled simultaneously, no bank could be singled out if multiple banks received funds. And, as long as demand was sufficiently high, the maximum bid amount meant that at least ten banks per auction received funds. The Fed stimulated demand by setting the minimum price below LIBOR and the federal funds rate. This feature attacked the view that participating banks were distressed, since “banks would not necessarily signal an abnormally high demand by bidding” (FOMC and Fed 2007b; Armantier, Krieger, and McAndrews 2008). Moreover, distressed banks couldn’t rely on the TAF since some bidders did not win funds, and loans settled three days after the auction (Mishkin 2008).

**21. Exit Strategy: The FOMC cited continuing improvements in the economy when it announced on January 27, 2010, the last TAF auctions.**

Early discussions of the TAF left open the possibility that it could become a permanent facility (Mishkin 2008; FOMC and Fed 2007c). Unlike most of the Federal Reserve’s other programs, the TAF did not have an end date and could, legally, continue regardless of



whether the financial system faced “unusual and exigent circumstances” (FOMC and Fed 2009a). However, by December 2008, FOMC transcripts show that members were anxious about the growing size of the Fed’s balance sheet. Nonetheless, while Fed staff believed the TAF “should downsize pretty automatically” as participants stopped seeking funds in favor of lower alternatives and more flexibility (FOMC and Fed 2008d). By summer 2009, TAF auctions had decreased but still provided tens of billions of dollars in liquidity per operation (Fed and Runkel 2007–2010b). In its September 2009 meeting, Fed staff first proposed a gradual reduction in offering amounts (FOMC and Fed 2009a). The Fed decided then to phase out 84-day auctions by shortening the maturities first to 70 days, and then removing credit longer than 28 days altogether (FOMC and Fed 2009b). On January 27, 2010, the FOMC announced the wind-down of several GFC programs including the TAF, specifying the final two amounts offered (USD 50 billion and USD 25 billion) and dates (February 8 and March 8) when they also raised the minimum bid rate (FOMC 2010).

## References and Key Program Documents

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## Appendix

### Federal Reserve Haircut Schedule

Collateral Category	Securities or Instruments with Market Prices (% of Market Value)			Securities or Instruments if Market Price Not Available (% of Par or Outstanding Balance)	Loans Deposited at FRS (% of Market Value)	Loans Not Deposited at FRS (% of Outstanding Balance)
	Duration Buckets					
	0 to 5	>5 to 10	>10			
<b>US Treasuries and Fully Guaranteed Agencies:</b>						
Bills, Notes, Bonds, Inflation Indexes	98%	97%	93%	90%		
Zero Coupons, STRIPS	98%	95%	90%			
<b>Government Sponsored Enterprises:</b>						
Bills, Notes, Bonds, Inflation Indexes	97%	96%	92%	85%		
Zero Coupons, STRIPS	96%	94%	89%			
<b>International Agencies:</b>						
Bills, Notes, Bonds - US Dollar Denominated	97%	95%	93%	80%		
Bills, Notes, Bonds - AAA - Foreign Denominated	92%	90%	85%			
Zero Coupons, STRIPS	94%	92%	86%			
Brady Bonds- US Dollar Denominated	95%	92%	88%	60%		
Brady Bonds - Foreign Denominated	90%	87%	83%			
Foreign Governments - US Dollar Denominated	97%	95%	90%	75%		
Foreign Governments - Foreign Denominated	92%	90%	85%			
Foreign Government Agencies - US Dollar Denominated	97%	95%	90%	75%		
Foreign Government Agencies - AAA - Foreign Denominated	92%	90%	85%			
Municipal Bonds - US Dollar Denominated	97%	95%	92%	75%		
Municipal Bonds - AAA - Foreign Denominated	90%	85%	80%			

Corporate Bonds - US Dollar Denominated	97%	95%	93%	80%		
Corporate Bonds - AAA - Foreign Denominated	92%	90%	85%			
German Jumbo Pfandbriefe - AAA - US Dollar Denominated	96%	92%	90%	60%		
German Jumbo Pfandbriefe - AAA - Foreign Denominated	92%	90%	85%			
Asset-Backed Securities - AAA (includes Collateralized Loan and Debt Obligations)	98%	96%	93%	85%		
Asset-Backed Securities - non AAA (excludes Collateralized Loan and Debt Obligations)	97%	95%	92%	80%		
Commercial Mortgage-Backed Securities - AAA	97%	95%	92%	80%		
Mortgage Backed Securities (includes agency and private label)	98%	96%	93%	90%		
Collateralized Mortgage Obligations - AAA (includes agency and private label)	97%	95%	92%	80%		
Trust Preferred Securities	94%	92%	90%	70%		
Mutual Funds (tcuux, tcudx, tcuux)	90%					
Government Sponsored Enterprise Stock (FNMA, FHLM)	87%					
Bankers Acceptances, Certificates of Deposit, and Commercial Paper	97%			95%		
Commercial and Agricultural Loans:						
Minimal Risk Rated					90%	80%
Normal Risk Rated					87%	75%
Agency Guaranteed Loans					93%	90%
Commercial Real Estate Loans					87%	75%
Construction Real Estate Loans					87%	75%
1-4 Family Residential Mortgages					91%	85%
Home Equity					89%	85%
Consumer Loans - Autos, Private Banking, Installment, Etc.					87%	80%

<b>Consumer Loans - Credit Card Receivables, Student Loans</b>						<b>75%</b>
<b>Consumer Loans - SubPrime Credit Card Receivables</b>						<b>60%</b>

*Source: Federal Reserve System 2006.*

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