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The Federal Reserve's Response to the 2023 Banking Turmoil: The Bank Term Funding Program*

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Federal Reserve Board

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Abstract

The Bank Term Funding Program (BTFP) was an emergency liquidity facility set up by the Federal Reserve in March 2023 following the failure of Silicon Valley Bank which experienced a classic bank run driven by weak fundamentals. This paper provides an in-depth discussion of the design and implementation of the BTFP and presents some evidence on program outcomes. It also quantifies how the lending terms compare to those of the Discount Window—the Federal Reserve's main standing liquidity facility. The BTFP successfully acted as a backstop source of funding for depository institutions with large unrealized securities losses and heavy reliance on uninsured deposits and, in doing so, helped to avert a potential systemic banking crisis. The program ceased issuing new loans in March 2024 and closed one year later as the last loans matured. All outstanding loan balances were repaid in full.

Keywords: Banking stress, Emergency liquidity facilities, Lender of last resort
JEL Codes: E58, E65, G21

*The views expressed in this paper are those of the authors and do not necessarily represent those of the Federal Reserve Board of Governors or anyone in the Federal Reserve System.

1 Introduction

Stresses owing to interest rate risk that had been building in the banking sector through the post-pandemic interest rate tightening cycle culminated on Wednesday, March 8, 2023 with a run on deposits at Silicon Valley Bank (SVB). The run on SVB was a classic example of a textbook bank run driven by uninsured depositors that grew concerned about the solvency of the bank given the extent of securities losses it faced in the rising interest rate environment (Metrick, 2024). Within two days, SVB was closed and placed in receivership midday on Friday—a highly unusual occurrence, as bank closures historically happen after business hours, highlighting the exceptional severity of the deposit flight. The run dynamics spread to two other banks, Signature Bank and First Republic Bank, as depositors became increasingly concerned about the safety of their deposits in these banks as well. Going into the weekend of Saturday, March 11, the initial run and observed contagion showed signs of spreading more widely.

Facing a potentially widespread banking crisis, authorities responded quickly and decisively. After receiving a recommendation from the boards of the Federal Deposit Insurance Corporation (FDIC) and the Federal Reserve, and after consultation with the President, the Secretary of the Treasury invoked the "systemic risk exception", allowing the FDIC to complete its resolution of both SVB and Signature Bank, which at that point had also failed, while fully protecting depositors. At the same time, the Federal Reserve announced the establishment of the Bank Term Funding Program (BTFP) under the authority provided in Section 13(3) of the Federal Reserve Act. In turning to this emergency authority, the BTFP represents an innovative response to a classic systemic banking crisis that differs in important ways from the more standard use of the discount window to manage stress in the banking system. This unusual step was taken to support American businesses and households by making additional funding available to eligible depository institutions to help assure banks have the ability to meet the needs of all their depositors.

The BTFP was set up with remarkable speed by leveraging existing discount window infrastructure and was fully operational the morning of Monday, March 13. It extended term loans to eligible depository institutions (DIs) against open market operations (OMO) eligible collateral valued at par with zero haircuts. The ability to value collateral at par was critical because it allowed DIs to use the full face value of assets to secure funding at a time when the market value of those assets was depressed as interest rates continued to climb higher. Moreover, the one hundred percent margins and one-year duration of the loans provided additional certainty about funding relative to what banks might obtain at the discount window or from other sources. In terms of credit protection, advances were made with recourse beyond the pledged collateral and, in addition, the Department of the Treasury provided $25 billion from the Exchange Stabilization Fund (ESF) as credit protection to the Reserve Banks in connection with the program.

As an emergency lending facility, the BTFP, in conjunction with the systemic risk exemption, was effective at helping to avert a potentially systemic banking crisis and aided in normalizing conditions in the banking sector.[1] The program operated for one year and stopped issuing new loans on March 11, 2024. By March 7, 2025, all loans were repaid in full. Total advances made through the program amounted to over $750 billion across roughly 10,000 loans issued to over 1,800 DIs. Gross loan flows averaged $14 billion on a weekly basis over the life of the program and peaked at $78 billion the week of January 15, 2024. The average size of a loan made through the program was just over $80 million at an interest rate of 5% with a one-year maturity. This backstop source of emergency liquidity provided by the Federal Reserve to banks at a time of acute stress helped reassure depositors of the safety of their deposit funds and, in doing so, helped to support the flow of credit to American businesses and households.

The success of the BTFP in preventing a systemic crisis primarily reflects the design of the program, which used the Fed's 13(3) lending authority to enable the provision of liquidity tailored to the specific vulnerabilities that most needed to be addressed. Usage was concentrated among institutions that had generally larger unrealized securities losses and greater reliance on uninsured deposits. Borrowing activity was sensitive to the cost of BTFP loans relative to other sources of funding. Because the BTFP rate was fixed for the life of the loan at ten basis points above the one-year overnight indexed-swap (OIS) rate, which reflects market's expectations about the path of monetary policy one year ahead, borrowing climbed on days when BTFP was cheaper than other forms of funding. However, in the fourth quarter of 2023 when signs of weakening economic activity became more apparent, the OIS rate fell below the rate banks could earn on their reserves, and as a result some borrowing appears to have been financially motivated. In January 2024, the Board approved a change to the BTFP's terms so that the interest rate on new loans would not be lower than the interest rate on reserve balances (IORB) in effect on the day the loan was made.

This paper is related to existing work on the 2023 banking turmoil, including Archarya, et al. (2023), Benmelech, et al. (2023), Choi, et al. (2023), Jiang, et al. (2023), Metrick (2023), Caglio, et al. (2024), Chang, et al. (2024), Cipriani, et al. (2024), Glancy, et al. (2024) and Kelly and Rose (2025). Our analysis complements these studies by focusing on the Fed's policy response to the emerging systemic banking crisis. We describe the program design and implementation and present evidence that program outcomes were consistent with design objectives. Additionally, we present a novel decomposition of the cost of borrowing from the BTFP relative to primary credit at the discount window. Our decomposition highlights the role of interest rates and collateral valuation in boosting the attractiveness of the BTFP and how these channels interacted with the evolving monetary policy environment.

[1] Both the BTFP and the systemic risk exemption worked together to stabilize the banking sector. But, it is extremely difficult, if not impossible, to disentangle the two, so we will not try to do so in this paper.

The remainder of this paper is organized as follows. In the next section, we begin by recounting developments in the banking sector starting from the onset of the COVID-19 pandemic through the interest rate tightening cycle that began in early 2022. Against this backdrop, we describe the conditions that led to the failure of SVB in March 2023 and the subsequent contagion of stress to the broader banking system. Section 3 describes the objective of the BTFP, discusses design and operational details, and compares the BTFP to the discount window. Section 4 uses loan-level data from the BTFP to document a number of facts about program usage both over time and across borrowers and presents our decomposition of the relative cost of borrowing. Finally, Section 5 offers some concluding comments.

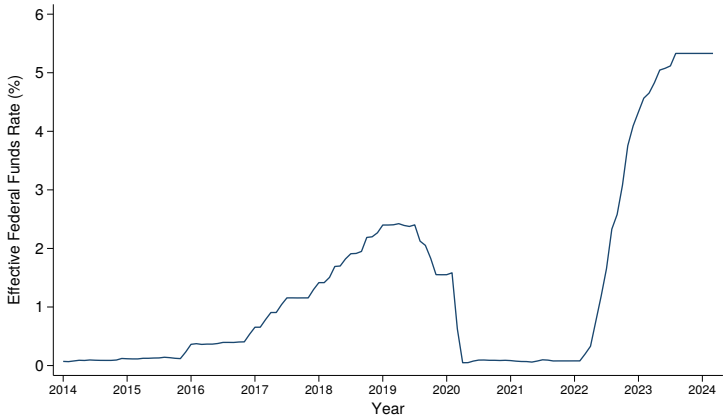
2 Developments in the Banking Sector through Early-2023

The onset of the COVID-19 pandemic in early 2020 created significant uncertainty about financial market conditions and the economic outlook. Like many other central banks around the world, the Federal Reserve responded aggressively by immediately lowering the target federal funds rate, the main policy tool of the Federal Reserve, back to the effective zero lower bound. This accommodative monetary policy stance extended the period of historically low interest rates that had prevailed since the Great Financial Crisis (GFC) over a decade earlier (Figure 1). In addition, the Fed undertook extraordinary actions in conjunction with other domestic agencies to help support U.S. financial institutions, businesses, and households.[2]

One such action aimed at supporting market functioning and promoting the effective transmission of monetary policy involved the purchase of Treasury securities and agency mortgage-backed securities (MBS) (Fleming, et al, 2022). These purchases were financed by newly issued reserves, which resulted in a significant increase in demandable uninsured deposits in the banking system (Figure 2). At the same time, banks faced limited opportunities to deploy those funds owing to heightened uncertainty associated with the pandemic. Many banks responded by investing those funds in longer-dated securities, such as Treasury securities and agency MBS with maturities of over three years, to boost yields (Figure 3a). Two years into the pandemic, this resulted in a segment of banks more heavily exposed to run and interest rate risk relative to peers.

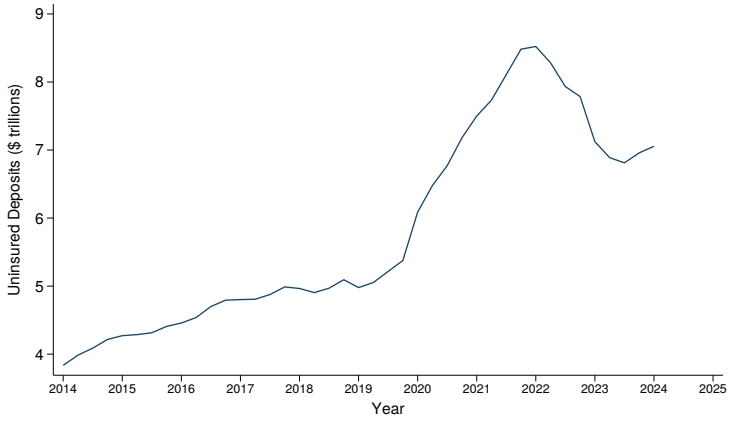
[2]For example, the Fed established five new emergency facilities, including the the Main Street Lending Program (Arseneau, et al, 2022), the Municipal Liquidity Facility (Haughwout, et al, 2022), the Paycheck Protection Program Liquidity Facility (Volker, 2022), and the Primary and Secondary Corporate Credit Facilities (Boyarchenko, et al, 2022) and reestablished four older facilities including the Commercial Paper Funding Facility (e.g., Boyarchenko, et al, 2022), the Primary Dealer Credit Facility (Martin and McLaughlin, 2022), the Money Market Mutual Fund Liquidity Facility (Anadu, et al, 2022), and the Term Asset-Backed Securities Lending Facility (Caviness, et al, 2022).

Figure 1: Monetary Policy, 2014 to 2025.



Source: Bureau of Labor Statistics via Federal Reserve Bank of St. Louis, FRED.

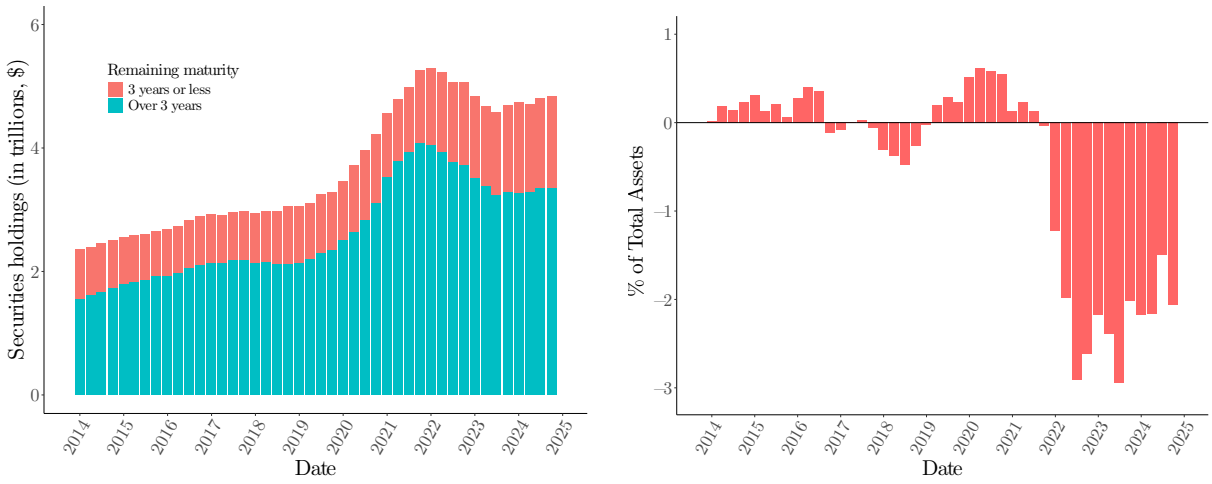
Figure 2: Banks' Reliance on Uninsured Deposits, 2014 to 2025.



Source: Bank Call Reports.

As global economic activity started to normalize in late 2021, persistent pandemic-related supply constraints resulted in inflationary pressure both in the U.S. and abroad. Globally, central banks responded by tightening monetary policy and the Fed was particularly aggressive in raising the target range for the federal funds rate 425 basis points over the course of 2022 and into 2023. Indeed, by July 2023 the upper range for the Federal Funds rate peaked at 5.5 percent marking the most rapid increase in the policy rate in the past forty years. A consequence of this shift in the stance of monetary policy was that many banks experienced significant declines in the market value of securities held on their balance sheets (Figure 3b) and this, in turn, put downward pressure on these banks' tangible capital (see also Flannery, 2023 and Jiang, 2023).

Figure 3: Maturity of Securities and Unrealized Securities Losses on Bank Balance Sheets



(a) Maturity of Banks' Securities Holdings

(b) Unrealized Securities Losses

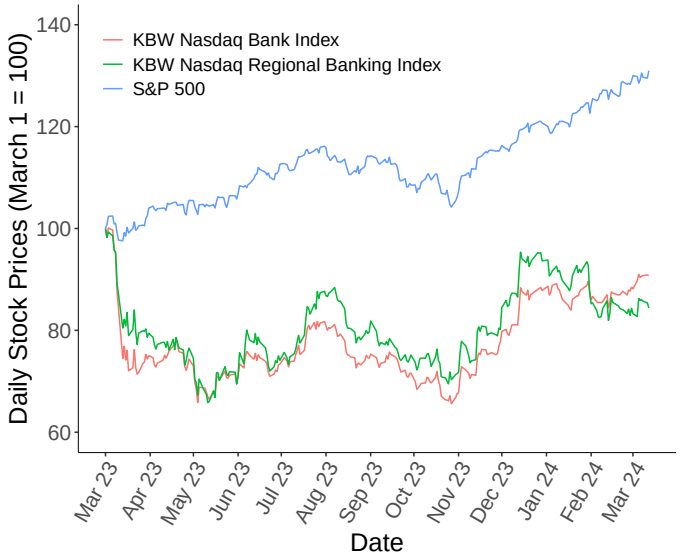
Source: Bank Call Reports.

The banking system eventually came under acute stress in March 2023. Silvergate Bank, an institution supervised by the Federal Reserve with $11 billion in assets, was the first bank to close operations. Silvergate's deposit base was unusually concentrated in the crypto industry and, beginning in November 2022, the bank experienced a significant depletion of deposits as a result of the crypto market downturn that began earlier in 2022. To meet those outflows, Silvergate was forced to sell assets at a loss, which contributed to its worsening outlook before the bank eventually announced its intention to voluntarily wind down operations on March 8.[3]

Later that same day, SVB, an institution supervised by the Federal Reserve with more than $200 billion in assets, announced that it had sold $21 billion from its available-for-sale (AFS) portfolio at an after tax loss of $1.8 billion. The bank was also planning to increase its term borrowings from $15 billion to $30 billion, and was seeking to raise $2.25 billion in capital. Depositors at SVB had been moving their money out of the bank in recent months on concerns about the bank's exposure to venture capital-backed technology companies, which had been experiencing a slowdown in growth since the year before. SVB's actions on March 8 were intended to bolster depositor confidence in the bank but had the opposite effect. The following day, when it was apparent that the bank was not able to raise the needed capital, it faced unprecedented deposit withdrawals, totaling $42 billion, and its stock price plummeted. As additional deposit withdrawal requests accumulated, the bank informed regulators on Friday, March 10, that it was unable to pay obligations on the roughly $100 billion in scheduled or expected deposit withdrawals for that day. The California Department of Financial Protection and Innovation declared SVB insolvent that morning, took possession of

[3]See Patel and Rose (2023) and Kelly and Rose (2025) on the role of crypto in the Silvergate failure and its possible implications for the subsequent broader banking crisis.

Figure 4: Daily Stock Price Indexes



Source: Bloomberg.

the bank, and appointed the FDIC as receiver.

As SVB was going into receivership on March 10, other banks with similar risk profiles—heavy reliance on uninsured deposits and large unrealized losses on longer-duration fixed rate assets—also came under pressure.[4] In conjunction with these risk factors, banks with a concentrated deposit base stemming from exposure to the crypto and technology sectors immediately came under the most acute stress. Signature Bank, an institution with $110 billion in assets, experienced continued stock price declines and suffered a run, with depositors withdrawing 20 percent of deposit balances on March 10. The bank was closed by the New York State Department of Financial Services on Sunday, March 12 with the FDIC named as receiver. Similarly, First Republic Bank also started to experience notable deposit outflows on March 10 and those outflows continued into the next week before the bank would ultimately be taken into receivership by the FDIC on May 1.

The stress caused by the initial run on SVB and subsequent contagion to Signature and First Republic showed signs of spreading more broadly across the banking sector. In the U.S., the KBW Nasdaq Bank Index and KBW Nasdaq Regional Banking Index—which track the performance of the leading and regional banks, respectively—experienced sharp declines (Figure 4). While the S&P 500 index did not show any signs of stress, the banking indexes declined by about 10 percent on March 13. Moreover, Moody's downgraded the US banking system from stable to negative on March 14 and placed six other banks—First Republic Bank, Western Alliance Bancorp, Comerica

[4]See also Acharya et al, (2023), BCBS (2023), Federal Reserve Board (2023), Group of Thirty (2024), and Metrick (2024) for additional accounts for the factors contributing to the failure of SVB and the extent that it contributed to destabilizing the broader banking system.

Inc., Intrust Financial Corporation, UMB Financial Corp and Zions Bancorporation—under review for a downgrade. Internationally, Credit Suisse—a Swiss bank that had experienced a succession of risk-management, corporate-governance, and compliance failures in recent years—came under renewed pressure. After sharp declines in its stock price and an announced intention to access emergency liquidity support from the Swiss National Bank during the week of March 13, another Swiss bank, UBS, agreed to merge with Credit Suisse.

Faced with the runs on SVB and Signature Bank, there was significant concern going into the weekend of March 11 and 12 that uninsured depositors would run at other banks, potentially leading to a systemic banking crisis with implications for the broader economy.[5] In response, the Federal Reserve, together with the FDIC and the U.S. Department of the Treasury, took decisive actions to protect bank depositors and reestablish confidence in the banking sector.

3 Standing up the Bank Term Funding Program

On Sunday, March 12, the Treasury Secretary approved a systemic risk exception to least-cost resolution after receiving a recommendation from the boards of the FDIC and the Federal Reserve and consultation with the President. The systemic risk exception allowed the FDIC to complete its resolution of both failed banks while fully protecting insured and uninsured depositors, who were able to access their deposits without restriction on Monday morning.[6] In contrast, shareholders and certain unsecured debt holders were not protected, and senior management at these banks was removed.[7] The losses associated with the resolution of the SVB and Signature Bank amounted to $16.3 billion and were fully covered by the Deposit Insurance Fund. As required by law, the FDIC will collect special assessments levied on banks to replenish the fund.[8]

At the same time, the Federal Reserve announced the introduction of the BTFP to provide term funding to eligible DIs. The program was established under the authority provided in Section 13(3) of the Federal Reserve Act with the approval of the Secretary of the Treasury and $25 billion in credit protection from the Exchange Stabilization Fund (ESF). In order to exercise its 13(3)

[5] Total uninsured deposits at banks with under $250 billion in total assets that experienced deposit outflows in the first quarter of 2023 provide a rough estimate of the upper bound of run risk. Using Call Report data, we find roughly $1.85 trillion of uninsured deposits at these banks were at risk as of the fourth quarter of 2022. Our estimate excludes uninsured deposits from the largest banks (those with assets greater than $250 billion) as these banks experienced significant deposit inflows during this period and therefore were not prone to deposit runs, see Caglio, et al., (2024) and Luck and Plosser, (2024).

[6] The systemic risk exception is an emergency tool policymakers can use to prevent a financial crisis spiraling out of control with detrimental effects to the real economy. Policymakers invoked it for the first time during the Global Financial Crisis in 2008-2009.

[7] See https://www.federalreserve.gov/newsevents/pressreleases/monetary20230312b.htm.

[8] See https://www.federalregister.gov/d/2023-25813. The FDIC will collect the special assessment at an annual rate of 13.4 basis points multiplied by a DI's uninsured deposits, reported for the quarter that ended December 31, 2022, adjusted to exclude the first $5 billion.

authority, the Federal Reserve Board found that "unusual and exigent circumstances" existed in light of the bank failures that resulted in stress to certain U.S. banks. The BTFP was fully operational the following morning of Monday, March 13.

3.1 Program Objective

The BTFP was designed to reassure depositors of the safety of their deposits in order to prevent a systemic run on the banking sector and, in doing so, help to support the flow of credit to American businesses and households. The emergency liquidity facility authorized all twelve Reserve Banks to make available additional funding to eligible DIs to help assure the public that the banking system had adequate ability to meet the need of all depositors. The BTFP was a backstop source of liquidity provided against high-quality collateral which eliminated the need for banks to sell securities at a loss during the time of stress. Indeed, at the time of the SVB failure, interest rate risk was expected to become even more acute as monetary policy continued to tighten and the BTFP was meant to reassure depositors that banks would be able to continue to manage this risk as interest rates continued to rise. A bank-of-the-envelope estimate of the extent of this risk suggests that a 100 basis point increase in Treasury yields is associated with a decline in the market value of securities measured relative to total assets of the banking system of between 0.5% to 0.7%, or between $115 to $161 billion[9]

Due to the unprecedented pace of the bank runs, the program needed to be fully operational almost immediately to stop further contagion.[10] The management of a crisis requires accelerated decision making and decisive action leading to quick and effective policy responses to help contain stress before it expands to the broader financial system (Honohan, 2024). In practice, however, accelerated decision making on the basis of incomplete information is challenging. In the case of the BTFP, the Federal Reserve needed to rely on available information about conditions in the banking system as of the weekend of March 11. In the very early hours of the morning of Sunday, March 12, that available information pointed to strong potential for further contagion as a result of the bank failures and significant financial market effects. This urgency informed the program's design. In order to respond quickly and decisively, the program took advantage of the existing discount window infrastructure to extend term loans to banks in order to satisfy depositor liquidity needs.

[9]This estimated range comes from a regression of quarterly changes in security losses as a share of total assets for bank i in quarter t on changes in the 5 year Treasury yield (quarterly average) while controlling for bank-specific fixed effects. We estimate this regression using quarterly Call Report data for a sample of $5,024$ commercial banks. Using the longest possible time series available, which covers the period 2010Q1 to 2022Q4, the estimated coefficient is 0.005 with a standard error (clustered at the commercial bank and time level) of 0.001. Restricting the sample to start in 2021Q1 raises the estimate to 0.007 with a standard error of 0.002. Total assets in the banking system in 2022Q4 were $23605.1B, thus an increase in the 5 year rate by 100 bps (1 percent) should result in an increase in total securities losses between $115B and $161B.

[10]Rose (2023) argues the March 2023 runs were extraordinarily fast and large by historical standards.

It also leveraged Treasury's loss absorption capacity to allow banks to borrow against collateral at minimal risk to the Fed.

3.2 Program Design

Key elements of the term sheet, presented in Table 1, were designed to allow the BTFP to achieve its objective as well as satisfy the requirements of Section 13(3) of the Federal Reserve Act.

The pool of eligible borrowers consisted of any U.S. federally insured DI or U.S. branch or agency of a foreign bank eligible for primary credit from the discount window. At the same time, restricting eligibility to institutions eligible for primary credit at the discount window helped to ensure borrowers were in sound financial condition.

Table 1: Term Sheet for the Bank Term Funding Program.

Borrower Eligibility:	Any U.S. federally insured depository institution or U.S. branch or agency of a foreign bank that is eligible for primary credit.
Eligible Collateral:	Any collateral eligible for purchase by the Federal Reserve Banks in open market operations, provided it was owned by the borrower as of March 12, 2023.
Collateral Valuation:	The collateral valuation will be par value. Margin will be 100% of par value.
Advance Size:	Advances will be limited to the value of eligible collateral pledged by the eligible borrower.
Advance Term:	Advances will be made available for a term of up to one year.
Rate:	The rate for term advances will be the one-year overnight index swap rate plus 10 basis points; the rate will be fixed for the term of the advance on the day the advance is made.
Fees:	There are no fees associated with the Program.
Prepayment:	Borrowers may prepay advances (including for purposes of refinancing) at any time without penalty.
Recourse:	Advances made under the Program are made with recourse beyond the pledged collateral to the eligible borrower.
Credit Protection:	The Department of the Treasury, using the Exchange Stabilization Fund, would provide $25 billion as credit protection to the Federal Reserve Banks in connection with the Program.
Program Duration:	Advances can be requested under the Program until March 11, 2024.

Eligible collateral included any asset eligible for purchase in open market operations, provided it was owned by the borrower as of March 12, 2023. Collateral was valued at par and no haircuts were applied. This feature was important because it allowed banks to use the full face value of assets whose depressed market value was at the heart of the problem. And the 100 percent margins provided additional access to funding relative to the discount window. The size of BTFP advances,

which had a term of up to one year, were limited by the value of eligible collateral pledged by the borrower. Along with the one-year term, these features differentiated the BTFP from primary credit and met the policy goals of providing sufficient liquidity to DIs in need of funding.

The interest rate was set to the one-year OIS rate plus ten basis points. Following news reports of some financially-motivated borrowing at the BTFP in late 2023, the Fed adjusted the rate on January 24, 2024, such that the rate on new BTFP loans was no lower than the interest rate paid on reserve balances (IORB). The advance rate was determined on the origination date and fixed for the term of the loan. There were no fees associated with the program and borrowers could prepay advances, including for the purposes of refinancing, without penalty at any time.

In terms of credit protection, advances were made with recourse meaning that if a borrower were to default and did not have sufficient collateral posted at its Reserve Bank, the Federal Reserve would have a claim against the borrower's other assets. In addition, the Department of the Treasury provided $25 billion from the Exchange Stabilization Fund (ESF) as credit protection to the Reserve Banks in connection with the program.[11] The criteria for collateral eligibility and recourse, together with credit protection provided by the Treasury, helped ensure that BTFP loans were secured to the satisfaction of the Reserve Bank extending the loan.

3.3 Program Operations

From an operational standpoint, 13(3) facilities are typically implemented using one of two models: (1.) a program run by a single Reserve bank, which involves the creation of a limited liability company (LLC), tends to be focused on non-bank borrowers, and typically involving larger sized advances with lower overall volumes; or (2.) a program spread across all Reserve Banks, which tends to focus on DIs and typically involves smaller sized advances with larger overall volumes. Rather than creating an LLC through which to run the program, facilities of the latter type often use discount window lending infrastructure.

Given its objective, the BTFP used the second model. One advantage of this approach is the speed with which loans can be extended. Provided a DI had agreed to the terms of its Reserve Bank's Operating Circular 10, enrollment in the BTFP involved sending a standard template email request for enrollment to the lending Reserve Bank for that DI. For every institution with a discount window collateral pledge account (U102) as of March 12, 2023, Reserve Banks automatically created a separate BTFP collateral pledge account (U101). The two collateral pledge accounts were distinct and the DI had to initiate the transfer of collateral which was nevertheless straightforward.[12]

[11] ESF's annual reports can be found at https://home.treasury.gov/policy-issues/international/exchange-stabilization-fund/esf-reports.

[12] To pledge securities collateral to the discount window, and therefore the BTFP, DIs need to move eligible securities to restricted accounts held at either the Fedwire Securities Service (FSS) or the Depository Trust Company (DTC). The Federal Reserve values these securities using prices provided by external vendors. The pledge of securities

Advances could be requested by an authorized person contacting its lending Reserve Bank to request BTFP funds. Starting on August 18, 2023, eligible borrowers needed to submit certification that the collateral pledged was owned by the borrower as of March 12, 2023, consistent with the terms of the program. Once these criteria were met, funds were generally sent to the borrowing bank before the close of business on that day. Most banks already had discount window collateral and readiness documents in place and, as a result, had easy operational receipt of funds (as quickly as 15 minutes if collateral and documents were prepared properly). That said, more steps were involved in securing funds when borrowers did not have discount window collateral and readiness documents in place.

3.4 Comparison with the Discount Window

Although the BTFP and primary credit offered through the discount window both provide liquidity to banks and share some operational infrastructure, the two programs have important differences with respect to the eligible collateral used to secure a loan, how that collateral was valued, the term of the advance, and the interest rate.

In terms of eligible collateral, the BTFP was more limited in that it only accepted collateral eligible for purchase by the Federal Reserve in open market operations (OMO). In contrast, primary credit at the discount window accepts OMO collateral, as well as a wider range of securities and loans. Collateral was valued at par for the BTFP, whereas for primary credit it is valued at its fair market value (adjusted for the relevant haircuts depending on the type of collateral). This difference in collateral valuation was an important feature of the BTFP because it allowed DIs to increase borrowing capacity especially for the institutions most in need of it — those with large unrealized losses on securities holdings. It also gave them the option to cover funding needs without having to realize losses from selling those securities at depressed valuations.

Another important difference is that BTFP loans had a term of up to one year, whereas primary credit has a term of up to 90 days. The extended term of BTFP advances provided stable funding to eligible DIs at a time when their deposit bases came into question. Finally, the interest rate for BTFP loans was at the one-year OIS rate plus ten basis points on the day of origination. The one-year OIS is based on the effective federal funds rate for a one-year maturity. Primary credit is extended at the primary credit rate, which, during this period, was set at the top of the target range for the federal funds rate. Moreover, the interest rate for BTFP loans was fixed for the term of the loan on the day the advance was made, whereas with primary credit advances, if the primary credit rate changes while a term primary credit loan is still outstanding, the new rate applies on

collateral is usually effective the same day within the operating hours of securities depositories. In contrast, the pledge of loan collateral, which was not eligible to borrow against through the BTFP, involves more steps and is a more complicated process.

and after the effective date of the change. This difference matters because there is no incentive to prepay a discount window loan when rates decline as the rate of the loan adjusts automatically. In contrast, the fixed BTFP rate in conjunction with a lack of any penalty for prepayment creates a stronger incentive to repay the loan as interest rates decline.

4 Outcomes

In this section, we explore program outcomes. We start with some facts about overall usage over the life of the program and turn to outcomes over time and across borrowers.

4.1 Overall Usage

Table 2 provides overall statistics on BTFP loans and borrowers. All told, 9,812 loans were originated over the life of the program for a total of $760 billion. As there was no prepayment penalty, many loans were originated for the purpose of refinancing an existing BTFP loan. This refinancing activity inflates the cumulative dollar amount of originations over the life of the program. Gross loan flows—an alternative measure of program size that accounts for refinancing activity—averaged $14 billion on a weekly basis over the life of the program and peaked at $78 billion the week of January 15, 2024. Loan sizes averaged $81 million, carried an average interest rate of 5.02 percent, and had an average duration of just under a year (327 days).

Turning to borrowers, there are roughly 9,800 domestically chartered DIs in U.S. banking system as a whole, and about 5,000 (or 51 percent) had a discount window account established with the Federal Reserve prior to the start of the BTFP.[13] Under half (or, roughly 2,100) of those with a discount window account elected to take the additional step of pledging collateral to the BTFP, which was a prerequisite for borrowing funds from the program. Of those, 1,804 (representing 52 percent of total assets in the banking system) originated at least one loan from the program, a utilization rate of over 85 percent. For those that did borrow, BTFP loans averaged around 4 percent of borrower assets. Many borrowers took out more than one BTFP loan, with an average of 5.4 loans per borrower, and the average borrower refinanced four times.

With regard to posted collateral, the terms of the BTFP limited collateral to that eligible for purchase by the Federal Reserve in open market operations (OMO). As such, collateral posted was comprised of agency collateralized mortgage obligations (17.8 percent), agency mortgage backed securities (35.7 percent), agency debt (27 percent), and Treasury securities (19.5 percent). In contrast, collateral posted to the discount window was much more heavily weighted toward non-OMO eligible collateral (56.5 percent), and included commercial and industrial loans and consumer

[13] See https://www.federalreserve.gov/monetarypolicy/discount-window-readiness.htm.

Table 2: Aggregate BTFP Loans and Borrowers

Loans	
Number of loans	9,812
Number of test loans	412
Dollar value of loans	$759.6 billion
Avg. gross weekly flow	$14.3 billion
Peak gross weekly flow	$78.4 billion
Avg. loan size	$80.7 million
Avg. interest rate	5.02%
Avg. duration	327 days
Borrowers	
DIs that pledged collateral	2,128
DIs that borrowed	1,804
Avg. BTFP borrowing as a share of total assets	3.9%
Avg. loans per borrower	5.4
Avg. refinanced loans per borrower	4.0

Source: Author's calculations using Federal Reserve data.

loans, among other types. The OMO-eligible collateral pledged to the discount window includes agency collateralized mortgage obligations and agency mortgage backed securities (22.2 percent), as well as agency debt and Treasury securities (20.3 percent).

Geographically, borrowers came from all twelve Federal Reserve Districts. On average, about 20 percent of DIs in the first (Boston), ninth (Minneapolis), tenth (Kansas City), eleventh (Dallas), and twelfth (San Francisco) districts originated loans through the program. For the other districts—the second (New York), third (Philadelphia), fourth (Cleveland), fifth (Richmond), sixth (Atlanta), seventh (Chicago), and eighth (St. Louis)—the share of active DIs was lower, at about 15 percent, on average.

4.2 Aggregate Outcomes over Time

With these baseline statistics in mind, we turn now to aggregate outcomes, focusing on changes in BTFP borrowing and the interest rate paid for these loans over time. In particular, we highlight the sensitivity of borrowing activity to the cost of BTFP loans relative to other sources of funding.

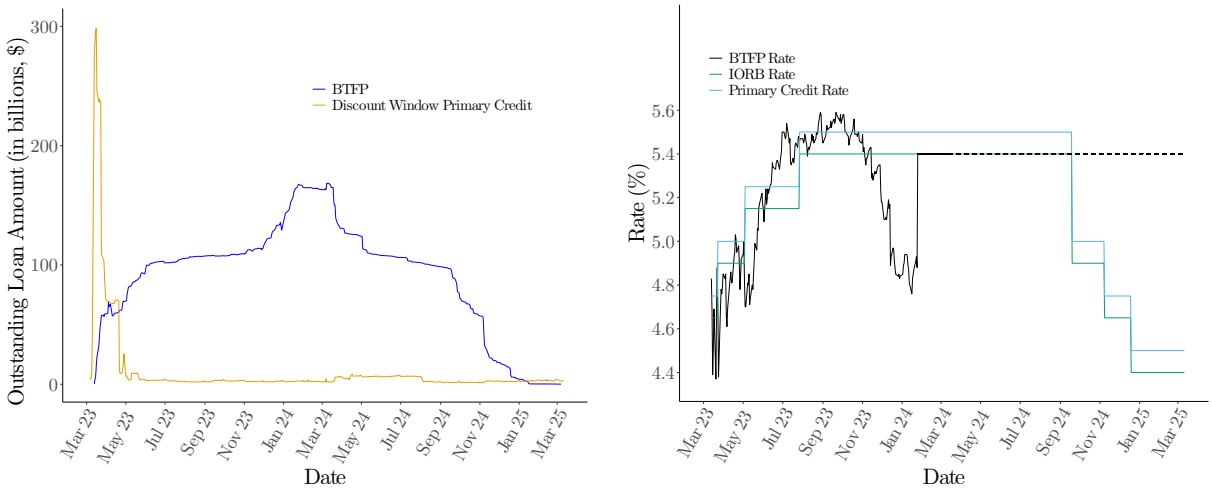
Figure 5 plots the daily outstanding balances at the BTFP and discount window (Figure 5a, left panel) and the BTFP rate relative to other market rates (Figure 5b, right panel). At the onset of the crisis, both the discount window and the BTFP were important sources of funding for DIs, as shown by the initial jump in the yellow and blue lines, respectively, in the left panel. Primary credit at the discount window spiked up, peaking at nearly $300 billion on March 17th, before immediately retracing most of this increase.[14] The BTFP experienced a similar rapid expansion soon after the

[14]The sharp retrenchment primarily reflects discount window loans made to banks that were placed into FDIC

program's launch. Taken together, these two sources of Federal Reserve credit exceeded $350 billion on March 24.

BTFP borrowing outstanding climbed in the weeks following its introduction, while primary credit outstanding declined. A key factor driving BTFP growth was attractive pricing relative to alternative sources of funding. The black line in Figure 5b shows that, despite considerable volatility over the first few weeks, the interest rate on BTFP loans was low relative to the primary credit (light blue line) and IORB rates (green line) through late June, even as the Federal Reserve continued to tighten monetary policy over this period. The lower BTFP rate reflected the view among financial market participants at the time that monetary policy would need to ease over the coming year, leading to expectations of a lower federal funds rates relative to its contemporaneous level. These expectations—embedded in the OIS rate—pushed down the BTFP rate relative to other sources of funding, whose rates are tied more closely to the contemporaneous federal funds rate. During this period, BTFP balances steadily climbed to above $100 billion.

Figure 5: BTFP Activity over Time: Quantities and Rates



(a) BTFP vs. Discount Window Borrowing

(b) BTFP rate and other relevant rates

Source: Author's calculations using Federal Reserve data.

As it became clear to market participants that the Fed would continue its tightening cycle through the summer, the OIS rate increased sharply, pushing the BTFP rate above the IORB by late-June. Activity in the program turned to a lull, with the amount outstanding holding roughly constant at about $120 billion for several months. At the same time, deposit outflows had largely stabilized across the banking system and market sentiment had improved, although vulnerabilities persisted for a subset of banks.

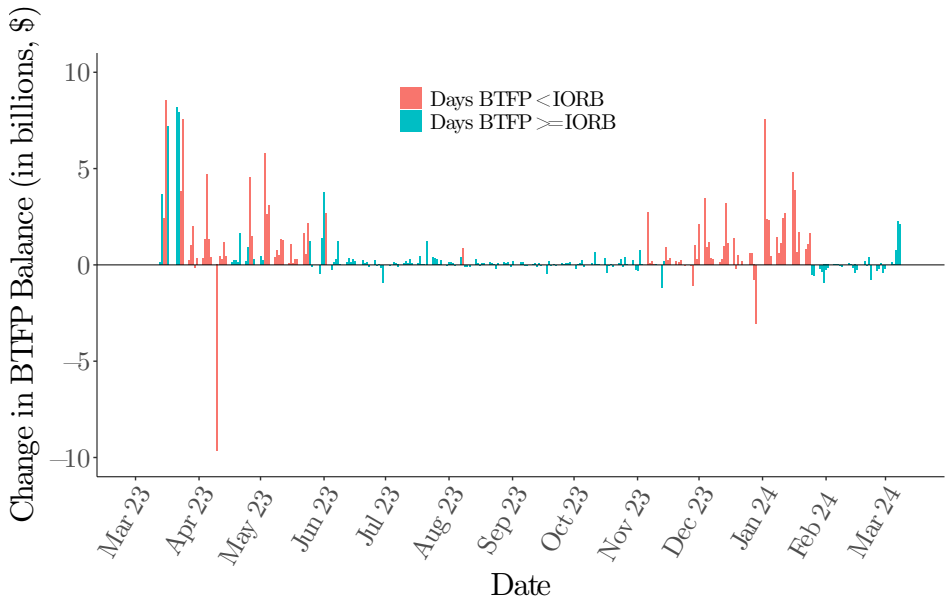
Signs of weakening economic activity towards the end of the year led to expectations of a lower

receivership.

federal funds rate, which pushed the OIS rate below the IORB rate in December. This sparked a second burst of lending, which appeared partly motivated by financial incentives. BTFP balances climbed to a peak program level of $168 billion in February 2024. This burst of activity came to a halt when the Federal Reserve made the decision in the month prior to closing the program to floor the BTFP rate at the IORB rate in effect on the day of loan origination. With the BTFP rate in the upper ranges of other relevant interest rates any incentives for DIs to borrow from the program were once again diminished. Activity slowed through March 2024, at which point the program stopped originating new loans.

A key takeaway is that once the most acute stresses had subsided, borrowing activity was highly sensitive to the BTFP rate relative to alternative sources of funding. Figure 6 further illustrates this point. We divide daily data on the net change in BTFP outstanding into two categories: days when the BTFP rate was below the IORB (orange bars), and days it was above the IORB (green bars). Early in the life of the program when the stress was most acute, borrowing climbed with muted sensitivity to relative interest rates. However, later in the program, rate sensitivity increased, as net changes in borrowing would pick up considerably if the BTFP rate fell below the IORB rate, and stayed mostly steady on days when the BTFP rate exceeded the IORB rate. These pickups in borrowing activity were considerably notable later in the program, when the BTFP rate dropped below the IORB rate for a protracted period.

Figure 6: Daily Changes in BTFP Loans Outstanding



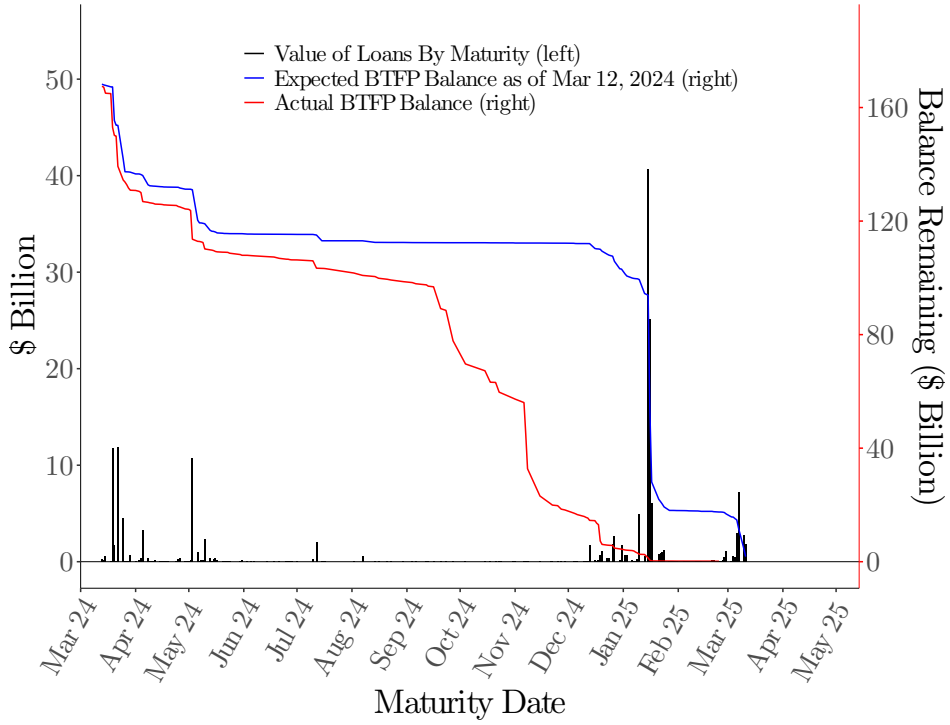
Source: Author's calculations using Federal Reserve data.

With a one year maximum loan duration, the wind down phase of the program lasted through March 2025. Figure 7 plots the actual BTFP outstanding balance (blue line) against a projected

outstanding balance under the assumption that borrowers pay off loans in full only at maturity (red line). The figure suggests that BTFP loan paydowns were also interest rate sensitive, although to a somewhat lesser degree than borrowings.

Repayment activity had three primary characteristics. First, BTFP loans were paid off ahead of schedule. Second, most of the outstanding balances were paid down during the period from September to December 2024, which coincides with a period of easing monetary policy, as the Federal Reserve lowered the target range for the federal funds rate from 5 to 5.25 percent in September to 4.25 to 4.5 in December of 2024. Some borrowers presumably paid down BTFP loan balances to seek cheaper funding alternatives in the declining interest rate environment. However, a significant segment of borrowers maintained their loans until maturity. These DIs had relatively more unrealized securities losses and greater difficulty in securing market funding at favorable terms. Taken together, these two observations highlight the importance of at-par collateral valuation for a subset of DIs, even late in 2024. The third and final take-away is that all outstanding balances were repaid in full by the time the program closed. The BTFP, and thus the American taxpayer, did not suffer any losses.

Figure 7: BTFP Loans Outstanding During Runoff Phase



Source: Author's calculations using Federal Reserve data.

4.3 Borrower-level Outcomes

Next, we combine loan-level data from the BTFP with DI-level data from the Call Reports to examine program usage at the borrower level. We show that, relative to comparable institutions, BTFP borrowers had higher unrealized losses on securities and greater reliance on uninsured deposits. Moreover, while the program was widely used by small to mid-sized commercial banks, larger credit unions used the program most intensively.

Table 3: Selected Balance Sheet Characteristics, by Business Model and Extent of Participation

	All DIs	Pledged Collateral to BTFP?			Borrowed from BTFP?		
		Yes	No	Difference	Yes	No	Difference
A. *All institutions*							
Total Assets, ($B)	2.66	9.77	0.65	9.12***	7.35	23.58	−16.23***
Unrealized Securities Losses, (%TA)	1.81	3.09	1.45	1.64***	3.15	2.76	0.39***
Uninsured Deposits, (%TA)	13.26	20.93	11.08	9.85***	20.81	21.59	0.78
FHLB Advances, (%TA)	1.56	2.92	1.19	1.73***	2.92	2.68	0.24
# of Institutions	9,484	2,090	7,394		1,779	311	
B. *Commercial Banks*							
Total Assets, ($B)	4.94	12.6	1.16	11.44***	9.28	31.48	−22.20***
Unrealized Securities Losses, (%TA)	2.64	3.34	2.30	1.04***	3.37	3.15	0.22
Uninsured Deposits, (%TA)	23.17	25.96	21.80	4.16***	25.80	26.90	−1.10***
FHLB Advances, (%TA)	2.72	3.21	2.48	0.73***	3.27	2.90	0.37
# of Institutions	4,671	1,540	3,131		1,310	230	
C. *Credit Unions*							
Total Assets, ($B)	0.45	1.16	0.28	0.88***	2.95	1.83	1.12**
Unrealized Securities Losses, (%TA)	1.01	1.65	0.83	0.82***	2.52	2.39	0.13***
Uninsured Deposits, (%TA)	3.63	6.54	3.22	3.32***	6.89	6.84	0.05
FHLB Advances, (%TA)	0.44	2.05	0.25	1.80***	1.94	1.95	-0.01
# of Institutions	4,813	550	4,263		469	81	

Source: Author's calculations using Federal Reserve data. Numbers are unweighted averages.

The first step to program participation was to pledge collateral to the BTFP. As shown in Panel A of Table 3, nearly one-quarter of all DIs pledged collateral to the program, highlighting the fact that setting up a BTFP account was relatively easy. Moreover, DIs that were not set up to use the discount window prior to the onset of the March 2023 stresses, but chose to go through the process of accessing the BTFP, benefited from being signed up to access the discount window as a by-product.[15] Regardless of whether or not they eventually borrowed, DIs that chose to pledge were considerably larger than those that did not ($9.8 billion in assets compared to $65 million).[16]

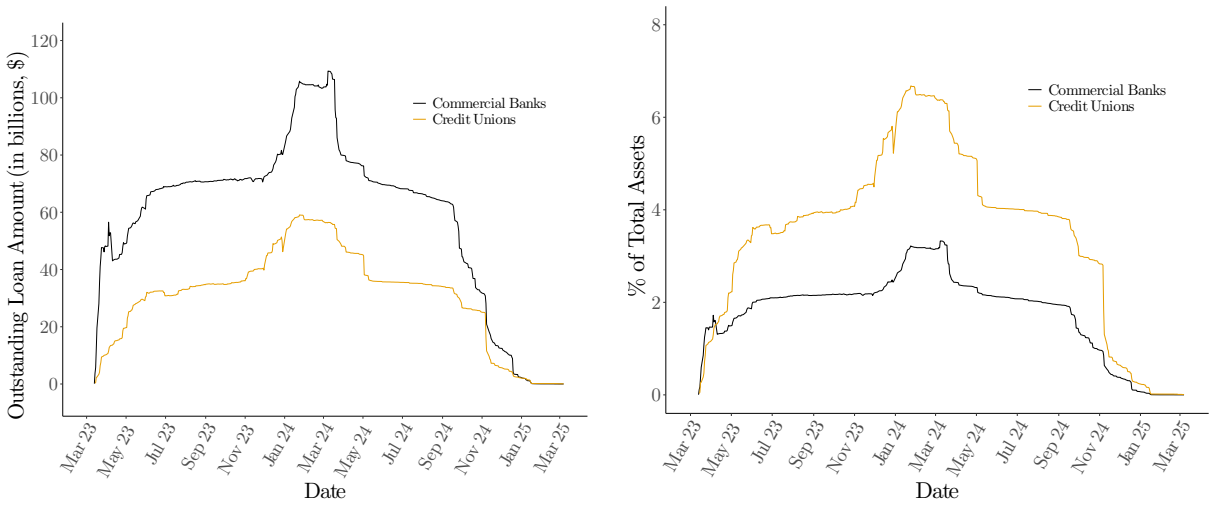
[15]Based on publicly available information available at https://www.federalreserve.gov/monetarypolicy/discount-window-readiness.htm, the number of institutions signed up to use the discount window increased by roughly 10 percent during 2023.

[16]To have a consistent sample of institutions, we limit our analysis to commercial banks and credit unions resulting

On the asset side of the balance sheet, DIs that chose to pledge collateral had larger unrealized securities losses (3.1% of total assets compared to 1.5%). At the same time, their funding structures were more reliant on uninsured deposits (20.9% of total assets compared to 11.1%) as well as FHLB advances (2.9% compared to 1.2%).

The majority of DIs that pledged collateral (1,779, or about 85%) eventually borrowed from the program. Conditional on having pledged, there were two main characteristics that differentiated borrowers from non-borrowers. The first was size as measured by total assets. DIs that pledged collateral and borrowed averaged $7.4 billion in assets, while pledgers that did not borrow averaged $23.6 billion. This difference is driven by a small number of very large DIs which pledged but never borrowed.[17] Removing these largest banks from the sample brings the average size of borrowers more in line with non-borrowers. The second characteristic that differentiated borrowers from non-borrowers was the extent of unrealized securities losses. DIs that borrowed experienced losses of about 3.2% of total assets, whereas non-borrowers were more modest at 2.8%. This difference is statistically significant at the 99% confidence level and is robust even when we remove the largest banks from the sample.

Figure 8: BTFP Outstanding Balance, by Institution Type



(a) BTFP Borrowing

(b) BTFP Borrowing Share of Assets

Source: Bank Call Reports.

The type of depository institution was also an important determinant of program usage. Panels B and C of Table 3 present the same balance sheet characteristics broken out separately for commercial banks and credit unions. Roughly one-third of all commercial banks (or, 1,540 out of

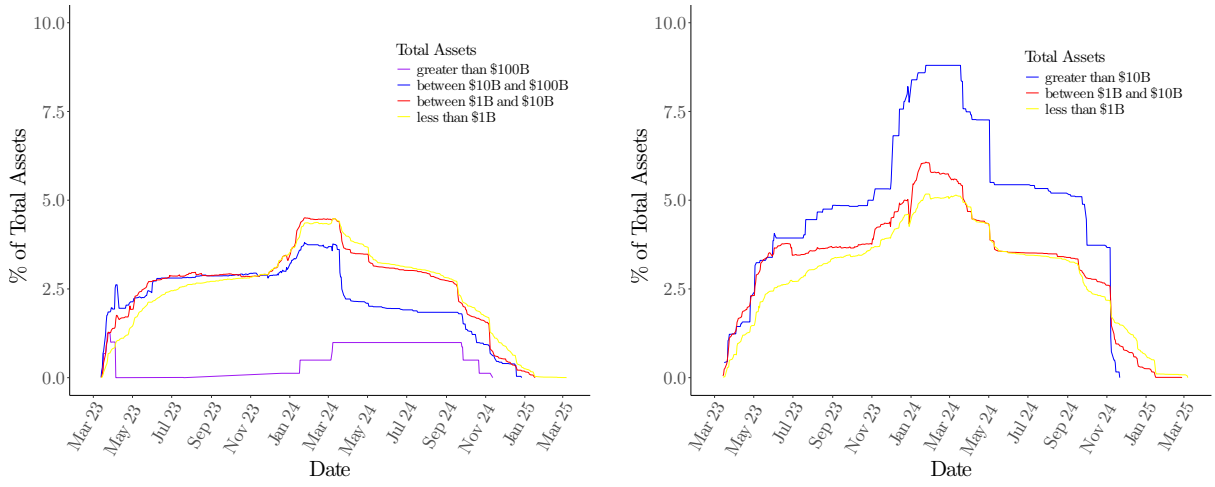
in a negligible reduction in coverage of overall BTFP borrowers. For example, the 1,779 BTFP borrowers reported in Table 3 is lower than the 1,804 reported in Table 2 because we removed a few BTFP borrowers that are U.S. branches of foreign banks as well as one bridge bank.

[17] Among the 30 largest DIs, all but three pledged collateral. Of those that pledged, 20 borrowed (average total assets of over $450 billion) while 7 did not (average total assets of roughly $950 billion).

4,671) chose to pledge collateral compared to just over ten percent (550 out of 4,813 total) of credit unions. The balance sheet characteristics associated with the decision to pledge were similar across the two types of institutions and, conditional on having pledged, the majority of both commercial banks and credit unions (about 85% for both) ultimately ended up borrowing funds. With regard to the propensity to borrow, there was little to differentiate borrowers from non-borrowers among all but the largest commercial banks.[18] In contrast, the larger credit unions with greater unrealized securities losses were more likely to borrow funds from the program.

Figure 8 shows BTFP take-up (left panel) by institution type, as well as a share of assets (right panel), over the life of the program. While commercial banks accounted for two-thirds of outstanding BTFP volumes, credit unions were more intensive users as measured by the share of assets. Another way to assess intensity of usage is to compare total borrowing from the program to the amount of uninsured deposits exposed to run risk. Peak borrowing from at-risk banks amounted to $109.4 billion compared to $1.85 trillion in uninsured deposits, so actual usage was roughly 3 percent of our estimate of the upper bound of the potential size of the stress.[19] This number was considerably higher for credit unions, which borrowed $18.7 billion, amounting to 51 percent of $36.5 billion in uninsured deposits held by these institutions. The patterns of take-up and paydown were similar over time for both types of institutions, suggesting similar sensitivity in usage to potential stress and relative interest rates across the two types of institutions.

Figure 9: BTFP Borrowing Share of Assets, by Institution Type and Size



(a) Banks

(b) Credit Unions

Source: Bank Call Reports.

[18]The table shows that conditional on having pledged collateral, commercial banks that borrowed were smaller and had significantly lower shares of uninsured deposits, but this result is driven by the very largest banks. Removing these banks from the sample shows no statistically difference in the balance sheet characteristics of borrowers relative to non-borrowers.

[19]See footnote 5 for how these numbers were calculated.

Figure 9 provides additional color by showing BTFP borrowing as a share of total assets differentiated by institution type and size. For banks (Figure 9a, left panel), most borrowing was concentrated among smaller and mid-sized institutions with total assets less than $100 billion, although large banks (those with over $100 billion in total assets) did draw on the program both at its inception as well as right before it closed. For banks with total assets less that $100 billion, BTFP borrowing averaged roughly 5.5 percent of uninsured deposits. In contrast, usage among credit unions (Figure 9b, right panel) was mainly concentrated in larger institutions (in this case, credit unions with total assets greater than $10 billion) where total BTFP borrowing topped out at nearly 10 percent of total assets in the months prior to the closure of the program. BTFP borrowing for mid-size credit unions (those with between $1 and $10 billion in total assets) averaged 83 percent of uninsured deposits and for larger credit unions (those with over $10 billion in total assets) the average was 47 percent.

Table 4: Summary Statistics, Early vs Late Borrowers

	# Institutions	Assets ($B)	Uninsured Deposit to Assets (%)	Unrealized Securities Losses (%)	CRE to Assets (%)	FHLB adv to Assets (%)	max BTFP to Assets (%)
A. *All depository institutions*							
Early Borrowers	1008	8.46	21.55	3.2	21.04	3.22	5.93
Late Borrowers	771	5.9	19.85	3.08	19.74	2.52	3.68
Difference		-2.65	-1.70^{***}	-0.12	-1.30^{*}	-0.70^{***}	-2.25^{***}
B. *Banks*							
Early Borrowers	742	10.67	26.73	3.44	26.05	3.6	5.55
Late Borrowers	568	7.47	24.59	3.28	24.69	2.84	3.23
Difference		-3.19	-2.13^{***}	-0.16	-1.36^{*}	-0.76^{***}	-2.31^{***}
C. *Credit Unions*							
Early Borrowers	266	2.3	7.12	2.53	7.07	2.18	7
Late Borrowers	203	1.5	6.58	2.51	5.89	1.63	4.92
Difference		-0.80^{**}	-0.54	-0.02	-1.18^{*}	-0.55	-2.08^{***}

Source: Author's calculations using Federal Reserve data. Numbers are unweighted averages.

A final cut of the data compares early borrowers to late borrowers. Those DIs that tapped the BTFP early in the program tended to be DIs with the riskiest balance sheet profiles. Table 4 below divides all borrowers into early borrowers (those who first borrowed from the program prior to June 13, 2023) and late borrowers (those that first borrowed from the program after June 13, 2023). The table shows that regardless of whether the borrower was a commercial bank or a credit union, early borrowers tended to rely more heavily on both uninsured deposits and FHLB funding as compared to later borrowers and, to a lesser extent, had larger unrealized securities losses. This suggests that the DIs that needed the program the most were the ones most likely to take advantage of BTFP

funding early on. Later in the life of the program, when activity picked up as the BTFP dropped below the IORB in late 2023, there were concerns about financially-motivated borrowing from the BTFP, whereby a borrower could borrow funds cheaply from the BTFP and deposit those funds with the Federal Reserve to earn a risk free return on the IORB rate. These concerns were resolved with the decision to floor the BTFP rate at the IORB rate in the month prior to when the program ceased originating new loans.

4.4 Cost of Borrowing Relative to Primary Credit

As discussed in Section 3.4, two key differences between the BTFP and the discount window stem from the way collateral is valued across the two facilities and the interest paid on advances. In this subsection, we decompose the total cost differential across the two facilities to quantify the effect of these features. We show that both played an important role increasing the attractiveness of the BTFP relative to primary credit at the discount window.

For either the BTFP or the discount window, indexed by $i \in (BTFP, DW)$, the daily cost of borrowing for a loan originated at date τ is given by $(1/360)LV_\tau^i r_\tau^i$, where LV_τ^i denotes the lendable value of collateral and r_τ^i denotes the interest rate. The lendable value is given by $LV_\tau^i = MV_\tau(1-h_\tau^i)$, where MV_τ is the market value of collateral at origination and h_τ^i is the facility-specific haircut.

By design of the term sheet, the lendable amount for the BTFP is given by the par value of collateral, so that $LV_\tau^{BTFP} = PV_\tau$, and the interest is fixed at origination at r_τ^{BTFP} for the full maturity of the loan.[20] The total cost of borrowing from the BTFP is given by:[21]

$$c_\tau^{BTFP} = PV_\tau r_\tau^{BTFP}$$

For primary credit at the discount window, the lendable amount is determined by the market value of collateral at the time of origination subject to a haircut, so $LV_\tau^{DW} = MV_\tau(1-h_\tau^i)$, where for ease of exposition we assume $h_\tau^{DW} = 0$, and the interest rate, $r_{\tau+t}^{DW}$, adjusts daily.[22] The total cost for originating a discount window loan at date τ, holding it to its 90-day maximum maturity, and then subsequently rolling it over at $\tau+90$, $\tau+180$, and $\tau+270$ to match the 360-day duration

[20] Assuming $PV > MV_\tau$, this gives rise to an implied haircut of $h_\tau^{BTFP} = 1 - (PV/MV_\tau^{BTFP}) < 0$.

[21] Our cost comparison is between a BTFP loan and a series of 90-day maturity discount window loans designed to match the 365-day maturity of the BTFP. Technically, a borrower would need to originate a 90-day discount window loan and roll if over four times to match the maturity of offered by the BTFP—three times at the maximum 90-day duration and then once more at a 5-day duration. For simplicity, we ignore this last five day period and compare a 360-day BTFP loan to a comparable set of discount window loans.

[22] In fact, the assumption of a zero discount window haircut is not implausible. The Federal Reserve effectively set the haircut to zero on eligible discount window collateral, including Treasuries, agency debt and agency MBS, allowing banks to borrow the full market value of their collateral until October 31, 2023. On November 1, 2023, Reserve Banks reset their discount window margins for eligible collateral back upward.

of a BTFP loan is given by:

$$c_{\tau}^{DW} = \frac{1}{360}\sum_{r=0}^{3}\sum_{t=1}^{90}\left[MV_{\tau+90r}r_{\tau+90r+t-1}^{DW}\right]$$

The difference between the two gives us an expression for the total cost differential, denoted Δ_{τ}, of borrowing from the two facilities:

$$\Delta_{\tau} = \frac{1}{360}\sum_{r=0}^{3}\sum_{t=1}^{90}\left[MV_{\tau+90r}r_{\tau+90r+t-1}^{DW}\right] - PVr_{\tau}^{BTFP}$$

Using this expression, we can decompose the total cost differential into separate components driven by the differences in interest rates and collateral valuation across the two facilities.

To isolate the extent to which the cost differential is attributed to interest rates, assume $PV_{\tau} = MV_{\tau+t}\ \forall\ t$. This assumption shuts down any difference in collateral valuation (both are hypothetically assumed to be valued at par), so the cost differential simplifies to

$$\Delta_{\tau}^{IR} = PV_{\tau}\left[\frac{1}{360}\sum_{t=1}^{360}r_{\tau+t-1}^{DW} - r_{\tau}^{BTFP}\right]$$

The interest rate channel is driven entirely by the spread between the average of the floating discount window rate over the 360-day duration and the fixed interest rate on a BTFP loan originated at τ. We label this as the *interest rate channel*, denoted Δ_{τ}^{IR}. Intuitively, if we normalize the par value of collateral at origination, so that $PV_{\tau} = 1\ \forall\ \tau$, the interest rate channel reflects the interest differential of borrowing \$1 of loanable funds for either program. Any fluctuation in the market value of collateral is neutralized because we impose $PV_{\tau} = MV_{\tau+t} = 1\ \forall\ \tau$ and t, so it has no affect on the cost of borrowing from the discount window.

The portion of the cost differential driven by differences in collateral valuation across the two facilities can be isolated by assuming $r_{\tau}^{BTFP} = r_{\tau+t}^{DW}\ \forall\ t$. This assumption shuts down any difference in interest rates (both are hypothetically assumed to be at the primary credit rate), so the cost differential simplifies to

$$\Delta_{\tau}^{CV} = \frac{1}{360}\sum_{r=0}^{3}\sum_{t=1}^{90}r_{\tau}^{DW}\left[MV_{\tau+90r} - PV_{\tau}\right]$$

The *collateral valuation channel*, denoted Δ_{τ}^{CV}, is driven by the fact that the quantity of lendable funds is determined by the par value of collateral for the BTFP and by market value for the discount window, which is reset at each origination, τ, $\tau + 90$, $\tau + 180$, and $\tau + 270$, of a 90-day discount window loan. Intuitively, when $PV_{\tau} > MV_{\tau+t}$ the BTFP is attractive relative to the discount window because it allows a borrowers to access a greater quantity of lendable funds

per unit of collateral.

Note that this decomposition separates the total cost differential into two mutually exclusive components so that the sum of the interest rate channel and the collateral valuation channel recovers the total cost differential, $\Delta_\tau = \Delta_\tau^{IR} + \Delta_\tau^{CV}$.

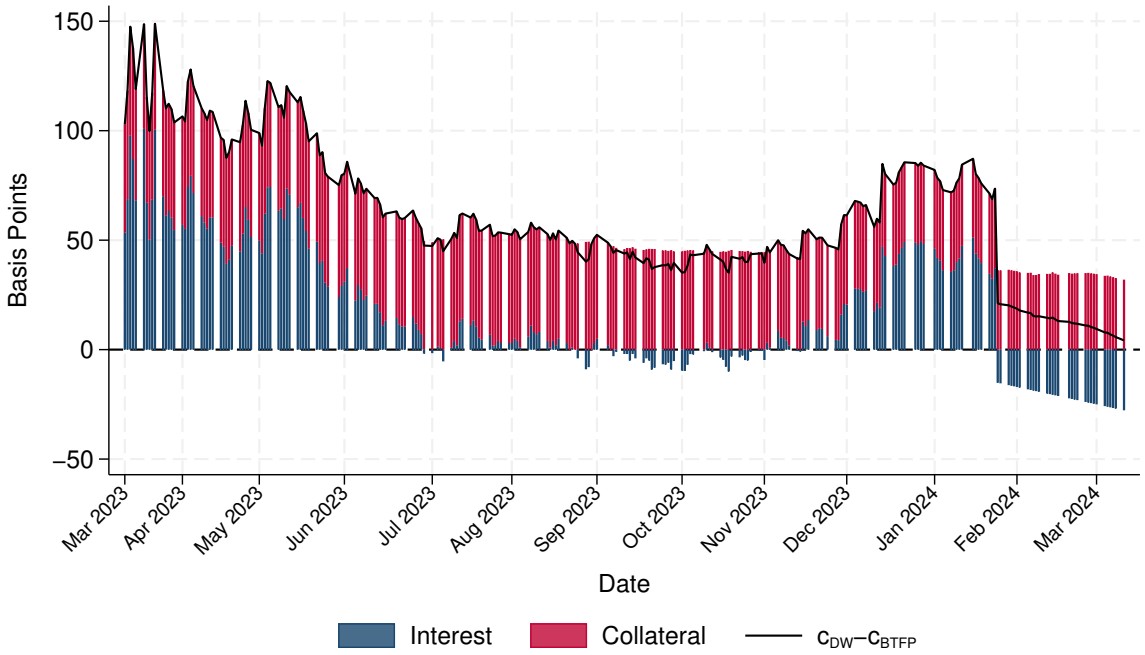
We take this decomposition to the data using publicly available data on the BTFP rate, r^{BTFP}, and the primary credit rate, r^{DW} and confidential data from the program for measures of par and market value of collateral. A challenge in measuring collateral valuation is that individual borrowers adjusted both the quantity and composition of collateral posted to the program over time (for example, Treasuries versus agency debt or MBS) and these portfolio adjustments make it difficult to isolate valuation changes. We address this by focusing on the subset of borrowers that posted an initial amount of Treasury collateral within the first week of the program and held that same collateral until the program closed.[23] Our measures of par and market value then average across all borrowers that satisfy this criteria. This allows us to eliminate quantity and composition adjustments, so that any remaining variation can be exclusively attributed to valuation changes. Finally, we normalize the par value of collateral at origination to one and measure market value relative to par. With this normalization, our decomposition is measured in basis points and reflects the cost of borrowing \$1 from the discount window at rate $r_{\tau+t}^{DW}$ based on the market value of collateral, $MV_{\tau+t}/PV_\tau < \$1$, relative to borrowing \$1 from the BTFP at rate r_τ^{BTFP}.

Results are presented in Figure 10. The total cost differential, depicted by the black line, shows that the BTFP remained a cheaper source of funding relative to the discount window over the entire life of the program, although the benefit diminished towards the end.[24] On average, borrowing from the BTFP was 62 basis points cheaper than the discount window for borrowed funds over a comparable duration. The stacked bars decompose the cost differential into the collateral valuation and interest rate channels. The collateral valuation channel provided a consistently positive boost to the attractiveness of the BTFP relative to the discount window throughout the life of the program, averaging about 44 basis points.

[23] By focusing on Treasuries we are likely understating the attractiveness of the BTFP because unrealized losses were greater, on average, for all other forms of eligible collateral.

[24] Our decomposition assumes perfect foresight for both the path of the primary credit rate and the market value of collateral used to secure a discount window loan. In practice, the uncertainty about the future cost of discount window borrowing likely created an additional benefit for the BTFP which we do not capture.

Figure 10: Decomposition of Cost Differential between Discount Window and BTFP



Source: Author's calculations using Federal Reserve data.

The role of the interest rate channel is more nuanced. Early in the program, the BTFP rate was below that of the primary credit rate and a borrower could lock this low rate in over the life of the loan, whereas a borrower from the discount window faced a floating primary credit rate that increased over time as monetary policy continued to tighten (see Figure 5b). This feature, along with the ability to value collateral at par, made the BTFP extremely attractive at a point when the stress was most acute, reducing its cost relative to the discount window by at it's peak by roughly 150 basis points, roughly 2/3 of which is attributed to the interest rate channel. Moving into the second half of 2023, the gap between the BTFP rate and the primary credit rate closed such that the interest differential fluctuated around zero and the interest rate channel did not add to the attractiveness of the program. Nevertheless, the BTFP remained a relatively cheap source of funding through the collateral valuation channel. The interest rate channel picked up again in December and into January 2024 as the BTFP rate fell below the primary credit rate, but this abruptly reversed when the BTFP rate was floored at the IORB. From this point on, the interest rate channel worked against the program because BTFP borrowers were locked in at an elevated fixed BTFP rate whereas a borrower at the discount window would have benefited from a floating rate primary credit rate, which fell sharply as monetary policy started to ease. All told, the boost provided by the interest rate channel was more modest than the collateral valuation channel,

pushing down the cost of borrowing from the BTFP by an average of 18 basis points relative to the discount window.

5 Conclusion

The March 2023 run on SVB unfolded at a rapid pace and the spillover of these stresses to the broader banking system raised significant concerns about broader systemic riks. Acknowledging the potential long-lasting economic hardship associated with systemic banking crises, the Federal Reserve acted quickly and decisively in conjunction with the U.S. Department of the Treasury to establish an emergency liquidity facility designed to act as a backstop for banks experiencing stress-related liquidity pressure. The BTFP was set up with remarkable speed and was fully operational in a couple of days. In conjunction with the systemic risk exemption invoked by the FDIC, it was effective at averting a potentially systemic banking crisis and aided in the normalization of conditions in the banking sector in subsequent weeks (see, also, Metrick, 2024). The program was open for active lending for a year and, given the one year maximum duration of credit extended through the BTFP, it was fully unwound by March 2025. The outstanding balance on all loans was repaid in full by all borrowers prior to the maturity date of the last loans originated throughout the program.

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