Emergency Lending and Moral Hazard

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Abstract

Central banks have increasingly addressed potential and emerging financial crises by establishing emergency lending facilities. Although these facilities can be justified if they interrupt negative feedback loops that cause economic losses, concomitant moral hazard issues can have destabilizing effects that increase the likelihood and severity of future crises. This paper examines moral hazard effects of the Federal Reserve's Bank Term Funding Program (BTFP), established during the March 2023 banking turmoil. Using an instrumental variable estimation for causal inference, we find that banks with greater BTFP access were less likely to diversify funding sources or strengthen liquidity resilience as policymakers directed because they did not amass liquid asset buffers compared to other banks. Contrary to the BTFP's goal of preventing securities sales, we find that BTFP access led banks to sell underwater securities. Banks relying more on the BTFP also showed less lender-of-last-resort contingency preparedness, as these banks were relatively less likely to boost discount window collateral pledges and conduct borrowing tests in the period after the 2023 crisis. Our results demonstrate moral hazard consequences of emergency lending and support strengthening crisis-prevention tools like standing backstop facilities and microprudential standards.

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1 Introduction

Since the Global Financial Crisis, central banks around the world have turned to emergency lending and liquidity facilities with increasing regularity. Along with their potential benefits, these facilities entail costs including threats to central bank independence, operational risk, inequity, legal challenges, and moral hazard. Among these, the risk of moral hazard is particularly troublesome because it accompanies virtually all emergency backstops and can increase the likelihood and severity of future crises, as financial institutions and investors come to expect government backstops and do not self-insure against a range of tail risks (Freixas et al., 2002; Bernanke, 2010; Mishkin and White, 2014). Consequently, moral hazard presents policymakers considering emergency measures with a long-run tradeoff against the short-run benefit of preventing potential damage to the financial system and the broader economy (Mester, 2024). Although many studies have evaluated these short-run benefits since the proliferation of interventions over the last two decades, the costs of emergency facilities are less well studied. The relative dearth of evidence on the costs of these facilities at least in part reflects substantial empirical challenges posed by the difficulty in measuring costs, self-selection into the programs, and the endogeneity of the facilities' introduction to banking and financial market conditions.

In this paper, we investigate the adverse moral hazard effects of emergency central bank facilities. Specifically, we examine the experience with the Bank Term Funding Program (BTFP), which was established immediately after the failures of Silicon Valley Bank (SVB) and Signature Bank in March 2023. The BTFP was designed to offer funding to depository institutions to help ensure that they could meet depositor withdrawals during the heightened uncertainty following the bank failures. Importantly, the BTFP offered term funding against securities valued *at par*, which marked a substantial difference between this facility and the Federal Reserve's (Fed's) standing discount window. Even while BTFP loans were on offer, however, policymakers and regulators publicly called on banks to internalize the lessons from

the March 2023 bank failures by diversifying their private funding sources and otherwise ensuring contingency preparedness.

Therefore, our investigation proceeds by assessing the extent to which banks with more access to the BTFP were less likely to diversify, prepare, and test contingency funding sources. To measure access to the BTFP, we use confidential data to determine bank-level collateral pledged to the facility. The total collateral pledged by each bank equals the effective line of credit that the Fed committed to provide, because the BTFP lent against the par value of collateral without applying haircuts. We relate this measure of BTFP access to banks' subsequent use of alternative and contingency sources of funding, including time deposits, reciprocal deposits, wholesale funding, brokered deposits, and liquid asset buffers. In addition, we use confidential information on discount window activity to assess whether banks with more access to the BTFP were less likely to prepare for future borrowing at the Fed's discount window, even as policymakers, regulators, and the experience of recently failed banks encouraged such preparation.

To connect our measure of BTFP access to the outcomes of interest, we confront an endogeneity challenge presented by banks' selection into BTFP participation and the possibility that such participation was caused by a separate factor, which could in turn affect the willingness or ability to tap alternative funding sources. To break the endogenous link between BTFP access and our outcomes of interest, we instrument for total collateral pledged to the BTFP using BTFP-eligible collateral pledged to the discount window prior to SVB's failure. The relevance of this instrument is underpinned by the relative ease with which institutions could place discount window collateral at the BTFP compared to institutions that, at the outset of the BTFP, lacked either discount window eligibility or BTFP-eligible collateral prepositioned at the discount window. To support the exogeneity of the instrument, we show that BTFP-eligible collateral placed at the discount window is unrelated to bank characteristics as well as bank-level deposit growth both before and after the 2023 banking crisis. Further, we subject our main results to placebo tests using the

mix of BTFP-*ineligible* collateral placed at the discount window to demonstrate that the amount of pre-positioned collateral itself cannot explain our results. These placebo tests offer support for the exclusion restriction, which requires that the mix of collateral placed at the discount window in 2022 was unrelated to the outcomes of interest except through the influence on the ease of BTFP access.

We find that banks with more access to the BTFP exhibited a lower propensity to amass private funding and make preparations for contingency borrowing, contrary to regulatory guidance. Although policymakers generally aim to design emergency lending facilities in a manner that will ensure financial institutions return to private markets for liquidity when financial conditions normalize (Bernanke, 2010), we show that the banks that were more exposed to the BTFP were comparatively less inclined to use or test alternative and contingency funding sources, including time deposits, brokered deposits, wholesale funding, and reciprocal deposits. Institutions with more BTFP access also maintained smaller liquid (cash and securities) asset buffers. Moreover, despite the stated aim of the BTFP to help banks avoid selling their underwater securities, we find evidence that institutions with more liquidity cover from the BTFP were more inclined to sell their securities. Lastly, we investigate whether banks with more BTFP access followed the guidance to maintain operational access to the discount window through test loans and collateral placement. The BTFP evidently suppressed banks' discount window testing frequency and reduced total collateral positioned with the Fed. These results reveal how ad hoc lending facilities can reduce banks' engagement with standing lending facilities such as the discount window.

We demonstrate robustness of these results to three different samples of banks throughout: banks that pledged any collateral to the discount window prior to the 2023 banking turmoil, banks that entered the crisis with the required legal documents on file to use the discount window, and banks with a nonzero pledge amount to the BTFP. Furthermore, we show that our results are not driven by BTFP borrowing mechanically crowding out private funding sources. Even when we measure outcomes over a longer horizon when BTFP bor-

rowing was nearly nonexistent, our results hold, and are often slightly stronger in economic and statistical significance. Finally, we show that discount window collateral pledging *per se* does not explain the results, as BTFP-ineligible collateral is unrelated to banks' ultimate BTFP pledge and the contingency funding outcomes.

A few features of the experience with the BTFP allow us to credibly identify the moral hazard costs of emergency lending facilities. First, although moral hazard effects can manifest in a multitude of ways, the lessons of the regional banking crisis prompted clear official guidance for banks to diversify their private funding sources and to test and prepare contingency borrowing capabilities. This guidance provides clear direction in our search for moral hazard effects of the BTFP. Because moral hazard can take many forms, it is often insufficient to merely test for divergent behavior across banks with different capital adequacy. Instead, it is important to consider the exact types of risks financial institutions may shift to the government as a result of a particular intervention.[1]

Second, as described above, the terms of the BTFP allow us to overcome a common endogenous selection concern presented by access to emergency facilities. If a bank's participation decision is driven by the realization of an important outside factor—for example, depositor flight as a response to perceived bank health—then participation in the emergency facility *and* a bank's ability to secure private funding could be caused by this third factor. To draw a causal link between BTFP access and the subsequent manifestation of moral hazard, we use the fact that only certain types of collateral (acquired before the crisis) were eligible for the BTFP. The bank-level variation in BTFP-eligible collateral positioned at the Fed's standing discount window prior to the regional banking crisis offers a plausibly exogenous instrument for access to the BTFP.

Our work contributes to empirical studies that aim to document the causal effect of the expectation of bank-specific bailouts on moral hazard. In particular, prior work considered

[1]Moreover, strong supervisory ratings and adequate capitalization can be prerequisites for borrowing at emergency lending facilities, as was the case with the BTFP. As a result, differences in capital adequacy can be immaterial in explaining risk-shifting among the set of banks with reasonable access to lending facilities.

variation in the likelihood of firm-specific bailouts based on political affiliation, as in Dam and Koetter (2012), or a credit rating agency's assessment of the government's willingness to let a given firm fail, as in Mariathasan et al. (2014). Both of these studies—which consider a bailout concept closely related to the too-big-to-fail problem that featured prominently in the Global Financial Crisis—find that banks with greater odds of government support in the event of failure tend to operate with smaller capital buffers. By contrast, we examine the effects of ad hoc and broad-based emergency facilities to understand the costs associated with these increasingly common backstops. These facilities do not necessarily constitute a bailout or depend on the extent of distress of any particular institution, and their creation can produce moral hazard in a wide swath of firms simultaneously. In this way, our paper offers empirical evidence for the theoretical result of Farhi and Tirole (2012), in which support that is imperfectly targeted to distressed institutions can distort incentives in a manner that generates future instability.

We also contribute to the literature that examines the effects of emergency central bank facilities introduced to stanch a burgeoning financial crisis. In contrast to numerous studies that assess the intended benefits of such programs (Campbell et al., 2011; Duygan-Bump et al., 2013; Acharya et al., 2017; Gilchrist et al., 2024), we focus on the potential costs. Understanding both aspects of emergency backstops is necessary for informed policy making during, and outside of, crisis events.

Lastly, a related paper is Glancy et al. (2024), who also examine the BTFP. The authors use higher frequency data to demonstrate the ability of the BTFP to support the liquidity positions of vulnerable banks in March 2023. They find that banks with high reliance on uninsured deposits and large unrealized losses on securities holdings suffered larger deposit outflows; that the BTFP helped replace deposit outflows for banks with larger securities losses; and that banks used the BTFP to build cash holdings. Lastly, the authors find no marked differences in securities and loan growth between high- and low-capital banks in the weeks after the launch of the facility.

Our results carry important lessons for policymakers. In particular, demonstrating the adverse moral hazard effects of emergency facilities emphasizes the importance of developing a robust and systematic regime to handle nascent financial disruptions (Carlson et al., 2015). In order to avoid over-reliance on ad hoc emergency liquidity facilities, it is worthwhile to focus on establishing permanent lending facilities that exist within a broader regulatory framework that entails liquidity and capital requirements along with clear mechanisms for resolving financial institutions. Integrating standing lending facilities into a coordinated supervisory and regulatory policy framework can help ensure a more stable financial system that is able to withstand a range of scenarios without introducing moral hazard risks that could sow the seeds of the next crisis.

2 Institutional Background

2.1 2023 Banking Turmoil

In response to elevated inflation in the aftermath of the COVID-19 pandemic, the Fed embarked on a relatively rapid policy tightening cycle in March 2022. As shown in Figure 1, the rise in short-term rates resulted in deposits leaving the banking system. The drawdown of traditional bank deposits is a common phenomenon in rising rate environments, as many banks do not pass through the higher rates to deposit accounts one-for-one (Drechsler et al., 2017; Kang-Landsberg et al., 2023).

[Figure 1 about here]

The deteriorating funding environment led many banks to turn to other liabilities to replace lost core deposits. For example, Figure 2 demonstrates that the number of banks using higher-cost brokered deposits began to rise after the Fed started to lift interest rates. Higher rates additionally reduced the mark-to-market value of many bank assets, including the numerous securities purchased during the preceding low-rate environment.

[Figure 2 about here]

Eventually, depositors and investors became worried about the liquidity position of banks with risky, undiversified funding profiles (Jiang et al., 2024; Kelly and Rose, 2025). In particular, SVB faced rapid depositor flight following an 8-K filing outlining a plan to raise capital after selling underwater securities and, more importantly, revealing rapid deposit runoff. On March 10, SVB was put into receivership, sparking contagion dynamics that affected other banks (Caglio et al., forthcoming) and ultimately resulted in the invocation of the systemic risk exception to guarantee all uninsured deposits of SVB and Signature bank, which failed the same weekend as SVB. Despite this guarantee, banks and depositors rapidly moved to minimize exposure to uninsured deposits. For example, Figure 3 shows that in the aftermath of the failures, more banks entered into reciprocal deposit agreements, which allow a network of banks to exchange deposits in order to provide more deposit insurance to their customers.

[Figure 3 about here]

2.2 The Bank Term Funding Program

As part of the emergency policy response to the emerging banking crisis, the Federal Reserve launched the Bank Term Funding Program (BTFP) lending facility. Through the BTFP, the Fed aimed to address the perceived sources of the crisis by offering to lend against collateral eligible for purchase in open market operations, such as U.S. Treasuries and U.S. agency securities. Securities acquired after the launch of the BTFP were ineligible for the program. Importantly, the lending value of the collateral pledged to the BTFP was based on the par value of the securities, without applying haircuts. In this way, the Fed attempted to negate depositors' concerns about banks' liquidity positions stemming from flighty sources of funding and liquid assets that could only be sold at steep discounts.

BTFP loans differed from primary credit loans obtained through the discount window in several other ways. In addition to accepting only a subset of collateral types eligible for ordinary discount window credit and valuing them at par, advances made under the BTFP had a term of up to one year. By contrast, advances under primary credit may be made for a term of up to 90 days (though these loans could be rolled over into new loans at maturity). Second, rather than the primary credit rate, the rate for term advances under the BTFP was initially set at the one-year overnight index swap rate plus 10 basis points. Third, the rate on BTFP loans was fixed for the term of the loan on the day of the advance. With primary credit advances, the applicable rate may change if there is an adjustment to the primary credit rate while a loan is still outstanding.

In order to borrow from the BTFP, potentially eligible institutions had different administrative, operational, and legal hurdles to clear depending on their pre-crisis discount window preparation. Institutions that were eligible for primary credit, had discount window borrowing documentation (Operating Circular #10, "OC-10") in place, and had BTFP-eligible collateral in their discount window pledge account could borrow from the BTFP immediately after moving collateral to the BTFP pledge account via either a phone call to Fedwire Services Support or an online pledge submission via FedLine.[2] However, even if a bank had an OC-10 in place, a lack of BTFP-eligible collateral prepositioned at the discount window would require the additional steps of locating and transferring unencumbered collateral that was owned prior to March 12, 2023. As we discuss in more detail when explaining our identification strategy, there was substantial variation in collateral types pledged to the discount window, with numerous banks pledging only BTFP-ineligible collateral types prior to the banking crisis.

Activity at the BTFP was robust upon inception. As we show in Figure 4, borrowing from the facility rose to about $100 billion within three months, while the par value of collateral pledged to the facility reached nearly $500 billion. In panel A of Table 1, we show

[2]In some instances, eligible collateral for the BTFP could also be placed through the Depository Trust Company.

that about 500 banks positioned collateral by the end of March, with that number growing rapidly each month. By the end of Q3 2023, nearly 1,300 banks had placed collateral at the BTFP at some point, and almost 1,000 banks took a loan from the facility. In panel B of Table 1, we report the average (normalized) pledging and borrowing amounts as well as the interquartile range for all BTFP pledgers as of Q3 2023. In the final row of the panel, we report the same borrowing statistics for institutions conditional on BTFP borrowing. On average, banks directly accessing the BTFP pledged over 6% of the value of their liabilities, while borrowers drew just over 4% of pre-BTFP liabilities.

[Figure 4 about here]

[Table 1 about here]

There was substantial commentary regarding the generosity of the terms of the facility and the potential for moral hazard to arise as a result of the BTFP (NPR, 2023; Murdoch and Mandl, 2023; Vari, 2023), which was established under the emergency Section 13(3) of the Federal Reserve Act and included a Treasury backstop against potential losses.

3 Hypothesis Development

Our primary research question is whether we can identify a *causal* effect of the BTFP on moral hazard. Although moral hazard is a central concern with any government backstop, it can manifest in myriad types of risk-taking by banks, which can frustrate attempts to identify adverse incentive effects of facilities like the BTFP. In this case, however, we are guided in our search for moral hazard effects by focusing on the bank funding weaknesses exposed in the aftermath of SVB's collapse (Kelly and Rose, 2025) and the statements made by regulators and policymakers about appropriate bank behavior in light of those systemic weaknesses.

In recognition of the potential for bank complacency due to the BTFP, Fed officials encouraged banks to take proactive steps to self-insure rather than expect government support in the future. For example, even as the BTFP was actively providing backstop liquidity, banks were warned that "bank management must take ownership of their operational preparedness before a liquidity crisis occurs," and "Though we tailored a solution under these circumstances, banks would be very unwise to assume the Fed will be able to provide special, individualized attention and creative solutions in the event of another liquidity crisis" (Ostrander, 2023). An insistence that banks diversify their funding sources and test contingency borrowing alternatives represented a common theme in policymakers' recommendations for banks in the aftermath of SVB's failure (e.g., Barr, 2023; Dobbeck, 2023; Logan, 2023; Ostrander, 2023).

Bolstering this less formal direction to banks, the Fed, FDIC, NCUA, and OCC issued official regulatory guidance in the form of an Addendum to the 2010 Interagency Policy Statement on Funding and Liquidity Risk Management.[3] This guidance provided several clear directions and recommendations, including:

1. Depository institutions should maintain a broad range of funding sources.

2. Institutions should regularly test any contingency borrowing lines and funding sources to ensure that staff is well versed in the requisite operational procedure.

3. Depository institutions should incorporate the discount window as part of their contingency funding arrangements.

4. Depository institutions should establish and maintain operational readiness to borrow from the discount window by pre-pledging collateral and conducting small value borrowing tests.

[3]The Addendum is available at `https://www.fdic.gov/sites/default/files/2024-03/fil23039a.pdf` and the 2010 Interagency Policy Statement is available at `https://www.govinfo.gov/content/pkg/FR-2010-03-22/pdf/2010-6137.pdf`.

In sum, banks were directed to ensure that they maintained access to contingent funding sources through operational preparation and testing *even outside of crisis events*. In this context, the 2023 increase in the number of banks using brokered and reciprocal deposits evident in Figures 2 and 3 may partly reflect banks responding to the lessons of SVB's collapse and essentially following the supervisory guidelines.

Thus, our approach focuses broadly on understanding how access to the BTFP affects banks' willingness to both internalize the lesson of the 2023 banking crisis and follow the official guidance to diversify private funding sources and prepare for contingency funding scenarios. As a demonstration of this potential relationship, Figure 5 shows that more banks filed the OC-10 paperwork required to gain access to the discount window following SVB's failure and the public encouragement to secure discount window access. While this pattern can be partly driven by the introduction of the BTFP itself, we also show that more banks pre-positioned collateral at the discount window, which includes activity by banks that had an OC-10 on file but had not previously pledged any collateral. Further, Figure 6 demonstrates that banks were not simply drawn to discount window participation by the prospect of accessing the relatively generous BTFP, as much of the collateral pledged in the post-SVB period comprised BTFP-ineligible assets.

[Figure 5 about here]

[Figure 6 about here]

To understand the potential manifestation of adverse moral hazard effects in response to the BTFP, we assess the following hypotheses:

- H1: Greater access to the BTFP is negatively related to the accumulation of alternative and contingency funding from the private market.
- H2: Greater access to the BTFP did not result in lasting higher liquid asset buffers.

- H3: Institutions with greater access to the BTFP were less likely to conduct tests of discount window borrowing.
- H4: Institutions with greater access to the BTFP were less prone to accumulate collateral at the Fed.

4 Data

We use three main datasets to measure how access to the BTFP affected banks' funding activity. First, we gather a combination of public and confidential information on bank-level BTFP activity, including borrowing volume and pledged collateral types and amounts. While data for borrowing banks was released in March 2025 according to the original terms of the facility, pledging activity among non-borrowing banks was not publicized.

Second, we use data from the Fed's discount window data repository to determine which banks had the relevant OC-10 paperwork on file to access the standing lending facility. Further, we observe the types of collateral pledged to the discount window before and after the BTFP, measured at par and lendable values. We also collect information on banks' discount window borrowing before and after the introduction of the BTFP to identify test loans.

Third, we use the FFIEC Call Reports to extract information on changes in banks' funding profiles. We focus on important sources of contingency and alternative funding for banks as they dealt with a decline in traditional deposits, including reciprocal deposits, brokered deposits, time deposits, and wholesale deposits. In addition, we record information on liquid asset buffers maintained by banks, which are crucial components of banks' contingency funding plans, as well as realized gains and losses to proxy for the extent of security sales. We also obtain measures of bank size, such as assets and liabilities, so that we can appropriately scale funding, borrowing, and pledging amounts to make meaningful comparisons between institutions.

Table 2 reports the mean, median, and inter-quartile range for many of the relevant variables not already reported in Table 1, as of December 2022. We present descriptive statistics for three samples of banks that we will use throughout most of our analysis: (1) banks that had collateral pledged to the discount window as of February 2023, our preferred sample, (2) banks that had filed OC-10 before the introduction of the BTFP, and (3) banks that pledged collateral to the BTFP by Q3 2023. The first sample comprises banks that have an observably comparable willingness to pledge collateral with their Federal Reserve Bank, and which also enjoyed an automatically opened BTFP collateral account. The second sample of banks had filed the legal agreements to place collateral at the discount window, and could theoretically shift collateral to the Fed at will. However, we cannot observe reasons for certain banks' decision to pledge no collateral at the discount window, and the sample could thus include banks that have different institutional dispositions towards pledging collateral at the Fed. The final sample consists of only those banks that had pledged collateral to the BTFP, which offers robustness to our main sample insofar as it ensures that our estimates are not driven by banks with an endogenous independent variable of zero. Furthermore, this sample limits possible concerns that selection into BTFP pledging is related to an important unobservable confounder.

[Table 2 about here]

5 Measurement, Identification, & Methodology

Our measure of BTFP access is based on the effective line of credit offered to each bank by the Fed. We therefore focus on the par amount of collateral pledged to the BTFP, which equals the extent of the funding backstop that the Fed committed to provide based on the terms of the facility. Specifically, we calculate BTFP access as the maximum par value of collateral pledged to the BTFP by Q3 2023, divided by liabilities as of year-end 2022:[4]

[4]As shown in Figure 4, borrowing and pledging at the BTFP had stabilized by Q3 2023. A principal reason to select the maximum pledge prior to Q4 is that an arbitrage opportunity arose in the final months

$$\text{BTFP Access}_b = \frac{max(\text{BTFP Collateral}_{b,t} \mid t < 2023Q4)}{\text{Liabilities}_{b,2022Q4}}. \quad (1)$$

As shown in Figure 7, there were substantial differences between banks' maximum borrowing and pledging amounts, with many pledging institutions opting not to borrow at all. In fact, there were more institutions that pledged without borrowing (the points lying exactly on the x-axis of Figure 7) than there were institutions that borrowed 95% or more of their pledged collateral (roughly the points lying on the 45-degree line of Figure 7).

[Figure 7 about here]

The decision to measure BTFP access using collateral pledged rather than amount borrowed is further rationalized by the fact that accessing the BTFP with pre-positioned collateral was a trivial matter. In contrast, the future pledging procedure and rules governing the BTFP could potentially change. Consequently, the backstop function of the BTFP was in place for institutions that had pledged collateral but chose not to borrow, possibly because collateral was positioned for precautionary reasons or because banks that pledged but did not borrow would not have their identities publicly released one year after the facility was closed.[5]

Irrespective of the measure of BTFP access, we must overcome substantial endogeneity and selection concerns to retrieve causal estimates of the moral hazard effects of the BTFP. A bank's decision to access the BTFP is an endogenous response to its funding structure, which introduces familiar bias into the β parameter in the following structural relationship:

$$\Delta Y_b = \alpha + \beta \cdot \text{BTFP Access}_b + \varepsilon_b. \quad (2)$$

of 2023, which drove pledging and borrowing activity that differed from the purpose of the facility and represented a different data generating process. In January 2024, the Fed changed the rate on BTFP loans to prevent such an arbitrage.

[5]For evidence that identity disclosure generates stigma, see, for example, Anbil (2018) and Anbil and Vossmeyer (2021). Beyhaghi and Gerlach (2026) use discount window borrowing to show that modern stigma concerns may only be present for a subset of banks.

In equation (2), ΔY_b is the change in an outcome of interest from December 2022 to December 2023 for bank b. We demonstrate a concrete example of the selection concern present when naively estimating equation (2) in Figure 8. Specifically, Figure 8 plots the β_k parameter estimates from a dynamic difference-in-differences specification given by:

$$ln(\text{Uninsured Deposits}_{bt}) = \alpha_b + \gamma_t + \sum_{k=-4}^{4} \beta_k \cdot \text{BTFP Access}_{bk} + \epsilon_{bt}, \tag{3}$$

where BTFP Access is measured using the maximum borrowing amount (panel A) or the maximum collateral pledged (panel B).[6] BTFP Access clearly predicts prior and future uninsured deposit outflow. Therefore, a third variable—such as uninsured depositor withdrawals in this case—can potentially drive both a bank's decision to access the BTFP *and* changes in alternative funding choices.

[Figure 8 about here]

Given the endogeneity concerns, we identify a causal effect using an instrumental variables (IV) strategy. Specifically, we instrument for BTFP Access$_b$ in equation (2) with the amount of BTFP-eligible collateral pledged at the discount window prior to the 2023 banking turmoil. Thus, our first-stage regression takes the following form:

$$\text{BTFP Access}_b = \alpha + \beta \cdot \text{BTFP-Eligible Collateral}_b + \nu_b, \text{ where} \tag{4}$$

$$\text{BTFP-Eligible Collateral}_b = \frac{\text{Gov./Agency Discount Window Collateral}_{b,2022Q4}}{\text{Liabilities}_{b,2022Q4}}. \tag{5}$$

In Figure 9, we plot the mix of BTFP-collateral for the set of banks with collateral pledged to the discount window as of year-end 2022, which is our preferred sample of in-

[6] Nearly identical patterns emerge when using core deposits as the dependent variable.

stitutions. There is substantial variation across banks, with many institutions posting no BTFP-eligible collateral in the ordinary course.

[Figure 9 about here]

This instrument should be relevant, because banks that had collateral pledged to the discount window had a BTFP collateral pledge account automatically opened when the BTFP launched. For these institutions, placing collateral in the BTFP pledge account simply required a phone call or the submission of an online form.

Instrument independence constitutes a second identifying assumption for the validity of our IV estimation. In panel C of Figure 8, we show that bank-level uninsured deposit growth from 2022 through 2023 is orthogonal to BTFP-eligible collateral placed at the discount window, which supports the notion that our instrument is unrelated to confounding bank-level developments such as depositor activity. In Table 3, we present regression results that summarize the lessons of Figure 8. While we find that BTFP collateral placement is related to the realization of uninsured and core deposit losses in the OLS specification, IV estimates obtain inconsistently signed point estimates with no statistically significant relationship.

[Table 3 about here]

To further support the exogeneity of our instrument based on the 2022 discount window collateral, we regress the instrument on a suite of contemporaneous (i.e., year-end 2022) bank characteristics. The independence assumption could be thrown into question if observable bank attributes such as funding structure, the mix of securities, or unrealized losses differed systematically with our instrument. In Table 4, we show that these factors exhibit virtually no statistical association with the instrument across our samples. A lone exception is a relationship between size and our instrument in the sample of discount window eligible banks, which reflects the fact that most institutions with an OC-10 on file that have not pledged collateral (and thus receive a value of zero for the instrument) tend to be smaller.

Isolating the univariate association with size, Figure 10 presents a binned scatterplot that demonstrates the absence of a systematic relationship between the instrument and bank size. In sum, banks with high or low values of the instrument are statistically similar to each other across a host of variables.

A final important identifying assumption lies in the exclusion restriction, which requires that the mix of collateral placed at the discount window in 2022 was unrelated to the outcomes of interest, except through the influence on the ease of access to the BTFP. Although fundamentally untestable, it is plausible that the instrument is appropriately excluded from the second stage. In subsequent analysis, we offer placebo tests that supply additional evidence in favor of the independence assumption and exclusion restriction.

[Table 4 about here]

[Figure 10 about here]

6 Results

In Table 5, we report the first stage estimates, which reveal the expected positive relationship between our instrument and the endogenous measure of BTFP access. We also observe high F-statistics, even for the smaller samples that we consider, which supports the relevance assumption for valid IV inference.

Table 6 reports our first set of IV results for alternative and contingency funding sources, estimated as follows:

$$\Delta Y_b = \alpha + \beta \cdot \widehat{\text{BTFP Access}}_b + \varepsilon_b,$$

where ΔY_b measures the 2022Q4–2023Q4 change in a funding source for bank b, divided by total assets as of 2022Q4. Across all samples, we find that as a share of 2022 assets, banks with more proximity to the BTFP decreased time deposits, wholesale funding, brokered

deposits, and reciprocal deposits relative to banks with less BTFP access. The parameter estimates reported in panel A reveal that a BTFP collateral pledge equivalent to one percent of 2022 liabilities results in an average decline in these funding sources of between 0.61% and 0.24% of assets. We note that statistical significance is lower for reciprocal deposits (respectively, for panels A-C, $p = 0.01$, $p = 0.15$, and $p = 0.35$) partly reflecting the inefficiency of the IV estimator and the fact that relatively few institutions used reciprocal deposits compared to other funding sources. In the reduced form regression of the change in the reciprocal deposits share on our instrument (not shown), we again achieve universally negative point estimates with much higher levels of statistical significance (respectively, $p = 0.00$, $p = 0.01$, and $p = 0.17$).

These results show that even well after the SVB crisis subsided, the BTFP undermined banks' willingness to boost the use of contingency funding sources. Consequently, the BTFP—although possibly justified in the context of the regional bank turmoil at the time—worked against the push to encourage banks to access a wider range of private funding sources.

[Table 5 about here]

[Table 6 about here]

We next turn to the question of whether banks with BTFP access saw a relative improvement in their longer-term liquid asset buffers. If banks with a higher propensity to pledge assets to the BTFP borrowed more from the Fed than other banks borrowed from private sources for precautionary purposes, we might expect to see a clear increase in cash buffers for the former group of banks. To the contrary, we show in Table 7 that access to the BTFP caused longer-term declines in liquid asset buffers, as measured by the change in cash and securities as a share of total assets (where securities are measured at amortized cost to abstract from fluctuations in market values). Decomposing the liquid assets into the cash portion in column 2, we observe no statistically significant difference in cash buffers.

This result is even more striking given the finding reported in column 3 that banks with more access to the BTFP in fact ran down their securities portfolios, which is regularly included as a source of liquidity in contingency funding plans. In the final column, we find that BTFP access led to the reduction in securities portfolios at least in part as a result of *outright sales*, as banks with more BTFP access reported relatively greater realized losses during 2023 (the discount window pledgers sample in panel A does not achieve conventional levels of statistical significance, with $p = 0.11$).

These findings are striking because a stated goal of the BTFP was to serve as a source of liquidity and eliminate the need for banks to sell securities and realize losses, as SVB did immediately prior to its collapse (Federal Reserve, 2023a). This goal of the facility was explained further in Ostrander (2023), "The thinking was that committed financing of these securities would significantly mitigate any concerns market participants had that a bank would need to realize losses on these securities." Evidently, banks used the promise of inexpensive term funding from the BTFP as cover to restructure their securities portfolios despite the risk that this restructuring otherwise entailed during the 2023 banking crisis. While restructuring the securities portfolios was perhaps desirable for a bank in the longer term, it exposed the institution to risk via a loss of depositor and market confidence and a reduction in regulatory capital.

[Table 7 about here]

In our final set of results, we examine how the BTFP affected banks' discount window preparation. Improving this preparation was a common goal among policymakers in the months following SVB's failure (Barr, 2023; Logan, 2023; Mester, 2024). In particular, banks were encouraged to preemptively place sufficient collateral at the discount window and to perform regular borrowing tests to maintain operational readiness.

Table 8 reports results for measures of banks' discount window preparedness. In the first column, we show the results using an indicator outcome variable that takes a value of one if a bank performed a small-dollar test of discount window borrowing in 2023 after the

BTFP was introduced. We find that banks with more BTFP access as measured by collateral pledged to the BTFP were less likely to perform a discount window test, despite regulators' strong encouragement to maintain readiness via test loans.[7] For ease of interpretation, we scale the results so that the point estimate in panel A implies that a one percent BTFP collateral pledge reduces the likelihood of a test loan by 2.6 percentage points. Given the statistical power issues stemming from the relatively small number of banks that perform discount window tests, we also report the reduced-form regression results for each outcome. We consistently find that banks with more BTFP access were less likely to test and prepare for discount window borrowing.[8]

In the second column of Table 8, we further restrict the binary outcome to take a value of one for only those post-BTFP discount window testers that did not conduct a test in the pre-BTFP sample, which begins in mid-2022. Although this outcome suffers from even stronger power issues, we find consistently signed point estimates in the IV results, and achieve statistical significance in the reduced-form regressions. Evidently, banks with less access to the BTFP were more likely to heed regulators' encouragement to perform discount window tests.

Lastly, in the final columns of Table 8, we show that BTFP access led to less collateral posted to the discount window. This is the case whether we use the midpoint percent change in the par value of discount window collateral (column 3) or, to a lesser degree, the midpoint percent change in the value of discount window collateral that is ineligible for the BTFP (column 4). In calculating the change in total discount window collateral for banks that pledge to the BTFP, we add the BTFP pledge amount to discount window collateral in order to avoid a mechanical relationship between BTFP access and total discount window collateral. This finding provides an important corroboration of our results on test loans

[7]SVB's lack of discount window preparation complicated efforts to provide emergency funding and resolve the bank in an orderly manner (Federal Reserve, 2023b), which helps explain the strong recommendations to ensure discount window readiness from the Fed and other agencies.

[8]Results for the incidence of discount window tests are not as relevant for the sample in panel B, as the point estimates are subject to attenuation bias. Most of the banks in the sample had no collateral pledged to the window and could not have conducted a discount window test.

because, to the extent that BTFP pledgers are more likely to borrow from the BTFP, these institutions may view BTFP borrowing as a de facto test of discount window borrowing. In summary, banks with less BTFP access responded to the crisis and regulatory encouragement by more forcefully ensuring discount window contingency preparedness.

[Table 8 about here]

6.1 Robustness

6.1.1 Placebo Tests Using Ineligible Collateral

In Tables 9–11, we repeat the analysis from Tables 6–8 with a "placebo" instrument that is constructed using the BTFP-*ineligible* collateral posted to the discount window at year-end 2022. The F-stats reveal that the placebo instrument has no predictive power, and point estimates from this exercise are unstable, inconsistently signed, and (up to expected type I error) not statistically different from zero. This exercise rules out a concern that discount window pledging itself is sorting banks in a manner that predicts future funding changes and discount window preparation, which bolsters the plausibility of the exogeneity of the instrument and helps address potential exclusion restriction violations that work through the stock of encumbered collateral.

[Tables 9–11 about here]

6.1.2 Dynamic Moral Hazard and Persistent Heterogeneity

One potential concern regarding the balance sheet results is that the relative decline in private funding sources reflects a "mechanical" response to greater BTFP borrowing among banks with more access to the BTFP. If high-access banks are more likely to borrow from the BTFP, these funds may simply replace the private contingency funding sources that we examine in Tables 6 and 7. To help address this concern, we repeat the main analysis for funding sources and liquidity buffers using a two-year window ending December 2024, when

total BTFP borrowing was nearly nonexistent. Tables 12 and 13 show that the results are qualitatively very similar to the main (one-year) sample. Contrary to the concern that the results reflect a mechanical relationship, banks with more BTFP access have persistently lower use of alternative funding sources and lower liquidity buffers.

[Tables 12 and 13 about here]

The persistence of the funding results reveals that all banks do not eventually succumb to the moral hazard effects evident among banks with ready access to the BTFP. If all banks internalized the backstop, even banks without initial access to the BTFP could be less likely to maintain funding diversification over time. In this scenario, any differential effect between banks with greater and lesser BTFP access should narrow. However, we find that such convergence did not transpire.

The lack of convergence can reflect differences that arise as high-access banks internalize little cost of tapping future bailouts, while low-access banks internalize the higher costs associated with gaining rapid access to a backstop facility. That is, even if all banks eventually update their *beliefs* that the Fed is willing to deploy emergency facilities in similar funding crises, the *expected benefit* of the backstop will remain heterogeneous. This heterogeneity can, for example, stem from operational inertia as a result of fixed costs incurred to change a bank's funding structure during the crisis or persistent balance sheet characteristics that limit the availability of pledgable assets and restrain the expected participation in future emergency facilities. Thus, the marginal value of the expected backstop remains higher for banks that already had an effective line of credit during 2023 and do not need to engage in a costly, supervised, and slow reconfiguration of the balance sheet that could also be constrained by the bank's business model. In this way, differing views regarding the amount and ease of accessing future support can account for the persistent wedge between the high- and low-access banks that we observe.

7 Conclusion and Policy Implications

In this paper, we present novel evidence on the adverse moral hazard effects of emergency lending facilities. Using the experience with the Fed's BTFP, which was created to address a potential banking crisis, we show that emergency backstops can work against efforts to encourage banks to self-insure against the risks that were laid bare by the very failures that led to the introduction of the BTFP.

In this episode, we show that banks with more access to the BTFP were relatively less willing to diversify their funding sources and make preparations for borrowing at the standing lending facility. Thus, our results also demonstrate how the use of emergency lending facilities can add to the reasons banks might limit their use of standing lending facilities that could otherwise help prevent a potential crisis.

Although emergency guarantees and backstops may well be warranted if they interrupt a would-be financial crisis, documenting evidence of moral hazard as we have done in this paper carries important policy implications. Most notably, our results highlight the importance of a systematic approach to supervision and regulation that allows policymakers to commit to longer-run goals of promoting stability and resilience. For example, policies to reduce or eliminate stigma of standing lending facilities could be enacted to ensure that institutions have ready access to liquidity under a broad range of scenarios. Further, countercyclical policies that require larger capital and liquidity buffers in good times—while unpopular among regulated institutions—could help policymakers commit to their longer-run goals and lead banks to internalize more of their risks. In this way, it could be possible to establish permanent lending facilities that exist within the broader framework of a liquidity and capital regulatory regime with clear mechanisms for resolving financial institutions, which would in turn help ensure a more stable and resilient financial system.

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Figure 1: Total Bank Deposits
This figure depicts a time series of total bank deposits.
Source: Federal Reserve H.8 Release

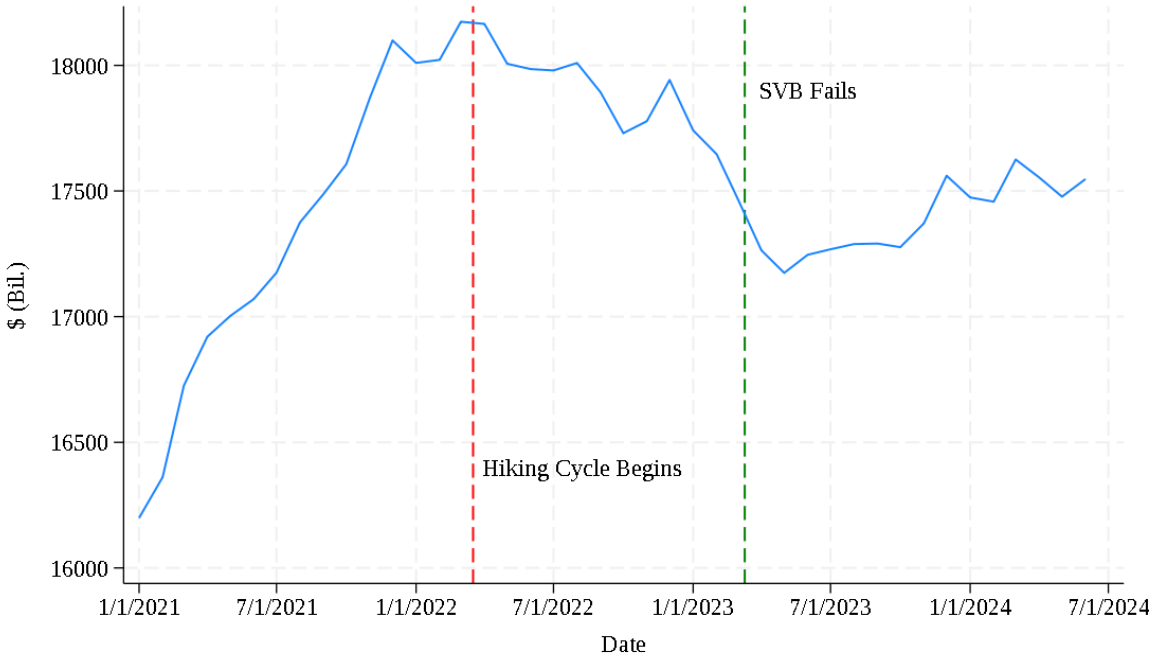


Figure 2: Brokered Deposit Users

This figure depicts a count of the number of banks using brokered deposits for the quarters indicated on the x-axis.

Source: Call Reports

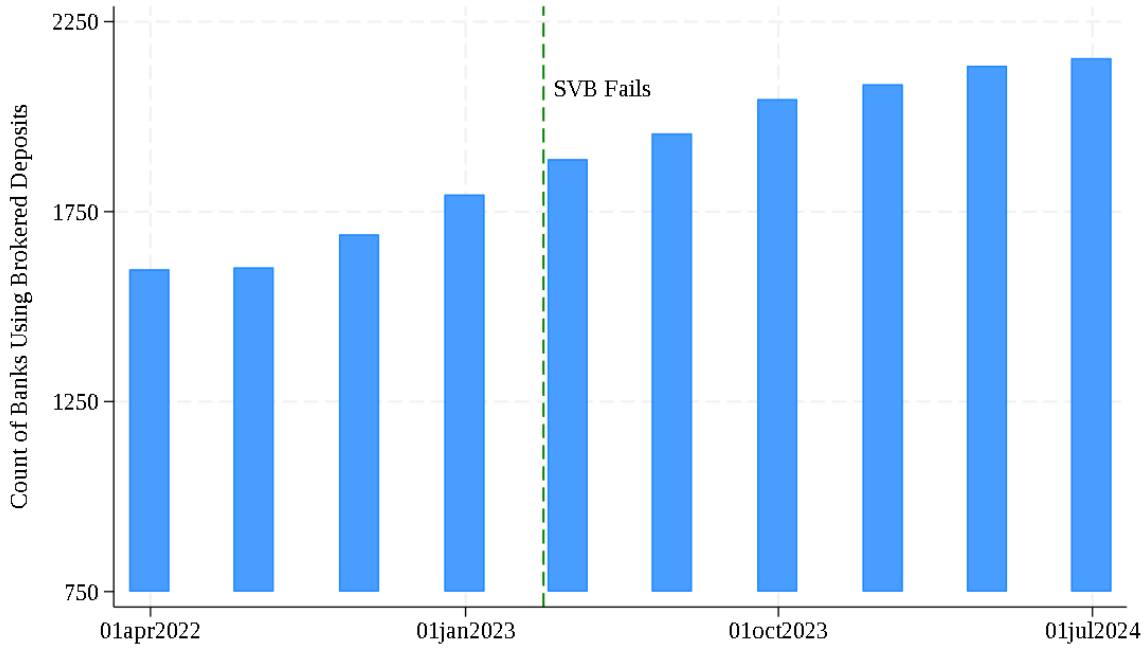


Figure 3: Reciprocal Deposit Users

This figure depicts a count of the number of banks using reciprocal deposits for the quarters indicated on the x-axis.

Source: Call Reports

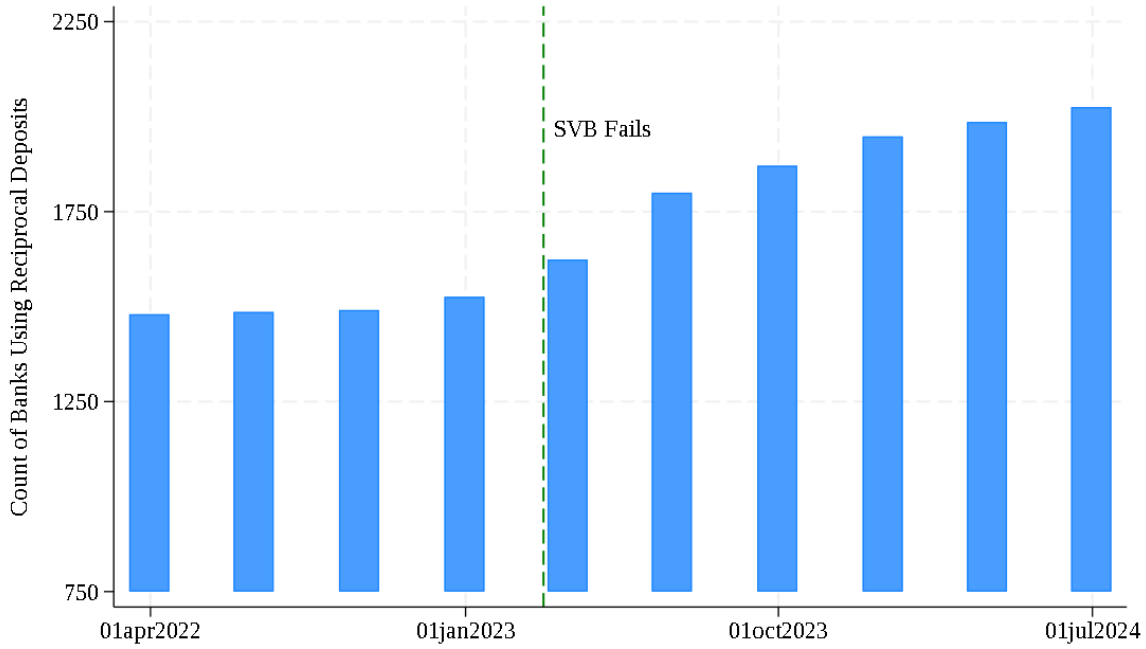


Figure 4: Total BTFP Activity

This figure depicts the volume of borrowing from and collateral pledged to the BTFP facility between its inception and Jun. 30, 2024.

Source: BTFP Data Repository

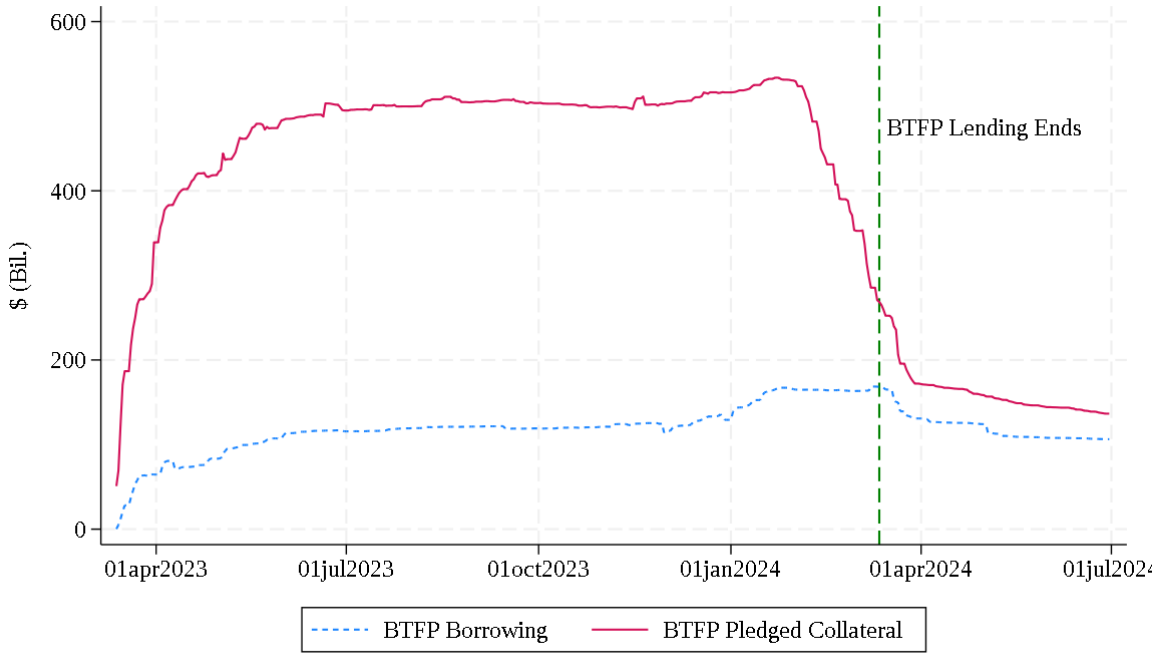


Figure 5: Discount Window Eligible and Pledging Banks

This figure depicts the count of banks that have either filed the requisite paperwork to be eligible for discount window credit or have pledged any amount of collateral to their discount window pledge account.
Source: Discount Window Data Repository

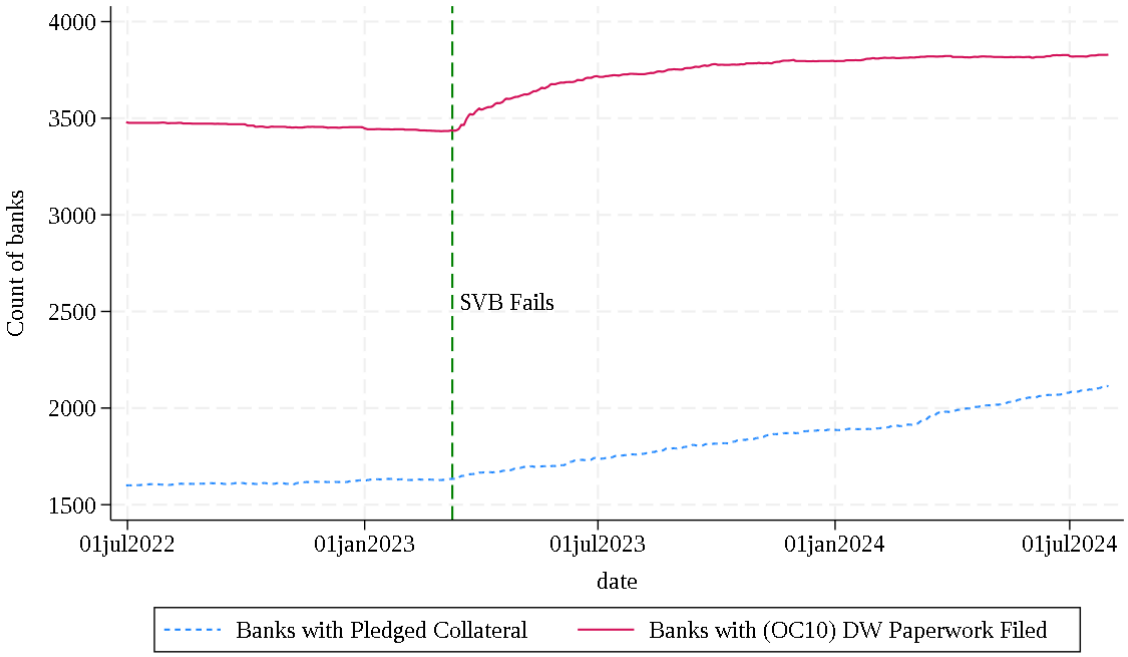


Figure 6: Discount Window Collateral Pledge Amount by BTFP Eligibility
This figure depicts the par value of collateral pledged to the discount window that was either eligible (blue shaded area) or ineligible (gray shaded area) for placement in BTFP collateral accounts.
Source: Discount Window Data Repository

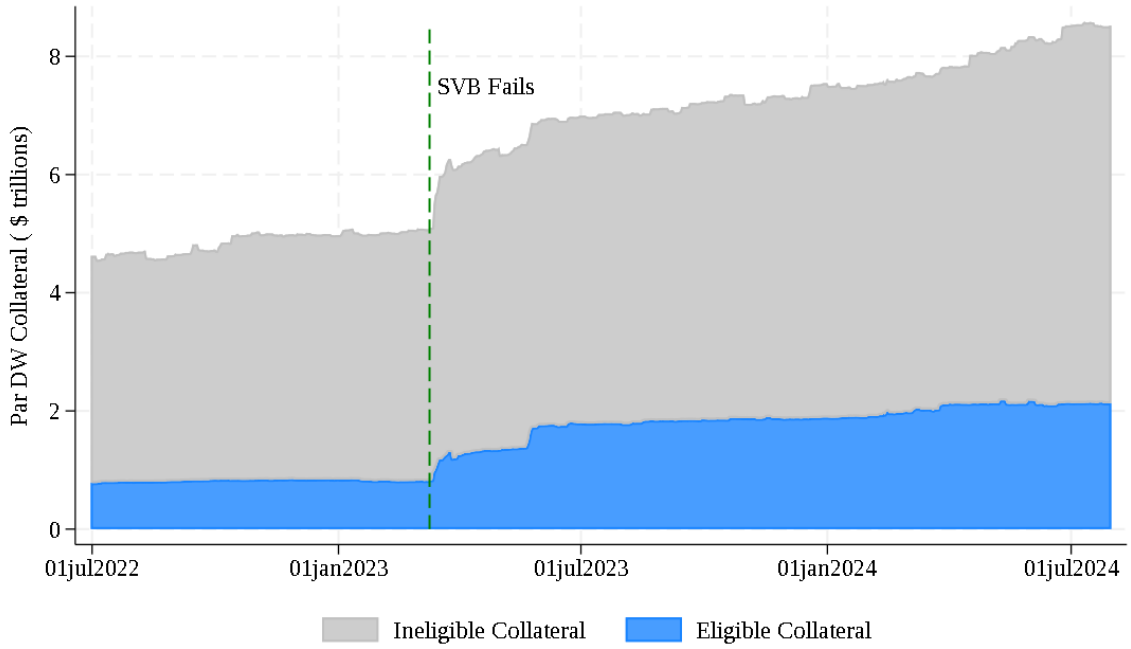


Figure 7: BTFP Collateral Pledged Versus BTFP Borrowing

This figure depicts a scatterplot of banks' maximum BTFP collateral pledge through Q3 2023 as a share of their year-end 2022 liabilities, against banks' maximum BTFP borrowing amount through Q3 2023 as a share of their year-end 2022 liabilities. A 45-degree line is included for reference. One outlier with a collateral-to-liability share over 70% is excluded from the graph for legibility.

Source: BTFP Data Repository

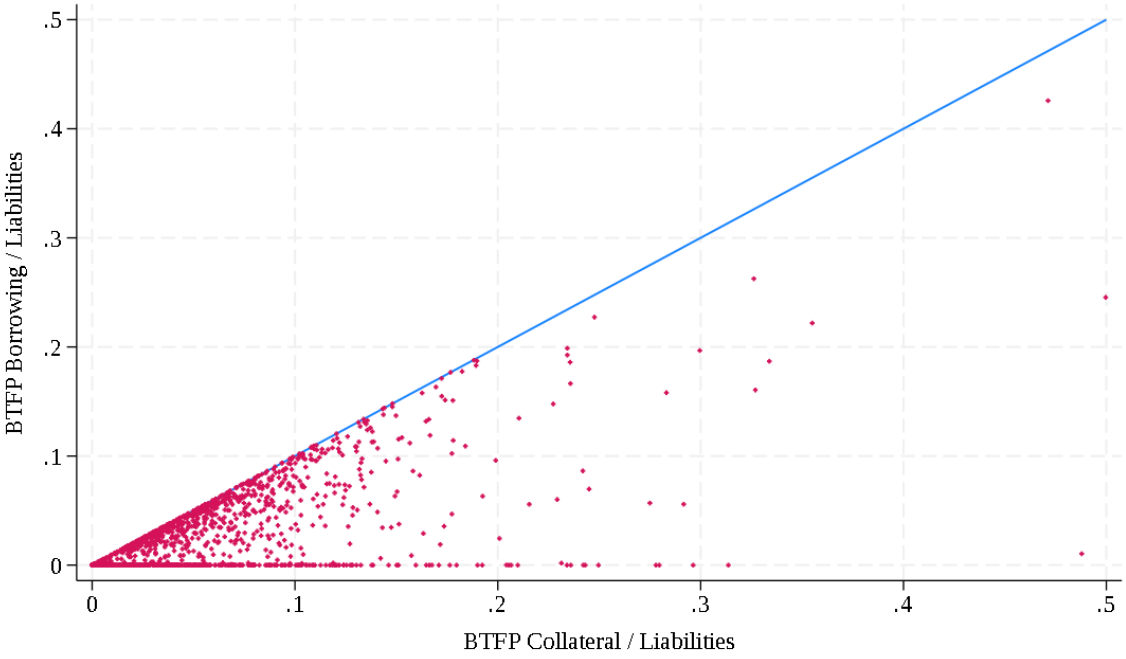
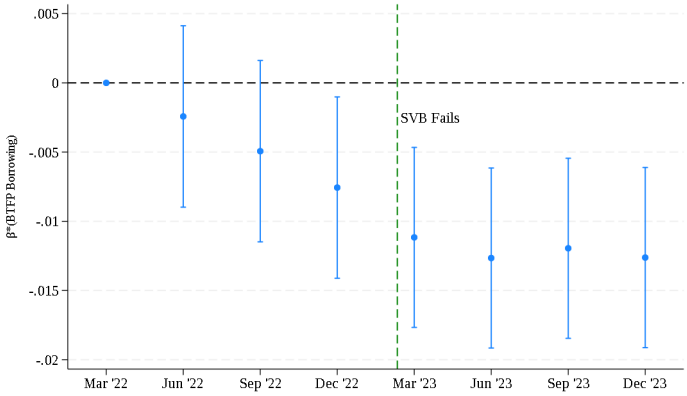
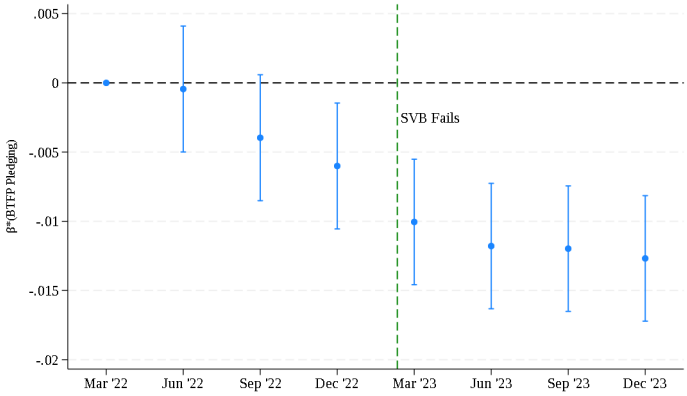


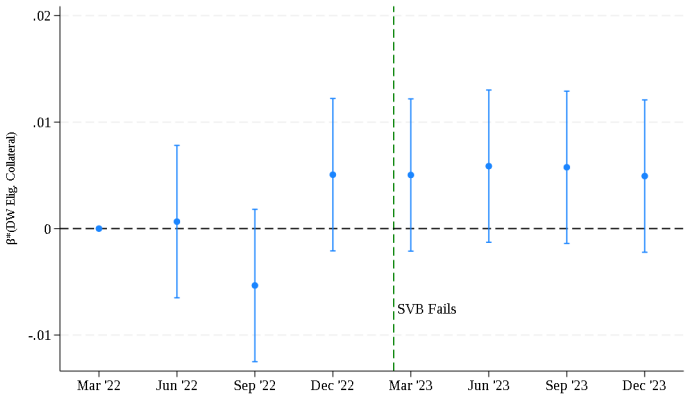
Figure 8: Uninsured Deposit Growth Differences Across Banks
This figure shows event study diff-in-diff plots using the continuous "treatment" variable indicated. Source: FFIEC Call Reports, BTFP Data Repository, Discount Window Data Repository



(a) Estimated coefficient representing the sensitivity of quarterly change in ln(Uninsured Deposits) to normalized BTFP borrowing



(b) Estimated coefficient representing the sensitivity of quarterly change in ln(Uninsured Deposits) to normalized BTFP collateral value



(c) Estimated coefficient representing the sensitivity of quarterly change in ln(Uninsured Deposits) to normalized BTFP-eligible collateral pledged to the discount window

Figure 9: BTFP-Eligible Collateral Pledged to the Discount Window

This figure depicts an ordered scatterplot of banks' share of BTFP-eligible collateral pledged to the discount window as of 2022, based on par value.

Source: Discount Window Data Repository

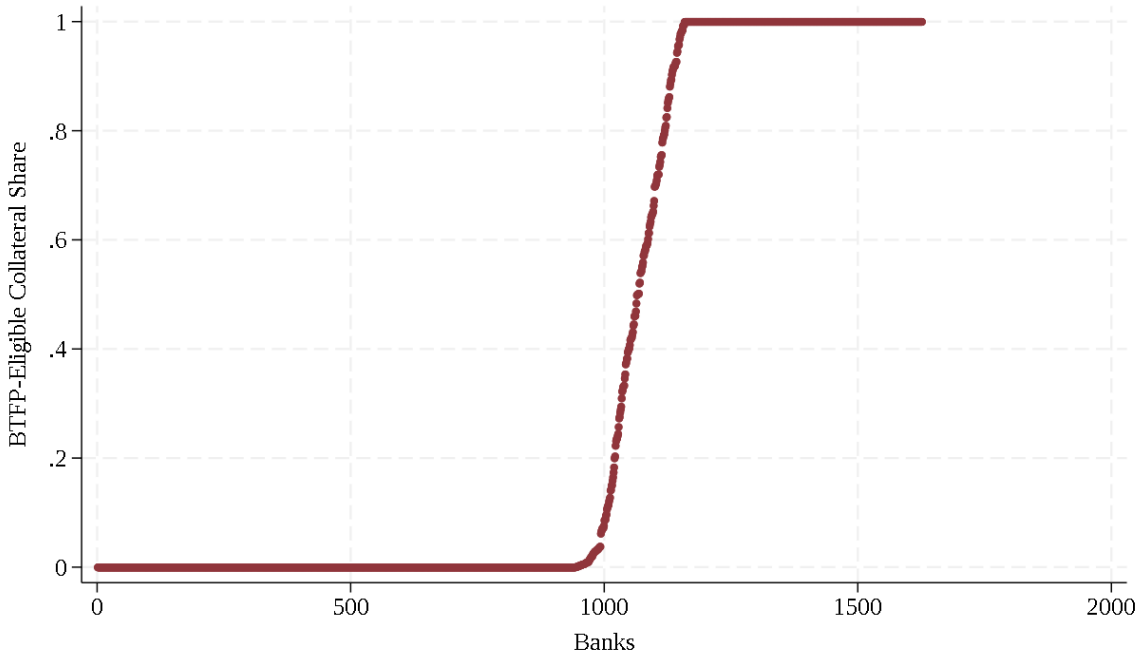


Figure 10: BTFP-Eligible Collateral Pledge Amount by Bank Size

This figure presents a binned scatterplot of the instrument (BTFP-eligible DW collateral as of year-end 2022) on the y-axis against size, measured by the natural logarithm of total assets, on the x-axis. Data are reported for the sample of banks that had collateral pledged to the discount window prior to SVB's failure. A linear regression of the instrument on size yields a coefficient estimate of 0.05 ($p = 0.53$), with an R^2 of 0.00.

Source: Discount Window Data Repository

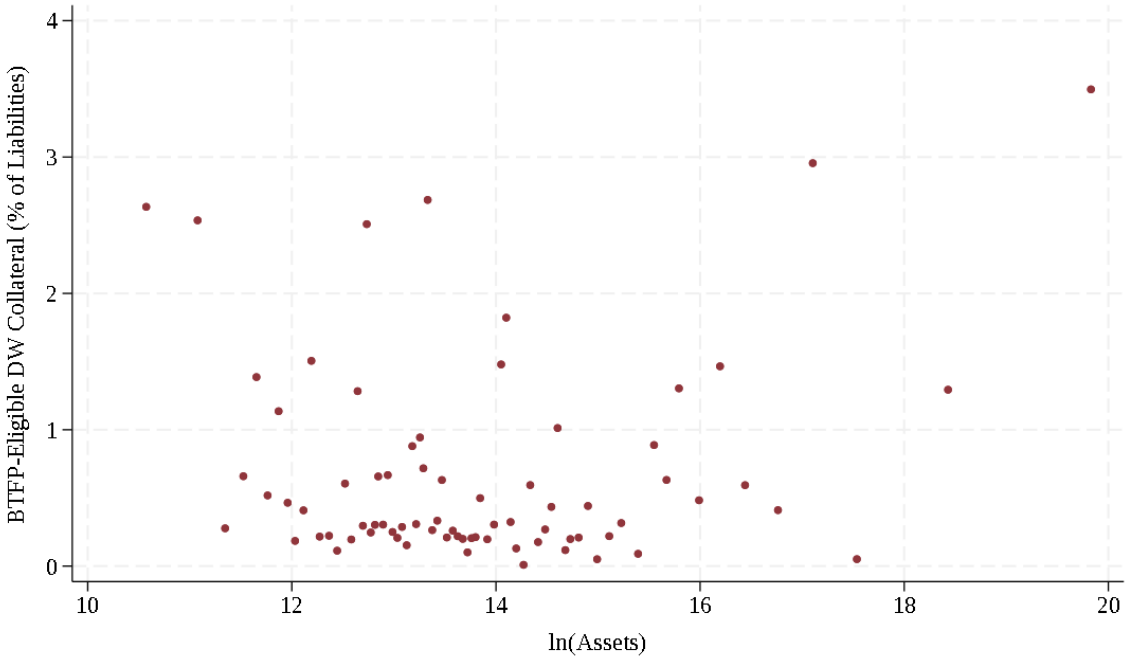


Table 1: BTFP Borrowing and Pledging Banks

This table reports the number of borrowers and collateral pledgers in panel A as of the indicated dates. In panel B, the table shows the mean, median, and interquartile range of bank pledging and borrowing amounts, measured as the maximum value between BTFP inception and September 30, 2023, normalized by year-end 2022 total liabilities. Sources: Call Report, BTFP Data Repository.

Panel A: Number of Banks Pledging to and Borrowing from the BTFP

	BTFP Pledgers	BTFP Borrowers	Total Pledgers (Cumulative)	Total Borrowers (Cumulative)
Mar 31, 2023	497	258	498	294
Apr 30, 2023	705	405	726	481
May 31, 2023	930	583	955	693
Jun 30, 2023	1,049	655	1,106	813
Jul 31, 2023	1,119	699	1,183	883
Aug 31, 2023	1,167	720	1,245	949
Sep 30, 2023	1,213	729	1,297	998

Panel B: BTFP Pledging and Borrowing Amounts (% of Liabilities)

	Mean	25th Percentile	50th Percentile	75th Percentile
$\frac{Q3Max\{BTFPCollateral\}}{Liabilities_{2022}}$	6.2	2.3	4.8	8.5
$\frac{Q3Max\{BTFPBorrowing\}}{Liabilities_{2022}}$	3.2	0.0	2.0	5.0
$\frac{Q3Max\{BTFPBorrowing\|Borr>0\}}{Liabilities_{2022}}$	4.2	1.1	3.2	6.0

Table 2: Descriptive Statistics

This table reports bank-level descriptive statistics for measures of bank size, funding sources, liquid assets, and discount window activity. All data except the final two discount window test variables are reported as of 2022. The final two variables report summary statistics for a binary indicator of a discount window test in 2023 after the inception of the BTFP (unconditionally, and conditional on no tests between Q2 2022 and the start of the BTFP, respectively). A test loan is defined as a loan with a total value of no more than $2,500. Descriptive statistics are reported for three different samples of banks, as indicated: "DW Pledgers," defined as banks that had collateral pledged to the discount window as of Feb. 28, 2023; "DW Eligible" banks that had filed the Operating Circular #10 documentation by Feb. 28, 2023; and "BTFP Pledgers," defined as banks that had pledged any collateral to the BTFP by Sep. 30, 2023. Sources: FFIEC Call Reports, BTFP Data Repository, Discount Window Data Repository.

	DW Pledgers (*N=1,627*)				DW Eligible (*N=3,457*)				BTFP Pledgers (*N=1,299*)			
	Mean	25th %ile	50th %ile	75th %ile	Mean	25th %ile	50th %ile	75th %ile	Mean	25th %ile	50th %ile	75th %ile
Assets ($ mil)	12110.1	341.2	785.8	2331.2	6157.4	193.6	430.6	1092.8	13391.8	266.2	591.7	1670.1
Liabilities ($ mil)	10878.1	311.3	705.4	2111.2	5536.7	175.8	389.8	982.3	12037.6	242.2	538.9	1534.3
Uninsured Deposits (% of Assets)	27.9	17.6	27.9	37.4	27.2	17.2	27.1	36.9	29.3	19.6	29.0	38.5
Core Deposits (% of Assets)	77.8	73.2	80.1	86.0	79.2	74.7	81.6	86.7	80.2	75.4	81.9	87.1
Time Deposits (% of Assets)	16.4	8.3	13.6	21.4	17.4	9.5	15.1	22.6	15.5	8.4	13.6	20.0
Wholesale Funding (% of Assets)	7.7	0.7	5.0	11.1	6.4	0.0	3.5	9.3	6.7	0.6	4.4	10.2
Brokered Deposits (% of Assets)	3.3	0.0	0.0	3.8	2.5	0.0	0.0	2.4	2.4	0.0	0.0	2.6
Reciprocal Deposits (% of Assets)	2.2	0.0	0.0	2.5	1.9	0.0	0.0	1.5	2.1	0.0	0.0	2.1
Cash (% of Assets)	6.8	2.2	4.0	8.2	7.8	2.5	4.8	9.8	5.5	2.1	3.7	6.7
Securities (Amort. Cost, % of Assets)	24.9	12.5	22.3	35.0	25.8	12.8	23.5	36.4	30.4	17.8	28.0	40.5
DW Collateral (% of Liabs.)	8.3	0.8	2.9	10.4	4.0	0.0	0.0	2.6	5.4	0.0	0.5	4.9
DW Test post-BTFP (1/0)	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
DW Test post-BTFP | No Prior Test (1/0)	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0

Table 3: Uninsured and Core Deposit Changes

This table reports ordinary least squares and instrumental variables estimates of the effect of banks' BTFP access—measured using the value of collateral placed at the facility—on the change in uninsured deposits and core deposits, as indicated. Uninsured deposits are only reported by banks with total assets of at least $1 billion. The variable "Pledged BTFP Collateral" is measured as the maximum collateral pledge to the BTFP by Sep. 30, 2023, divided by 2022 year-end bank liabilities. We instrument for "Pledged BTFP Collateral" with the BTFP-eligible collateral posted to the discount window as of year-end 2022, normalized by total liabilities. Standard errors are reported in parentheses. Statistical significance: *** $p \leq 0.01$,** $p \leq 0.05$,* $p \leq 0.10$. Sources: FFIEC Call Reports, BTFP Data Repository, Discount Window Data Repository.

Panel A: Discount Window Pledgers Sample

	Δ Uninsured Deps (% of assets)		Δ Core Deps (% of assets)	
	(OLS)	(IV)	(OLS)	(IV)
Pledged BTFP Collateral	-0.18***	-0.01	-0.16***	-0.23
	(0.07)	(0.17)	(0.05)	(0.24)
N	682	682	1,600	1,600
Adj. R^2	0.01	–	0.00	–
First Stage F-stat	–	116.69	–	84.80

Panel B: Discount Window Eligible Sample

	Δ Uninsured Deps (% of assets)		Δ Core Deps (% of assets)	
	(OLS)	(IV)	(OLS)	(IV)
Pledged BTFP Collateral	-0.20***	-0.09	-0.19***	-0.18
	(0.07)	(0.19)	(0.04)	(0.21)
N	891	891	3,364	3,364
Adj. R^2	0.01	–	0.01	–
First Stage F-stat	–	139.17	–	133.28

Panel C: BTFP Pledgers Sample

	Δ Uninsured Deps (% of assets)		Δ Core Deps (% of assets)	
	(OLS)	(IV)	(OLS)	(IV)
Pledged BTFP Collateral	-0.15**	-0.05	-0.18***	0.14
	(0.07)	(0.19)	(0.04)	(0.16)
N	447	447	1,290	1,290
Adj. R^2	0.01	–	0.02	–
First Stage F-stat	–	80.91	–	83.56

Table 4: Instrument Determinants Regression Across Samples (Dec. 2022)
This table reports ordinary least squares regressions of our instrument—the BTFP-eligible collateral posted to the discount window as of year-end 2022, normalized by total liabilities—on bank-level variables measured as of year-end 2022. This "determinants regression" is shown for three samples of banks as indicated in the column headers. Statistical significance: *** $p \leq 0.01$,** $p \leq 0.05$,* $p \leq 0.10$. Sources: FFIEC Call Reports, BTFP Data Repository, Discount Window Data Repository.

	Instrument: $\frac{\text{BTFP-eligible DW Collateral}}{\text{Liabilities}}$		
	DW Pledging Banks	DW Eligible Banks	BTFP Pledging Banks
Leverage Ratio	-0.01	-0.01	-0.00
	(0.03)	(0.02)	(0.03)
FHLB Member	-0.91	-0.38	-0.49
	(0.86)	(0.30)	(0.67)
$\frac{\text{FHLB Advances}}{\text{Liabilities}}$	-0.08	-0.03	-0.05
	(0.06)	(0.02)	(0.09)
$\frac{\text{Time Deposits}}{\text{Liabilities}}$	0.02	0.01	-0.00
	(0.02)	(0.01)	(0.02)
$\frac{\text{Interbank Deposits}}{\text{Liabilities}}$	-0.11	-0.04	-0.03
	(0.11)	(0.04)	(0.13)
$\frac{\text{Brokered Deposits}}{\text{Liabilities}}$	0.13	0.07*	0.18
	(0.08)	(0.04)	(0.14)
$\frac{\text{Indiv. + Corp. Deposits}}{\text{Liabilities}}$	-0.10	-0.04	-0.03
	(0.09)	(0.03)	(0.11)
$\frac{\text{Public Deposits}}{\text{Liabilities}}$	-0.12	-0.05	-0.05
	(0.08)	(0.03)	(0.11)
$\frac{\text{Other Borr. (ex-FHLB)}}{\text{Liabilities}}$	-0.05	-0.04*	-0.04
	(0.04)	(0.02)	(0.07)
$\frac{\text{Wholesale Funding (ex-OBM)}}{\text{Liabilities}}$	-0.07	-0.03	-0.06
	(0.06)	(0.02)	(0.09)
$\frac{\text{Core Deposits}}{\text{Liabilities}}$	0.03	0.01	-0.01
	(0.05)	(0.02)	(0.04)
$\frac{\text{Unrealized Losses}}{\text{Assets}}$	0.05	0.03	0.07
	(0.04)	(0.02)	(0.05)
$\frac{\text{Treas. + MBS}}{\text{Securities}}$	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)
ln(Assets)	0.05	0.12**	0.16
	(0.09)	(0.05)	(0.09)
N	1,598	3,389	1,293
Adj. R^2	0.02	0.02	0.11

Table 5: First Stage Regression Results Across Samples
This table reports the first stage results from a regression of BTFP access—measured using the value of collateral placed at the facility—on our instrument—the BTFP-eligible collateral posted to the discount window as of year-end 2022, normalized by total liabilities (see equation 4). The first stage results are shown for three samples of banks as indicated in the column headers. Standard errors are reported in parentheses. Statistical significance: *** $p \leq 0.01$,** $p \leq 0.05$,* $p \leq 0.10$. Sources: FFIEC Call Reports, BTFP Data Repository, Discount Window Data Repository.

	2^{nd} Stage Endog. Regressor: $\frac{Q3Max\{BTFPCollateral\}}{Liabilities_{2022}}$		
	DW Pledging Banks	DW Eligible Banks	BTFP Pledging Banks
BTFP-eligible DW Collateral_{2022}	0.38***	0.41***	0.57***
	(0.04)	(0.04)	(0.06)
N	1,600	3,364	1,290
F-stat	84.80	133.28	83.56
R^2	0.05	0.04	0.06

Table 6: Changes in Funding Sources Following the BTFP

This table reports 2SLS estimates of the effect of BTFP access—measured using the value of collateral placed at the facility—on the change in several alternative and contingency funding sources from Dec. 31, 2022 to Dec. 31, 2023. The variable "Pledged BTFP Collateral" is measured as the maximum collateral pledge to the BTFP by Sep. 30, 2023, divided by 2022 year-end bank liabilities. We instrument for "Pledged BTFP Collateral" with the BTFP-eligible collateral posted to the discount window as of year-end 2022, normalized by total liabilities. Standard errors are reported in parentheses. Statistical significance: *** $p \leq 0.01$,** $p \leq 0.05$,* $p \leq 0.10$. Sources: FFIEC Call Reports, BTFP Data Repository, Discount Window Data Repository.

Panel A: Discount Window Pledgers Sample

	Δ Time Deposits (% of assets)	Δ Wholesale Funding (% of assets)	Δ Brokered Deposits (% of assets)	Δ Reciprocal Deposits (% of assets)
Pledged BTFP Collateral	-0.61***	-0.47***	-0.50***	-0.24***
	(0.14)	(0.14)	(0.11)	(0.10)
N	1,600	1,600	1,600	1,600
First Stage F-stat	84.80	84.80	84.80	84.80

Panel B: Discount Window Eligible Sample

	Δ Time Deposits (% of assets)	Δ Wholesale Funding (% of assets)	Δ Brokered Deposits (% of assets)	Δ Reciprocal Deposits (% of assets)
Pledged BTFP Collateral	-0.58***	-0.42***	-0.42***	-0.12
	(0.14)	(0.12)	(0.10)	(0.08)
N	3,364	3,364	3,364	3,364
First Stage F-stat	133.28	133.28	133.28	133.28

Panel C: BTFP Pledgers Sample

	Δ Time Deposits (% of assets)	Δ Wholesale Funding (% of assets)	Δ Brokered Deposits (% of assets)	Δ Reciprocal Deposits (% of assets)
Pledged BTFP Collateral	-0.88***	-0.61***	-0.65***	-0.06
	(0.13)	(0.12)	(0.10)	(0.07)
N	1,290	1,290	1,290	1,290
First Stage F-stat	83.56	83.56	83.56	83.56

Table 7: Changes in Liquid Assets Following the BTFP

This table reports 2SLS estimates of the effect of BTFP access—measured using the value of collateral placed at the facility—on the change in cash and securities (measured at amortized cost). The final column uses the sum of the absolute value of realized gains and losses during 2023, which is meant to proxy for the extent of securities sales. The variable "Pledged BTFP Collateral" is measured as the maximum collateral pledge to the BTFP by Sep. 30, 2023, divided by 2022 year-end bank liabilities. We instrument for "Pledged BTFP Collateral" with the BTFP-eligible collateral posted to the discount window as of year-end 2022, normalized by total liabilities. Standard errors are reported in parentheses. Statistical significance: *** $p \leq 0.01$,** $p \leq 0.05$,* $p \leq 0.10$. Sources: FFIEC Call Reports, BTFP Data Repository, Discount Window Data Repository.

Panel A: Discount Window Pledgers Sample

	Δ Cash & Securities (% of assets)	Δ Cash (% of assets)	Δ Securities (% of assets)	Σ|Realized Gain/Loss| (% of securities)
Pledged BTFP Collateral	-0.45**	0.00	-0.45***	4.45
	(0.19)	(0.11)	(0.12)	(2.76)
N	1,600	1,600	1,600	1,571
First Stage F-stat	84.80	84.80	84.80	86.56

Panel B: Discount Window Eligible Sample

	Δ Cash & Securities (% of assets)	Δ Cash (% of assets)	Δ Securities (% of assets)	Σ|Realized Gain/Loss| (% of securities)
Pledged BTFP Collateral	-0.31**	0.06	-0.36***	4.23**
	(0.15)	(0.10)	(0.10)	(1.74)
N	3,364	3,364	3,364	3,298
First Stage F-stat	133.28	133.28	133.28	133.99

Panel C: BTFP Pledgers Sample

	Δ Cash & Securities (% of assets)	Δ Cash (% of assets)	Δ Securities (% of assets)	Σ|Realized Gain/Loss| (% of securities)
Pledged BTFP Collateral	-0.23**	0.03	-0.25***	5.22**
	(0.11)	(0.08)	(0.08)	(2.67)
N	1,290	1,290	1,290	1,284
First Stage F-stat	83.56	83.56	83.56	84.31

Table 8: Changes in Discount Window Borrowing Preparation

This table reports 2SLS estimates and reduced-form estimates of the effect of BTFP access—measured using the value of collateral placed at the facility—on the incidence of discount window testing (columns 1 and 2) and the change in discount window collateral after accounting for collateral placed at the BTFP (columns 3 and 4). The variable "Pledged BTFP Collateral" is measured as the maximum collateral pledge to the BTFP by Sep. 30, 2023, divided by 2022 year-end bank liabilities. We instrument for "Pledged BTFP Collateral" with the BTFP-eligible collateral posted to the discount window as of year-end 2022, normalized by total liabilities ("BTFP-Eligible DW Collateral"). Standard errors are reported in parentheses. Statistical significance: *** $p \leq 0.01$,** $p \leq 0.05$,* $p \leq 0.10$. Sources: FFIEC Call Reports, BTFP Data Repository, Discount Window Data Repository.

Panel A: Discount Window Pledgers Sample

	1/0 (DW Test post-BTFP)		1/0 (DW Test post-BTFP | no prior)		Pct. Δ DW Collateral		Pct. Δ Inelig. DW Collateral	
	(IV)	(RF)	(IV)	(RF)	(IV)	(RF)	(IV)	(RF)
Pledged BTFP Collateral	-2.60***	–	-1.25*	–	-6.93***	–	-0.79	–
	(0.95)		(0.76)		(2.10)		(1.32)	
BTFP-Eligible DW Collateral	–	-0.99***	–	-0.47***	–	-2.63***	–	-0.50
		(0.24)		(0.18)		(0.39)		(1.01)
N	1,600	1,600	1,600	1,600	1,600	1,600	1,190	1,190
First Stage F-stat	84.80	–	84.80	–	84.80	–	149.84	–

Panel B: Discount Window Eligible Sample

	1/0 (DW Test post-BTFP)		1/0 (DW Test post-BTFP | no prior)		Pct. Δ DW Collateral		Pct. Δ Inelig. DW Collateral	
	(IV)	(RF)	(IV)	(RF)	(IV)	(RF)	(IV)	(RF)
Pledged BTFP Collateral	-0.86	–	-0.45	–	-16.84***	–	-3.22**	–
	(0.70)		(0.58)		(3.43)		(1.56)	
BTFP-Eligible DW Collateral	–	-0.35**	–	-0.18	–	-5.76***	–	-1.99**
		(0.16)		(0.15)		(0.96)		(0.99)
N	3,364	3,364	3,364	3,364	2,263	2,263	1,344	1,344
First Stage F-stat	133.28	–	133.28	–	68.80	–	163.01	–

Panel C: BTFP Pledgers Sample

	1/0 (DW Test post-BTFP)		1/0 (DW Test post-BTFP | no prior)		Pct. Δ DW Collateral		Pct. Δ Inelig. DW Collateral	
	(IV)	(RF)	(IV)	(RF)	(IV)	(RF)	(IV)	(RF)
Pledged BTFP Collateral	-0.99	–	-0.56	–	-13.35***	–	-4.37***	–
	(0.68)		(0.55)		(2.11)		(1.69)	
BTFP-Eligible DW Collateral	–	-0.56***	–	-0.32***	–	-7.66***	–	-2.76***
		(0.17)		(0.12)		(1.80)		(0.94)
N	1,287	1,287	1,287	1,287	1,127	1,127	553	553
First Stage F-stat	83.52	–	83.52	–	88.68	–	91.42	–

Table 9: Changes in Funding Sources Following the BTFP Using a Placebo Instrument

This table reports 2SLS estimates of the effect of BTFP access—measured using the value of collateral placed at the facility—on the change in several alternative and contingency funding sources from Dec. 31, 2022 to Dec. 31, 2023. The variable "Pledged BTFP Collateral" is measured as the maximum collateral pledge to the BTFP by Sep. 30, 2023, divided by 2022 year-end bank liabilities. We instrument for "Pledged BTFP Collateral" with the BTFP-ineligible collateral posted to the discount window as of year-end 2022, normalized by total liabilities. Standard errors are reported in parentheses. Statistical significance: *** $p \leq 0.01$,** $p \leq 0.05$,* $p \leq 0.10$. Sources: FFIEC Call Reports, BTFP Data Repository, Discount Window Data Repository.

Panel A: Discount Window Pledgers Sample

	Δ Time Deposits (% of assets)	Δ Wholesale Funding (% of assets)	Δ Brokered Deposits (% of assets)	Δ Reciprocal Deposits (% of assets)
Pledged BTFP Collateral	1.03	-1.34	-1.33	-1.05
	(1.15)	(1.07)	(0.99)	(0.88)
N	1,600	1,600	1,600	1,600
First Stage F-stat	2.36	2.36	2.36	2.36

Panel B: Discount Window Eligible Sample

	Δ Time Deposits (% of assets)	Δ Wholesale Funding (% of assets)	Δ Brokered Deposits (% of assets)	Δ Reciprocal Deposits (% of assets)
Pledged BTFP Collateral	-1.85	1.96	2.40	2.90
	(1.85)	(2.09)	(2.20)	(2.48)
N	3,364	3,364	3,364	3,364
First Stage F-stat	1.49	1.49	1.49	1.49

Panel C: BTFP Pledgers Sample

	Δ Time Deposits (% of assets)	Δ Wholesale Funding (% of assets)	Δ Brokered Deposits (% of assets)	Δ Reciprocal Deposits (% of assets)
Pledged BTFP Collateral	5.24	-3.55	-1.99	-5.33
	(8.63)	(5.45)	(3.13)	(8.35)
N	1,290	1,290	1,290	1,290
First Stage F-stat	0.41	0.41	0.41	0.41

Table 10: Changes in Liquid Assets Following the BTFP Using a Placebo Instrument

This table reports 2SLS estimates of the effect of BTFP access—measured using the value of collateral placed at the facility—on the change in cash and securities (measured at amortized cost). The final column uses the sum of the absolute value of realized gains and losses during 2023, which is meant to proxy for the extent of securities sales. The variable "Pledged BTFP Collateral" is measured as the maximum collateral pledge to the BTFP by Sep. 30, 2023, divided by 2022 year-end bank liabilities. We instrument for "Pledged BTFP Collateral" with the BTFP-ineligible collateral posted to the discount window as of year-end 2022, normalized by total liabilities. Standard errors are reported in parentheses. Statistical significance: *** $p \leq 0.01$,** $p \leq 0.05$,* $p \leq 0.10$. Sources: FFIEC Call Reports, BTFP Data Repository, Discount Window Data Repository.

Panel A: Discount Window Pledgers Sample

	Δ Cash & Securities (% of assets)	Δ Cash (% of assets)	Δ Securities (% of assets)	Σ|Realized Gain/Loss| (% of securities)
Pledged BTFP Collateral	-1.94	-0.81	-1.13	-17.70
	(1.65)	(0.89)	(0.96)	(18.63)
N	1,600	1,600	1,600	1,571
First Stage F-stat	2.36	2.36	2.36	2.64

Panel B: Discount Window Eligible Sample

	Δ Cash & Securities (% of assets)	Δ Cash (% of assets)	Δ Securities (% of assets)	Σ|Realized Gain/Loss| (% of securities)
Pledged BTFP Collateral	4.57	2.14	2.44	36.43
	(3.93)	(1.92)	(2.23)	(38.73)
N	3,364	3,364	3,364	3,298
First Stage F-stat	1.49	1.49	1.49	1.13

Panel C: BTFP Pledgers Sample

	Δ Cash & Securities (% of assets)	Δ Cash (% of assets)	Δ Securities (% of assets)	Σ|Realized Gain/Loss| (% of securities)
Pledged BTFP Collateral	-5.72	-2.76	-2.96	-85.34
	(9.14)	(4.60)	(4.68)	(149.10)
N	1,290	1,290	1,290	1,284
First Stage F-stat	0.41	0.41	0.41	0.35

Table 11: Changes in Discount Window Borrowing Preparation Using a Placebo Instrument

This table reports 2SLS estimates of the effect of BTFP access—measured using the value of collateral placed at the facility—on the incidence of discount window testing (columns 1 and 2) and the change in discount window collateral after accounting for collateral placed at the BTFP (columns 3 and 4). The variable "Pledged BTFP Collateral" is measured as the maximum collateral pledge to the BTFP by Sep. 30, 2023, divided by 2022 year-end bank liabilities. We instrument for "Pledged BTFP Collateral" with the BTFP-ineligible collateral posted to the discount window as of year-end 2022, normalized by total liabilities. Standard errors are reported in parentheses. Statistical significance: *** $p \leq 0.01$,** $p \leq 0.05$,* $p \leq 0.10$. Sources: FFIEC Call Reports, BTFP Data Repository, Discount Window Data Repository.

Panel A: Discount Window Pledgers Sample

	1/0 (DW Test post-BTFP)	1/0 (DW Test post-BTFP | no prior)	Pct. Δ DW Collateral	Pct. Δ Inelig. DW Collateral
Pledged BTFP Collateral	11.88	3.78	98.45	61.93
	(9.68)	(5.12)	(61.15)	(46.09)
N	1,600	1,600	1,600	1,190
First Stage F-stat	2.36	2.36	2.36	1.91

Panel B: Discount Window Eligible Sample

	1/0 (DW Test post-BTFP)	1/0 (DW Test post-BTFP | no prior)	Pct. Δ DW Collateral	Pct. Δ Inelig. DW Collateral
Pledged BTFP Collateral	17.49	10.37	103.10***	207.02
	(15.71)	(10.11)	(32.10)	(250.03)
N	3,364	3,364	2,263	1,344
First Stage F-stat	1.49	1.49	9.58	0.69

Panel C: BTFP Pledgers Sample

	1/0 (DW Test post-BTFP)	1/0 (DW Test post-BTFP | no prior)	Pct. Δ DW Collateral	Pct. Δ Inelig. DW Collateral
Pledged BTFP Collateral	-11.78	-5.65	583.52	298.07
	(20.46)	(11.59)	(1403.77)	(1062.90)
N	1,287	1,287	1,127	553
First Stage F-stat	0.40	0.40	0.17	0.08

Table 12: Changes in Funding Sources Following the BTFP (Dec. '22 – Dec. '24)

This table reports 2SLS estimates of the effect of BTFP access—measured using the value of collateral placed at the facility—on the change in several alternative and contingency funding sources from Dec. 31, 2022 to Dec. 31, 2024. The variable "Pledged BTFP Collateral" is measured as the maximum collateral pledge to the BTFP by Sep. 30, 2023, divided by 2022 year-end bank liabilities. We instrument for "Pledged BTFP Collateral" with the BTFP-eligible collateral posted to the discount window as of year-end 2022, normalized by total liabilities. Standard errors are reported in parentheses. Statistical significance: *** $p \leq 0.01$,** $p \leq 0.05$,* $p \leq 0.10$. Sources: FFIEC Call Reports, BTFP Data Repository, Discount Window Data Repository.

Panel A: Discount Window Pledgers Sample

	Δ Time Deposits (% of assets)	Δ Wholesale Funding (% of assets)	Δ Brokered Deposits (% of assets)	Δ Reciprocal Deposits (% of assets)
Pledged BTFP Collateral	-0.75***	-0.43**	-0.52***	-0.28*
	(0.23)	(0.17)	(0.14)	(0.14)
N	1,564	1,564	1,564	1,564
First Stage F-stat	86.47	86.47	86.47	86.47

Panel B: Discount Window Eligible Sample

	Δ Time Deposits (% of assets)	Δ Wholesale Funding (% of assets)	Δ Brokered Deposits (% of assets)	Δ Reciprocal Deposits (% of assets)
Pledged BTFP Collateral	-0.78***	-0.37**	-0.44***	-0.15
	(0.23)	(0.17)	(0.14)	(0.12)
N	3,291	3,291	3,291	3,291
First Stage F-stat	137.08	137.08	137.08	137.08

Panel C: BTFP Pledgers Sample

	Δ Time Deposits (% of assets)	Δ Wholesale Funding (% of assets)	Δ Brokered Deposits (% of assets)	Δ Reciprocal Deposits (% of assets)
Pledged BTFP Collateral	-0.94***	-0.44***	-0.49***	-0.12
	(0.18)	(0.15)	(0.13)	(0.10)
N	1,264	1,264	1,264	1,264
First Stage F-stat	85.24	85.24	85.24	85.24

Table 13: Changes in Liquid Assets Following the BTFP (Dec. '22 – Dec. '24)
This table reports 2SLS estimates of the effect of BTFP access—measured using the value of collateral placed at the facility—on the change in cash and securities (measured at amortized cost). The final column uses the sum of the absolute value of realized gains and losses during 2023 and 2024, which is meant to proxy for the extent of securities sales. The variable "Pledged BTFP Collateral" is measured as the maximum collateral pledge to the BTFP by Sep. 30, 2023, divided by 2022 year-end bank liabilities. We instrument for "Pledged BTFP Collateral" with the BTFP-eligible collateral posted to the discount window as of year-end 2022, normalized by total liabilities. Standard errors are reported in parentheses. Statistical significance: *** $p \leq 0.01$,** $p \leq 0.05$,* $p \leq 0.10$. Sources: FFIEC Call Reports, BTFP Data Repository, Discount Window Data Repository.

Panel A: Discount Window Pledgers Sample

	Δ Cash & Securities (% of assets)	Δ Cash (% of assets)	Δ Securities (% of assets)	Σ|Realized Gain/Loss| (% of securities)
Pledged BTFP Collateral	-0.75**	-0.13	-0.62***	4.22
	(0.33)	(0.17)	(0.24)	(2.86)
N	1,564	1,564	1,564	1,535
First Stage F-stat	86.47	86.47	86.47	88.27

Panel B: Discount Window Eligible Sample

	Δ Cash & Securities (% of assets)	Δ Cash (% of assets)	Δ Securities (% of assets)	Σ|Realized Gain/Loss| (% of securities)
Pledged BTFP Collateral	-0.55**	-0.05	-0.50***	4.13**
	(0.24)	(0.15)	(0.17)	(1.80)
N	3,291	3,291	3,291	3,226
First Stage F-stat	137.08	137.08	137.08	137.89

Panel C: BTFP Pledgers Sample

	Δ Cash & Securities (% of assets)	Δ Cash (% of assets)	Δ Securities (% of assets)	Σ|Realized Gain/Loss| (% of securities)
Pledged BTFP Collateral	-0.48***	-0.28***	-0.20*	5.04*
	(0.16)	(0.10)	(0.12)	(2.77)
N	1,264	1,264	1,264	1,258
First Stage F-stat	85.24	85.24	85.24	86.03