Interest-Rate Risk and Runaway Deposits: Reassessing the March 2023 US Bank Failures

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Abstract

The primary cause of the failures was a lack of liquidity for the banks that were unable to meet depositors' withdrawals, as the three banks and First Republic Bank had experienced credit losses in March and May of 2023. In this essay, the question is posed as to why these banks were fragile, and what changes following the crisis most directly tackle the fragility. It says that unrecovered interest-rate losses, stemming from the aggressive monetary tightening of 2022, and the high concentration, digital mobility and lack of insurance for deposits in banks with weak governance and supervision were responsible for the failures. Both conditions were satisfactory in themselves, but combined to create a run that was more rapid than liquidity conditions at the time were thought to be capable of handling. The essay discusses recent scholarship, as well as official reviews conducted by the Federal Reserve, the Basel Committee on Banking Supervision, the Financial Stability Board and the Government Accountability Office, and the FDIC's alternative deposit insurance. It notes a general consensus on the importance of uninsured deposits and interest-rate risk; uncertainty over the extent of the vulnerability beyond the failed banks and whether the runs were basic or panic-related; and the absence of causal evidence related to the impact of regulation tailoring. The essay evaluates capital, liquidity, long-term debt, deposit insurance and supervisory reforms against the backdrop of their interaction, and finds that the interaction most directly affects liquidity readiness and deposit insurance design, and that measurement of capital should be included, though in part.

Keywords: bank runs; Silicon Valley Bank; interest-rate risk; uninsured deposits; deposit insurance; liquidity regulation; banking supervision; financial stability

1. Introduction

From 8 to 12 March 2023, Silvergate Bank announced its voluntary liquidation; Silicon Valley Bank (SVB) was closed by the regulators of California and Signature Bank was closed by New York regulators. First Republic Bank was the failed bank in May. In total, the pair of events were among the biggest bank failures in U.S. history. On 12 March, the US authorities issued an exception to treat both SVB and Signature as a “systemic risk exception” and announced the creation of a new Bank Term Funding Program (BTFP). The episode turned out to be somewhat unusual, since it did not come about as a result of a wave of credit losses. The Federal Reserve's own review cited primarily interest-rate risk and liquidity risk that management did not adequately attend to, and supervisors were too late in bringing to

the attention of management (Board of Governors of the Federal Reserve System, 2023).

This essay explores the vulnerabilities of these banks and which post-crisis reforms most directly target these vulnerabilities. It claims that the key was a "connection". Large unrealised losses on fixed-rate assets were the result of rapid monetary tightening in 2022, and the funding that was overwhelmingly uninsured, concentrated and digitally mobile provided depositors with both an incentive and means to walk away before losses were realised. Each of them individually could have been dealt with: there were many banks that had unrealised losses without failing and many banks that had uninsured deposits in stable relationships. This resulted in a run too quick for liquidity rules that were already in place to account for, given poorly governed and loosely supervised banks. If this is right, then reforms which increase the capital measurement requirements are useful but not enough; and policy should pay more attention to the readiness for liquidity; the treatment of uninsured funding; and the design of deposit insurance.

The essay is restricted to U.S. banks, and to policy debate until 2024. It does not consider the issues of resolution and cross-border supervision that arose in the Credit Suisse rescue. Since there are several papers below which are working papers and some figures are not in the published papers, readers should check details with the original papers. The essay is in 5 parts: Background for readers without the background, Literature review, Analysis of the interaction argument, Evaluation of reform options, and conclusion with statement of limitations.

2. Background

2.1 Maturity transformation and the 2022 rate cycle

Banks receive long-term deposits and have long-term loans and securities which provide the funds. It is a key activity of banks and presents them with two types of risk. The reason interest-rate risk occurs is that the market value of fixed-rate assets declines when rates increase. Liquidity risk can occur due to the possibility of quick withdrawals of cash by depositors, which may be faster than the conversion of assets to cash without any loss. The classic Diamond and Dybvig (1983) model illustrates that it is possible for a bank to be vulnerable to self-fulfilling runs even when it would be solvent if it did not experience such runs. The purpose of deposit insurance was to eliminate the run risk that insured depositors might have.

In March 2022, the Fed hiked the policy rate target from 0% to 0.25% to 4.25% to 4.5% by December 2022 and further increased it in 2023. This represented one of the quickest tightening cycles in decades and reduced the market value of long-duration, fixed-rate securities within the banking sector. These losses are apparent in different ways depending on accounting conventions. Securities that are available for sale are recognised at fair value and gains or losses from their operations are added to accumulated other comprehensive income (AOCI). Unrealised losses are not reported as a loss on the balance sheet for securities classified as held to maturity. The US rules allow the largest banks to account for AOCI in regulatory capital, with the smaller banks having the choice not to do this (Board of Governors of the Federal Reserve System, 2023).

2.2 The failures

In the Federal Reserve's review, SVB is a bank that had grown very rapidly, to $209 billion in assets, with deposits from technology companies and those backed by venture capital. A lot of the growth in deposits in 2020 and 2021 went into longer-dated securities, and the bank's hedging of interest-rate risk was not effective compared to other banks (Board of Governors of the Federal Reserve System, 2023). Approximately 94% of all its deposits were uninsured, meaning that they exceed the $250,000 coverage limit (Board of Governors of the Federal Reserve System, 2023). This is the Federal Reserve's figure; the reader is urged to verify this in the original report.

On 8 March 2023, SVB announced a securities portfolio sale at a loss and a capital raise. When it happened, depositors, many of them channelled to the bank through the same network of venture capitalists, responded immediately. The total amount of money left on 9 March was approximately $42 billion, with additional withdrawals exceeding $100 billion predicted on 10 March, leading to the closure of this day (Board of Governors of the Federal Reserve System, 2023). The single-day outflows were around a quarter of the total deposits and SVB had approximately $170 billion in total deposits. This ratio is an approximation based on the figures mentioned in the cited document and not a figure reported in the cited review.

2.3 The official response

On 12 March, they invoked the systemic risk exception to ensure that all depositors of Signature and SVB got their money and, on the same day, the Federal Reserve established the BTFP, which offered loans to banks using high-quality securities valued at par, for up to one year. The result was that the losses on the markets value account would not be immediately deducted from the liquidity of borrowers' banks. This program ended its lending in March 2024. The guarantee of uninsured deposits was a "special measure" taken after the fact, and therefore raised questions of "moral hazard" and whether the formal coverage limit makes sense for large depositors (Federal Deposit Insurance Corporation [FDIC], 2023).

3. Literature Review

3.1 Interest-rate risk, deposit franchises and fragility

One of the most central empirical questions is: How close the banking system was to being insolvent, on a mark-to-market basis? According to Jiang et al. (2024), the tightening of policy in 2022 had resulted in large aggregate losses to banks' market value of their assets—trillions of dollars, they estimate, and many banks had low or negative market-value equity. They also believe that if uninsured depositors pulled their money in large numbers, a large number of banks, estimated at nearly 190, would not be able to pay all insured depositors without outside help. The main lesson they want you to take away is that the vulnerability was not limited to the loss of assets, but was also due to a depositor base that could run.

Drechsler et al. (2023) tackle the issue from the economics perspective of deposits. Previous research has found that banks can increase their spreads on deposits as their interest rates rise because depositors are slow to switch to higher-yielding deposits (Drechsler et al., 2017), so giving some protection to the interest rate risk on assets (DFA) can also be realized through the deposit franchise value. The 2023 paper contends that this hedge is tied to deposit stability, which is the least stable with respect to uninsured deposits, as they have more reason to monitor and to move. In this scenario, a bank that looks like it is 'hedged' on paper may be 'vulnerable' in reality, should the deposits that constitute the hedge be the ones most likely to walk out the door. Both of the two papers agree about the variable that turns uninsured losses into failure risk: the uninsured share.

3.2 Run dynamics, speed and information

A second track will explore the unfolding of the run. Cipriani et al. (2024) rely on data from payment systems which they are able to follow in almost real time. As they recall it, their results are: outflows were swift, took place amongst large depositors and were not limited to any particular bank, but see the paper for actual figures and the paths through which they believe they flowed. Cookson et al. (2023) study the impact of social media, finding that banks with a more active investor and depositor base on social media platforms had more negative market responses during the run. This is a working paper and the conclusions drawn from this paper should be taken as such. Metrick (2024) sets the episode in the broader context of banking panics, explains the events in the week that followed, and suggests that the panic of 2023 was similar to earlier banking panics in that it unfolded through a series of stages involving the spread of rumors of bank failures, the rush to withdraw funds from troubled banks, and the rapid conversion of deposits into electronic currency.Metrick (2024) traces the place of the episode in the longer history of banking panics, outlines the steps of the panic, and argues that the panic of 2023 was similar to earlier banking panics in that it passed through a series of stages, starting with the spread of rumors of bank failures, a rush for withdrawals from troubled banks, and the rapid conversion of deposits into electronic currency.

These studies indicate that speed of the runs themselves, as environments, was itself a changed environment. Shortest time to response for a supervisor or a bank is the time between mobile banking, concentrated depositor network and instant payment access. This is important to regulation because outflow rates are set for a given stress period based on assumptions.

3.3 Official reviews and international lessons

Official reviews are important evidence-based data as they are based on supervisory records that are not available to academic researchers. The Federal Reserve's review identified deficiencies in SVB's risk management processes, and it also identified an inadequacy of supervisors in promptly addressing

weaknesses that were identified within the bank, as well as a decrease in the rigor applied to a bank with a profile similar to that of SVB under the regulatory framework (Board of Governors of the Federal Reserve System, 2023). The Government Accountability Office (GAO, 2023) also did a preliminary review of agency action, and looked at the supervisory attention paid to SVB and Signature and its timeliness and effectiveness. On an international level, the Basel Committee on Banking Supervision (BCBS, 2023) examined the pandemic of bank runs from 2023 and found that it was driven by weaknesses in governance, in bank business models, as well as by interest-rate and liquidity risk, and that the speed and scale of deposit withdrawals merited a discussion of the treatment of certain depositors in the liquidity standards. Resolution was the primary priority of the Financial Stability Board (FSB, 2023), which took initial steps in learning from past experiences about the timeliness of action required and the operational preparedness that is essential.

The FDIC (2023) outlined three general options for deposit insurance: limited coverage (at current levels), unlimited coverage and targeted coverage for specific types of accounts (e.g., business payment accounts). Report balances the important financial stability issues with moral hazard and the practical issues each may present.

3.4 Agreement, debate and gaps

It's generally accepted that SVB and Signature were poorly managed, that they underestimated interest-rate risk and that uninsured deposits played a key role in the pace of the run. The discussion is largely one of focus and treatment. One interpretation of the Federal Fed review is that it highlights certain instances of management and supervisory shortcomings. A second reading, following Jiang et al. (2024) and Drechsler et al. (2023), emphasizes a broader structural vulnerability in banks of similar profiles, which was largely averted thanks to official action. A third question is whether the runs were more of a case of fundamentals, or of the Diamond and Dybvig (1983) type, where, in this case, the data on payments does not distinguish between.Metrick (2024) and the payment-data evidence in Cipriani et al. (2024) are compatible with either option, and the literature does not resolve the question.

There are two gaps that inspire this essay. First, a lot of empirical research is descriptive or based on a single episode, thus there is limited causal evidence of the impact of regulatory tailoring on bank behavior. Second, there is a tendency in the reform literature to consider capital, liquidity and deposit insurance as separate issues. Rather than treating them as answers to a single interacting vulnerability, the analysis below assesses them.

4. Analysis: Why the Interaction Matters

4.1 A simple framework

A stylized condition clarifies the argument. Suppose a bank's assets are worth less at market value than its deposits at par. Then late-moving depositors would suffer losses if the bank were liquidated, which gives every depositor a reason to move early. Insured depositors are protected whatever happens, so their incentive is weak. Uninsured depositors are exposed, so their incentive is strong. The vulnerable zone is therefore defined by two quantities together: the size of the market-value shortfall and the share of funding that is uninsured. A large shortfall with a small uninsured share is unlikely to produce a run, because most depositors have no reason to leave. A large uninsured share with a healthy market-value cushion is likewise unlikely to produce one, because the bank can pay everyone. Failure risk is highest where both are present.

SVB sat in this zone. According to the Federal Reserve's review, unrealized losses on its held-to-maturity portfolio approached its reported equity at the end of 2022 (Board of Governors of the Federal Reserve System, 2023); the precise figures should be checked against the report. With roughly nine-tenths of deposits uninsured, a loss of confidence among a small and closely connected set of depositors was sufficient to cause a failure. This is consistent with the findings that the uninsured share converts asset losses into fragility (Drechsler et al., 2023; Jiang et al., 2024).

4.2 Why the framework missed the combination

The regulatory framework in place in 2022 evaluated these two elements separately and, for banks of SVB's size, applied them lightly. Following legislation in 2018 and the Federal Reserve's tailoring rules in 2019, banks in SVB's asset range were subject to less demanding requirements than the largest institutions (Board of Governors of the Federal Reserve System, 2023). One consequence was that SVB could exclude

unrealized securities losses from regulatory capital. Reported capital ratios therefore remained comfortable while market-value solvency deteriorated, which weakened the signal available to both supervisors and markets.

Liquidity rules had a related limitation. Liquidity requirements are calibrated to outflow assumptions over a stress horizon, and the Basel liquidity coverage ratio uses a 30-day period. SVB's single-day outflow of roughly a quarter of deposits is far faster than such calibrations imagine. The BCBS (2023) review points toward reconsidering how liquidity standards treat deposits that can be moved quickly and by large amounts, and the FSB (2023) emphasizes that operational readiness, including access to collateral and central bank facilities on short notice, is part of resilience. The point is not that the rules were applied wrongly. They were designed in a period when run speed and depositor concentration looked different.

Supervisory behavior compounded the problem. The Federal Reserve's review reports that supervisors identified weaknesses but acted slowly, and that the changed regulatory posture reduced their willingness to press for remediation (Board of Governors of the Federal Reserve System, 2023). The GAO (2023) review of agency actions likewise examines the timing of supervisory responses. These findings suggest that rule design and supervisory culture reinforced one another.

4.3 Counterarguments

Two objections deserve consideration. The first is that the interaction story overstates the structural problem. Most banks with unrealized losses did not fail, and the failures involved banks with unusual funding concentrations and weak governance. This is true, and it is why the argument concerns a combination of conditions and not a general fragility of all banks. However, the evidence that a larger set of banks occupied an uncomfortable position (Jiang et al., 2024) suggests that the vulnerability was not unique to three institutions, even if their management made matters worse.

The second objection is that official intervention shows the system was resilient. The systemic risk exception and the BTFP did contain the panic. But a system that is stable only because of unplanned, exceptional backstops is not demonstrating robustness of its ordinary rules, and the exception creates its own incentives for large depositors to expect protection in future (FDIC, 2023). Resilience that depends on ad hoc intervention should be counted as a cost of the framework and not evidence for it.

5. Evaluating Reform Options

5.1 Recognizing unrealized losses in capital

In July 2023, the U.S. agencies put forward proposals to introduce the most stringent capital standards to a larger set of large banks, including the inclusion of AOCI as part of regulatory capital for banks beyond a size limit. This would be a solution to the information problem discussed in Section 4.2 as capital ratios would be based on amounts of securities that are available-for-sale in their market value. Though it's a good idea, it comes with some restrictions when compared with the interaction thesis. It is not applicable to "held to maturity" securities, on which a substantial proportion of SVB's exposure was based. Second, a bank might have a positive capital after a favorable AOCI adjustment, but still be in a "run," if its customers don't value its assets, or if the customers can turn them around faster than the bank can do so. Capital takes losses, but does not offer cash when there is a run. Since then, the status of the 2023 proposals has been unclear, and isolated references to that are not made here, but readers are referred to the agencies' current publications for the status of the proposals at that time.

A. Liquidity needs and preparedness.(5.2) Liquidity needs and preparedness.

The interaction argument weights liquidity measures handed specifically. These include broadening the definition of liquidity requirements to more banks, rethinking the maturity of the uninsured deposits, and having banks have a ready supply of liquid collateral at the Federal Reserve that can be borrowed. This is reflected in the focus by the FSB (2023) on operational readiness and in the concern raised by the BCBS (2023) relating to outflows' pace. The advantage of this way of thinking is that it explains how transactions that incurred losses turned into failures: the disparity between the rate at which people withdrew their cash and the rate at which assets could be liquidated. The problem is that an inflation of liquid assets is costly in terms of earnings on the bank and could have the risk of being diverted elsewhere; hence calibration is important. There is no evidence presented here that could lead to numerical thresholds.

5.3 Long-term debt requirements

In 2023, it was further proposed that banks with over $100 billion in assets maintain a minimum level of long debt so as to provide cushioning for losses, and to better enable resolution. This is basically the same as the FSB (2023) focus on resolution. Long term debt may help lower the cost of the deposit insurance fund as well as public bailouts in the case of failure. It does not nullify a run but since a run adds up before resolution starts. It is recommended to be used in addition to liquidity measurements and not in replacement.

5.4 Deposit insurance design

FDIC (2023) options are customized according to the uninsured rate. If coverage were unlimited, there would be no reason for any depositor not to run but there would be a reason for depositors who are able to watch banks to run. One can argue that while limited coverage is probably right for most of the time, the interventions in March 2023 demonstrate that a limiter for big depositors is unlikely to be believed during a crisis. A compromise is to cover targeted payment accounts containing operational funds that businesses are not able to easily liquidate. The allure to it under the interaction thesis is that it brings the component of the balance that constitute the runnable balance down where there is a low number of alternatives available to the firm. The disadvantages is that it is complicated to define and may create a risk of being inappropriately "qualified" through a firm structures. The decision is a compromise between stability and discipline, more substantial than evidence alone, but one of least coherence in terms of interaction is fending off exceptional intervention to keep things the way they are.

5.5 Supervision

Quotidian reviews and the GAO (2023) reviews both highlight the need for timely escalation of supervisory actions. If supervisors do not want to make changes if they learn about area(s) of weakness, then the rule changes will have little impact. The reforms to supervisory practice are more difficult to quantify than the changes to the capital ratios and that may be the reason they are not so feature prominently in the literature of reform; nevertheless, it is clear that the question of whether the interaction between the two kinds of risk – rate risk and funding risk – is identified early is directly related to supervisory practice reforms.

5.6 Synthesis

In sum, these options are different in addressing various aspects of the interaction. Capital recognition brighter lights loss visibility. Liquidity readiness is a response to the quickness of outflow. Money at risk is the cost of failure and this should be taken care of by Long Term Debt. Deposit insurance reform is about rushing. Supervision addresses detection. None of these are entirely tackled by any of them; and in conjunction, the attention of the liquidity readiness in addition to the design of the liquor store insurance would be most directly associated with the mechanism that caused the failures in March 2023, and capital recognition would be a required (but incomplete) complement.

6. Limitations and Conclusion

6.1 Limitations

There are a few ideas that I'm missing from this essay. Uses a limited number of episodes limiting inferences. There are several key papers whose results are used here which are in the process of being published (and whose results are subject to revision), and some quantitative statements here are reported from memory from the original papers and marked for verification. The framework in Section 4.1 is stylized and interactive strategic behaviour between the depositors is not modelled formally. Much of the evidence related to the effect of tailoring on behavior comes from a self-assessment by the Federal Reserve, and it is important to keep that Mind in Mind when reading it. Also, one should be aware that the policy setting has developed since the proposals outlined above and the essay is not meant to reflect the existing policy stance.

6.2 Conclusion

The failures in March 2023 can be better explained in terms of unfulfilled interest rate losses combined with the lack of runability in the deposit base and their extensive uninsured nature, as well as with regards to poor governance and supervision. The recent literature is unanimous that important risk exposures included uninsured deposits and risk to interest rates, but variable in scope on which banks were affected by the runs, and on whether the runs were fundamentally or

panic-driven. If the vulnerability was not caused by one component alone, then "remedies" seem to be more likely to be effective if they improve the readiness of liquidity in addition to making changes to how capital is measured, and if they enhance the powers of supervisors to escalate cases. The predominant need for future research is the collection of causal empirical evidence of how the nature of regulation's tailoring and the nature of deposits affected banks' performance, to adjust regulatory reforms on the basis of a wider range of experience than the one in the current episode.

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