

SILICON VALLEY BANK AND THE CHANGING STRUCTURE OF BANKING



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Starting in March 2023, the U.S. banking sector experienced the failure of several major banks, and the entire industry was threatened with a crisis. Rising interest rates over the previous two years had diminished the value of banks' assets, as they typically borrow short term and lend or invest long term at fixed rates. But most banks have stable funding from deposits on which they have historically been able to pay low rates even when market interest rates rise, so that the losses in asset value are typically offset by increased future earnings. The banks that failed did not have these hedges because, in different combinations, their depositors were uninsured, exposed to increases in interest rates, or not "sleepy." While policy responses have stabilized the banking sector for 2023, more banks may face similar challenges in the future as fintech and financial innovation continues to erode banking market power both in deposits – making the cost of funding more responsive to market interest rates – and in lending – reducing the role of long-term relationships between banks and borrowers and so reducing the stability of funding, but also the importance of banks in the U.S. economy.

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01
INTRODUCTION

In early March of 2023, Silicon Valley Bank then First Republic Bank collapsed spectacularly and in rapid succession, and were taken over by the FDIC. Signature Bank was taken over shortly thereafter. Together these three banks had $550 billion assets, exceeding any year of the financial crisis and setting an ignominious new record. These failures raised fears of a systemic U.S. banking crisis, and deposits started flowing out of all but the biggest, too-big-to-fail banks in the U.S. banking sector. Two policy responses stabilized outflows. The Federal Reserve created an unusually generous lending facility for banks, and the FDIC resolved the failed banks to preserve the value of all deposits, including those that were *de jure* uninsured. While the outflow of deposits has stabilized, many critiques are claiming that these policies have only temporarily papered over deep problems in the banking sector that will hurt the U.S. economy, either through a crisis or a longer term drag on growth.

Is there an elevated risk of a banking crisis, and what can we expect over the next few years? While there is a risk of further losses that cause a crisis, I argue below that these concerns are overblown for now. Instead, the real concerns are longer-term and lie in the changing evolution of the banking sector in the U.S., partly driven by fintech and the ongoing evolution of lending and transactions services in the U.S. economy.

I start by reviewing how banks operate and argue that two central factors caused the failure of these three banks. The first factor was the rise in inflation and medium-term interest rates that started in early 2021. After waiting nearly a year to respond, the Federal Reserve raised interest rates during the year before the bank failures, and the combination of high short rates and high inflation raised the entire yield curve. Regulators and bank managers thought that banks were well positioned for possible interest rate increases, although perhaps not of the magnitude that we witnessed. And the banks largely were well positioned. But the second factor was what led to disaster for these banks nonetheless. Most banks have sticky deposits, that make them highly profitable when interest rates rise. But these three banks did not, because a lot of their deposits were uninsured and/or a lot of their depositors were particularly vulnerable to interest rate rises themselves.

But these failures are important for the future of the U.S. banking system as harbingers. The banking sector is facing increasing competition from a variety of fintechs and neobanks and challenger banks. These challengers are both changing how lending is funded and reducing how much market power banks have over depositors. On the one hand, these innovations are improving the efficiency of our financial system, but on the other hand, they also pose significant risks unless bank managers and regulators adapt in ways they did not in the cases of the three failed banks.

02
BANKING

Traditionally, banks do what is called maturity transformation: they invest in higher-yield, long-term assets like loans and fund these investments largely with lower-yield, short-term deposits. In practice, the assets that banks hold are not just loans. They also lend money to the Federal Reserve (bank reserves) and hold asset like Treasury bills for liquidity purposes, which allows them to come up with cash quickly to meet an unusually high amount of withdrawals. They also hold long-term securities like bonds, own physical branches, and can hold derivatives to hedge risks associated with any these assets. And finally, they have "franchise value," which is the value of the relationships, brand name, and organizational structure that the bank has established over time. Similarly, in practice, the liabilities of the bank are not just demand deposits but include other short-term and longer-term debt, and of course owner equity – the residual value of the bank in excess of the deposits and debt-like liabilities on the bank balance sheet.

Over the last few years, banks, particularly large regional lenders like the banks that went insolvent, saw inflows of deposits and little demand for loans.[2] When the pandemic hit, the Federal government spent trillions to support people and the economy. But U.S. national output and income temporarily crashed – there was not the actual income to back up these transfers at the time, and less actual output produced to spend on. Households and firms saved more, and the government funded the transfers by issuing debt.

Banks took in deposits from households and firms and lent to the government, by buying Treasury debt (and increasing bank reserves at the Federal Reserve). That is, over the past few years, the U.S. banking system has been practicing narrow banking at the margin. Rather than making loans to households and businesses, they have been lending to the government. In some ways, this is inefficient. The reason we have the complex and costly regulatory and supervisory structure of the banking system is to provide cheap deposit-based funding to banks to make information-intensive

2 When I refer to banks and the banking sector, I mean to exclude investment banks.

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loans to households and to small and medium sized enterprises (SMEs), not to invest in liquid government securities. That can be done by absolutely anyone, most obviously a government bond fund and, for short-duration assets, a prime money market mutual fund.

Like any other business, a bank can fail because of insolvency problems or because of liquidity problems. A bank becomes insolvent when it is no longer profitable in the sense that the value of its current debts and future costs of running the business exceed the value of its current assets and future revenues. A bank becomes illiquid when it cannot today meet its current obligations with its currently available funds.

For banks (and many bank-like financial institutions), these two types of failure are more closely linked than for the typical firm.[3] Insolvency tends to cause illiquidity at a bank, as depositors and short-term creditors withdraw their funding if they are not insured, or, if they are insured, as (competent) regulators shut down the banks to avoid greater losses that they would have to cover. Illiquidity on the other hand tends to cause insolvency because people value banks for their liquidity services. A bank that cannot meet withdrawals by liquidating its assets or borrowing against its future profits fails, which is why most banking systems have a lender of last resort that can support banks that are illiquid but are not insolvent in the long-term sense. A final note: whether a bank failure is due to liquidity or solvency can be difficult to discern in real time. Whether a banking crisis is a liquidity crisis or a solvency crisis can be extremely difficult to tell even years later.

03
WHAT CAUSED THE 2023 BANK TROUBLES?

The first factor precipitating the three recent bank failures and raising concerns about a broader banking crisis is the recent rise interest rates. Increases in interest rates caused the market value of the bonds and loans that banks own to decline. The post-pandemic increase in actual and expected inflation caused the market interest rate on 5-year Treasury debt to rise by four percentage points between the start of 2021 and its peak in October of 2022. How bad was this for banks? A rough proxy for the implied decline in the current value of their loans and assets – most of which are U.S. government obligations and commercial or residential mortgages – is given by the 8.4 percent decline in the U.S. Mortgage-Backed Securities Index over the past three years.[4]

The second precipitating source of losses for bank assets is credit related losses. The post-pandemic period has seen a large decline in the value of commercial real estate, which secures many commercial and industrial loans made by banks.[5] At present, these losses appear to be more minor than interest rate losses for most banks. The best state-of-the-art estimate, done shortly after the collapse of Silicon Valley Bank, is that bank assets have lost about 10 percent of their value with some banks losing less, and others losing more than 20 percent.[6] This total loss is slightly larger than the rough estimate of interest rate losses, and suggests that, for the majority of banks, asset values have declined primarily due to increases in interest rates.[7]

But surely, you might ask, bank managers, regulators, and supervisors must have foreseen the possibility of interest rates rising from historically low levels and prudently hedged that risk? The answer is no and yes. The answer is no in the sense that banks did not hedge these risks using derivatives. Banks could have completely insured their on-balance-sheet assets using interest rate swaps. But to my knowledge, no banks or regulators are claiming to have been hedged. And the best independent estimates are that they were not.[8]

But banks were hedged in a way. When market interest rates rise, new loans that banks make and new securities that they buy pay higher interest rates, but they do not tend to pass along these higher interest rates to depositors. So when interest rates rise, banks become more profitable. Of course, over time some depositors leave the banks for high-

3 Some firms that are insolvent operate for a while before being shut down. And many firms enter bankruptcy for reasons of liquidity, because they cannot sell or borrow against future profits, and emerge solvent once given liquidity, while illiquidity at a bank causes insolvency.

4 This index measures the performance of residential mortgage pass-through securities publicly issued by U.S. agencies in the U.S. domestic market, so encompasses the decline in asset values purely due to interest rates increases and not due to any credit losses.

5 Gupta, Mittal, Van Nieuwerburgh (Sept 2022), https://www.nber.org/papers/w30526.

6 Jiang, Matvos, Piskorski, Seru (March 2023), https://www.nber.org/papers/w31048.

7 There is uncertainty around this estimate, and my conversations suggest that practitioners and regulators view actual losses are less than this estimate. That said, more credit risk may yet be realized from real estate lending.

8 Jiang, Matvos, Piskorski, & Seru (April, 2023), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4410201.

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er rates elsewhere, and competition among banks raises deposits rates slowly over time. But, traditionally, a bank's increase in franchise value is a natural hedge for the losses on existing loans caused by interest rate increases.

Bank managers and regulators understand these dynamics, and the framework of banking supervision embeds this framework into bank accounting. Banks can designate loans and securities as "hold to maturity" which means that they do not have to recognize changes in value due to changes in interest rates on their balance sheets. The motivation for this is exactly that banks' franchise values provide a natural hedge. The November 2022 Financial Stability Report states: "…in a rising rate environment, the value of banks' deposit franchise increases and provides a buffer against these unrealized losses that is also not captured by Generally Accepted Accounting Principles."[9] To monitor a bank, regulators and managers could compare the market value of all liabilities to the market value of all loans and assets and, critically, also franchise value. But instead, they designate some assets as "hold-to-maturity" reflecting that they are (in theory, or partly) offsetting the interest rate risk in the franchise value. Banks then monitor and report current and expected net interest margins, which measure the extent to which the average interest rate earned on assets exceeds the average interest rate paid for funding (mainly deposits). Like marking everything to market, this approach measures whether a bank is long-term solvent.

In contrast to losses due to interest rate increases, losses due to defaults or credit impairment are, appropriately, treated differently. When material risk of default appears (usually a missed loan payment for example), the bank provisions for this credit loss immediately, the loss in loan (or asset) value is reflected on the balance sheet, and this loss reduces the capital ratio of the bank and may require that it raise capital or lend less. While bank managers and regulators may perceive increases in default probabilities that are not yet reflected on balance sheets, we partly can check the above claim that credit losses on bank balance sheets were relatively small by looking at the Federal Deposit Insurance Corporation ("FDIC") report of the (aggregated) bank balance sheet of the U.S. banking sector. The FDIC shows only small declines in asset values currently, consistent with only small credit losses.[10] That said, the biggest concern for banks going forward is that credit losses continue to grow. Piled on top of the interest rate losses, such losses could lead to contractions in lending and more bank failures.

Turning back to interest rates, given the regulatory environment, the different hold-to-maturity treatment of interest-rate losses is a good thing. Booking interest rate losses would impair a bank's capital ratio and reduce its ability to make loans, which would be a bad thing if the bank were still long-term solvent. Instead, managers and regulators can focus on solvency.[11]

So the big question: did the increases in interest rates damage the long-term solvency of the U.S. banking sector or did the natural hedge of franchise value insure banks against their losses? The best estimates from April 2023 suggest that, while franchise value may not have hedged all of the interest rate losses, it did hedge most of them.[12] Thus, increases in interest rates were not good news for banks, but they appear unlikely to cause a solvency crisis for the banking sector at this point.

But then what happened to the banks that failed?

04
THE BANKS THAT FAILED

The banks that failed did so in large part because they were outliers – more exposed to the interest rate increases than most, and significantly reliant on deposit like technology startups and cryptocurrency firms that were hit hard by increases in interest rates. But these bank failures are significant because they tell us where the entire banking sector may be headed.

Silicon Valley Bank failed for three reasons that amplified the losses from increasing interest rates that have hit almost all U.S. banks. First, more than half of its depositors were technology startup firms.[13] As interest rates rose, most of these startups stopped getting new funding from investors. Because higher interest rates raise the rate of return

9 Page 34, https://www.federalreserve.gov/publications/files/financial-stability-report-20221104.pdf.

10 https://www.fdic.gov/analysis/quarterly-banking-profile/.

11 For a model and an analysis of some of the trade-offs in this approach see Begenau, Bigio, Majerovitz, & Vieyra (2023) https://julianebegenau.com/files/2023/04/BankQTheory_PaperMain.pdf.

12 Drechsler, Savov, & Schnabl (April 2023), https://pages.stern.nyu.edu/~asavov/alexisavov/Alexi_Savov_files/Deposit_Franchise_Valuation.pdf.

13 The figures for this paragraph come from https://am.jpmorgan.com/content/dam/jpm-am-aem/global/en/insights/eye-on-the-market/silicon-valley-bank-failure-amv.pdf.

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required to make a business viable, some of these startups went under, some defaulting on their loans from SVB. Second, most of SVB's deposits were not insured. More than 90 percent of SVB's deposits came from firms, which typically have account balances well in excess of the $250,000 limits on FDIC insurance. In contrast, most banks are mainly funded by smaller retail deposits. Finally, these startups were funded by a few small venture capital and/or private equity firms. This created a perfect storm: SVB lost money due to increases in interest rates and some loan defaults, their depositors were largely uninsured, and their depositors were not dispersed, sleepy households, but firms connected by a small number of financially-savvy investors. After more than a year of a declining stock price and increasing oversight by bank supervisors, when the regulators acted to have SVB raise more capital, deposits were withdrawn at such a rate that SVB could not meet the demand and it failed. The irony is that this was not the disruption of the traditional financial sector that the fintechs using SVB had hoped for.

Like SVB, First Republic and Signature Bank also had large shares of their deposits that were uninsured. Less than 40 percent and less than 10 percent of deposits were retail deposits respectively.[14] Rather than the deposits of startups, First Republic catered to high net-worth clients, with significant deposits above the insured maximum. Signature had deposits from cryptocurrency exchanges and issuers, and had lost more than 20 percent of its depository base before it was closed by regulators.

The immediate problem at these banks was the combination of interest rate losses that were hedged by franchise value and lots of uninsured deposits that destroyed franchise value as they left.

05
THE POLICY RESPONSE

The failure of these large regional banks was not completely unexpected by markets. The stock prices of these banks had been declining for more than a year. But their failures were triggered by sudden deposit outflows, and following the failures, other banks in the system started seeing significant outflows, while the largest banks, the Systemically Important Financial Institutions ("SIFIs") saw significant inflows. Research shows that when deposits leave a bank, even for spurious, non-fundamental reasons, they do not return thus destroying franchise value.[15] Further, in a panic, even some insured depositors run.[16] Finally, recent financial innovations have made deposits less sticky (as discussed in the next section). As examples, effective deposit insurance can be increased dramatically by moving to certificates of deposit distributed across banks (e.g. CDARS) or by using accounts that deposit balances across many banks to stay under the insured maximum at each (e.g. Wintrust, or the back-end product IntraFi).[17]

In response to the deposit outflows, the FDIC and Federal Reserve coordinated a response that was mostly but not entirely standard. They reduced the incentive for depositors to run, by convincing depositors who were *de jure* uninsured that they were *de facto* insured and by increasing the liquidity of banks to meet withdrawals.

Without going into the details or timing, the FDIC took over each bank, and sold all its assets and liabilities, including uninsured deposits, to a better-capitalized bank. Thus, the uninsured depositors at the banks were effectively bailed out. While most previous bank failures have involved no depositor losses, there have been bank failures in U.S. history in which the bank has been sold at a loss and the FDIC has imposed some of the losses on uninsured depositors. By not imposing any losses on any uninsured depositors in these recent cases, the FDIC helped to convince depositors that all deposits were safe, at least for now. Note that when these banks were sold, they were sold at a loss, and these losses were absorbed by the FDIC insurance fund that is funded by mandatory insurance fees (taxes) on banks. And the previous owners of the banks got nothing.

The other Important policy response was the establishment of the Bank Term Funding Program ("BTFP") by the Federal Reserve. The Federal Reserve as the lender of last resort is supposed to lend freely to solvent banks in exchange for good collateral at high interest rates, Bageho''s dictum. The BTFP lends freely at high rates, but also allows banks to borrow more than the market value of the securities that they pledged (they can borrow par value), so that some of the lending is actually uncollateralized. Thus, lending is more "free" than Bagehot would recommend. Why? Because of the "hold to maturity" logic and accounting. Consider a bank that has the expected future

14 Cembalest (March 10, 2023) https://www.chase.com/personal/investments/learning-and-insights/article/eye-on-the-market-silicon-valley-bank-failure.

15 See Iyer & Puri (2012), https://www.aeaweb.org/articles?id=10.1257/aer.102.4.1414.

16 Shin (2009), https://www.aeaweb.org/articles?id=10.1257/jep.23.1.101.

17 Firms are often required to bank where they borrow which may restrict their options to withdraw deposits, but can require banks to protect their deposits in other ways that can destroy the surplus that the bank earns on deposits or use regulatory capital.

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franchise value to cover its losses on long-term loans and securities due to the increase in interest rates. If deposits are withdrawn and it has to sell its securities, it has to book the losses, which reduces regulatory capital and restricts lending. If it can instead borrow against the securities, it simply replaces deposits with borrowing from the BTFP. From the bank's perspective, this is an imperfect fix because the interest rate on the BTFP is above that typically paid on deposits. So some franchise value is destroyed. But the idea of the BTFP is that clearly solvent banks will have all the liquidity they need to meet any deposits outflows, so there is no incentive for depositors to withdraw in the first place.

Indeed, following these policies, the deposit outflows from large regional banks stopped.

What would have happened had these policy choices not been made and would it have been a big deal?

Had the policy choices not assuaged the fears of uninsured depositors, there likely would have been three significant issues for the U.S. economy. First, banks with the biggest mark-to-market losses, the most uninsured depositors, and the biggest reliance on franchise value would have failed as uninsured depositors fled. Second, a set of banks also exposed to these factors would have experienced deposit outflows and would have reduced their lending. In 2009, when a European Union regulation lowered the amount that was insured in bank accounts in Denmark, there was a reshuffling of deposits across banks as depositors moved amounts above the maximum to other banks to get insurance.[18] Those banks experiencing net outflows reduced lending. Third, and perhaps still happening slowly over the next few years, there would have been decreased competitiveness and increased concentration in the U.S. banking sector as the largest SIFIs received deposit inflows at the expense of smaller banks.

Had the policy choices not assuaged the fears of uninsured depositors, there likely would have been three significant issues for the U.S. economy

The obvious (and unlikely) policy response would be to insure all deposits and thus stabilize the distribution of deposits across banks. Realistically, large depositors do not continually monitor bank balance sheets, and so do not provide information that is not already available to supervisors or visible in market prices. A counterargument is that runs caused by the lack of insurance ensure that regulators close failing banks promptly.

06
CHANGES IN BANKS, FINTECH, AND FUTURE RISKS

Were these banks the canary in the coal mine? The stability and solvency of our banking system when interest rates rise relies upon depositors being sleepy enough and banks having enough market power that interest rates on deposits can be kept low and banks can make high profits for a while. A significant part of the story of the bank failures so far is that the recent rise in interest rates exposed the fact that some banks did not have those sleepy depositors or that market power, and these banks failed. These banks were also banks without strong lending franchises, that is, where deposit growth far outstripped lending opportunities. If the rise in fintech in banking continues, many more banks may find themselves in the same boat, without sleepy depositors and without lending relationships that help stabilize deposits, and so without an increase in franchise value the next time interest rates rise.

Consider first deposits, the funding side of banking. Financial innovation is pushing hard to contest deposits, which would increase the cost of funding for banks and change franchise values. As noted above, there are a variety of deposit management fintechs (and roboadvisers) that compete for deposits by paying close to market short-term interest rates on balances in deposit accounts. Consumers can now keep their money in checkable money market mutual funds or apps that look like banks apps but that deposit account balances in an account at the U.S. bank with the highest interest rate each night. Apple just entered the market with a bank account, and The Narrow Bank applied for a banking license to practice narrow banking by simply investing all deposits in its reserve account. It plans to offer accounts that pay an interest rate slightly below the rate paid by the Fed on reserves. So far, these innovations have had only a small impact on the overall stickiness of deposits. But I expect that competition is coming hard for deposits over the next decade.

Second, consider lending. Challengers have been far more successful in disrupting bank lending. Mortgage brokers

18 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2780073.

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have taken over originating most mortgages, and companies like SoFi make lots of student loans. Private credit is growing, as companies like Blackstone, Apollo, and KKR are providing financing to businesses that would previously have borrowed from banks. Insurance companies are using various means to fund private credit. Peer to peer platforms make personal loans and lend to consolidate credit card debt. The SIFIs are competing with the rest of the banking sector to make information-intensive loans to SMEs by using big data to substitute for the information that regional and smaller banks gather directly. For example, JPMorgan Chase brough in the OnDeck system a few years ago to pre-approve small business loans based on analysis of their account-level data. And the process is continuing, as start-ups, existing banks, and tech companies are developing innovations in lending that do not rely on deposits to fund lending. These innovations reduce the strength of the relationship between corporations and banks that partly stabilizes bank deposits. These innovations also reduce banks' franchise values – the higher interest rates that banks can earn on loans that require the information that they are uniquely positioned to create and on which a mutually-beneficial long-term relationship is built.

At the same time, as described above, banks have moved towards holding fewer loans on their balance sheets, and instead holding more tradeable securities. For regulatory reasons, they hold a lot of mortgage backed securities. But once a mortgage is securitized, there is no important reason that it be held by a bank rather than by any other investor. Funding for the loan need not come from deposits or the banking sector.

Together these trends suggest we do not need as large a traditional banking sector, in which a costly regulatory framework oversees an opaque process in which liquid deposits fund illiquid loans. In fact, a lot of lending is already funded by investors through securitization. Lots of loans are bundled and (mostly) made liquid. And as a result, banks themselves are investing less in loans and more in securities and the traditional business of banking is shrinking, banks need fewer deposits. These changes alter the risks that face banks. And also have significant implications for systemic risks and for regulation. Financial stability will depend more and more on different financial institutions and funding sources than just banks and deposits.

One promise of fintech in banking is that competition can deliver higher interest rates to depositors. But this promise comes hand-in-hand with a peril. To the extent that challenger banks and neobanks succeed in delivering value for depositors, they will make deposits more contestable, which will reduce the extent to which bank (or neobank or challenger bank) franchise value hedges interest rate losses. Managers and regulators should not count heavily on sleepy depositors in the future, the way they have with mixed success in the recent past. ■

> ***Had the policy choices not assuaged the fears of uninsured depositors, there likely would have been three significant issues for the U.S. economy***

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