

Analysis of SVB's Collapse from Financial and Human Nature Perspectives

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Abstract. Following the Federal Reserve's rapid increase in interest rates, the bankruptcy of Silicon Valley Bank raised concerns of the general public. Selecting data, tables, graphs, financial reports, and media reports from the Federal Reserve, Silicon Valley Banks Financial Group, Wall Mine, and other resources, this research finds that duration mismatch and the problem in the executive team interact with each other and affect the stable functioning of SVB, contributing to its failure. By analyzing the resources mentioned above, making comparisons where it is possible, and conducting logical reasoning according to human psychology, this research realizes that it is the factors that are mentioned before that responsible for the collapse of Silicon Valley Bank. Based on the research result, we claim that large financial institutions need to learn lessons from the event of SVB.

Keywords: Silicon Valley Bank, Duration mismatch, Executive team, Financial institutions

1. Introduction

The collapse of Silicon Valley Bank (SVB) in early 2023 marked a significant event in the financial landscape, standing as the second-largest bank failure in U.S. history. The cataclysmic downfall was spurred by a relentless bank run that exposed the vulnerabilities ingrained within SVB's operational framework. SVB's insolvency was a key factor, worsened by a mismatch in its asset-liability management strategy. The bank's heavy investments in long-term fixed-rate securities during a period characterized by persistently low interest rates left it acutely susceptible to the Federal Reserve's abrupt and aggressive rate hikes, precipitating substantial mark-to-market losses.

Moreover, the crisis was further compounded by a series of inadequate risk management practices. These issues led to a swift loss of depositor confidence, resulting in a bank run. The catastrophic collapse of this financial institution not only unveiled the fragility of individual banking entities but also underscored the intricate interdependencies that underpin the broader financial system, serving as a stark reminder of the ramifications of systemic vulnerabilities and lapses in risk governance.

This analysis will delve into the multifaceted factors that culminated in SVB's demise, shedding light on the intricate web of challenges faced by the bank and the profound implications of its

collapse on the financial sector at large.

The paper is organized in the following way: Part 2 is the analysis of the cause behind the collapse; Part 3 is the background and impact of the Fed's fund rate policy changes. Part 4 is a financial data comparison between SVB and large banking organizations (LBOs), and Part 5 is the analysis of aspects of the SVB's executive team.

2. Analysis of SVB's collapse from financial perspectives

2.1. Duration mismatch of SVB's assets and liabilities

2.1.1. Analysis of assets

Based on Figure 1, SVB displayed a significant increase in the value of its asset portfolio, which expanded from \$57 billion in 2018 to \$212 billion in 2022, reflecting a 271.3% growth. It was primarily driven by new capital inflows into the bank, enabling expansions in net loans, from \$28.1 billion to \$73.6 billion, and investment securities, from \$25.8 billion to \$125.1 billion.

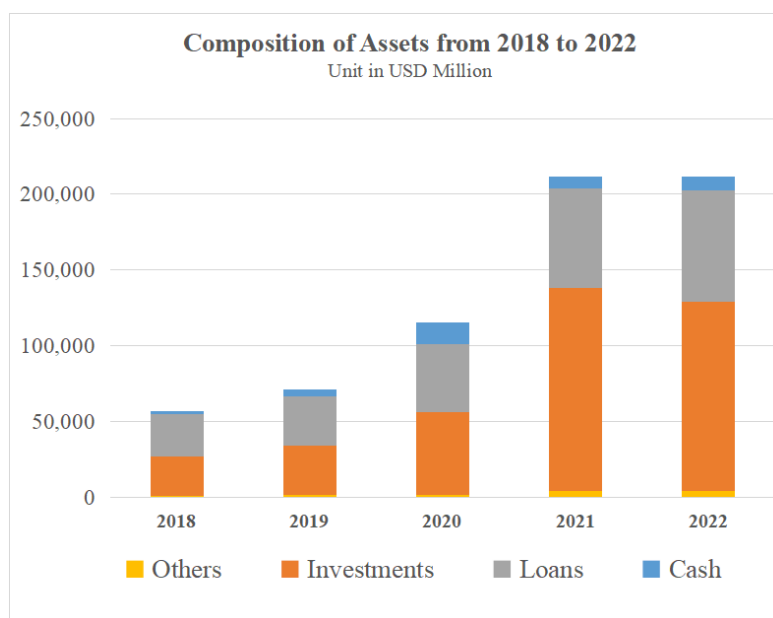


Figure 1. Composition of assets from 2018 to 2022

In addition to net loans and investment securities, SVB's asset classification includes cash and cash equivalents and other assets. However, these two categories account for small proportions relative to net loans and investment securities.

2.1.2. Net loans

Silicon Valley Bank (SVB) expanded its net loans from \$28.1 billion to \$73.6 billion, representing a growth of 161.9% from 2018 to 2022. This expansion was mostly driven by clients in the technology and life sciences/healthcare sectors. SVB's client base spanned various stages of development: early-stage startups with revenues under \$5 million, mid-to-late-stage companies with revenues between \$5 million and \$75 million, and mature companies with revenues over \$75 million [1]. Despite the significant increase in loan volume, net loans as a percentage of total assets decreased from 49.2% in 2018 to 34.8% in 2022, demonstrating a diversified asset allocation. This

strategic focus underscores SVB's commitment to supporting the financial needs of innovative and high-growth companies throughout their development stages.

SVB's primary clients typically received loans with relatively low interest rates and longer maturities, often extending beyond five to ten years [2]. While this approach supported the financial stability and growth of these innovative companies, it also introduced certain risks. The prolonged maturity of these loans meant that SVB's assets were tied up for extended periods, potentially becoming less flexible in responding to changing market conditions. The lower interest rates, although beneficial for clients, implied that the returns on these loans were not as high, creating a potential imbalance when compared to the interest rate environment. This scenario laid the groundwork for financial complexities that could impact the overall health of SVB's asset portfolio.

2.1.3. Investment securities

Based on Figure 2, SVB's investment securities primarily consisted of Mortgage-Backed Securities (MBS), which were the largest segment of its portfolio. The value of SVB's investment securities surged from \$25.8 billion in 2018 to \$125.1 billion in 2022. Investment securities accounted for 45.0% of total assets in 2018, rising to approximately 59.0% in 2022. MBS, favored for their yield and perceived stability, were central to SVB's strategy and were categorized as either Held-to-Maturity (HTM) or Available-for-Sale (AFS).

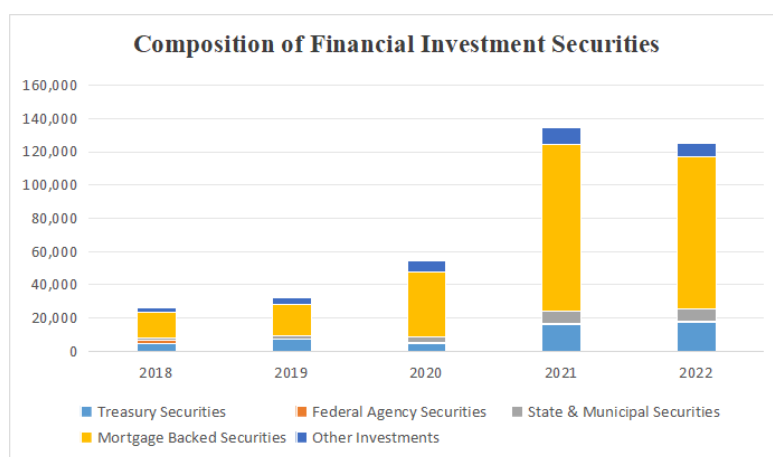


Figure 2. Composition of financial investment securities

Figure 3 indicates that SVB predominantly invested in HTM securities, which made up about 76.1% of their portfolio in 2022. This approach aimed to reduce income volatility and avoid the immediate recognition of losses due to interest rate fluctuations, thereby preventing public panic. HTM securities were recorded at historical cost rather than market value, shielding them from market volatility on financial statements. This strategy also benefited regulatory capital preservation, as HTM securities' unrealized and unreported losses did not impact regulatory capital immediately.

HTM securities are intended to be held until maturity, often extending over several years, with fixed interest rates that remain constant over the life of the security. By holding these securities to maturity, SVB sought to stabilize its income statements and avoid recognizing unrealized and unreported losses caused by fluctuating interest rates. However, this long-term holding strategy created a significant duration mismatch. While SVB's assets were tied up in long-term securities, it faced the potential need to meet short-term liabilities. As interest rates rose, the unrealized and unreported losses on these long-term securities became more apparent, undermining confidence and

contributing to a bank run. It can be seen from Figure 4 SVB's unrealized loss had increased from \$84 million to \$2253 million from 2018 to 2022.

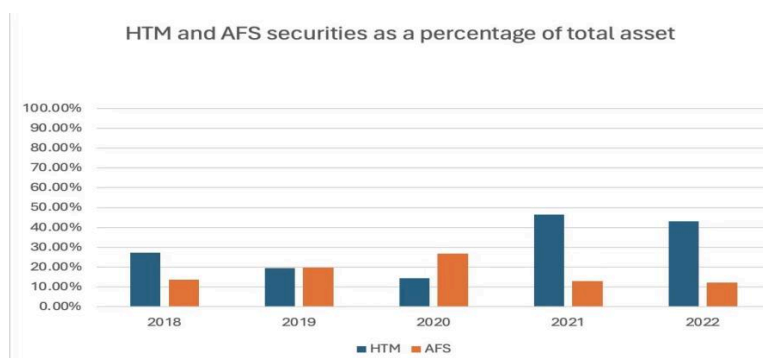


Figure 3. HTM and AFS securities as a percentage of total asset

AFS securities, comprising approximately 23.3% of SVB's investment portfolio in 2022, offered liquidity and flexibility, allowing SVB to sell them to meet liquidity needs or capitalize on market opportunities. These securities were marked-to-market, introducing financial statement volatility but also providing potential capital gains. Changes in AFS securities' value directly impacted financial statements, reflecting the bank's financial health but also exposing it to potential market-driven losses.

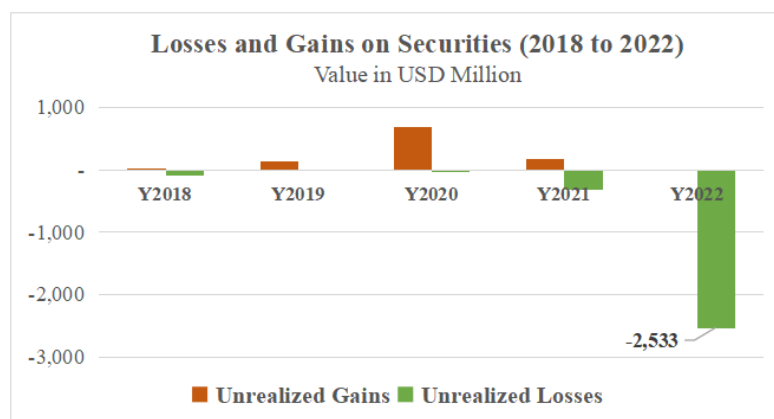


Figure 4. Losses and gains on securities

The significant duration mismatch in SVB's investment strategy, with a heavy reliance on long-term HTM securities, exposed the bank to substantial interest rate risk. This mismatch, coupled with the eventual recognition of unrealized losses, was pivotal in SVB's instability.

2.1.4. The composition of liabilities

Figure 5 suggests that, in 2018, SVB's liabilities experienced gradual growth, with a steady increase in deposits as it catered to the financial needs of startups and mature companies in the technology and life sciences sectors. By the end of 2018, SVB's total deposits were \$44.6 billion, which increased to \$173.1 billion by the end of 2022, marking a 288% increase. This growth was particularly pronounced between 2019 and 2021, a period during which SVB Financial Group's size tripled, largely driven by low interest rates and an influx of client liquidity through various funding events such as IPOs, secondary offerings, and venture capital investments. The bank's deposit base

grew substantially, with a significant concentration in venture capital-backed (VC-backed) and early-stage start-up firms [3].

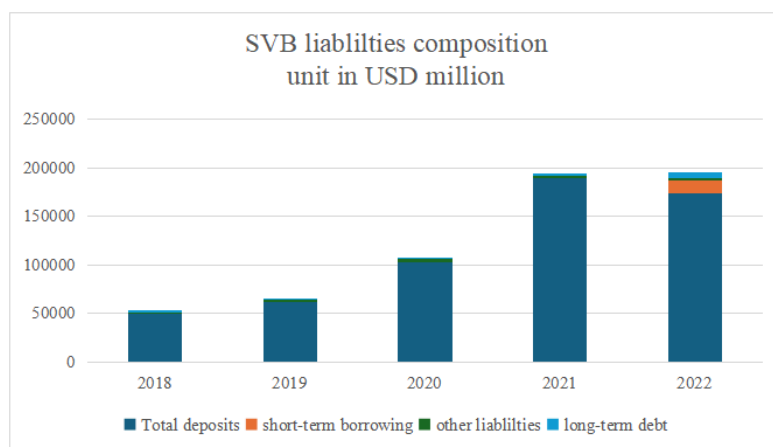


Figure 5. Liabilities composition of SVB

By 2022, SVB's liability structure was heavily reliant on deposits, which comprised 81.1% of its total liabilities. A critical component of these deposits was demand deposits, which stood at \$94.3 billion, representing 54.5% of the total deposit base. Demand deposits are typically short-term in nature, with interest rates that are relatively low. SVB's primary clients for demand deposits were technology and life sciences firms, particularly those backed by venture capital. These clients often held large balances to manage operational expenses and funding needs.

As interest rates began to rise in 2022, the dynamics of SVB's deposit base shifted. The cost of funds increased, and the previously low-interest environment that had facilitated deposit growth started to reverse. Clients, particularly those in the tech sector, began to face their own liquidity challenges, leading to increased withdrawal of deposits from SVB. This created a substantial risk, as approximately 94% of SVB Financial Group's total deposits were uninsured by the end of 2022. This lack of insurance coverage meant that the bank's deposit base was highly sensitive to market confidence and perceptions of risk.

SVB's management faced challenges in managing the concentration risk inherent in its liability structure. The bank's strategy heavily relied on the continuous inflow of deposits from a narrow client base in the technology and VC sectors. As the economic environment changed and the tech sector experienced a downturn, the bank was ill-prepared to handle the rapid outflow of deposits.

It is indicated in Figure 6 that the short-term nature of its liabilities, primarily demand deposits with low interest rates, highlighted a significant vulnerability.

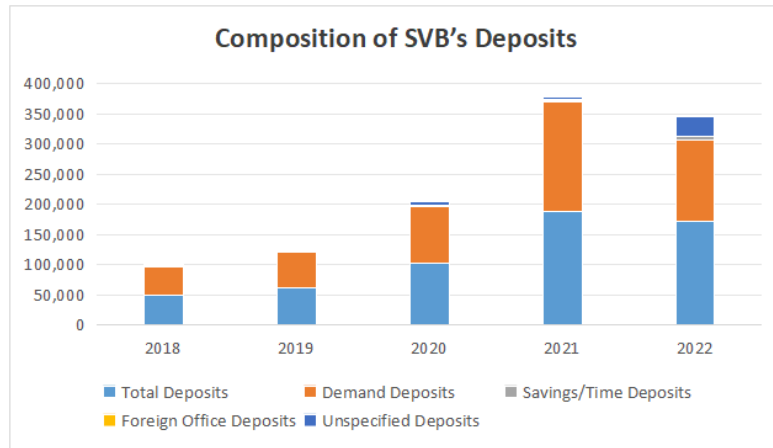


Figure 6. Composition of SVB deposit

2.2. Duration mismatch and its impact

In 2022, Silicon Valley Bank (SVB) reported a diverse portfolio of investment securities, segmented into Held-to-Maturity (HTM) securities and Available-for-Sale (AFS) securities. The HTM securities, accounting for 76.1% of the total investment securities portfolio, exhibited a weighted-average duration of 6.2 years. Conversely, AFS securities, representing 23.3% of the portfolio, had a weighted-average duration of 3.6 years. To derive the weighted-average duration of SVB's overall securities portfolio, the following calculation is employed:

$$\text{Weighted - Average Duration of Securities Portfolio} = (0.761 \times 6.2) + (0.233 \times 3.6)$$

$$\text{Weighted - Average Duration of Securities Portfolio} = 4.7222 + 0.8388$$

$$\text{Weighted - Average Duration of Securities Portfolio} = 5.561 \text{ years}$$

Assuming commercial loans within SVB's asset portfolio have an approximate duration of 1 year, and given that the asset composition consists of approximately 60% investment securities and 40% loans, the overall duration of SVB's assets can be estimated as follows:

$$\text{Duration of Assets} = (0.60 \times 5.561) + (0.40 \times 1.0)$$

$$\text{Duration of Assets} = 3.3366 + 0.40$$

$$\text{Duration of Assets} = 3.7366 \text{ years} \approx 3.74 \text{ years}$$

In terms of SVB's liabilities, which are predominantly short-term deposits, the duration is effectively close to zero years. This assumption is based on the nature of short-term deposits, which have minimal interest rate sensitivity due to their imminent maturity.

The duration gap, which reflects the difference between the durations of SVB's assets and liabilities, is calculated as follows:

$$\text{Duration Gap} = \text{Duration of Assets} - \text{Duration of Liabilities}$$

$$\text{Duration Gap} = 3.74 \text{ years} - 0 \text{ years}$$

$$\text{DurationGap} = 3.74\text{years}$$

This duration gap of 3.74 years indicates a significant mismatch between the durations of SVB's assets and liabilities. Such a gap exposes the bank to potential interest rate risk, as fluctuations in market interest rates can impact the bank's financial stability and performance.

3. Background and impact of the fed's rate cut

The Federal Reserve's decision to cut interest rates in 2020 was primarily influenced by the unprecedented challenges posed by the COVID-19 pandemic. The rapid spread of the coronavirus globally led to a significant economic downturn and increased the risk of a severe recession in the United States. From Figure 7, in March 2020, the Federal Reserve took the federal funds rate target range down from 0% to 0.25%. This unprecedented move was part of a broader set of measures to inject liquidity into the financial system and support the economy during the pandemic. The Fed's actions were also aimed at stabilizing financial markets, which were experiencing extreme volatility. This led to a decrease in the yields of fixed-income assets such as long-term Treasury bonds and Mortgage-Backed Securities (MBS), as the new bonds issued offered lower interest rates, making existing bonds more attractive and their prices increased.

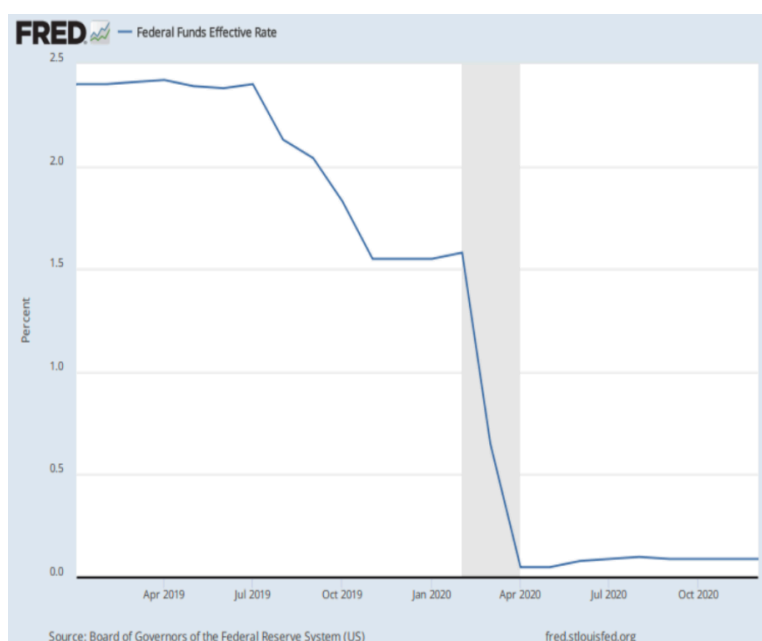


Figure 7. The federal funds effective rate

The Federal Reserve's interest rate cuts in 2020 had a significant impact on the bonds held by SVB. Due to the significant growth in SVB's deposit base in 2020, partly because tech startups received a large amount of financing and investment, these cash and deposits flowed into SVB, necessitating the bank to find channels to invest these funds for income generation. Consequently, SVB chose to purchase large amounts of U.S. Treasury bonds and MBS. However, with the Federal Reserve's rate cuts, the yield on these investments might be affected, subsequently impacting SVB's financial return.

3.1. Bankruptcy process

In 2022, because of the persistently high inflation in the United States, the Fed began to raise interest rates.

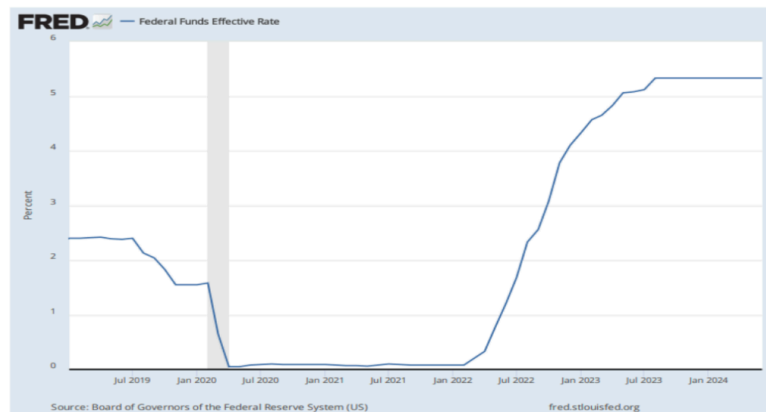


Figure 8. The federal funds effective rate post-2020

Based on Figure 8, the Federal Reserve's interest rate hike in 2022 had a significant impact on various asset prices, including the bonds held by SVB. As the Federal Reserve raised interest rates, market interest rates rose, leading to a decrease in the market value of SVB's bond holdings, especially long-term bonds. Because bond prices move inversely to market interest rates, when interest rates rise, bond prices fall. This served as the catalyst for SVB's bankruptcy.

The global economic downturn and widespread inflation put immense pressure on the tech industry. The Federal Reserve's multiple interest rate hikes to combat inflation further exacerbated the situation, making borrowing more expensive and affecting investment in tech companies. During the pandemic, many tech companies had expanded rapidly, hiring many employees to accommodate the surge in online activities. However, with the easing of the pandemic and the worsening macroeconomic situation, the tech industry faced a structural shift from expansion to contraction, leading to massive layoffs. These factors create "tech winter". Due to the tech winter, a large number of technology companies have withdrawn money from SVB, leading to a decrease in SVB's deposit volume.

As the Federal Reserve began aggressive interest rate hikes in 2022 to curb inflation, market interest rates rose, leading to significant unrealized losses on SVB's long-term bonds and MBS. Tech companies, facing a deteriorating financing environment, began to withdraw large amounts of deposits, exacerbating SVB's liquidity pressure. In 2023, SVB claimed that they would sell 21 billion bonds to incur 18 billion losses, and they also issued new shares and preferred stocks to finance 22.5 billion.

This behavior indicated to the market that it was facing a liquidity issue and triggered market panic; a run on the bank ultimately occurred. Customers attempted to withdraw 42 billion dollars in a single day. The stock price of SVB collapsed by 60% on March 9, 2023, eventually suspended trading, declared bankruptcy, and was taken over by the government agency FDIC.

4. Comparison and analysis

4.1. Financial data comparison between SVB and Large Banking Organizations (LBOs)

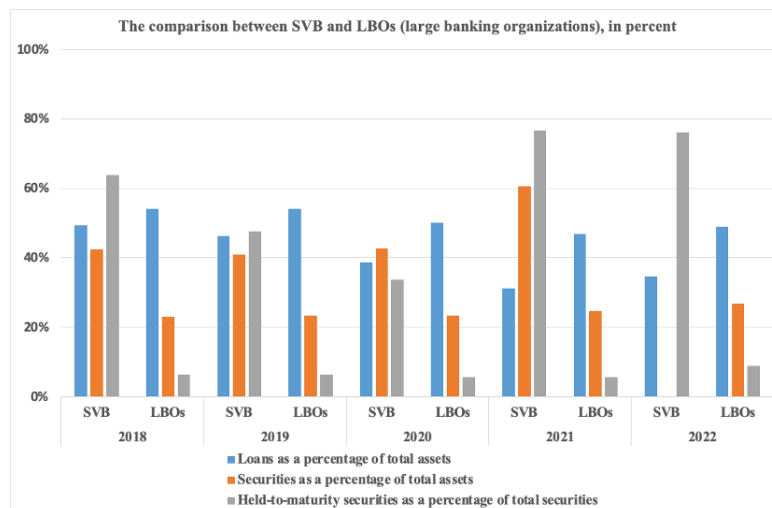


Figure 9. The composition between SVB and LBOs

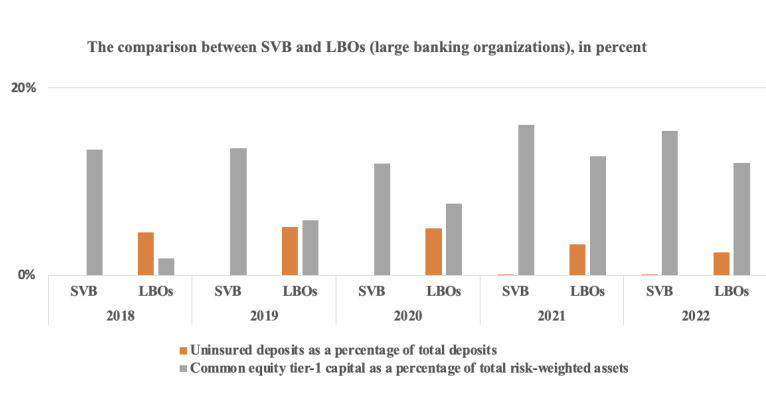


Figure 10. The composition between SVB and LBOs in deposit

Data collected from SVB annual reports and the data of LBOs are from the call report website [4]. Value for large banking organizations (LBOs) represents the weighted average insured commercial banks having assets greater than \$100 billion, with the exception of banking organizations in the Large Institution Supervision Coordinating Committee (LISCC) supervisory portfolio.

Figure 9 and Figure 10 show the key metrics of SVB from 2018-2022, with a comparison with LBOs (large banking organizations). With data demonstration, is clear to see that some financial investment is abnormal compared with the LBOs.

4.2. Analysis the trend of each metrics

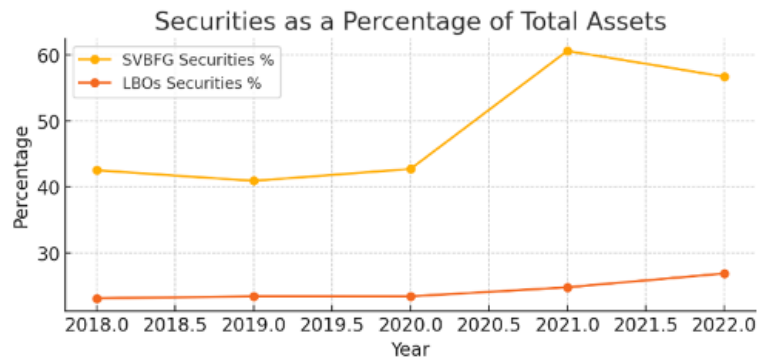


Figure 11. The composition of SVB and LBOs: securities as a percentage of total assets

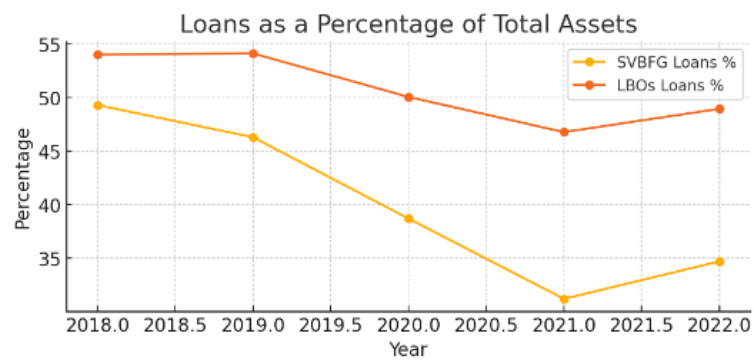


Figure 12. The composition of SVB and LBOs: loans as a percentage of total assets

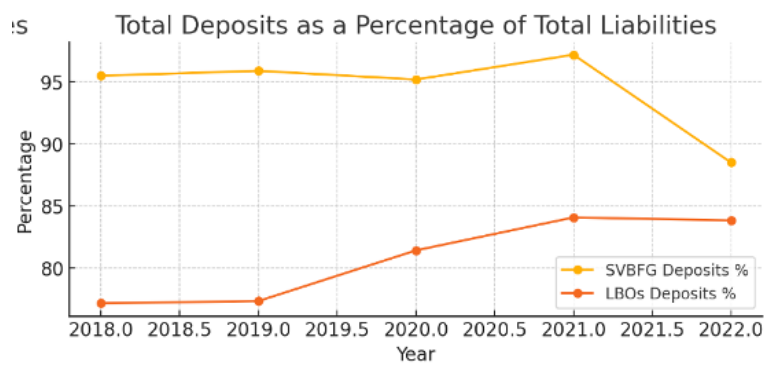


Figure 13. The composition of SVB and LBOs: deposit as a percentage of total liabilities

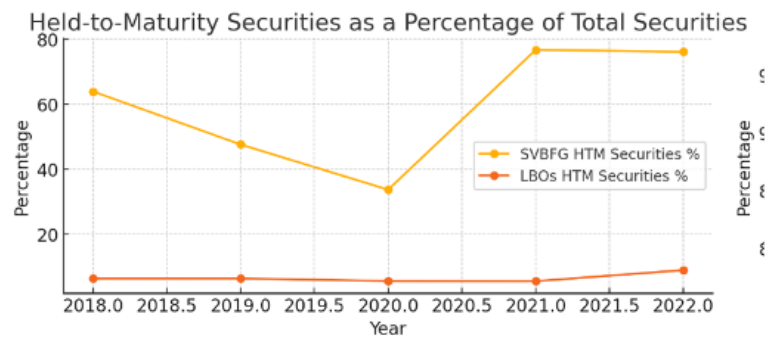


Figure 14. The composition of SVB and LBOs: HTM as a percentage of total securities

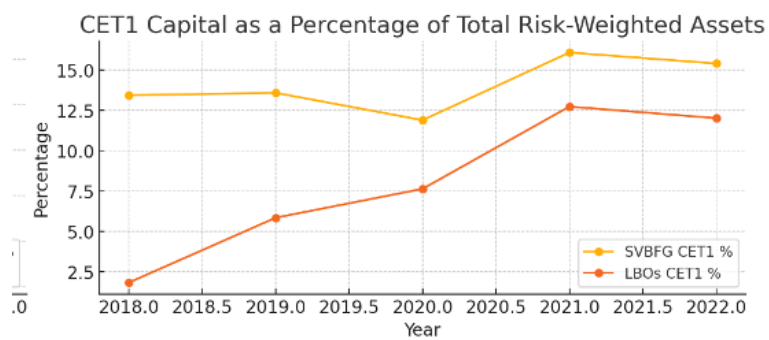


Figure 15. Composition of SVB and LBOs: CET1 capital as a percentage of total risk-weighted assets

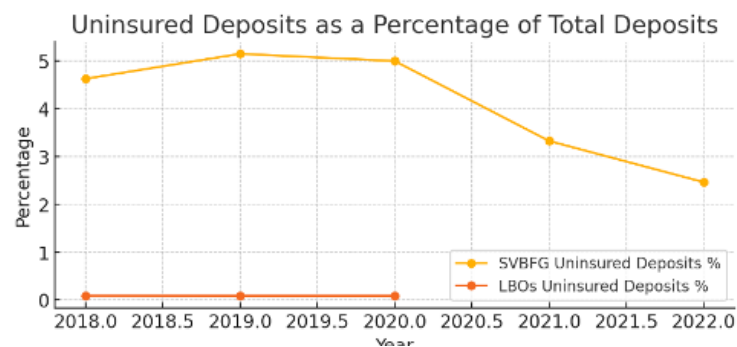


Figure 16. Composition of SVB and LBOs: uninsured deposits as a percentage of total deposit

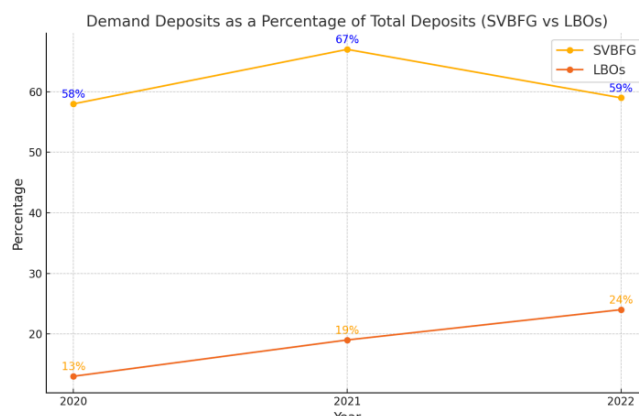


Figure 17. Composition of SVB and LBOs: demand deposits as a percentage of total deposit

The following analysis is based on Figure 11 to Figure 17.

Based on Figure 12, the percentage of SVB's loans relative to total assets dropped significantly from 49.3% in 2018 to 31.2% in 2021, before rising slightly to 34.7% in 2022. Conversely, LBOs remained higher and more stable, falling from 54.03% in 2018 to 48.95% in 2022. The largest decrease for SVB was between 2019 and 2021.

Initially, there was a small decline from 49.3% to 46.3%, indicating a modest rebalancing of the asset portfolio or a strategic shift in loan issuance. A more substantial drop to 38.7% followed, suggesting a cautious lending approach due to market conditions or internal strategies. The most significant annual decrease was 31.2%, coinciding with the peak of the COVID-19 pandemic, likely reflecting a conservative approach and a shift towards safer assets. By the next year, loans recovered to 34.7%, indicating a partial return to loan issuance or an adjustment in asset allocation as market conditions improved.

The securities as a percentage of total assets is shown in Figure 11. In 2018-2019, the trend was very stable, with a slight increase from 54.03% to 54.13%. LBOs maintained a consistent loan-to-asset ratio, indicating stable lending practices; in 2019-2020, it showed a decrease to 50.06%, marking a response to the early impacts of the pandemic. The 4.07% points drop is less pronounced than SVB's reduction, reflecting a more stable lending environment for larger banks. In 2020-2021, the trend further declined to 46.78%. The continued reduction in loans suggests ongoing caution in lending, though less severe than SVBFG's changes; In 2021-2022, a slight increase to 48.95%, indicating a cautious return to lending as economic conditions improved.

SVB consistently had a higher percentage of HTM securities compared to LBOs in Figure 14. In 2020-2021, A dramatic increase to 76.7%, up by 43%. This significant rise likely reflects a strategic pivot to lock in yields and manage interest rate risk during a period of low interest rates and high market volatility, which could also indicate a response to the COVID-19 pandemic. SVB stabilized at a high level. This suggests that SVBFG maintained a substantial portion of its portfolio in HTM securities to continue to hold a lot of long-term securities. It also triggers the duration mismatch it creates since SVB doesn't have enough cash for the depositors to withdraw.

The CET1 capital as a percentage of total risk-weighted assets of the two groups in these 5 years is shown in Figure 15. Although SVBFG consistently maintained a higher CET1 ratio compared to LBOs. But the truth is not as it is shown. Since SVB bought many of HTM and AFS securities, while these securities contribute to a higher CET1 ratio by providing stable returns and being

considered low risk, they are not easily liquidated. In a liquidity crunch, selling these securities could result in substantial losses, as they are intended to be held until maturity.

Their CET1 capital seemed so “high” when the depositors withdrew 25 percent of their deposits in one day, far exceeding the typical HQLA level. Far more, in 2019, the FDIC eliminated the LCR requirement for banks with less than \$250 billion in assets. Silicon Valley Bank has remained slightly below the \$250 billion level in each of the past two fiscal years, indicating that regulations are missing for the supervision of Silicon Valley banks. Regulators and the market might perceive the bank as less liquid despite a high CET1 ratio if they believe the bank’s assets are overvalued or if there are concerns about the quality of its assets. This perception can lead to a loss of confidence among depositors and investors.

The trend of the total deposit, uninsured deposit, and demand deposits as a percentage of total deposits in Figure 13, Figure 16, and Figure 17 shows that SVB consistently maintains a significantly higher proportion of demand deposits compared to LBOs, underscoring its distinct operational focus and client base characteristics.

Demand deposits a bank account from which deposited funds can be withdrawn at any time without advance notice. As SVB holds lots of demand deposits, it’s also one of the risk problems that exist in SVB. A high reliance on demand deposits could make SVB have a higher sensitivity to economic fluctuations. So, when facing an economic downturn, there could be rapid withdrawal pressures. Effective risk management practices would be crucial to handle such scenarios. Unfortunately, SVB did not successfully handle this problem.

5. Analysis on aspects of the executive team

First of all, the executive team had a problem with an unconscionable salary structure. The composition salary of the executive is mainly formed by 4 parts: base salary, bonus, stock option, and other incentive scheme. Among these constitutes, the bonus for the senior managers takes up a large share of the sum of the officers’ salary, and the standard for assessing how much the executive benefit the company and the shareholders is deeply connected with SVB’s ROE(Rate of Return on Common Stockholders’ Equity), an important index to weigh the profitability of a bank, which is a stimulant encouraging the executive team to take high-risk investing strategy and lose the risk management of the bank. The CEO of SVB, Gregory Becker, is a typical example of this. As shown in Figure 18, from the end year 2018, SVB largely increased their share of non-AFS assets by having more HTM securities, loans/leases held for investment, and other investments [5]. At the same time, Becker’s total compensation was about \$7.5 million in 2018, and then for the next year, his compensation jumped to around \$10 million and kept his compensation at about this amount for the next three years. These graphs show the composition of Gregory Becker’s salary.

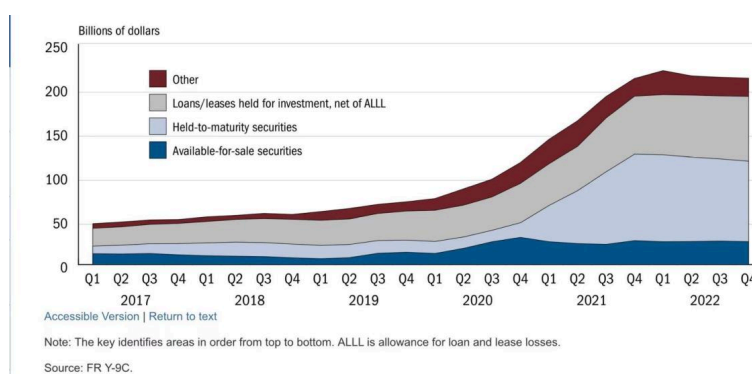


Figure 18. The composition of SVB's assets

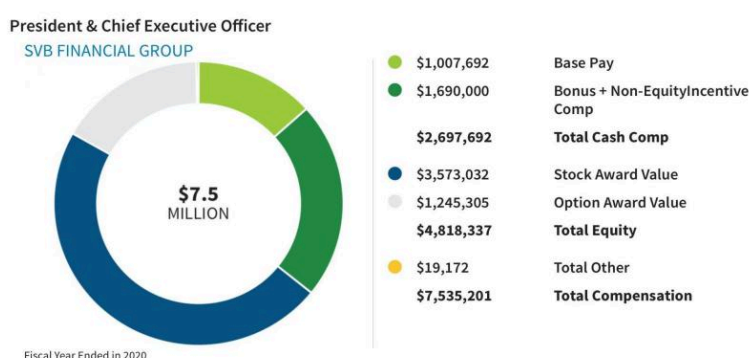


Figure 19. The composition of the compensation of Gregory Becker, former CEO of SVB in 2020

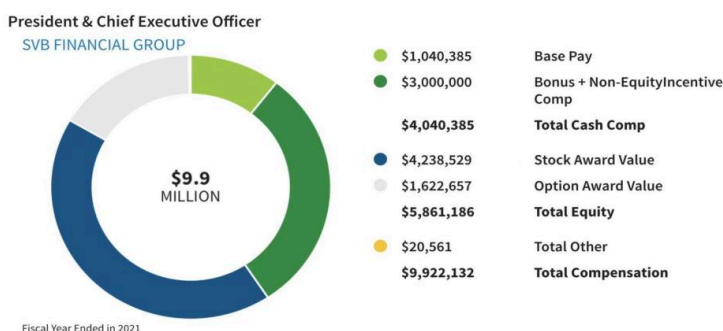


Figure 20. The composition of the compensation of Gregory Becker, former CEO of SVB, in 2021

As depicted in Figures 19 and 20, Becker's total compensation was about \$7.5 million in 2020 with a bonus of \$1,690,000, and these numbers jumped to \$9.9 million and \$4,040,385. The bonus share in his total compensation in 2020 was 22.4%, but in 2021, this number increased to 30.2%. Change in the salary of the seniors is alongside the change in SVB's investment [6]. The ROE encouraged the senior managers to give up the conventional and conservative way of investing, leading the investing strategy of SVB to have an obvious change from 2018, taking a more aggressive investing method, and hence foreshadowing the downfall of the bank.

In addition, the executive team had a penalty due to egoism. In this case of SVB, there was a rarely happened situation where the CRO of SVB, Laura Izurieta, who had been the CRO since 2016, left her position in April 2022. Her departure was nearly 8 months before his successor's arrival, leaving the position vacant and making the terrible risk management of the bank even worse.

It is said that the CEO who was responsible for leaving this crucial position was unfilled because the CRO tried to convince him to liquidate their position and so vanquished the loss, and the CEO refused her proposal, harming his interest. He, therefore, was thought to make no one on duty of alerting him about the risk on purpose. This might not be decisive evidence, but not having filled this key position, Izurieta's leave made the bank lack proper oversight of risk management processes, which contributed to SVB's final collapse.

Last, the executive team had a lack of supervision from the board. As indicated in Figure 18, in the assets of Silicon Valley Bank, there were more than 50% percent of their assets in securities, and amongst all SVB's investments in securities, there were almost 78% of its securities are HTM(Held-to-Maturity). MBS (Mortgage-Backed Securities) was the most common type of HTM in this part of securities, with a ratio of 68% of the total value of SVB's securities investment. Due to MBS's negative convexity, the assets shrunk substantially, with the Federal Reserve Rate going high, causing the 10-year interest rate to also go high as its MBS suffered a loss. But in US GAAP (Generally Accepted Accounting Principles), the HTM portfolio will not be marked to the market, meaning neither profit nor losses were going to be exposed until maturity. Thus, the executive team hid the facts and the present situation of the bank de facto from the shareholders and the board. The board failed to supervise the executive team and ask them to react against the crisis, making the executive team out of rein. Figure 20 also highlights that CEO Gregory Becker sold his options in 12,451 shares, totaling \$1,309,596, just half a month before the bank declared bankruptcy. These unsupervised actions by the executive team were instrumental in SVB's bankruptcy [7].

6. Conclusion

This study conducts a multidimensional analysis to explore the reasons behind the collapse of Silicon Valley Bank (SVB), highlighting the dual impact of poor financial management and executive decision-making errors. Through a detailed analysis of the mismatch between SVB's assets and liabilities, the study reveals the risks of long-term fixed-rate securities investment strategies in a rapidly rising interest rate environment. It also critically examines the compensation structure of SVB executives, particularly the bonus settings of CEO Gregory Becker, where incentives based on short-term performance indicators encouraged high-risk investment strategies. The focus of this study is on revealing the complexities and challenges of banking management in a rapidly changing macroeconomic environment through rich data analysis and comparisons. By contrast with other large banking organizations, this paper highlights the uniqueness of SVB in its high-risk investment strategies and customer deposit structure, providing an important case study for financial regulators and the banking industry. To prevent potential crises similar to this one in the future, it is recommended that financial regulatory authorities implement stricter monitoring and assessment of the banking industry's asset-liability management, executive compensation structures, and risk management strategies. Additionally, future research could further explore how technology can help enhance transparency and improve risk management in the banking sector, especially against the backdrop of ongoing global economic fluctuations and uncertainties.

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