Comparative Analysis of Silicon Valley Bank and Other Bank Types: Factors Contributing to SVB's Failure and Implications for the Banking Industry

Xiaoyao Yan[1,a*], Jiaying Peng[1, b], Yuyi Dai[2, c]

[a]*Corresponding Author Email: 2660834054@qq.com; [b] Pjy071025@qq.com; [c] 1337396923@qq.com

[1]ChangeJun Billingualschool, ChangSha, 410221, China
[2]Xi'an Jiaotong-liverpool University, Suzhou, 215000, China

Abstract. This study investigates the March 2022 failure of Silicon Valley Bank (SVB), the largest U.S. bank to fail since the 2008 financial crisis. It examines the differences between SVB and other types of banks and identifies the factors that led to SVB's failure. Four different types of banks will be compared and the various sources of risk specific to SVBs will be analyzed. By investigating the failures of SVBs and comparing them to other types of banks, this study aims to provide insights into the factors that lead to SVB failures. It will shed light on the risks faced by banks heavily involved in SVBs and the potential impact on the wider banking industry.

Keywords: Silicon Valley Bank (SVB), Bank failure, Duration Mismatch, Interest rate hike, Banking industry implications.

1 Introduction

In March 2022, Silicon Valley Bank (SVB) experienced a significant collapse, marking it as the largest bank failure in the United States since the crisis in 2008. Within 48 hours, SVB became insolvent, leading to its takeover by the Federal Deposit Insurance Corporation (FDIC) on March 10. SVB, known for primarily financing technology start-ups, had been conducting business with nearly half of all U.S. enterprises in this sector. During the 2019-2021 coronavirus pandemic, SVB thrived alongside the tech boom, accumulating billions in deposits and investing a substantial portion of these funds in long-term US government bonds. At the time, with market interest rates hovering close to zero, banks could still generate profits even if long-term US government bonds offered only minimal returns. However, the aggressive interest rate hike campaign initiated by the US Federal Reserve to combat inflation adversely impacted Silicon Valley banks, particularly those heavily involved with technology start-ups [1]. This sector comprised 44 percent of the technology and healthcare companies that went public in the United States the previous year. The repercussions of the Silicon Valley banks' failure were widespread, extending their crisis to numerous global markets. The objective of this study is to examine the differences between SVB and other bank types and identify the factors that contributed to the failure of SVB. Four distinct categories of banks and various sources of SVB risk will be the primary focus of this research. The findings of this study are expected to have implications for the banking systems, potentially leading to advancements in the banking industry.

BDEDM 2024, January 12-14, Ningbo, People's Republic of China

DOI 10.4108/eai.12-1-2024.2347150

2 The Analysis of Commercial Banks in U.S.

2.1 Category 4" bank

2.2.1 The complete category of Commercial Banks in U.S.

Table 1. The Levels of Commercial Banks.

Level	Definition	Examples
Category 1	The global systemically important banks in U.S. (G-SIBs). The average total consolidated assets is $100 billion.	Bank of New York Mellon, Citigroup, Goldman Sachs, JPMorgan Chase [1]
Category 2	Not US G-SIBs; The average total consolidated assets is greater than or equal to US$700 billion; Or the average total consolidated assets is greater than or equal to US$100 billion and $75 billion in cross-jurisdictional activity.	Northern Trust
Category 3	The average total consolidated assets is greater than or equal to $250 billion; Or the average total consolidated assets is greater than or equal to $100 billion and $75 billion or more in one of the three indicator: weighted short-term wholesale funding, non-bank assets, or off-balance sheet exposure [2]	Capital One, Charles Schwab, PNC Financial, U.S. Bancorp [3]
Category 4	The average total consolidated assets is greater than or equal to $100 billion.	Silicon Valley bank [3]

Note: Resource: federalreserve.gov

The Silicon Valley Bank (SVB) falls under Category 4 of banks.

2.2.2 The difference of "Category 4" and others

The following are the major difference between Category 4 and other categories.

(1) The total assets of “category 4” is more than the total assets of other types of banks, about $100 to $250 billion.

(2) Category 4 standards only apply to U.S. market

(4) Category 4 banks will receive the most comprehensive regulatory relief, including the elimination of liquidity coverage ratio (LCR) and non-sufficient funding (NSF) requirements.

The Liquidity Coverage Ratio (LCR) is a regulatory requirement that measures a bank's ability to withstand a significant liquidity stress event within 30 days. Its purpose is to ensure that banks maintain an adequate level of high-quality liquid assets (HQLA) to meet their short-term liquidity needs [4]. Non-Sufficient Funds refers to a situation where a bank account does not have enough available funds to cover a requested withdrawal or payment. When a customer attempts to make a payment or withdraw funds, but the available balance in their account is insufficient, the transaction is typically rejected, and the account is said to have a "non-sufficient funds" status [4].

2.2 The Features of SVB'S Clients

Silicon Valley Bank's main customers are startups in Silicon Valley, and it is the main financial channel between the high-tech industry, founders, startups, and employees in the United States. Silicon Valley Bank also offers a variety of financial products and services, including commercial loans, credit cards, private banking, investment banking, wealth management, and more, in addition, Silicon Valley Bank works with many start-ups to help them finance, expand, and grow. Main clients of Silicon Valley Bank are Apple Inc, Google Inc, Facebook Inc, Tesla Inc, Airbnb Inc., etc. One of the key factors contributing to the failure of SVB and other banks in Category 4 is the inherent volatility and uncertainty within the technology sector. Start-ups and technology companies often operate in highly competitive and rapidly evolving markets, which can result in significant financial instability. The success of these companies is closely tied to market trends, investor sentiment, and the ability to innovate and adapt to changing circumstances. Consequently, when the technology sector experiences downturns or disruptions, banks like SVB may face increased risks of insolvency and failure. SVB's close relationship with the technology start-up ecosystem means it may have exposure to venture capital funding. The availability and flow of venture capital can be unpredictable, and a slowdown in funding or reduced investor confidence can have a direct impact on SVB's ability to provide financing to its clients.

3 Analyzing the Sources of Risk in Silicon Valley Banks

3.1 Assets Side

The bank's own securities asset investment strategy ——the increase of Hold to Maturity (HTM) assets and sales of available-for-sale (AFS). A HTM bond is a special kind of bond, which refers to a "Hold to Maturity" bond. AFS bond portfolio is an investment strategy designed to generate income by investing in available-for-sale bonds. AFS stands for "available-for-sale financial assets," which include stocks, bonds and other securities. The downside is that once you are forced to sell AFS and HTM, you need to recognize a profit or loss in the current period. In the era of low interest rates, in order to pursue higher returns, banks have extended the period, resulting in huge floating losses since the interest rate hike. If there is a run because of panic, it will make floating losses become real losses. The ratio of float losses to tier 1 at the newly taken over Silicon Valley Bank was 98% (see table 2).

Table 2. Top 100 Commercial Bank by Assets Size in 2022.

12	institution	Symb	Emp	Total securities	8,245,000.000	-14,137,000,000	-171.46
5	U.S.Bancorp		75423	161,002.399,000	8,245,000.000	-15,159.000.000	-98.08
82	City National Bank of Florida		1054	6,722.544,000	15,456,000.000	-3,048,115.000	-83.65
7	Truist Bank	TFC	51428	130,037,000,000	3.644,060.000	-798 504.000	-16.56
85	United Community Bank	UCBI	2800	6,213,519,000	1 279,736.000	-108,563.000.000	-15.87
80	Glacier Bank	GBCI	3383	9,022,801,000	227,743,000,000	-4,771,404,000	-15.27

3	Citibank	C	191685	485,347.000,000	17.445.927.000	-6,788.000,000	-15.18
32	Fisrt-Citizens Bank & Ttust Company	FCNCA	10536	19,269.898,000	26,579,000,000	-41,623,000,000	-14.95
95	Columbia State Bank	COLB	2026	6.621.856,000	163,911.799,000	-9,058 000,000	-14.08
59	Associated Bank	ASB	4171	6,708,415,000	35,948 000.000	-1.632 379,000	-13.86
21	The Huntington National Bank	HBAN	18968	40,474,513,000	6,683,154,000	-505.817,000580	-13.54
48	Wintrust Financial Bank	WTFC	3506	6.950,974,000	2 251.841.000	5800. 940,000	-13.33
68	First interstate Bank	FIBK	3590	10.397,943,000	2 685783.000	-696 473.000	-12.65
76	First Bank		2599	9,969,144,000	3,434.969,000	-2,156,763,000	-12.59
71	Stifel Financial Corp.	SF	354	7,624,448,000	10 894.617.000	6.200.000.000	12.46
1	JPMorgan Chase&Co.	JPM	220271	631.123.000,000	31,940,886.000	-10,866 212,000	-12.09

Note: Top 100 Institutions by Asset Size (to change sort click header title)

An AFS bond portfolio is an investment strategy designed to generate income by investing in bonds that are available for sale. AFS stands for "available-for-sale financial assets," including stocks, bonds and other securities.

Table 3. The SVB's Balance Sheet in 2022.

Dollars in millions, except par value and share data)	December 31,	
	2022	2021
Assets	$ 13803	$14586
Cash and cash equivalents	26069	27221
Available-for-sale securities, at fair value (cost of $28,602 and $27,370, respectively, including $530 and $61 pledged as collateral, respectively)	91321	98195
Held to-maturity securities, at amortized cost and net of allowance for credit losses of $6 and $7 (fair value of $76,169 and $97,227, respectively) Non-marketable and other equity securities	2664	2543
Non-marketable and other equity securities	120054	127959
Total investment securities Loans, amortized cost	74250	66276
Allowance for credit losses: loans Net loans	636	422
Premises and equipment, net of accumulated depreciation and amortization	73614	65854
Goodwill	394	270

Other intangible assets, net Lease right-of-use assets	375	375
Accrued interest receivable and other assets	136	160
Total assets	335	313
Liabilities and total equity Liabilities:	3082	1791
Noninterest-bearing demand deposits Interest-bearing deposits	211793	211308
Total deposits		
Short-term borrowings		
Lease liabilities	80753	125851
Other liabilities 92365		
Long-term debt	92356	63352
Total liabilities	173109	189203
Commitments and contingencies (Note 21 and Note 26)		71
SVBFG stockholders' equity: Preferred stock, SO.001 par value, 20,000,000 shares authorized; 383,500 and 383,500 shares issued and outstanding, respectively Common stock, $0.001 par value, 150,000,000 shares authorized; 59,171,883 and 58,748,469 shares issued and outstanding, respectively	413	388
Additional paid-in capital	3014	2467
Retained earnings	5370	2570
Accumulated other comprehensive income (loss)	196598	194699
Total SVBFG stockholders' equity	16004	16236
Noncontrolling interests	291	373
Total equity	16295	3646
Total labilities and total equity	211793	211308

Note: Resource: SEC.com

On March 9, 2023, Silicon Valley Bank announced that it would sell $21 billion of available-for-sale assets (AFS), with an after-tax loss of $1.8 billion, while announcing a refinancing of $2.25 billion to address losses and provide liquidity support. This made the market on the Silicon Valley Bank debt run panic intensified, Silicon Valley Bank fell more than 60% on the same day, and then entered the state of suspension.

3.2 Liability Side

Because the rapid interest rate hike of the Federal Reserve in 2022 has led to a difficult life for global technology startups, with financing difficulties and stock prices falling continuously, but research and development must continue, and they have to withdraw a large number of deposits in Silicon Valley banks to ease their own financial pressure. Combined with factors such as the Fed's balance sheet reduction, deposits in Silicon Valley banks have been flowing out since peaking in March 2022. In 2022, total deposits fell by $16 billion, accounting for about 10% of total deposits, especially demand non-interest-bearing deposits plunged from $126 billion to $81 billion, greatly increasing the pressure on the interest expense of the debt side as shown in table 3. (20) Cash flow from bank withdrawals has become the common choice of most technology companies, and the phenomenon of runs has emerged.

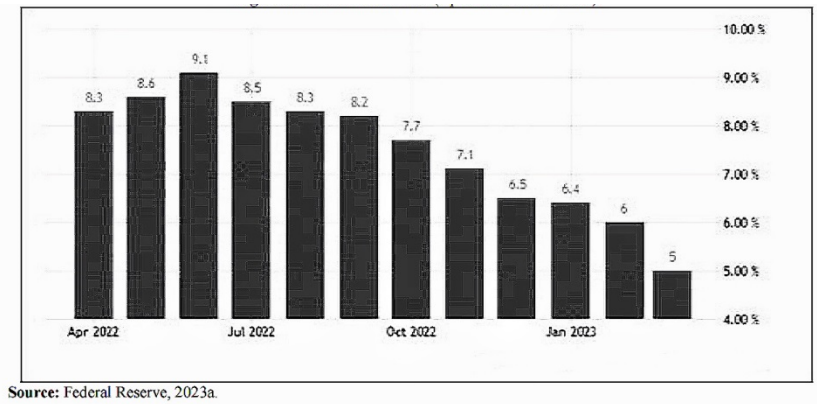
3.3 Interest Rate Interest (Maturity Mismatch)

According to Nasdaq, a maturity mismatch is when a company's short-term assets and short-term obligations don't match up [5]. According to Will, a company cannot satisfy its financial obligations if its short-term liabilities are greater than its short-term assets [6]. A company may also have issues if its long-term assets are financed by short-term liabilities. Additionally, hedging may involve a maturity mismatch. For banks, maturity mismatch is crucial. The dynamic interaction between the macroeconomy and the financial sector may change in the medium term as a result of the introduction of maturity mismatch in the banking system [7]. Additionally, they claimed that maturity mismatch could negatively impact banks' ability to currently meet demand for loans. Moreover, the maturity mismatch required to facilitate long-term investment programs while meeting investors' liquidity needs should allow banks to earn spreads in an environment with a positively sloping yield curve.

As the economy continues to grow, the number of maturity mismatches occurring is decreasing, but the mistake of maturity mismatches was made with the bankruptcy of SVB in March 2023.SVB primarily served the technology and venture capital sectors, and it grew at a very fast rate [8]. The liquidity boom provided an important impetus for venture capital activity. From 2020 onwards, SVBs have received large deposit inflows ($198 billion in March 2022 and $74 billion in June 2020) (ARUNASSET INVESTMENT SERVICES, 2023) [9]. Greg said like many banks, SVB's liabilities are mainly in the form of demand deposits; as a result[10], they tend to be short-term and much less sensitive to interest rate movements. In contrast, SVB's assets are in the form of longer-term bonds, such as U.S. Treasuries and mortgage-backed securities. These assets tend to have much longer maturities, and their prices are therefore much more sensitive to changes in interest rates. He also said SVB absorbs cash through short-term demand deposits and invests these assets in long-term financial instruments. This tension is not unusual for a financial institution, but since March 2022, the Federal Reserve has been raising interest rates at record rates, and as rates have risen, the value of long-term bonds in SVB's portfolio has declined. Since the value of deposit liabilities is fixed, this has had a direct negative impact on their net asset base. So people are no longer trusting the banks, and in one day, trying to get all their money back at once, the banks simply can't pay them all [11].

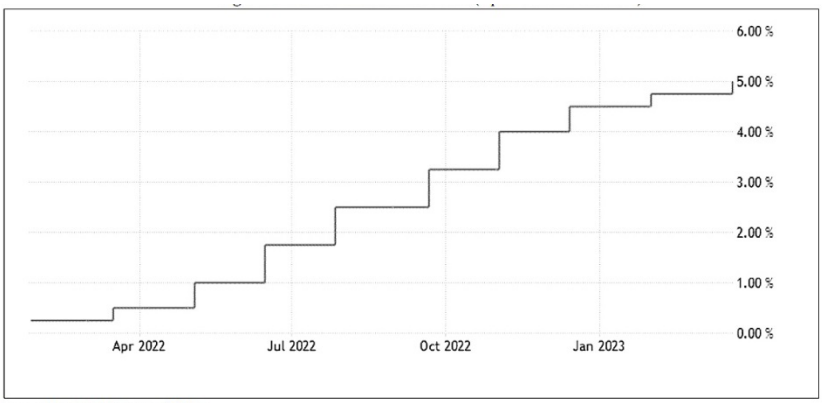
3.4 Federal Rate Increase

Figure 1 and Figure 2 shows that US inflation and long-term interest rates fluctuate over time, due to the fact that US inflation remains high, the Open Market Committee recommends limiting the money supply by raising interest rates to reduce the inflation [12].



Source: Federal Reserve, 2023a.

Fig. 1. Fed Effective Interest Rate [12].



Source: Federal Reserve, 2023a.

Fig. 2. U.S. Inflation Rates [12].

This led to SVB failure to manage interest risk and maturity mismatches. Since March 2022, the Fed has raised U.S. interest rates by 4.5 percentage points [11]. But a large portion of SVB's assets is invested in fixed-income securities, such as U.S. government bonds and mortgage-backed securities. This This leads to a mismatch of income and expenses for SVB.

3.5 The impact of interest increases on SVB

Hinh and Dinh said that as of the end of 2022, SVB's $117 billion in invested assets consisted of U.S. Treasury bills, bonds, and government agency mortgage-backed securities (see table 1) [11]. These bonds can be categorized into AFS (about $26 billion) and HTM (about $91 billion). Each quarter, SVB can switch securities between AFS and HTM, and in a high interest

rate environment, transfers between AFT and HTM can hit equity. On top of that, as of mid-March 2023, AFS bonds with an average maturity of 3.6 years were yielding only 1.8%, while HTM bonds had a 10-year yield of about 1.6%.SVB's net loan portfolio of $74 billion returns less than 4% net of loan-loss allowances. SVB's net loan portfolio in table 1 also returns less than 4% net of loan-loss allowances. SVB's net loan portfolio is returning less than 3% net of loan-loss allowances. When interest rates rise, SVB has to compete with other sources, which can force him to pay 4.5% interest on his savings deposits. At the same time, it earns less than 2% on its assets, which is not sustainable. What's more, SVB primarily serves the tech and risk control sectors, so when the tech industry boomed, SVB's deposits increased substantially. SVB invested these deposits in longer-term securities to boost returns and increase profits. At that time, SVB did not effectively manage the interest rate risk of these securities and did not develop effective tools, models, and metrics to measure interest rate risk [8].

3.6 Analysis of Management Team

According to information provided in SVB's 2023 proxy statement [13], SVB's Board of Directors consists of 12 people. And according to the UK's Daily Mail, Tom King, 63, is the only member of the board of directors of the bankrupt Silicon Valley Bank with investment banking experience; the other directors have not practiced investing and are not bankers, according to the UK's Daily Mail. In addition, there are some problems with the behavior of board members. For example, SVB CEO Greg Becker, who was also a board member of the San Francisco Fed on March 4th. He sold $3.6 million in stock days before the bank failed [14]. Board member Kate Mitchell, who has served on the Silicon Valley Bank board since 2010, donated $50,000 to Hillary's presidential campaign. She was in tears when Trump was elected. She even traveled to Kyoto, Japan, to visit a shrine on Thanksgiving that year. Board member Garen K. Staglin donated $10,000 to Biden's election campaign in 2020, $10,000 to the Hillary Foundation in 2015, and another $54,000 in 2016. he donated $35,800 to Barack Obama in 2011 and $11,000 to the Democratic National Committee.

The SVB board and risk team also appear to be lacking in their control of risk management. SVB's most senior risk officer was absent for almost eight months in 2022, according to Rossi, but a new CRO wasn't hired until January 2023[15]. This lack of leadership may result in the board and risk management team not being aware of the risks that may occur in the portfolio and ineffective market and liquidity risk management techniques and procedures. Only one of the seven board members of SVB's Risk Committee has experience in risk management, and none of them have held a top risk management role, such as Chief Risk Officer, according to information provided by SVB in its 2023 Proxy Statement. Given the very high technical complexity of bank risk, this may make it difficult for the Board to ask management the right questions about risk and management strategies.

3.7 Regulatory issues

3.7.1 Standards are too lax

Barr said that in 2019, the Federal Reserve Board revised its supervisory framework, maintaining the enhanced prudential standards that apply to g-sibs but adjusting the requirements that apply to all other large banks [8]. SVB is a "Category 4" bank at the time of its bankruptcy, meaning that it was subject to less stringent prudential standards than had been in place

prior to 2019. That is, the SVB board conducts stress tests less frequently, has no bank capital stress testing requirements, and does not have stringent capital planning and liquidity risk management standards. SVB are also not required to file resolutions with the Federal Reserve Board, although their banks are required to file resolutions with the FDIC. Barr adds that SVBs are not subject to liquidity risk management standards nor is it required to file a resolution with the Federal Reserve Board. In this case, its risk management structure would be weaker [8].

3.7.2 Failure of Regulators

The Federal Reserve Bank of San Francisco, as the regulator, failed to point out the problems of Silicon Valley Bank under its jurisdiction in a timely manner, and a member of its board of directors is also the CEO of Silicon Valley Bank.

4 Conclusion

This article addresses important questions about the March 10th Silicon Valley Bank collapse. Types of SVB? Characteristics of Silicon Valley Bank customers? Sources of risk for Silicon Valley bank failures? What lessons have been learned from the turmoil? The conclusion of the analysis is Silicon Valley banks fall into category 4, with total assets exceeding those of other types of banks by approximately $100 billion to $250 billion. In addition, the category 4 banks have less stringent regulations, and it eliminates the liquidity coverage ratio and underfunding requirements. So that means when SVB's clients want their money back in one lump sum, SVB can't pay them all. SVB's primary clients are startups and technology companies. These companies are susceptible to market trends, investor sentiment, and changing circumstances. As a result, SVB may have access to venture capital funding. When the technology industry experiences a recession or disruption, SVB is at greater risk of bankruptcy and failure.

There are then four main sources of risk for SVB's insolvency: 1) Significant increase in interest rates by the Federal Reserve negatively impacted SVB's cash flow and balance sheet; 2) SVB fails to manage interest risk and maturity mismatch, increasing its holdings of HTM assets and selling AFS; 3) SVB board members are self-interested and lack expertise; 4) Failure of regulators to identify risks in a timely manner and lax regulatory standards. While the collapse of the SVB hurt the economy, stakeholders learned from it and made changes to it, including: Improving the resilience of the banking system to risk. For example, Barr proposes and implements Basel III end-of-cycle reforms to better reflect trading and operational risks in measuring banks' capital requirements [8]. In addition, he plans to introduce long-term debt requirements for large banks that are not G-SIBs, giving them a loss-absorbing buffer. Banks should pay attention to the maturity mismatch between demand deposits and securities and adjust the share of HTM and AFS in a timely manner. At the same time, banks need to diversify their assets and liabilities and pay close attention to their maturity structure to improve customer trust and prevent bank runs. Central banks should take time to warn the banking system before implementing monetary policy. This is because central bank rate hikes have important implications for the solvency and liquidity of the banking sector. The regulatory and supervisory role of central banks requires thorough and frequent review. Bank boards need to improve their supervisory and managerial capacity and have certain requirements for the identity and background of board members.

References

[1] Tailoring rule - Federal Reserve Board - Home. (n.d.). https://www.federalreserve.gov/aboutthefed/boardmeetings/files/tailoring-rule-visual-20191010.pdf

[2] Legal Information Institute. (n.d.). 12 CFR § 252.5 - categorization of banking organizations. Legal Information Institute. https://www.law.cornell.edu/cfr/text/12/252.5#d_1

[3] ABA seeks stress test relief for "category IV" regional banks. ABA Banking Journal. (2018). https://bankingjournal.aba.com/2018/12/aba-seeks-stress-test-relief-for-category-iv-regional-banks/

[4] Bank for International Settlements. "Basel Committee on Banking Supervision, Basel III: The Liquidity Coverage Ratio and Liquidity Risk Monitoring Tools," Page 7. Accessed Sept. 4, 2021.

[5] Nasdaq. "Maturity mismatch definition. https://www.nasdaq.com/glossary/m/maturity-mismatch

[6] Will Kenton. (2022). Maturity mismatch: Definition, example, prevention. Investopedia. https://www.investopedia.com/terms/m/maturitymismatch.asp#:~:text=Maturity%20mismatch%20is%20a%20term%20used%20to%20describe,instrument%20and%20the%20underlying%20asset%27s%20maturities%20are%20misaligned

[7] Liu Yang, Yuhuan Yi & Shanshan Wang (2021) Banks' maturity mismatch, financial stability, and macroeconomic dynamics, Economic Research-Ekonomska Istraživanja, 34:1, 3038-3063, DOI: 10.1080/1331677X.2020.1867212

[8] Barr, M. (2023). Bank oversight: Statement by vice chair for supervision board of governors of the fed system. https://www.federalreserve.gov/newsevents/testimony/files/barr20230328a.pdf

[9] ARUNASSET INVESTMENT SERVICES (2023). SVB Bank Collapse: What's An Asset-Liability Mismatch? https://arunasset.com/svb-bank-collapse-whats-asset-liability-mismatch/

[10] Greg Brown. (2023). The Silicon Valley Bank Collapse: Takeaways and Lessons Learned. KENAN INSTITUTE of Private Enterprise. https://kenaninstitute.unc.edu/commentary/the-silicon-valley-bank-collapse-takeaways-and-lessons-learned/#:~:text=These%20assets%20tend%20to%20have%20a%20much%20longer,and%20investing%20these%20funds%20in%20longer-term%20financial%20instruments.

[11] Hinh, T. and Dinh (2023). Lessons from the Silicon Valley bank crisis. Policy center for the new though, policy brief. https://www.policycenter.ma/sites/default/files/2023-03/PB_15-23_Hinh.pdf

[12] Federal Reserve (2023b). Statement on longer-run goals and monetary policy strategy: Adopted effective January 24, 2012; as reaffirmed effective January 31, 2023. Federal open market committee (FOMC). https://www.federalreserve.gov/monetarypolicy/files/FOMC_LongerRunGoals.pdf

[13] SVB's 2023 Proxy Statement. https://d18rn0p25nwr6d.cloudfront.net/CIK-0000719739/7d992e5b-9272-4bc8-a5cf-5a8c6b8c5251.pdf

[14] Dow Jones & Company. (2023, March 12). Opinion | who killed Silicon Valley Bank?. The Wall Street Journal. https://www.wsj.com/articles/who-killed-silicon-valley-bank-interest-rates-treasury-federal-reserve-ipo-loan-long-term-bond-capital-securities-startup-jpmorgan-bear-stearns-lehman-brothers-b9ca2347

[15] Rossi, C. (2023). Viewpoint: Silicon Valley bank's failure in risk management. Insurance Journal. https://www.insurancejournal.com/news/national/2023/03/14/712038.htm