

A Review of the Failure of Silicon Valley Bank

The media has provided various analysis of the Silicon Valley Bank's failure, potentially highlighting a larger chaos at play within the banking system. It's no doubt that the banking system is critical to the economy, and the 2008 financial crisis serves as a subtle reminder of its importance to the agents of the global economy.

In my previous assessment of the US Federal Reserve's approach to inflation, I discussed how their use of Flexible Average Inflation Targeting (FAIT) has led to rising interest rates. Referencing [this](#) paper may be useful in understanding how the bank run at Silicon Valley Bank unfolded.

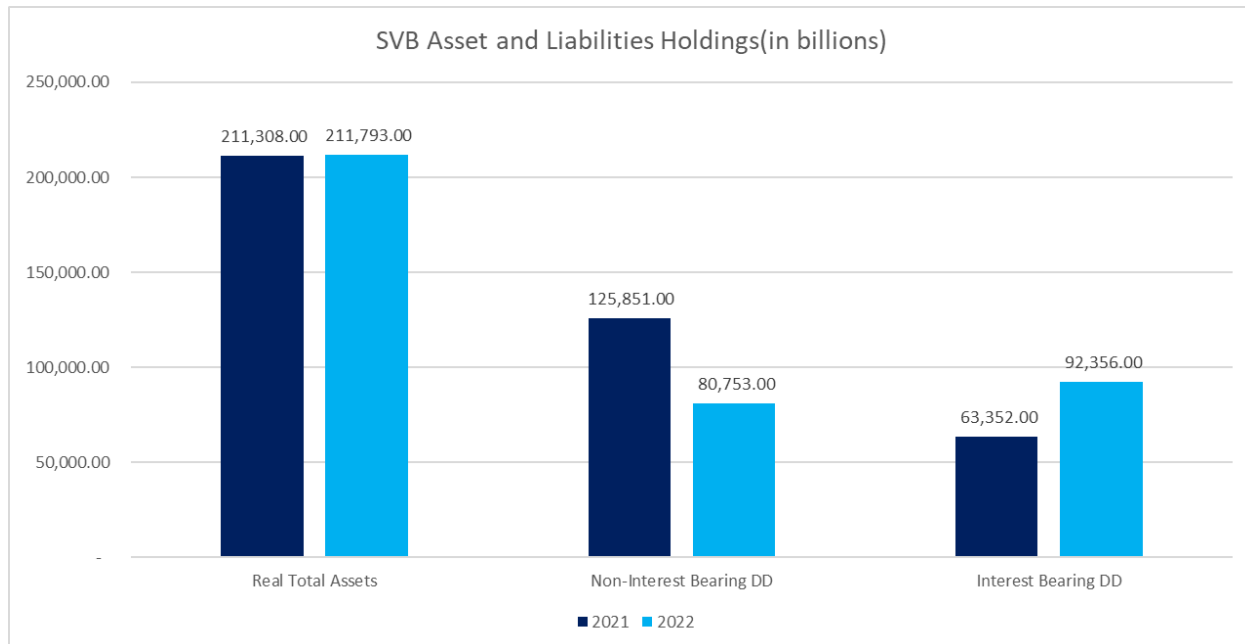
About Silicon Valley Bank

Silicon Valley Bank("SVB") Financial Group is a diversified financial services company that operates as a bank holding and financial holding company. It has various subsidiaries and divisions that provide a range of banking and financial products and services to clients across the United States and in key international innovation markets.

SVB has a strong dedication to supporting clients of all sizes and stages throughout their growth life cycle, particularly in the technology, life science/healthcare, private equity/venture capital, and premium wine industries.

Through its principal subsidiary, Silicon Valley Bank, SVB Financial Group offers commercial and private banking products as well as asset management, private wealth management, and other investment services.

As of December 31, 2021, SVB had total assets of \$211.3 billion, with \$125.8 billion in non-interest bearing demand deposits and \$63.35 billion in interest-bearing deposits. In 2022, the company's asset base increased to \$211.8 billion, with non-interest bearing deposits reduced to \$80.8 billion and interest-bearing deposits increasing to \$92.4 billion.



In 2022, SVB's total assets increased by 0.2%. However, during the same period, the bank's Non-Interest Bearing Demand Deposits decreased by 36%, while Interest Bearing Deposits increased by 46%. This change in the bank's liability holdings indicates that SVB has more work to do in servicing the significant increase in interest-bearing deposits.

The Bank Operation and The Macro Economy

This paper aims to assess the issues behind the failure of SVB, taking into consideration major global events such as COVID-19, Fed Stimulus Check, and the Russian Ukraine War. Understanding the narrative from the Macro Economy globally will provide additional perspective around the failure of SVB.

Firstly, it is important to understand how banks operate, specifically SVB. The bank primarily takes deposits from Venture Capitalist firms, Tech Startups/Businesses, and the Crypto Industry. These deposits come in the form of Interest Bearing deposits and Non-Interest Bearing Deposits. Depositors with Interest Bearing deposits earn interest on their money, and SVB has to be profitable after satisfying its obligations to its customers.

In order to pay the interest on its deposits, SVB has to invest its funds by giving out loans at higher interest rates than what it gives its depositors, or invest in the bond market. However, the bank has to stay highly liquid to ensure that when the depositors request their money, it can be made available to them.

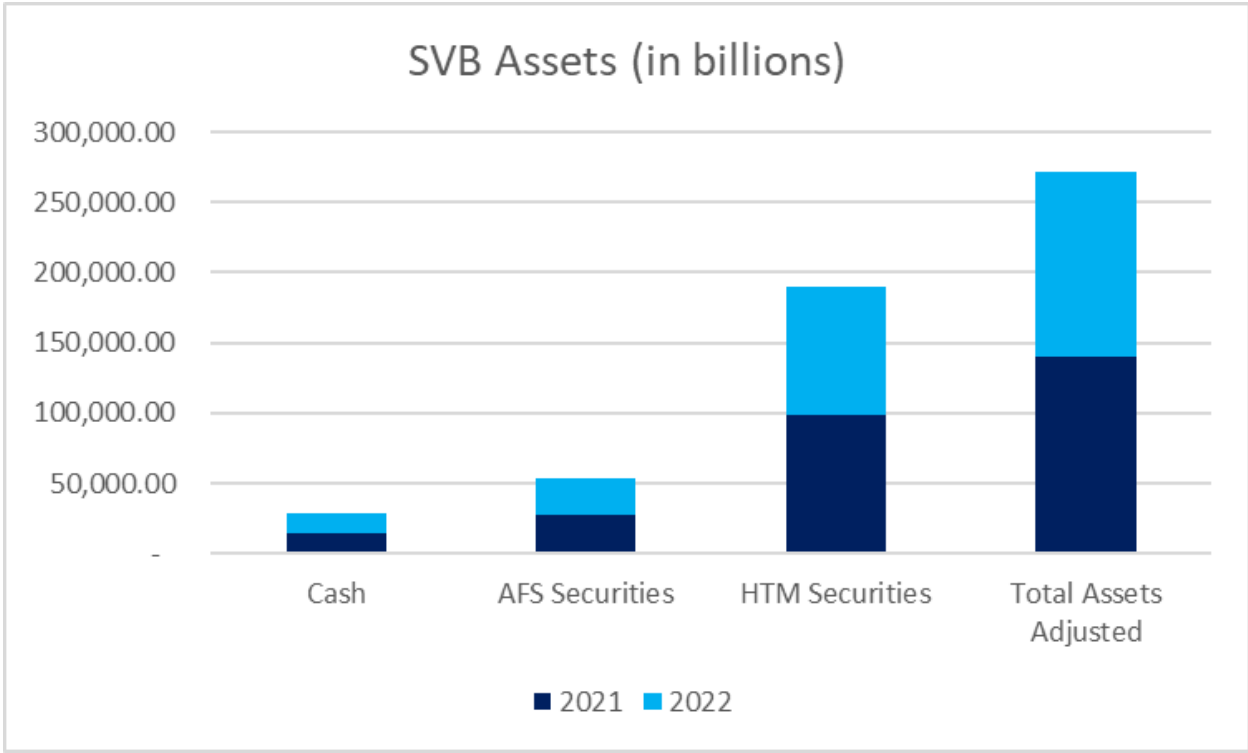
Referencing the chart on SVB Asset and Liabilities Holdings, in 2022, SVB Non-Interest Bearing Deposits decreased massively by \$41 billion dollars, while its Interest Bearing Liabilities increased by \$29 billion dollars. To tie this to the economy, during COVID-19, the economy

experienced low inflation and growth rates, which resulted in the Fed policy for the Banks to lend out money to businesses at an interest rate of 0% to individuals and businesses.

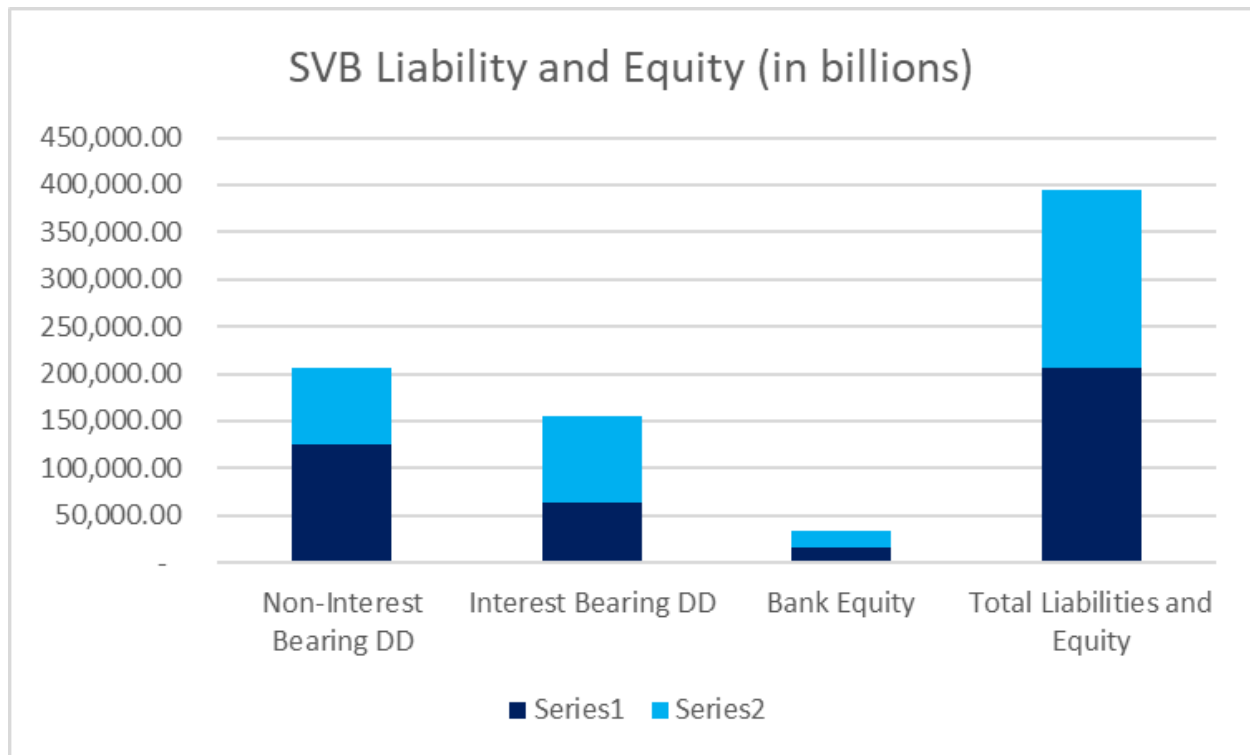
If SVB had liabilities (deposits) that were interest bearing in nature, but with interest rates at 0%, there was no strong obligation to make intense profits to meet its depositors' demands. Rather, all SVB had to do was invest those interest bearing deposits in securities to earn some yield.

However, due to the Fed policy towards stimulating the economy in COVID-19, there was an increase in money supply, resulting in rising inflation. The Fed, as part of their Macroeconomic objectives, had to curb inflation by raising interest rates. The rising interest rates meant that SVB had to invest their money in assets that yielded well above the interest rate and the rising inflation rate to gain value for their money and be profitable.

SVB Investments in a Rising Interest and Inflation Rate Environment



For the purpose of this assessment, the asset base has been adjusted to include its Cash Holdings, Available for Sale Securities, and Held till Maturity Holdings only. As a result, the total asset is \$140 billion in 2021 and \$131 billion in 2022.



For the purpose of this assessment, the liability base mentioned above has been adjusted to include Non-Interest Bearing, Interest Bearing Demand Deposits, and Bank Equity only. As a result, the total liability and equity amount to \$205 billion in 2021 and \$189.4 billion in 2022.

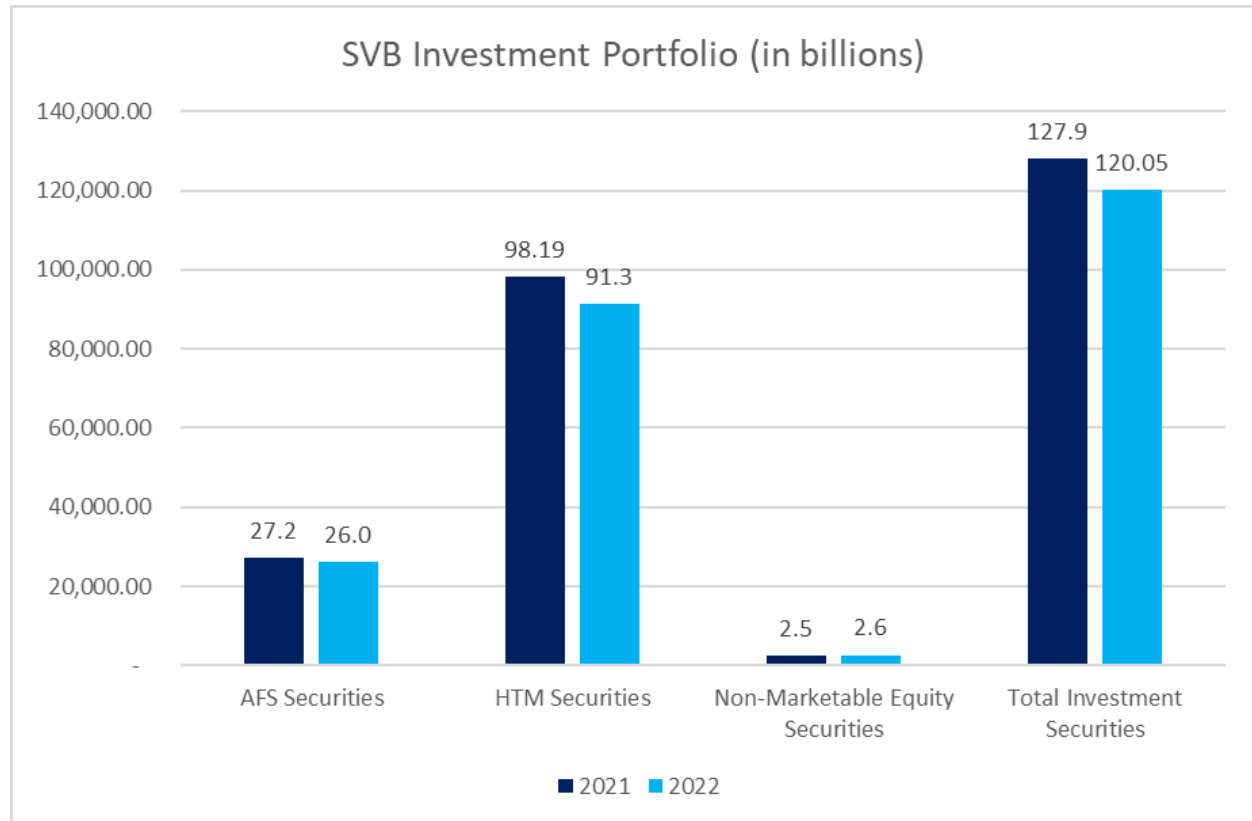
Banking Regulations

Before delving into SVB's investments, it's important to highlight the regulatory aspect of the bank. In the banking system, the bank's capital (equity) to asset ratio must be greater than 13%, and the bank should undergo stress tests of its balance sheet and income statement to assess its ability to meet its obligations to depositors during macroeconomic events such as rising interest rates.

Additionally, the Liquidity Coverage Ratio (LCR) is a critical ratio for banks. In the US, there are stringent requirements around the LCR for banks with assets greater than \$250 billion. The LCR is a quantitative liquidity requirement implemented by US Bank Regulators. It requires each subject company to maintain high-quality liquid assets (HQLA) sufficient to meet its projected total net cash outflows over a 30-calendar day period of significant stress.

SVB narrowly escaped the stringent LCR regulation since its asset value is \$205 billion, and it invests most of its deposits in HQLA. However, this wouldn't be a cause for alarm if appropriate risk management was in place, and most importantly, if SVB underwent stress testing.

SVB Investment Portfolio



SVB held Available for Sale (AFS) securities, which are debt or equity securities purchased with the intent of selling before they reach maturity or holding them for an extended period if they lack a maturity date. According to accounting standards, unrealized losses and gains are included in the income statement, affecting SVB's profit or loss for the year ended.

On the other hand, Held to Maturity Securities (HTM) are securities purchased to be owned until maturity, such as bonds and Mortgage-Backed Securities. With HTM Securities, the value of these investments is not recorded and updated on the company balance sheet based on their fair market value, and they can significantly impact the company's liquidity.

Despite having \$91.3 billion invested in HTM securities, which had an unrealized loss of over \$15 billion due to rising interest rates, SVB did not hedge these investments against interest rate risk, indicating inadequate risk management. However, SVB continued to record the book value of \$91.3 billion for HTM rather than the actual value of \$76.3 billion. This created the illusion of having sufficient liquidity to meet its obligations to customers.

HTM Securities 2022			
	Amortized Cost	Unrealized Gains	Unrealized Losses
US Agency Debentures	486.00		(52.00)
Residential MBS:			
Agency Issued MBS	57,705.00		(9,349.00)
Agency Issued CMO - Fixed Rate	10,461.00		(1,885.00)
Agency Issued CMO - Variable Rate	79.00		(2.00)
Agency Issued CMBS	14,471.00		(2,494.00)
Municipal Bonds and Notes	7,417.00	2.00	(1,269.00)
Corporate Bonds	708.00		(109.00)
Total HTM Securities	91,327.00	2.00	(15,160.00)

Profile of Assets Held in SVB HTM Securities

Mortgage Backed Securities

Mortgage-backed securities (MBS) are variations of asset-backed securities that are formed by pooling together mortgages exclusively. The investor who buys a mortgage-backed security is essentially lending money to home buyers.

Agency Debenture

An agency debenture is debt (bonds) issued at a fixed, or variable, interest rate by a United States federal agency

Collateralized Mortgage Obligation

A collateralized mortgage obligation (CMO) refers to a type of mortgage-backed security that contains a pool of mortgages bundled together and sold as an investment.

Municipal and Corporate Bond

A municipal bond, commonly known as a muni, is a bond issued by state or local governments. Corporate Bond is a bond issued by a corporation in order to raise financing for a variety of reasons such as to ongoing operations, M&A, or to expand business

Risks Associated to HTM Securities Held by SVB

For every investment, there are different layers of risk involved. As an asset manager, SVB should be well aware of the risks associated with holding securities to maturity (HTM) and put

measures in place to mitigate such risks to ensure that a liquidity crisis is avoided. The key risks include:

Interest Rate Risks

The Price of a bond changes with changes in the market interest rate. The risk associated with bonds and interest rate is that as interest rate rises, the price of the bond falls as such the value of the bond decreases.

Credit Risks

The failure in timely payment of interest by the principal issuer. This type of risks is low especially when investing in Treasury Bonds and in Corporate Bonds with high credit ratings.

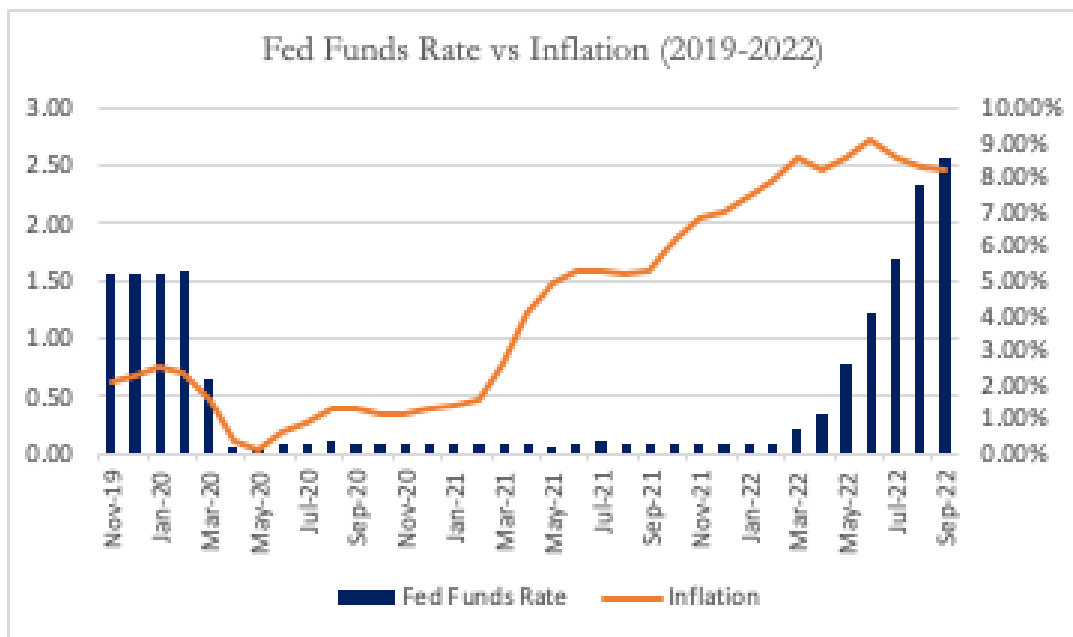
Liquidity Risks

This risk arises when the holder faces difficulty in selling its asset. Hence, they are not easily convertible to cash.

Inflation Risks

The risk arises from the decline in the value of a security's cash flows due to inflation.

Interest Rate, Inflation Rate and SVB Investment



[Fed Fund Rate vs Inflation Rate](#)

The chart above is an excerpt from my previous paper, published in November 2022. The Federal Funds Rate has been rising steadily since 2020, which has put SVB Holdings at high risk due to its investment holdings losing value. Additionally, the current inflation rate is quite high at 6.04%, exacerbating the situation.

The rising interest and inflation rates have resulted in SVB HTM losing value due to both Interest Rate Risk and Inflation Rate Risk. SVB had invested in Fixed Yield Bonds, which meant that in order to effectively manage interest rate risks, it had to hedge the risk with Interest Rate Swaps.

How Interest Rate Swap Works

An interest rate swap is a forward contract that involves the exchange of one stream of future interest payments for another, based on a specified principal amount. Typically, interest rate swaps involve the exchange of a fixed interest rate for a floating rate or vice versa. This is done to reduce or increase exposure to fluctuations in interest rates.

To explain more succinctly, in an interest rate swap, SVB would pay a fixed rate to receive a floating rate in return. The difference between the two rates is known as the Swap Rate.

Let's consider a case study. Suppose SVB invests in a bond instrument at a fixed yield of 2%, and the interest rate rises. As a result, the value of the bond decreases. However, SVB can offset the loss with earnings from the Swap Rate.

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SVB FINANCIAL GROUP AND SUBSIDIARIES NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

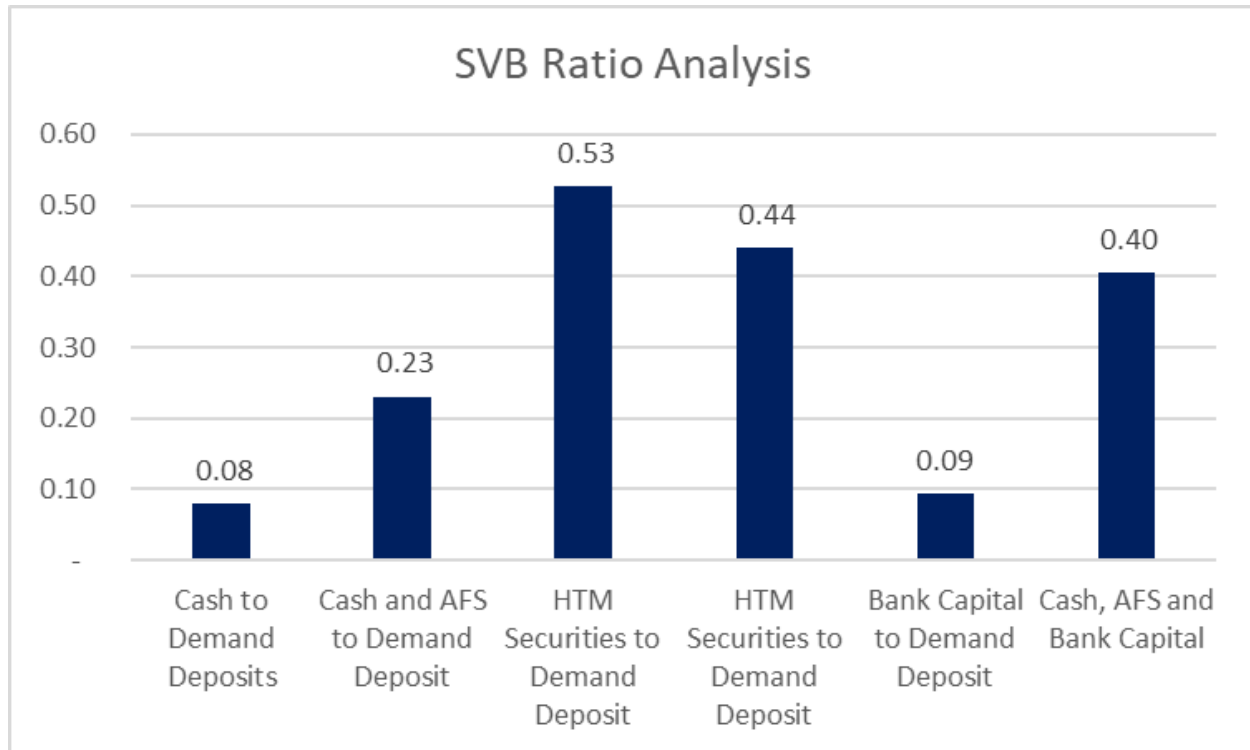
The total notional or contractual amounts and fair value of our derivative financial instruments at December 31, 2022, and December 31, 2021, were as follows:

	December 31, 2022			December 31, 2021		
	Notional or Contractual Amount	Fair Value		Notional or Contractual Amount	Fair Value	
Derivative Assets (1)		Derivative Liabilities (1)	Derivative Assets (1)		Derivative Liabilities (1)	
(Dollars in millions)						
Derivatives designated as hedging instruments:						
<i>Interest rate risks:</i>						
Interest rate swaps (2)	\$ 550	\$ —	\$ —	\$ 10,700	\$ 18	\$ —
<i>Currency exchange risks:</i>						
Foreign exchange contracts	778	17	—	—	—	—
Foreign exchange contracts	616	—	56	—	—	—
Total derivatives designated as hedging instruments		17	56		18	—

In 2021, SVB held \$10.7 billion in Interest Rate Swaps, but in 2022, they reduced their holdings to \$550 million. This reduction leaves them with an HTM holdings of \$91 billion that is all unhedged and free to be crushed by the mighty forces of interest rates.

Silicon Valley Bank has failed to manage its risks by not hedging its investments for Interest Rate risks. This lack of risk management puts the bank in a vulnerable position should interest rates fluctuate.

2022 Ratio Analysis of Silicon Valley Bank



Cash to Demand Deposits

The Cash to Demand Deposits ratio is a measure of a bank's ability to meet its liquidity requirements in the event that depositors request all of their funds. This ratio indicates the amount of cash that the bank has on hand in relation to its demand deposits.

Currently, SVB's Cash to Demand Deposits ratio is 0.08, which means that the bank can only meet 8% of its demand deposits with its available cash. This ratio suggests that SVB may have limited capacity to meet unexpected withdrawal requests from its depositors, and may need to rely on other sources of liquidity in such scenarios.

Cash and AFS to Demand Deposits

The Cash and AFS to Demand Deposits ratio measures the cash at hand plus the Available for Sale Securities and how they can meet SVB's liquidity requirements if depositors request for all their funds. Currently, the ratio stands at 0.23, indicating that SVB can only meet 23% of its demand deposits held in its books

Unadjusted HTM Securities to Demand Deposits

This ratio measures the Held to Maturity Securities not adjusted for unrealized losses and how it can meet SVB liquidity requirements if the depositors request for all their funds.

The Unadjusted HTM Securities to Demand Deposits ratio is 0.53, which implies that SVB can only meet up with 53% of its demand deposit held in its books.

Adjusted HTM Securities to Demand Deposits

This ratio measures the Held-to-Maturity (HTM) Securities adjusted for unrealized losses and assesses how well it can meet SVB's liquidity requirements if depositors request all of their funds.

The adjusted HTM Securities to Demand Deposits ratio currently stands at 0.44. This indicates that SVB can only cover 44% of its demand deposits held in its books with its actual value of HTM Securities.

Bank Capital to Demand Deposits

This ratio measures the bank's capital and its ability to meet SVB's liquidity requirements in the event that depositors request for all their funds.

The adjusted Bank Capital to Demand Deposits ratio is 0.09, which implies that SVB can only meet 9% of the demand deposits held on its books.

Cash, AFS and Bank Capital to Demand Deposits

This ratio measures the cash at hand, available-for-sale securities, and bank capital and how it can meet SVB's liquidity requirements if depositors request all of their funds. The ratio currently stands at 0.40, indicating that SVB can only meet 40% of the demand deposits held on its books.

Conclusion

The customers of Silicon Valley Bank became aware that the bank was experiencing a severe liquidity issue, resulting in a bank run. According to our ratio analysis, SVB had poor liquidity that could barely meet 50% of its demand deposits. This ultimately led to the failure of Silicon Valley Bank.

Silicon Valley Bank failed to manage its risk adequately in a turbulent macroeconomic environment. The bank's capital was insufficient to cover the demand deposits at hand, and most of the liquidity was locked up in long-term holdings that were losing value due to rising interest rates and inflation.

The key question to consider is whether Silicon Valley Bank has had poor fund management structures since 2021 and 2022, and it took a rising interest rate environment to expose this flaw. If the Fed continues to hike interest rates, there could be a possibility of another major banking system crisis around the corner, resulting in depositors losing trust in banks. This could potentially lead to the need for the Fed to roll out a Central Bank Digital Currency. Alternatively, it's possible that this is just an isolated event.

Appendix

SVB Financial Extracted as at December 2022			
Assumptions			
% Change in Real Total Assets		0.2%	
% Change in Non-Interest Bearing DD		-36%	
% Change in Interest Bearing DD		46%	
	2021	2022	
Assets			
Cash	14,586.00	13,803.00	
AFS Securities	27,221.00	26,069.00	
HTM Securities	98,195.00	91,321.00	
Total Assets Adjusted	140,002.00	131,193.00	
Real Total Assets	211,308.00	211,793.00	
	2021	2022	
Liabilities			
Non-Interest Bearing DD	125,851.00	80,753.00	
Interest Bearing DD	63,352.00	92,356.00	
Bank Equity	16,609.00	16,295.00	
Total Liabilities and Equity	205,812.00	189,404.00	
HTM Securities 2022			
	Amortized Cost	Unrealized Gains	Unrealized Losses
US Agency Debentures	486.00		(52.00)
Residential MBS:			
Agency Issued MBS	57,705.00		(9,349.00)
Agency Issued CMO - Fixed Rate	10,461.00		(1,885.00)
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Total HTM Securities	91,327.00	2.00	(15,160.00)

SVB Investment Portfolio		
	2021	2022
AFS Securities	27,221.00	26,069.00
HTM Securities	98,195.00	91,321.00
Non-Marketable Equity Securities	2,543.00	2,664.00
Total Investment Securities	127,959.00	120,054.00

Ratio Analysis	
	2022
Cash to Demand Deposits	0.08
Cash and AFS to Demand Deposit	0.23
HTM Securities to Demand Deposit	0.53
HTM Securities to Demand Deposit	0.44
Bank Capital to Demand Deposit	0.09
Cash, AFS and Bank Capital	0.40

Charts

