BANKING RISK
THE ROLE OF RISK MANAGEMENT AND THE CHIEF RISK OFFICER

Andrew B Miller, PhD

March 17, 2023

WHO’S SPEAKING?

Andrew B Miller, PhD is a finance professional with over 25 years of experience working with and consulting to financial services companies.

Dr. Miller is a technical expert in risk management and valuation with executive-level corporate experience.

Dr. Miller has testified on behalf of banks in federal courts and in front of the SEC. He has conducted numerous independent banking investigations.

Dr. Miller holds a PhD from Cornell and an MS from Stanford. He was previously a professor at NYU.

Dr. Miller has consulted to financial services companies and their outside counsel including Citigroup, Duetsche Bank, JPMorgan, Bank Of America, Wells Fargo, AIG, Blue Mountain Capital (now Assured Investment), the Federal Housing Finance Association and the FHLB Chicago, among others.

WHO'S SPEAKING?

He's also afraid of heights, so he took up rock climbing to try to manage that risk.

WHY ARE WE HERE TODAY?

The recent banking turmoil has raised numerous questions and issues around banking risk

Bank runs, failures, wobbles

- Silicon Valley, Signature, Silvergate
- First Republic, Credit Suisse
- Who's waiting in the wings?

Questions and interventions

- SVB appears to have been without a chief risk officer (CRO) for much of 2022.
- DOJ and SEC investigating SVB and Signature.
- President Biden requesting additional powers to punish executives and banks for "mismanagement and excessive risk taking."

WHAT IS BEING SAID

How Bank Oversight Failed: The Economy Changed, Regulators Didn't *WSJ 3/24/23*

- "The question we were all asking ourselves over that first week was, 'How did this happen?'" Federal Reserve Chair Jerome Powell said Wednesday (about SVB).
- Not until late 2022, when rates had already risen substantially, did regulators warn SVB that its **modeling of interest-rate risk was inadequate.**
- By 2022, the key issue for both the economy and banks was inflation, which jumped above 5% after decades around 2%.
- Meetings (at SVB) with Fed examiners became more intense, said a former employee who worked in risk management.
- **Company management (at SVB), though, effectively bet that interest rates would decline.** The bank in a presentation of second-quarter results last year told investors it was "shifting focus to managing downrate sensitivity."

WHAT IS BEING SAID

How Bank Oversight Failed: The Economy Changed, Regulators Didn't *WSJ 3/24/23*

- **SVB did model interest rate risk, but it ran the models assuming that higher interest rates boosted profits**, according to people familiar with the matter. The Fed issued another "matter requiring attention" alert regarding the bank's interest-rate modeling, one of the people said.

The nascent legal conflicts begin with internal bank disagreement over risk management, disagreement with regulators, criticism by investors, and ultimately depositor sentiment.

- Ideally, when bank examiners pointed out problems, the bank's management would agree and voluntarily comply. But former examiners for the San Francisco Fed said that a bank might involve its lawyers if it didn't agree with the examiners' findings, treating the process as a court case rather than a routine oversight matter.

THE GATHERING STORM

Boards, Attorneys, Regulators, Investors, Creditors, Academics, Clients, Press, Politicians

- Preparing/filing investor lawsuits claiming securities fraud and inside knowledge of inadequate risk management

- The bank’s shareholders accuse the SVB Financial Group chief executive, Greg Becker, and chief financial officer, Daniel Beck, of ***concealing how rising interest rates*** would leave its Silicon Valley Bank unit “particularly susceptible” to a bank run.

- Opening investigations with focus on risk management, SEC, DOJ, FDIC

- Deposit flight to perceived safety and returns – voting with feet, heightened awareness of risk, lack of time/ability to distinguish their bank from SVB/Signature.

THE GATHERING STORM

Boards, Attorneys, Regulators, Investors, Creditors, Academics, Clients, Press, Politicians

- Calling for tighter oversight and better risk management
- Proclaiming a failure of risk management
- Investigating and/or hunting for failures of risk management
- General sense that risk management failure is a substantial part of the failures and crisis
- Bank boards are reconsidering their treatment of risk management

THE GATHERING STORM

Quotes and headlines

- WSJ, Bank Failures Train Spotlight on Shortcomings in Risk Management
- Golbal Risk Association, Silicon Valley Bank: A Failure in Risk Management
- Barron's, …"a reminder of how important it is to take every single basis point of risk management seriously."
- Forbes, "the bank's models to predict risk and performance are said to have been flawed."
- WSJ, "Bank boards have risk committees tasked with forestalling problems. But the members of those committees don't always have the skills or stature to make themselves heard."

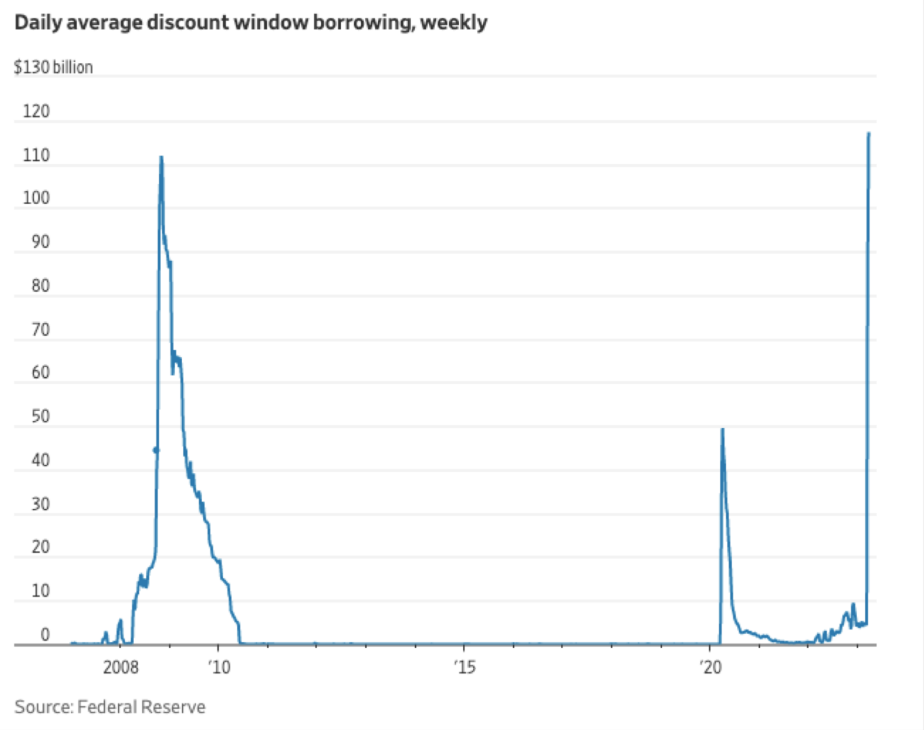
STRAIGHT TALK

Despite the gathering clouds around interest rate risk management, it is not so straightforward

- Much attention is probably focused on interest rate risk management because everyone can see that interest rates have gone up, so it is a likely culprit.
- But bank interest rate risk management is multi-faceted
    - Making loans to customers a variable rates provides an interest rate risk hedge
    - Making loans to customers at fixed rates imposes interest rate risk, but mitigates credit risk.
    - Having a large, diversified, uncorrelated depositor base provides rate protection (Why? Because depositors are sticky at lower rates as rates rise)
    - Rates go up and down. What doesn’t look like good rate risk management today may look like great rate risk management tomorrow. Much criticism today is short sighted.
    - Use of derivatives for rate hedging comes at a cost that should be weighed.
    - Before assessing the state of interest rate risk management at any bank, it is critical to consider the specifics of that particular bank and its total business.
    - Interest rate risk management can only judged in its entirety.

LIQUIDITY PRESSURES AFTER SVB

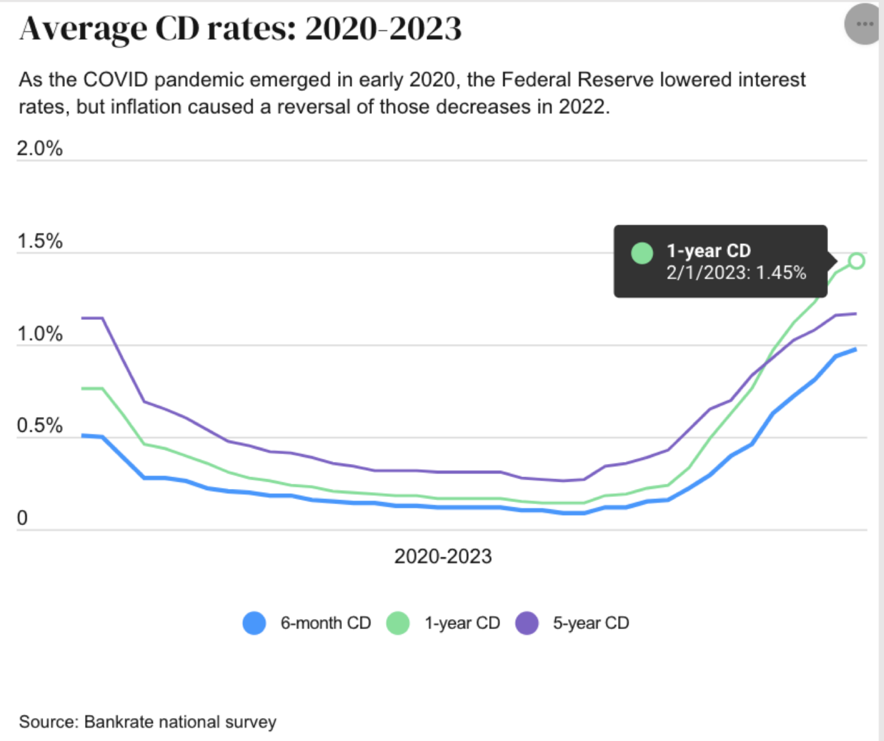
Banks are struggling with liquidity - deposit flight to perceived safety and higher yielding alternatives



- Estimates of total Fed program lending for week of March 15 are about $300B (of which about $233B was through the San Francisco Fed).
- Bank Term Funding Program onlined March 9, 2023 in response to SVB and now sitting at $35B.
- Borrowing at the Federal Home Loan Bank system has increased also.
- Banks are shoring up liquidity.

RATE PRESSURES ON DEPOSITS?

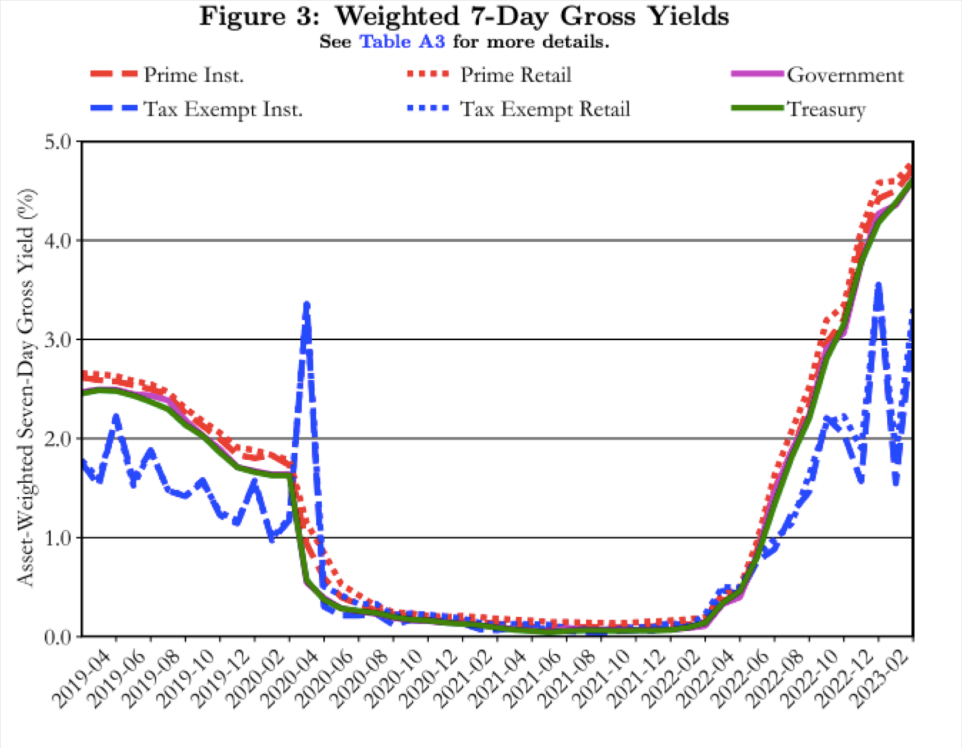
Despite all the hoopla about rising alternatives for depositors, average CD rates are not much higher



Where they go from here largely depends on inflation and FED policy.

That could follow a variety of paths including a sustained increase or a fairly quick return trip down.

RATE PRESSURES ON DEPOSITS?



Money market funds rates have risen more sharply than average CD rates, but have only very recently surpassed pre covid levels.

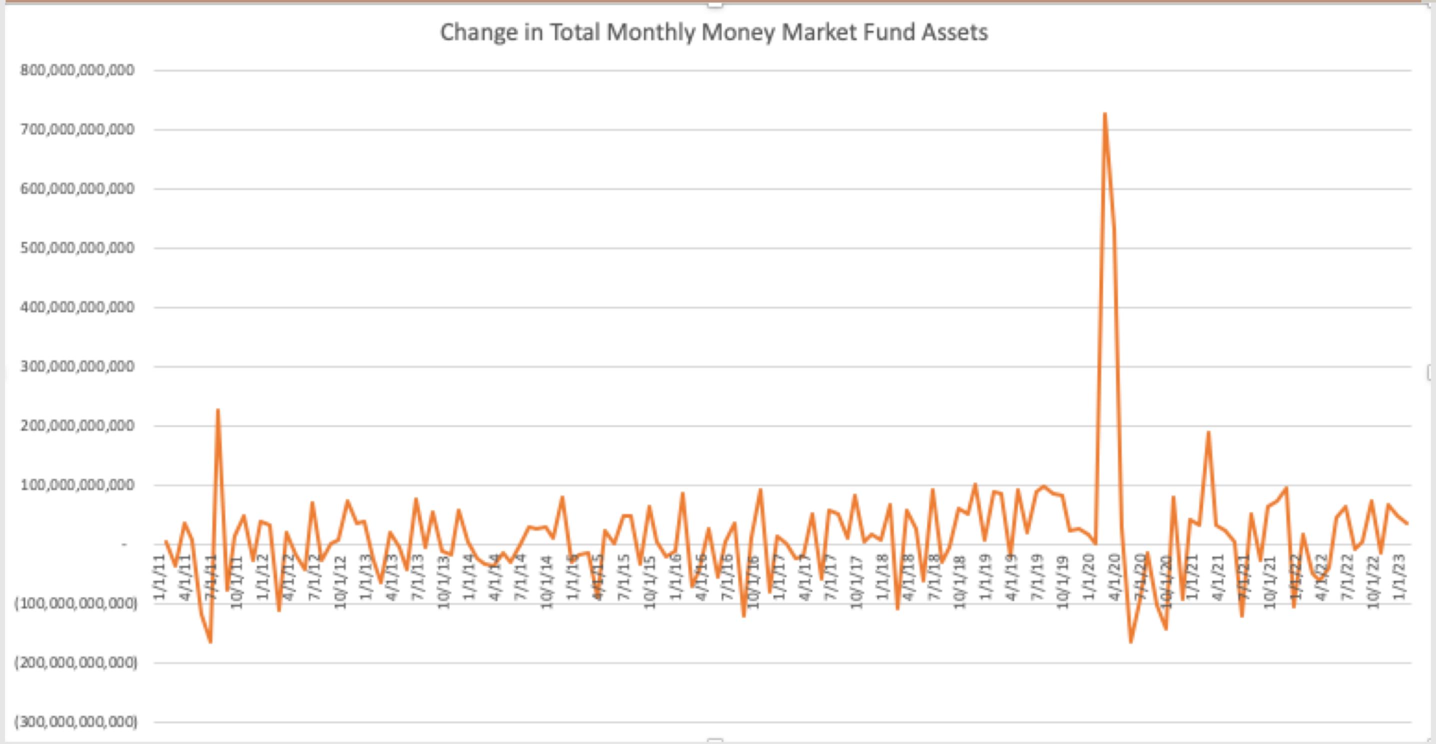
If there was any rationale to heightened deposit flight risk for this reason, it could only have been in the last few months.

Also, in the context of prior periods experiencing such rates, it is not clear that this should have sounded alarms.

Source: https://www.sec.gov/files/mmf-statistics-2023-02.pdf
Filings to 3/17/23.

RATE PRESSURES ON DEPOSITS?

Deposit loss to money markets as rates rose was NOT a predictive warning signal



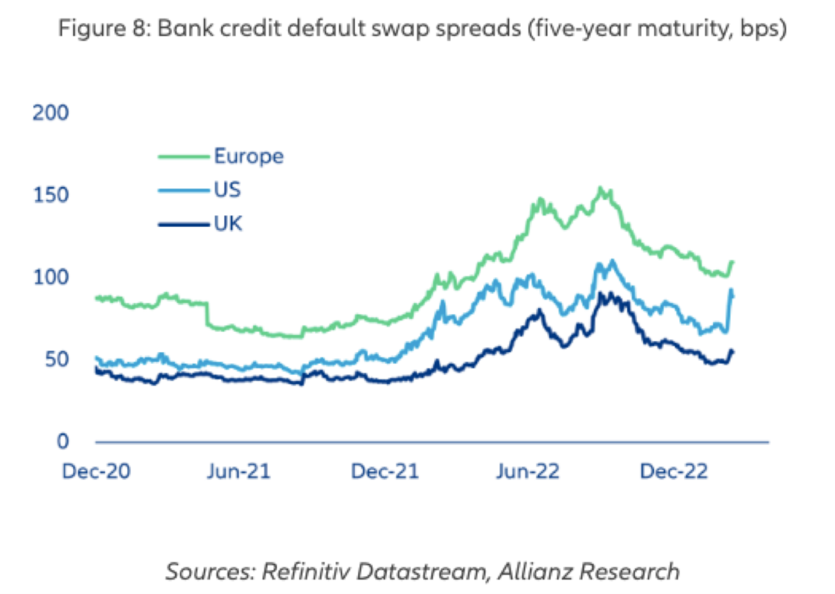
Data on money market assets from OFR show no clear pattern of flight from deposits over the last two years.

Source: Author presentation of OFR data

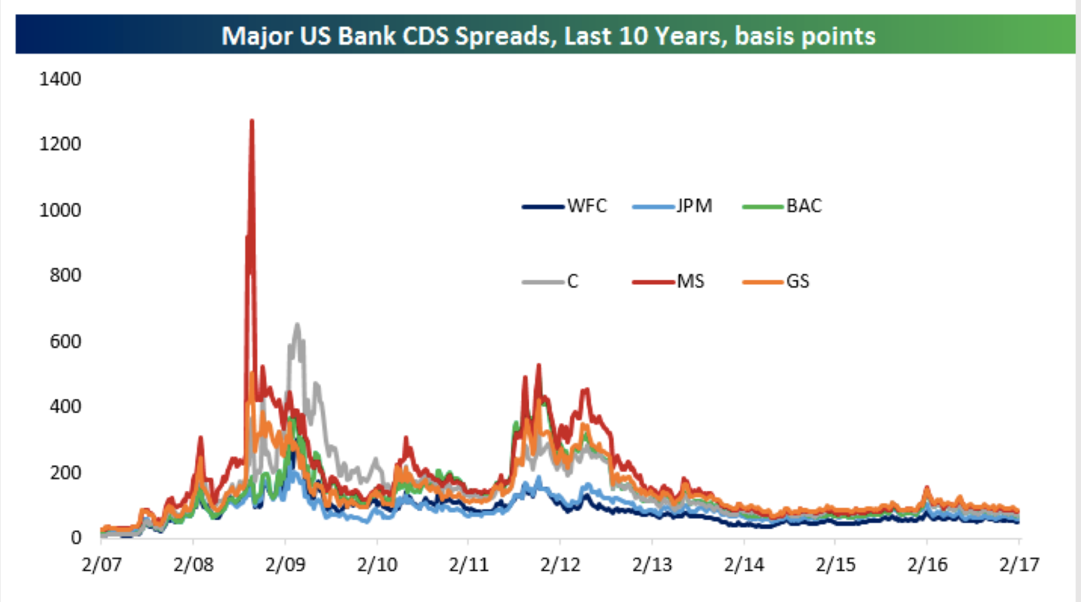
BANK CREDITORS NOT DRIVING

Banks are facing a slightly heightened risk of default, but it is not matching the liquidity risk – Bank creditors are not driving the crisis

Banks are facing heightened risk of default

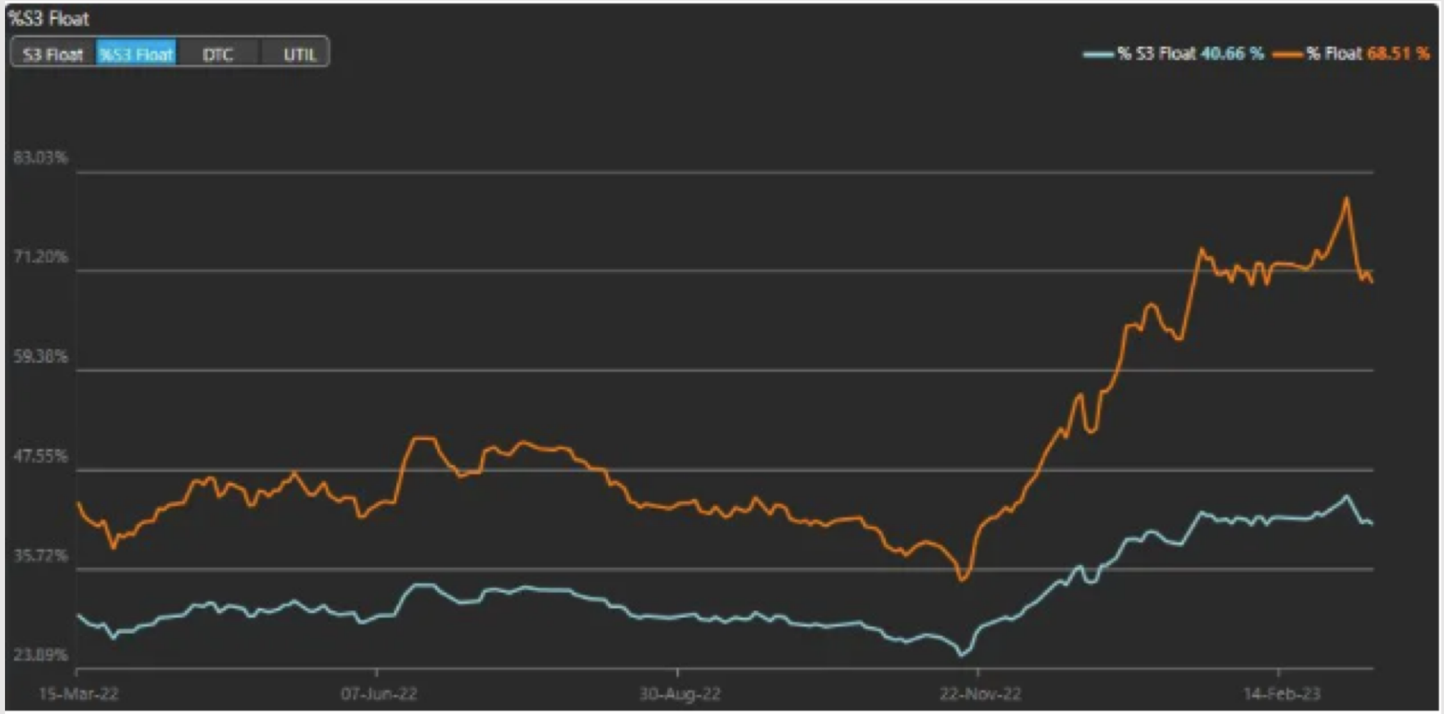


…but not at Great Recession levels (yet).



BANK INVESTOR PRESSURES

Short sellers pushed short interest in regional banks (KRE) way up in late 2022, peaking at 78% 3/3/23



In November 2022, short sellers dramatically ramped up bets against all regional banks.

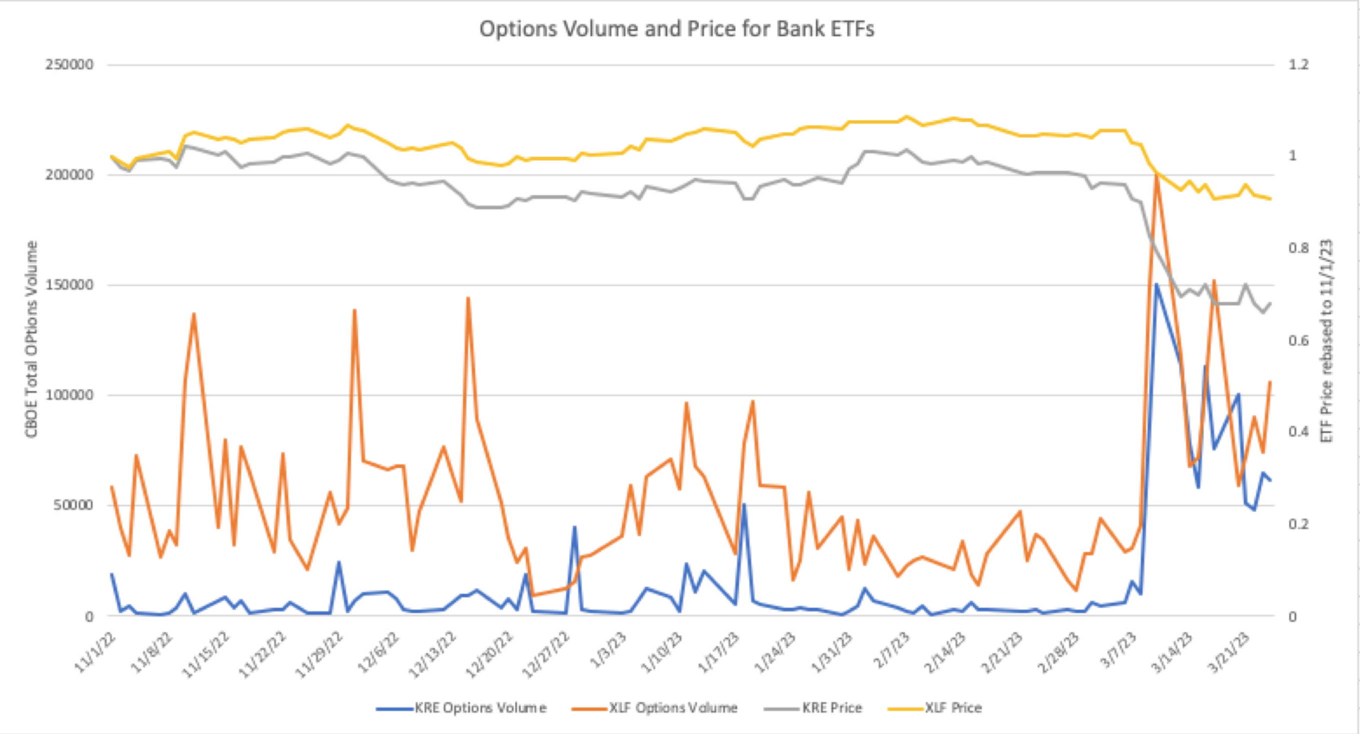
SVB and Signature were large components, but the short sellers ramped up against all regional banks.

So was SVB's run investor or depositor driven?

Source: S3 Partners, orange line is total short interest %, blue line is S3's position

CONTAGION!

Bank stocks started cratering 3/8/23 as option volumes and short interest spiked



Contagion has spread like fire and short sellers are looking for any excuse to liken any bank to SVB.

Regional banks (KRE) have been hit about 3x as much as big banks (XLF).

Source: options volume from CBOE, prices Nasdaq (rebased to 11/1/23)

WHAT CAUSED THE CRISIS?

Is this crisis a failure of risk management or something else?

The Case for Failure of Risk Management

- Failure to assess risks to rising rates
  - HTM assets
  - Loans
  - Depositors’ options
  - Lack of hedging
- Failure to assess liquidity risk
  - Uninsured deposits
  - Interconnected assets and liabilities
- Failure to assess correlation in risks
  - Rates and credit risk

WHAT CAUSED THE CRISIS?

Is this crisis a failure of risk management or something else?

The Case for Something Else

- Short sellers ramped up a campaign beginning in late 2022. Savvy uninsured depositors probably took note and watched nervously. As shorts peaked 3/3/23 (78% on KRE) depositors panicked.
- Creditors to banks did not feel the same panic – CDS prices have not spiked.
- Banks ARE well-capitalized and managing risk appropriately
  - Skittish depositors behaving like equity short-sellers and herd behavior drive the crisis, ask Peter Thiel what he was thinking.
  - Banks have a natural hedge in deposit stability and tend to match rate sensitivity of loans to that of deposits.

WHAT CAUSED THE CRISIS?

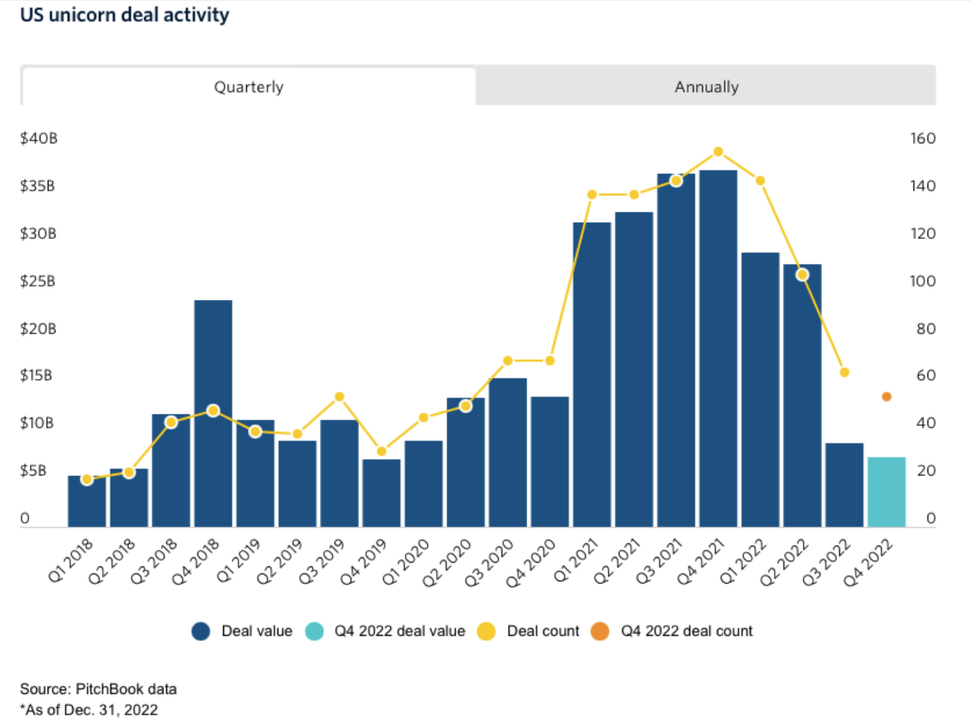
Is this crisis a failure of risk management or something else?

The Case for Something Else

- Risks ARE well-managed
  - Long-run inflation and interest rate expectations have varied little over past few years.
  - Flight to money markets did NOT predict runs.
- Banks hold safe assets for long-run stability – the crisis is a short-run freak out.
- SVB and Signature *were* unicorns
  - SVB because of its unique growth strategy tied to venture capital which drove its uninsured and highly correlated deposits from companies facing an industry downturn driven by rate increases.
  - Signature because of its very similar story to SVB but with the close-knit real estate investment/development industry in New York.

SVB WAS A UNICORN

What made SVB a ”unicorn”? Its clients were unicorns.

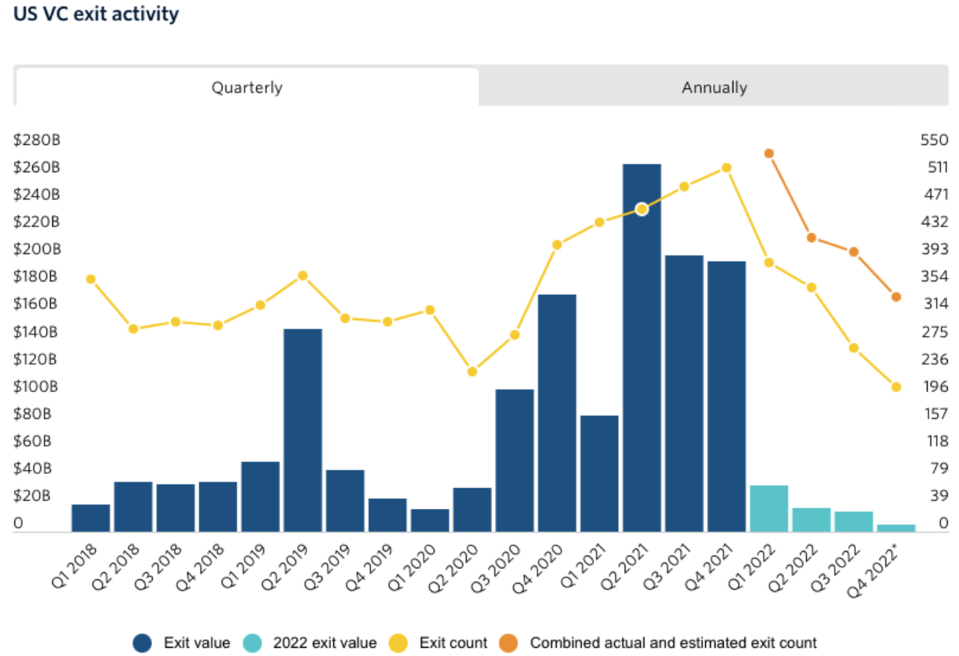


SVB was unique in that many of its clients were venture cap startups with deep interconnectivity (correlation) due to the structure of the industry with a few large VC funds (eg. Thiel)

It is no surprise, then, that the state of that industry would play on the stability of SVB’s business.

SVB WAS A UNICORN

What made SVB a ”unicorn”? Its clients were unicorns.



Source: PitchBook data
*As of Dec. 31, 2022

When VC funds cannot capitalize on their investments with an “exit”, they get very nervous.

SVB’s key deposit base was getting very nervous (or being told to be nervous by the VC funds) in late 2022.

BANKING RISKS BY OWNERSHIP

Lessons from a life in financial services conflicts with examples from Silicon Valley Bank's failure

Risks - External

- Myriad – just review the 10K section "Forward-looking Statements"
- This is the environment we live in. Banks must remain acutely aware of and responsive to these external risks.
- This presentation will focus on manageable risks or things that the bank can do. Yes, interest rate risks are external to a bank, but their risks must be handled internally.

Risks - Internal

- Life is very complicated but what can a bank actually do about it?
- There are numerous manageable (internal) risks that banks can respond to.
- **Today's Presentation - What are those management risks and how can a CRO respond? Non-technical, I promise.**

MANAGEABLE RISKS

- **Liquidity to meet total obligations**
- **Interest rates**
- **Asset and liability portfolios**
- **Valuation (market risk)**
- **Compliance**
- **Operational**
- **Communication of risk**
- **Going concern**

LIQUIDITY

A CRO can ensure that the dollars are available (or alert the Board otherwise).

A good CRO can communicate this stability to debtors and investors through company channels.

Total Obligations

- Possibly the #1 risk to any bank as depositor confidence will hinge on beliefs about safety of their money.
- Might sound simple, but actually requires an enormous risk management effort to “steer the ship” from troubled waters.
- Risk management should include both an assessment of long term and short term risks to both liquidation and the need to do so.
- Know your balance sheet and the associated markets as well as the temperature of your depositors. Ex. SVB AFS loss sale to GS.

INTEREST RATES

A CRO can help a bank mitigate it’s own internal incentives to favor short run results vs. long run stability.

A good CRO can do so at a reasonable cost of doing business.

The Banking Barometer – Rate Risk

- Fundamental building block of the banking business.
- Affects all sides of the financial statements as well as depositor/investor confidence.
- All banks must spread credit risks across assets and liabilities and from the short run to the longer run. This requires management of interest rate risks.
- Rate risk management includes diversification of assets and liabilities as well as direct mitigation through hedging programs.

INTEREST RATES

Wait! Why would banks forgo hedging or do it poorly?

Without a CRO it's nobody's business. With a typical executive, it's out of their wheelhouse. Often CRO's are convinced to forgo good practice to save money and boost short term results. Lack of corporate desire to fund what feels like another cost center (until it's too late!)

Interest Rate Hedging

- Can any bank really afford not to employ hedging programs? It depends.
- Even non-financial services companies regularly engage in hedging.
- And yet even large, sophisticated and systemic financial services companies choose to forgo comprehensive hedging. (Ex. See next page for the extreme example of SVB – more typical is to hedge but do it poorly.)
- Hedging is just good practice. It provides business operations insurance and should be considered a cost of doing business.

Just prior to implosion, SVB held approximately $216B in total assets including, at least, $191B in asset values sensitive to interest rates. And yet SVB had no interest rate swaps.

Um, guys who is driving the bus here?

SVB hedged $340M in forex, *deminimis* interest rate risk in 2021, and zero interest rate risk in 2022!

Surprisingly, SVB clients had more interest rate derivatives than SVB!

Derivatives

Derivative instruments are recorded as a component of other assets and other liabilities on the balance sheet. The following table provides a summary of derivative assets and liabilities at December 31, 2022, and December 31, 2021:

(Dollars in millions)	December 31, 2022	December 31, 2021	% Change
Assets:			
Equity warrant assets	$ 383	$ 277	38.3 %
Contingent conversion rights	12	—	—
Foreign exchange contracts	340	171	98.8
Total return swaps	40	—	—
Client interest rate derivatives	128	99	29.3
Interest rate swaps	—	18	(100.0)
Total gross derivative assets	903	565	59.8
Less: netting adjustments (1)	(351)	(137)	156.2
Total derivative assets	$ 552	$ 428	29.0
Liabilities:			
Foreign exchange contracts	$ 361	$ 137	163.5
Client interest rate derivatives	195	101	93.1
Total gross derivative liabilities	556	238	133.6
Less: netting adjustments (1)	(223)	(120)	85.8
Total derivative liabilities	$ 333	$ 118	182.2

Source: SVB 10K 12/31/22, p. 79.

WHERE DID SVB SIT?

For banks of similar asset sizes, SVB was definitely below any reasonable range of rate hedging

Issues

- See the next slide for a summary of bank's hedging activities. Generally, banks hedge their interest rate risks using swaps (and other derivatives) which are mostly interest rate related.
- The only bank that even comes close to the low level of hedging is Western Alliance (are they next?), but even they had $2.6B in notional swap value and were a much smaller bank than SVB.
- The average (non big 5 and HSBC) swaps to assets ratio is 67% - applied to SVB suggests that, were it average, it would have held $142B in swaps, not zero!

Table 13: Notional Amounts of Derivative Contracts

Top 25 Commercial Banks, Savings Associations and Trust Companies in Derivatives, in Millions of Dollars, September 30, 2022

Rank	Bank Name	Legal Entity Identifier	Total Assets	Total Derivatives	Total Futures (EXCH TR)	Total Options (EXCH TR)	Total Forwards (OTC)	Total Swaps (OTC)	Total Options (OTC)	Total Credit Derivatives (OTC)	Spot FX
1	JPMORGAN CHASE BANK NA	7H6GLXDRUGQFU57RNE97	$3,308,575	$54,304,061	$1,082,435	$1,095,480	$10,191,981	$32,885,146	$7,744,782	$1,304,237	$1,083,148
2	GOLDMAN SACHS BANK USA	KD3XUN7C6T14HNAYLU02	513,905	50,966,723	1,330,001	2,666,000	4,626,895	28,963,273	12,756,933	623,621	828,226
3	CITIBANK NATIONAL ASSN	E57ODZWZ7FF32TWEFA76	1,714,474	45,968,848	650,777	490,532	4,292,058	32,509,498	6,317,141	1,708,842	593,481
4	BANK OF AMERICA NA	B4TYDEB6GKMZO031MB27	2,407,902	21,597,071	263,156	211,870	3,850,597	13,444,743	3,286,069	540,636	490,760
5	WELLS FARGO BANK NA	KB1H1DSPRFMYMCUFXT09	1,712,442	12,162,668	523,282	472,763	973,648	7,984,059	2,094,880	114,036	28,849
6	STATE STREET BANK&TRUST CO	571474TGEMMWANRLN572	300,010	2,069,680	3,393	0	1,999,025	33,784	33,478	0	63,122
7	HSBC NA	1IE8VN30JCEQV1H4R804	166,765	1,465,693	33,794	6,570	499,336	821,879	89,931	14,183	50,866
8	BANK OF NEW YORK MELLON	HPFHU0OQ28E4N0NFVK49	344,654	1,063,986	36,861	38	253,677	747,766	25,369	275	110,307
9	U S BANK NATIONAL ASSN	6BYL5QZYBDK8S7L73M02	591,211	850,157	6,024	0	91,568	526,916	216,582	9,067	3,105
10	PNC BANK NATIONAL ASSN	AD6GFRVSDT01YPT1CS68	553,395	580,853	7,698	13,875	26,285	476,793	43,972	12,230	1,524
11	WESTERN ALLIANCE BANK		69,085	377,503	352,787	0	20,160	2,638	1,918	0	0
12	TD BANK NATIONAL ASSN	03D0JEWFDFUS0SEEKG89	394,332	358,334	0	0	2,425	355,868	41	0	0
13	TRUIST BANK	JJKC32MCHWDI71265Z06	534,185	324,271	6,552	26,684	21,023	201,708	59,918	8,386	597
14	NORTHERN TRUST CO	6PTKHDJ8HDUF78PFWH30	159,357	294,497	0	0	274,728	19,279	490	0	20,323
15	CITIZENS BANK NATIONAL ASSN	DRMSV1Q0EKMEXLAU1P80	224,480	268,544	1,181	0	11,706	233,657	19,314	2,686	95
16	MUFG UNION BANK NA	OX3PU53ZLPQKJ4700D47	124,556	207,177	1,689	0	19,472	180,148	5,867	1	398
17	REGIONS BANK	EQTWLK1G7ODGC2MGLV11	156,809	172,784	947	0	2,359	132,994	30,426	6,058	20
18	FIFTH THIRD BANK NA	QFROUN1UWUYU0DVIWD51	204,285	171,662	1,797	308	8,062	111,564	45,001	4,929	457
19	CAPITAL ONE NATIONAL ASSN	207ALC1P1YM0OVDV0K75	391,805	163,854	28,602	0	5,726	122,319	701	6,507	315
20	KEYBANK NATIONAL ASSN	HUX2X73FUCYHUVH1BK78	187,717	140,866	970	0	7,812	118,445	13,523	116	651
21	MORGAN STANLEY BANK NA	G1MLHIS0N32I3QPILB75	190,521	123,935	0	0	18,742	81,695	10,941	12,557	1,216
22	HUNTINGTON NATIONAL BANK	2WHM8VNJH63UN14OL754	179,434	91,319	527	0	5,924	78,394	2,507	3,968	69
23	UBS BANK USA		117,317	74,628	0	0	0	74,628	0	0	0
24	MANUFACTURERS&TRADERS TR CO	WWB2V0FCW3A0EE3ZJN75	197,679	71,917	0	0	2,812	66,696	2,409	0	131
25	COMERICA BANK		84,240	70,198	0	0	2,589	56,116	10,000	1,493	326
	Top 25 Commercial Banks, SAs & TCs With Derivatives		$14,829,133	$193,941,227	$4,332,472	$4,984,121	$27,208,609	$120,230,005	$32,812,192	$4,373,828	$3,277,986
	Other Commercial Banks, SAs & TCs With Derivatives		6,282,253	1,141,391	6,471	3,672	114,729	901,841	98,721	15,956	2,296
	Total All Commercial Banks, SAs & TCs With Derivatives		21,111,386	195,082,617	4,338,943	4,987,793	27,323,338	121,131,846	32,910,913	4,389,784	3,280,281

Note: Credit derivatives have been included in the sum of total derivatives. Credit derivatives have been included as an "over the counter" category, although the call report does not differentiate by market currently. Before the first quarter of 1995 total derivatives included spot FX. Beginning in that quarter, spot FX has been reported separately.

Source: Call reports, Schedule RC-L

Source: OCC Quarterly Report on Bank Trading and Derivatives Activities, 3Q2022

SVB WAS AN OUTLIER, RIGHT?

Derivatives Not Designated As Hedging Instruments	December 31, 2022 Notional Amount	December 31, 2022 Fair Value	December 31, 2021 Notional Amount	December 31, 2021 Fair Value
	(In thousands)			
Derivative Assets:				
Interest rate contracts	$ 108,451	$ 6,013	$ 87,470	$ 992
Foreign exchange contracts	[illegible]	[illegible]	28,463	1,517
Interest rate and economic contracts	145,480	7,814	115,933	2,509
Equity warrant assets	18,209	4,048	18,539	3,555
Total	$ 163,689	$ 11,862	$ 134,472	$ 6,064
Derivative Liabilities:				
Interest rate contracts	$ 108,451	$ 5,825	$ 87,470	$ 931
Foreign exchange contracts	37,029	81	28,463	—
Total	$ 145,480	$ 5,906	$ 115,933	$ 931

Source: Pacwest Bank 10K 2022

If Pacwest held swaps against rising rates, the value would have increased. Was Pacwest actively (although minimally) hedging rate declines in 2022?

Apparently not, unfortunately, it seems quite a few banks did not manage interest rate risk at all - or even bet against rising rates!

Others

- First Republic Bank who is still above water as of this writing, also had zero interest rate hedges on, at least, $160B of interest rate sensitive assets.
- Pacwest Bank goes to lengths to describe its derivative activities to manage interest rate risk and how it helps clients do the same, but in 2022 (10K 2/27/23) it held only approximately $108M in swaps (p. 154) on interest rate sensitive asset portfolios of approximately $35B. This is not hedging.
- What's worse, Pacwest carries those swaps at $6M! This indicates that they are old or were on the wrong side of rate increases!

SVB WAS AN OUTLIER, RIGHT?

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
Comerica Incorporated and Subsidiaries

	December 31, 2022			December 31, 2021		
		Fair Value			Fair Value	
(in millions)	Notional/ Contract Amount (a)	Gross Derivative Assets	Gross Derivative Liabilities	Notional/ Contract Amount (a)	Gross Derivative Assets	Gross Derivative Liabilities
Risk management purposes						
Derivatives designated as hedging instruments						
Interest rate contracts:						
Fair value swaps - receive fixed/pay floating	$ 3,150	$ —	$ —	$ 2,650	$ —	$ —
Cash flow swaps - receive fixed/ pay floating (b)	26,600	—	50	8,050	—	—
Derivatives used as economic hedges						
Foreign exchange contracts:						
Spot, forwards and swaps	392	1	3	452	—	2
Total risk management purposes	30,142	1	53	11,152	—	2

Source: Comerica Bank 10K 2022

Could billions in notional fixed for floating swaps have made sense at this time?

Comerica seems to have had the spirit, but hit and ran to third base by mistake

Others

- Comerica Bank, still alive as of this writing, went so far as to hedge using $30B in swaps – *against a decline* in interest rates in 2021 and 2022.
  - They did do this as a hedge against floating rate loans the bank made, so bravo for hedging, but how did they get upside down from the actualities of the recent economic environment. Leaving those floating rate loans alone would have provided an interest rate hedge!

ASSET AND LIABILITY PORTFOLIOS

A CRO will assess the risks to non-diversification and report.

A good CRO will catch it all early and help steer the ship.

Portfolio choice – The implicit risk management tool

- How a bank chooses it's assets and liabilities is fundamental to it's health. The choices should reflect management of risks.
- Portfolios should be diversified - It's possibly a cliché … and yet continually ignored. Why?
- There may be limitations on the types of depositors, borrowers, lenders, and assets available to the bank at any time.
- This may be either manageable or external. Either way, risk management demands that the risks be assessed and mitigated to the extent possible. Where not possible to mitigate, risks can be sized and disclosed.
- An obvious example is diversification of assets purchased with deposits. These can be spread over classes and durations to effect a diversified portfolio.
- Another is tracking levels of uninsured deposits which can also quantify deposit security or a "risk of flight" or bank run.

SVB'S UNINSURED DEPOSITS AND INVESTMENT/LOAN ASSETS TO DEPOSITS WERE VERY HIGH

Some risk factors do not require complicated mathematical analysis, they are reflected directly in the numbers – and are staring us right in the face.

The less diverse the deposit portfolio, the greater the risk.

The less diverse the use of those deposits, the greater the risk.

Top US banks by proportion of uninsured deposits

Limited to US banks with at least $50 billion in assets at Dec. 31, 2022

Ranked by call report data

Company (top-level ticker)	Total assets ($B)	Uninsured deposits[1]: Call report data before exclusions, public filings data ($B)	Uninsured deposits[1]: Proportion of total deposits after exclusions (%)[2]	Preferred deposits ($B)[3]	Loans + HTM securities/ total deposits (%)[4]	AOCI ($B)	AOCI: Proportion of total capital (%)	Tangible equity ratio (%)
● Silicon Valley Bank	209.0	151.6	93.8	0.0	94.4	-1.9	10.6	7.27
Bank of New York Mellon (BK)	324.6	175.1 / 156.6	92.0 / 82.3	0.7	31.2	-4.4	21.5	6.24
State Street Bank and Trust Co. (STT)	298.0	148.9	91.2	0.0	40.1	-3.4	18.1	6.16
● Signature Bank	110.4	79.5	89.3	1.4	93.3	-2.0	18.1	7.26
Northern Trust Co. (NTRS)	154.5	41.9	81.6	0.0	54.5	-1.5	13.0	6.62
Citibank NA (C)	1,766.8	598.2	73.7	2.0	64.6	-29.9	18.1	8.62
CIBC Bank USA (CM)	50.9	30.0	73.1	0.1	87.1	-0.3	4.5	11.19
HSBC Bank USA NA (HSBA)	162.4	94.2 / 86.9	70.6 / 65.2	0.1	47.4	-2.6	12.8	9.52
City National Bank (RY)	96.5	53.1	70.3	0.3	93.6	-1.6	17.3	6.65
First Republic Bank (FRC)	212.6	119.5	67.4	0.6	110.6	-0.3	1.7	8.11
East West Bank (EWBC)	64.1	35.1 / 26.8	65.8 / 50.2	3.9	91.1	-0.8	11.3	8.52
BMO Harris Bank NA (BMO)[5]	177.0	88.6	60.5	3.0	72.7	-3.5	16.9	8.87
Comerica Bank (CMA)	85.5	45.5	60.4	0.1	72.8	-3.7	40.7	4.85
Western Alliance Bank (WAL)	67.7	31.1 / 29.5	56.3 / 53.4	0.4	101.7	-0.7	10.6	7.52
Frost Bank (CFR)	53.0	23.8	53.6	1.5	44.6	-1.3	33.5	4.60
Banco Popular de Puerto Rico (BPOP)	56.1	28.1	53.1	16.2	58.3	-2.4	52.4	3.02
● MUFG Union Bank NA (USB)[6]	104.4	43.7	53.0	3.5	70.5	0.0	0.4	10.29
Zions Bancorp. NA (ZION)	89.5	37.6	52.2	1.7	93.2	-3.1	38.5	4.33
JPMorgan Chase Bank NA (JPM)	3,201.9	1,057.9	52.0	43.6	64.3	-18.0	6.2	8.32
U.S. Bank NA (USB)[6]	585.1	234.3	51.4	9.0	90.6	-11.2	19.7	5.81
Synovus Bank (SNV)	59.6	25.1	50.7	6.5	89.3	-1.4	23.5	6.74
● Bank of the West (BMO)[5]	91.6	36.6	50.7	6.3	83.4	-2.9	33.8	5.73
KeyBank NA (KEY)	187.6	75.6 / 67.1	50.0 / 44.4	8.0	88.7	-6.0	30.2	5.66
Fifth Third Bank NA (FITB)	206.3	88.3 / 69.4	48.4 / 38.0	6.6	72.3	-5.1	23.8	7.20
Goldman Sachs Bank USA (GS)	487.0	168.0 / 128.7	47.6 / 36.5	0.0	46.5	-1.2	2.2	9.57
Citizens Bank NA (CFG)	226.4	88.9	47.5	9.6	91.6	-4.5	19.3	7.10
Manufacturers and Traders Trust Co. (MTB)	200.3	79.4 / 74.2	47.1 / 44.0	11.4	87.4	-0.8	4.1	8.21
First Horizon Bank (FHN)[7]	78.7	30.3	46.2	5.1	92.6	-1.4	15.9	8.35
Bank of America NA (BAC)	2,418.5	909.3 / 617.6	46.1 / 31.3	25.2	82.0	-18.4	9.5	7.10
Huntington National Bank (HBAN)	182.3	84.6 / 47.3	45.6 / 25.5	4.1	90.8	-3.1	17.5	6.46

● Acquired, failed companies

Source:https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/svb-signature-racked-up-some-high-rates-of-uninsured-deposits-74747639

SVB'S LARGEST PORTFOLIO

SVB's largest portfolio was heavily concentrated in HTM, long-dated, MBS, with low yields

It also reflects a very low, flat, upsloping yield curve in an inverted yield curve environment with short term AFS yields just below longer term HTM yields

HTM

December 31, 2022

(Dollars in millions)	Total		One Year or Less		After One Year to Five Years		After Five Years to Ten Years		After Ten Years	
	Net Carry Value	Fair Value	Net Carry Value	Fair Value	Net Carry Value	Fair Value	Net Carry Value	Fair Value	Net Carry Value	Fair Value
U.S. agency debentures	$ 486	$ 434	$ 1	$ 1	$ 118	$ 111	$ 367	$ 322	$ —	$ —
Residential MBS:										
Agency-issued MBS	57,705	48,356	—	—	25	24	1,066	994	56,614	47,338
Agency-issued CMO—fixed rate	10,461	8,576	—	—	90	86	129	120	10,242	8,370
Agency-issued CMO—variable rate	79	77	—	—	—	—	—	—	79	77
Agency-issued CMBS	14,471	11,977	39	38	153	141	966	810	13,313	10,988
Municipal bonds and notes	7,416	6,150	29	29	235	224	1,362	1,244	5,790	4,653
Corporate bonds	703	599	—	—	115	103	588	496	—	—
Total	$ 91,321	$ 76,169	$ 69	$ 68	$ 736	$ 689	$ 4,478	$ 3,986	$ 86,038	$ 71,426

AFS

December 31, 2022

(Dollars in millions)	Total	One Year or Less	After One Year to Five Years	After Five Years to Ten Years	After Ten Years
U.S. Treasury securities	$ 16,135	$ 983	$ 14,373	$ 779	$ —
U.S. agency debentures	101	—	33	68	—
Foreign government debt securities	1,088	101	52	935	—
Residential MBS:					
Agency-issued MBS	6,603	—	—	43	6,560
Agency-issued CMO—fixed rate	678	—	—	—	678
Agency-issued CMBS	1,464	—	326	1,138	—
Total	$ 26,069	$ 1,084	$ 14,784	$ 2,963	$ 7,238

Source: SVB 10K, 2/24/23

Portfolio Characteristics

	HTM	AFS
% Total Portfolio	78%	22%
10+ Year Maturity	94%	28%
MBS	92%	35%
Yields	~2%	1.8%

Diversified? Well-chosen?

Questions regarding the largest asset class in SVB's largest portfolio

Source: https://www.mortgagenewsdaily.com/mbs/umbs/30/20

- Was there time to adjust? The decline in MBS values with rising rates was projected by all financial sources and the FED. The change was <u>not</u> sudden.
- Weren't the risk models at SVB screaming, at least, to add hedging given the long maturities in the face of rate rises?
- Banks that do not include trading for profit arms, should not place large directional bets on rates/prices.

SVB'S SECOND LARGEST PORTFOLIO

SVB's second largest asset was not diversified and was handcuffed to SVB's deposits.

"As of December 31, 2022, loans equal to or greater than $20 million to any single client (individually or in the aggregate) totaled $46.8 billion, or 63 percent of our portfolio." SVB 10K 2022, p.19

SVB's second largest portfolio, it's portfolio of client loans may have driven bank growth but not strength

Issues:

- It has been reported that SVB required clients to hold loaned money in deposits at the bank. Each such loan would have created an equivalent deposit and cash and/or investment securities.
- This is a kind of self-generated growth, different from typical banking, where independent deposits fund reasoned loans and credit risk.
- SVB's second largest portfolio was not diversified and strained under correlated default risk and this risk was also correlated to the bank's size – it's deposits.

SVB'S SECOND LARGEST PORTFOLIO

SVB's second largest portfolio, had a strong correlation to its size – deposits and investments. This was always a risk.

SVB FINANCIAL GROUP AND SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS

(Dollars in millions, except par value and share data)	December 31, 2022	2021
Assets		
Cash and cash equivalents	$ 13,803	$ 14,586
Available-for-sale securities, at fair value (cost of $28,602 and $27,370, respectively, including $530 and $61 pledged as collateral, respectively)	26,069	27,221
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)	91,321	98,195
Non-marketable and other equity securities	[illegible]	2,543
Total investment securities	120,054	127,959
Loans, amortized cost	[illegible]	66,276
Allowance for credit losses: loans	(636)	(422)
Net loans	73,614	65,854
Premises and equipment, net of accumulated depreciation and amortization	394	270
Goodwill	375	375
Other intangible assets, net	136	160
Lease right-of-use assets	335	313
Accrued interest receivable and other assets	3,082	1,791
Total assets	$ 211,793	$ 211,308
Liabilities and total equity		
Liabilities:		
Noninterest-bearing demand deposits	$ 80,753	$ 125,851
Interest-bearing deposits	[illegible]	63,352
Total deposits	173,109	189,203

Source: SVB 10K, 2/24/23

Without SVB's policy requiring clients to deposit loaned funds –

A) SVB becomes a $73B smaller bank with deposits of $100B and investment securities of $47B or;
B) SVB becomes a more diversified bank by filling in deposits from unrelated sources;
C) SVB would still have the credit risk from the client loans, but its deposits and investment portfolio would have been more manageable; and
D) Doing business this way, SVB created risk (by not diversifying) that needed risk management.

VALUATION

A CRO will spend an inordinate amount of time with risk and valuation models and approaches.

A good CRO will be unwavering in promoting the most appropriate and defensible fair values and risk estimates from the bottom up.

This is a ton of work. We may need two CROs!

Because risks affect valuations and getting valuations wrong can fuel panic

- Market risks are reflected in a bank's financial statements primarily through valuation and disclosure.
- There are numerous elements of the consolidated financial statements of every bank that depend critically upon risk assessment.
- Asset/Liability valuation even with observable market prices is subject to risk and fluctuation.
- Valuation other than mark to market is fundamentally a cash flow under uncertainty which depends directly upon risk modeling.

AFS VALUE

SVB's AFS portfolio valuation missteps fueled the bank run

- On 2/24/23, SVB filed its 2022 10K indicating it held $26B in AFS at fair value (using Level 2).
- These securities were very liquid US Treasury and Agency securities with combined yield of 1.79% and 3.6 year duration (8K, 3/8/23, later disclosed sale was to Goldman).
- On 3/8/23, less than two weeks later, SVB disclosed that it had sold “substantially all” of its AFS portfolio for $21.5B.
- SVB disclosed a loss of $2.5B (1.8B after tax) on the sale indicating the AFS portfolio was fair valued at $24B 3/8/23.
- But the loss was really $4.5B from 2/24/23. The magnitude of this loss on such a plain and liquid portfolio and the reporting discrepancy have been cited as reasons depositors lost confidence beginning 3/8/23.

SVB'S AFS VALUE

In 12 days, $5B of value on very liquid fixed income securities evaporated.

Issues

- Market *was* volatile, but did not fluctuate that much. Market price changes do not explain this.
- Fire sale? Did Goldman take advantage of SVB's need? Not that much for liquid securities!

AFS Securities

The major components of our AFS investment securities portfolio at December 31, 2022, and 2021 are as follows:

(Dollars in millions)	December 31, 2022 Amortized Cost	Unrealized Gains	Unrealized Losses	Carrying Value
AFS securities, at fair value:				
U.S. Treasury securities	$ 17,206	$ —	$ (1,071)	$ 16,135
U.S. agency debentures	120	—	(19)	101
Foreign government debt securities	1,209	—	(121)	1,088
Residential MBS:				
Agency-issued MBS	7,701	—	(1,098)	6,603
Agency-issued CMO—fixed rate	762	—	(84)	678
Agency-issued CMBS	1,604	—	(140)	1,464
Total AFS securities (1)	$ 28,602	$ —	$ (2,533)	$ 26,069

Source: SVB 10K, 2/24/23

Strategic actions to reposition balance sheet

AFS Portfolio Sale	AFS Sale Size	$21 billion
	Securities Sold	US Treasuries and Agency securities
	Yield of Securities Sold	1.79% 3.6-year Duration
	Preliminary Estimated Realized Loss[1]	$(1.8) billion (after-tax)

Source: SVB 8K, 3/8/23

SVB'S CREDIT LOSS ALLOWANCE

SVB's allowance for credit losses did increase from 2021 to 2022, but given the nature of the rising rate environment on it's borrowing clients – startups – was it enough?

SVB FINANCIAL GROUP AND SUBSIDIARIES

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Assets		
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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)	91,321	98,195
Non-marketable and other equity securities	2,664	2,543
Total investment securities	[illegible]	[illegible]
Loans, amortized cost	74,250	66,276
Allowance for credit losses: loans	(636)	(422)
Net loans	73,614	65,854

Source: SVB 10K, 2/24/23

Issues

- Dramatic interest rate increases had been cause for concern in early-stage and tech companies throughout 2022.
- Was the increase in loans and the slight increase in loss allowance consistent with economic reality?

Increase in allowance from 64bps to 86bps, is a large %, but does it really make sense to be allowing for less than 1% on this portfolio at this time?

VALUATION

Because risks affect valuations and getting valuations wrong can fuel panic

- There are numerous elements of the consolidated financial statements of every bank that depend critically upon risk assessment.
- Asset/Liability valuation even with observable market prices is subject to risk and fluctuation.
- Valuation other than mark to market is fundamentally a cash flow under uncertainty which depends directly upon risk modeliing.
- HTM vs. AFS
- Managing the models and cross-model risks
- The risks in estimating allowances and reserves
- Risks to liquid vs. illiquid assets and liabilities

COMPLIANCE

A CRO will work with internal and external stakeholders to ensure compliance.

A good CRO do all this in a way that avoids any critical surprises (failures of risk management).

Not all risk is manageable, but compliance is

- Banking regulations especially for liquidity and capital requirements
- Accounting – ensuring accounts are properly presented and audited including proper valuations and risk disclosures
- Securities regulations for proper risk identification and disclosure
- Good business practice – avoiding mismanagement, fraud and lawsuits

OPERATIONAL

A CRO will work to ensure that industry leading processes and systems manage operational risks appropriately.

A <u>good</u> CRO will recognize that this is a humbling task requiring them to acknowledge the need to trust and verify the work of specialists in IT, fraud, audit, while focusing on risk identification, measurement, and management.

As if dealing with the above were not enough, banks face enormous operational risks

- Interestingly, perhaps the most basic risk to any bank, is also probably it’s most well-understood.
- Internal processes and systems are now highly developed to avoid losses from risk management failures.
- Following Basil Standards and industry protocols may actually be more manageable than the big picture issues above.
- Perhaps this is due to the fact that theft and fraud are age-old whereas financial investments and their risks are always newer.

COMMUNICATION

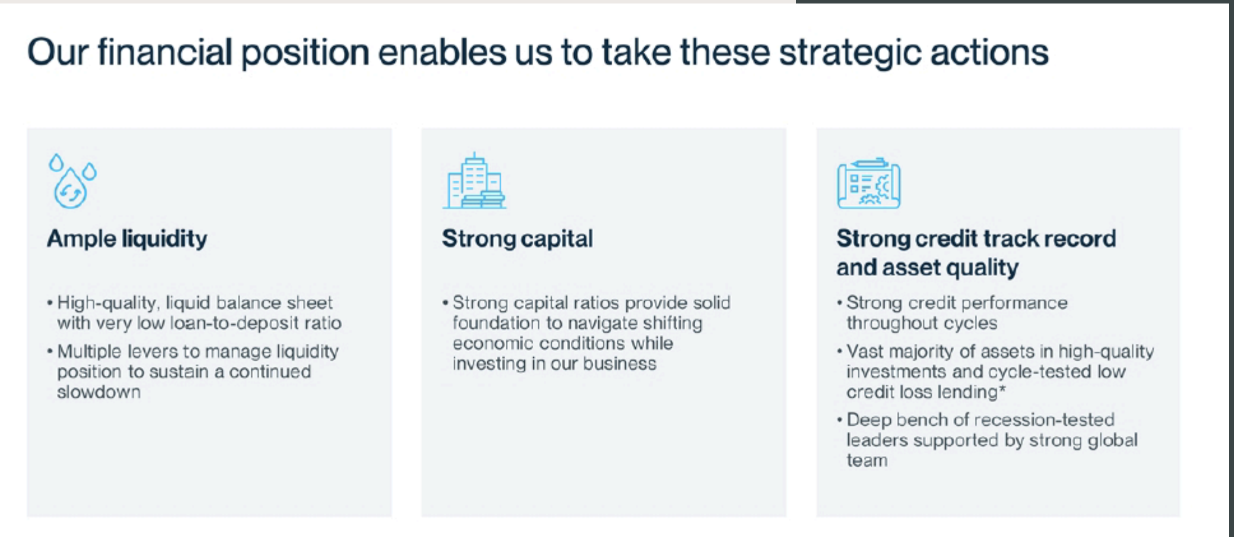
A CRO works to communicate assessed risks with stakeholders.

A good CRO exudes confidence to stakeholders by covering the critical risks.

In banking, communicating risk management internally and externally is critical to survival

- Beyond, way beyond, compliance is the need to manage risks and communicate that management to regulators, depositors, clients, lenders, investors, auditors and across business units internally.
- What happens when you don't do that? Surprises which are symptoms of failures in risk management upset business operations.

SVB'S (FINAL?) COMMUNICATION



Source: SVB 8-K 3/8/23

When SVB suddenly disclosed previously undisclosed risks, it lost depositor and investor confidence

Issues

- Sudden need to increase liquidity and raise capital is suspicious.
- "High-quality liquid balance sheet" contradicts AFS sale at 19% pre-tax discount and huge HTM position.
- "Capital ratios" are only relevant with confidence in their calculation.
- "Navigating shifting economic conditions" should have been addressed and communicated long before.
- "Strong credit performance" is suspect.

COMMUNICATION

Actions to Increase Asset Sensitivity[3]	**Increase Fed cash**	Increase Fed cash target to 4-8% of total deposits (from 4-6%)
	Partially lock-in term funding[3]	Increase term borrowings from $15B to $30B Hedge with forward starting swaps[3]
	Reconstruct AFS portfolio[3]	Buy short-duration USTs[3] Hedge with receive-floating swaps[3]

Source: SVB 8-K 3/8/23

When SVB suddenly decided to start hedging, it was too little and too late

Issues

- This may qualify as the dictionary definition of "too little too late".
- How can a systemic bank with hundreds of billions of dollars in assets and liabilities suddenly wake up to the need to hedge?
- To top it off, SVB ignored the elephant in the room – it's HTM portfolio with some $91B in interest rate sensitive securities. Where is the HTM hedging program?

GOING CONCERN

All risk feeds into the going concern question

- First line of defense is the audit opinion which is required (at least implicitly) to opine on whether each bank can continue to operate as a going concern.
- Depositors and investors, however, will make their own assessments.
- Risk management should include assessment of risks to the business model – cash flows and income projections should not be ignored.

SVB'S FAILURE STORY

The above, taken together, give a possible explanation for SVB's failure.

Effects of an unprecedented rise in short term interest rates	
"Normal" Bank	SVB
Investment securities protected by hedging and/or diversification – small change in value.	Investment securities not protected – large decline in value.
Diversified portfolio of loans at relatively lower rates – mitigated increase in credit risk, rate mismatch hedged.	Undiversified portfolio of loans – correlated default risk and additional risk to unhedged rate mismatch.
Diversified deposits – may actually increase with flight to cash.	Undiversified deposits – decline due to related venture cap freeze and startup cash burn.
Lower/no correlation between deposits and loans – credit risk unrelated to deposit stability, no material balance sheet impact.	High correlation between deposits and loans – credit risk correlated to deposit stability, death spiral of deposit run and decline in assets to meet withdrawals.
Depositors/Investors stay	**Depositors/Investors leave**

WHAT MAKES A GOOD CRO?

Command of the requisite quantitative and business skills and confidence to face the Board

A	Executive decision making across the banking organization
B	Managing a staff confidently to produce timely and correct risk work
C	A life in the trenches – Knowing how the sausage is made; intimacy with the models and assumptions down to the dollar
D	Reading the “tea leaves” – Economic trends especially rates; aware of the most present risks and their management
E	Teaching/communicating the often complicated language (math) of risk to intelligent but non-technical stakeholders – executives, managers, Board, auditors, regulators, investors, clients/depositors, courts of law, other banks…

OK, SMART GUY, SO WOULD A GOOD CRO HAVE PREVENTED THE SVB FAILURE?

I am respectfully not touching that one with a ten foot pole! There's a lot more under the hood to be examined here-

- What was the decision making process by major depositors starting the run? Only they know exactly what they saw and what triggered their response. Likely red flags – lack of liquidity, capital raise, discount AFS sale, nerves about startup economics in rising rates and possible recession, …
- Decisions by the executives and Board will need to be examined. What were the circumstances of the former CRO's departure? The new CRO appears to have been onboarding but offsite – didn't have time to implement any major changes?
- Clearly a good CRO in-place during 2021/2022 would have been screaming for hedging, but would the Board have listened?
- SVB faced a bit of bad luck by growing so fast just prior to the swiftest rate rise in history, but they do not appear to have really addressed that slow moving train wreck in any material way. A good CRO would not have stood by idle for that.

THANK YOU

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