# Lessons from SVB Failures: Bank Solvency Stress Test

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According to the excellent article written by Professor Stephen Cecchetti, the SVB collapse revealed four failures: risk management, market discipline, supervision, and resolution. I very much agree with this conclusion and decided to conduct further analysis based on the stress test models to see if we as investors can filter out those banks that need to be vigilant.

Similarly, we also used NYU Stern V-Lab's SRISK, the expected capital shortfall for financial firms in a systemic crisis, to run the simple stress test on publicly-traded medium-sized U.S. banks at the end of 2022. The approximate market decline was 40% within the 6 months during the financial crisis of 2007-2009 and that during the Covid period was 10%.

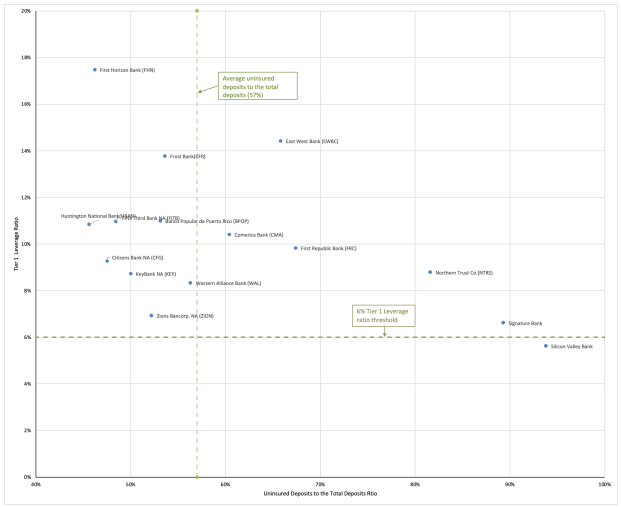
As the article says, we can sense whether a bank has sufficient capital based on the stressed leverage ratio. Apart from this indicator, the proportion of uninsured deposits to the total deposits should also be noticed as the larger this ratio, the higher probability that the bank run will happen. The FDIC defines uninsured deposits as any amount over the $250,000 limit. That is, if the depositor's account exceeds $250,000, the FDIC will only protect that amount, and the excess will not be compensated.

In order to judge whether banks have sufficient capital to repay debts, undertake losses, and resist risks in the dismal outlook, we add the impact of the huge market downturn on the bank's leverage ratio. The stressed leverage ratio is calculated by the bank's Tier 1 capital minus SRISK to its 2022 book value of total assets, which is different from the one defined in this article.

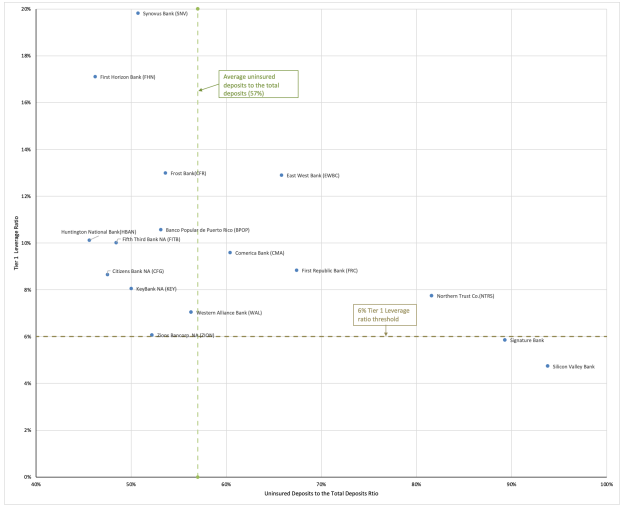
A scatter plot was used to screen the questionable banks grounded on two dimensions: stressed leverage ratio and the proportion of uninsured deposits. Here, the horizontal axis is the share of uninsured deposits to the total deposits and the vertical is the stressed Tier 1 leverage ratio. The Federal Reserve Board and FDIC published requirements for Regulatory Capital Rule in 2019 and announced that the minimum of Tier 1 Leverage Ratio should be 5%. In addition, if a bank has shown itself to be undercapitalized in the past, it must demonstrate a Tier 1 leverage ratio of at least 6% to be considered adequately capitalized. To be more conservative in risk management, we defined the stressed Tier 1 leverage ratio threshold as 6%. If the leverage ratio is under 6%, it indicates that the bank is undercapitalized and investors should be cautious.

Here we listed several scenarios on how the projected system capital shortfall would impact banks' Tier 1 leverage ratio in Dec. 2022. The decline in the S&P 500 index was incremented by 10%, ranging from 10% to 50%. Sources come from NYU Stern V-Lab, S&P Global Inc., BankRegData.

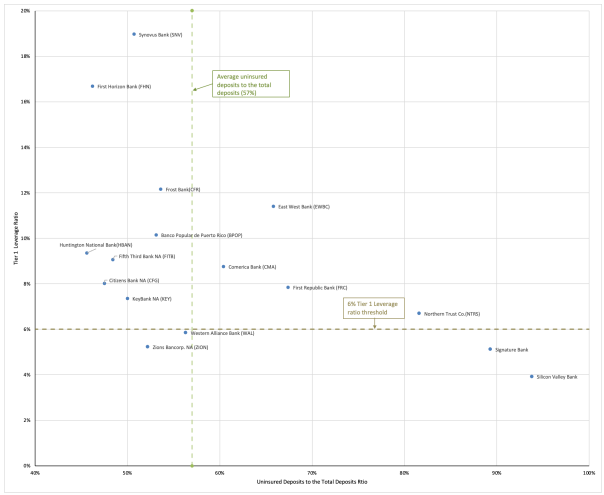
# Stress Tests on Leverage Ratio



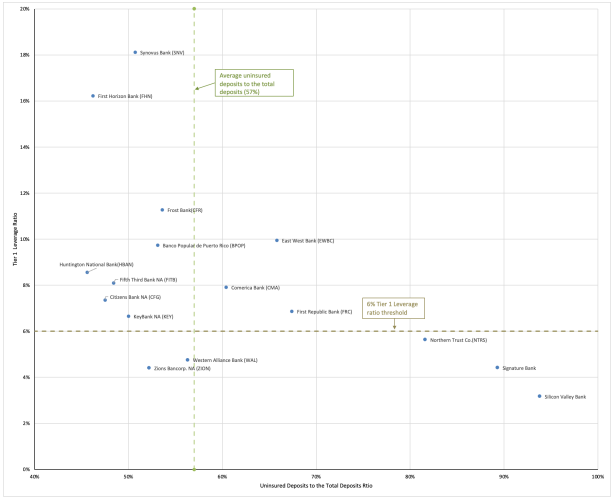

*(Scenario 1: 10% market decline)*



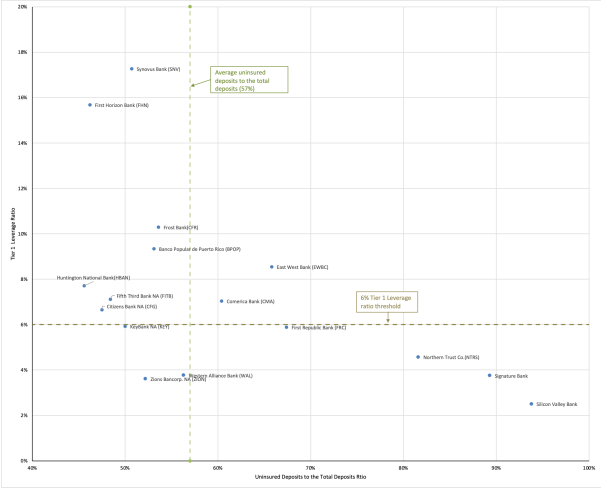

*(Scenario 2: 20% market decline)*




*(Scenario 3: 30% market decline)*




*(Scenario 4: 40% market decline)*




*(Scenario 4: 50% market decline)*

**Scenario 1:** When the decrease in S&P 500 index was about 10% within six months, ***Silicon Valley Bank*** was undercapitalized as it was under the leverage ratio threshold of 6% and their deposits were almost uninsured. Although Signature Bank's stressed leverage ratio was 6.6%, above the requirements, its risks cannot be ignored as it had higher uninsured deposits and a lower leverage ratio compared to peers.

**Scenario 2:** When the systemic risk increased by 10%, ***Silicon Valley Bank and Signature Bank*** both lacked the capital to protect against risks.

**Scenario 3:** When the market decreased by 30%, ***Silicon Valley Bank and Signature Bank*** were short of capital and had over 85% uninsured deposits. Also, ***Western Alliance Bank and Zions Bancorp*** were in danger as their stressed Tier 1 leverage ratio was below the threshold.

**Scenario 4:** When the market dropped 40% as the financial crisis of 2007-2009 happened again, ***Silicon Valley Bank, Signature Bank, and Northern Trust Co.*** had insufficient capital as required and had higher probability of bank run risks. ***Western Alliance Bank and Zions Bancorp*** were at high risk of failure

**Scenario 5:** When the economic outlook was worse than the 2008 financial crisis, falling by 50%. Apart from ***Silicon Valley Bank, Signature Bank, Northern Trust Co., Western Alliance Bank, and Zions Bancorp***, were two more banks likely to collapse, that is, ***First Republic Bank and KeyBank NA***. Their Tier 1 leverage ratio was just below 6% and investors should be cautious about that in case things got worse.

## Conclusion

The failure of Silicon Valley Bank and Signature Bank can be sensed from the simple chart and scenario tests. As the average market decline during the Covid was around 10%, Silicon Valley Bank obviously lacked the capital to satisfy the depositors' needs and absorbed the potential losses. Therefore, SVB shut down on March 10, 2023. Fueled by the panic in the bank run and crypto uncertainty, Signature Bank became the second to fail two days later.

It's clear that as the systemic risk gets higher and higher, the number of banks that are probable to collapse is increasing as well. These banks' Tier 1 leverage ratio is below the conservative threshold of 6% and the average percentage of uninsured deposits to the total deposits accounts for around 70%, indicating that once the bank run happens, about 70% of depositors cannot get their money back and cannot be compensated from FDIC, which will be a huge disaster to individuals, companies, and the financial market. If investors are more risk averse, they can set a band on these indicators, like 5% buffer band, to highlight those banks needed to be cautious.