

Regional Bank Stock Reactions to Using Held-to-Maturity Securities

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Abstract

On March 9, 2023, Silicon Valley Bank's (SVB) stock fell 60% while customers withdrew \$42 billion in deposits in the largest ever bank run. One of the underlying culprits was massive losses in SVB's long-term treasury holdings, much of which was categorized as held-to-maturity (HTM), a designation that values securities at maturity value instead of market value. SVB was not alone in using HTM securities. The regional banking sector proceeded to drop by 36% while large national banks declined by 14% over the next three months. This study shows that regional and national banks that used HTM were not harmed during 2022 and likely benefited from the higher equity and earnings values they could report. However, after SVB's collapse, HTM levels were significantly related to banks' stock decline from March to May 2023 after controlling for market capitalization, price to earnings ratio, and earnings growth. Regional and national banks recovered, respectively, 38% and 25% over the remainder of 2023, but those with higher levels of HTM securities remain discounted relative to their peers.

Keywords: Held to maturity, regional banks, Silicon Valley Bank, regional bank crisis

1. Introduction

Silicon Valley Bank's (SVB) rapid implosion in March of 2023 created the largest bank run in history and shed new light on the held-to-maturity (HTM) accounting method, which is based on historical cost instead of fair value. Signature Bank and First Republic soon followed SVB into bankruptcy, leading regional banking stocks to a 36% decline over the following three months despite the rest of the market gaining 3.3%. Regardless of which side one might fall on the appropriateness of HTM accounting, massive unrealized and unreported market losses on long-term securities classified as HTM will not fare well if those securities are needed for liquidity purposes.

SVB had high commercial deposit concentrations in the technology venture capital start-up market. It was operated without a chief risk officer for eight months, "during a difficult

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transition in the venture capital market,” eventually hiring someone in early January of 2023 (Prakash, 2023). The San Francisco Federal Reserve Bank reportedly filed multiple matters requiring attention (MRAs) and matters requiring immediate attention (MRIAs) with little response or effect. “While signs of significant and alarming risk were clear, no regulator used more severe tools, such as fines or consent orders, to require action from SVB.” (Congressional Record, 2023).

Perhaps the seeds for destruction began in 1993 with the Financial Accounting Standards Board (FASB) statement 115, and was reaffirmed in 2010 when FASB elected not to pursue a proposal to consider some financial assets to be valued as available-for-sale (AFS). Though a bank’s income statement is unaffected by whether a security is classified as AFS or HTM until it is sold, its equity calculation varies depending on the accounting method it employs. Unlike AFS, using HTM does not have an impact on the equity calculation, which, in effect, can hide unrealized losses. Despite the 2023 wreckage, FASB doubled down on the HTM classification on December 20, 2023, by deciding not to consider its elimination (Foley, 2023; Ho, 2023).

In times of rising interest rates, banks incur large unrealized losses on long-term securities, which reduce their asset values, liquidity, financial ratios, and future earnings (Ahmed et al., 2023; Marsh & Laliberte, 2023). With interest rates on a relatively steady decline for almost 40 years, unrealized losses had not been considered a problematic scenario until recently, when the iShares 20+ Treasury Bond exchange-traded fund (ETF), TLT, lost 30% in the 14 months leading to SVB’s bankruptcy.

The HTM method enables banks to avoid recognizing unrealized losses on long-term securities in their financial statements. Beatty (1995) reports that banks with lower portfolio turnover, return on equity, and realized gains on sales of securities are more likely to have more assets classified as HTM. By using HTM, banks can reduce volatility in regulatory bank capital and cover possible problems related to their stability or soundness (Barth et al., 1995; Hodder et al., 2002; Kim et al., 2019). However, adopting HTM accounting is not costless due to the U.S. Securities and Exchange Commission’s requirement related to selling HTM securities before maturity. According to Meder (2015), a large amount of HTM assets is associated with a reduction in banks’ loan growth, particularly during periods of monetary tightening. Furthermore, HTM can restrict banks’ financing and interest-rate-risk management options, resulting in a higher level of risk in bank loans (Kim et al., 2019). Yet, between 2021 and 2022, almost \$1 trillion of AFS securities were transferred to HTM, mostly by banks with lower capital ratios and longer-duration securities portfolios (Granja, 2023). Jiang et al. (2024) argue that this unusually huge amount of reclassified assets made banks fragile to insolvency bank runs by uninsured depositors.

Figure 1 shows the changing interest rate environment over the past 30 years, from 1994 to 2023. During periods of high interest rates, banks had more assets than lending opportunities, resulting in significant securities holdings and, by extension, duration exposure for those holding longer-term securities. The rate increases over the 2022-2023 period were different because the growth was the largest and fastest, and had the greatest capital loss impact. It is one thing to raise rates from 2.0% to 6.25% over two years (2004-2006 period), and quite another to raise rates from 0.25% to 5.25% over 15 months (2022-2023 period). In the latter case, there was little time to adjust and no offsetting yield to cover capital losses.

Only in 1994, when the target federal funds rate was raised from 3.0% to 6.0%, was there a corresponding large increase in long-term rates. However, in 1994, the 10-year T-bond yield began at 5.75%, as opposed to 1.9% in 2022, with interest offsetting some of the capital losses. The duration exposure is also much greater with lower interest rates, which bond prices are directly related to. With a 5.75% yield in 1994, the modified duration for a 10-year bond

was 7.4 compared to 9.0 when yields were 1.9% in 2022. Specifically, for each 1% increase in the rate in 1994 and in 2022, the bond price would decline by, respectively, 7.4% and 9.0%.

Figure 1: Changes in interest rates from 1994 to 2023

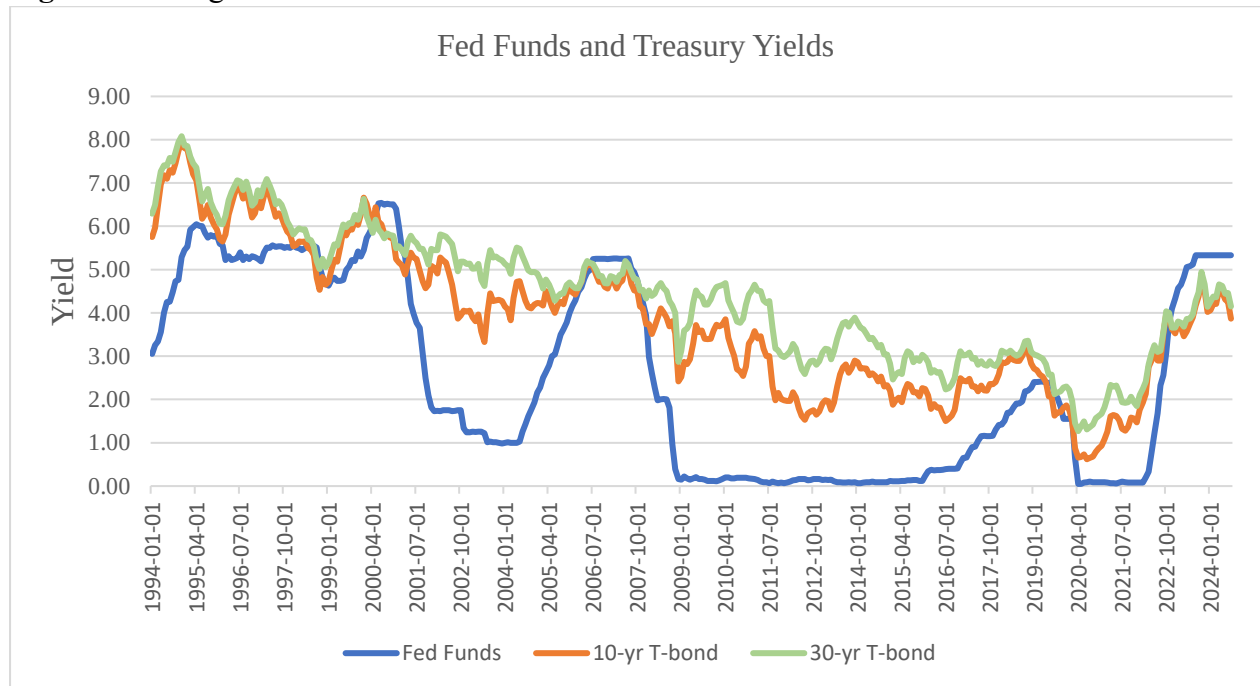


Table 1: Fed tightening periods since 1993 and effects on long-term yields and returns

	Fed funds rate change	10-year yield change	30-year yield change	10-yr return	30-yr return
1/94 to 2/95	2.87%	1.72%	1.32%	-3.08%	-8.78%
6/99 to 6/00	1.77%	0.20%	-0.11%	2.98%	4.03%
6/04 to 6/06	4.21%	0.36%	-0.35%	7.11%	10.97%
11/16 to 1/19	1.99%	0.57%	0.18%	3.23%	6.98%
1/22 to 5/23	5.25%	2.24%	2.03%	-16.14%	-34.59%

Table 1 shows the five monetary tightening periods since FASB's 115 statement in 1993. The January 2022 to May 2023 period witnessed the greatest rate increase and largest impact on long-term rates, with 10-year and 30-year T-bond yields increasing by over 2% and losses on constant maturity 10 and 30-year T-bonds of 16.1% and 34.6%, respectively. The only other period with capital losses was from January 1994 to February 1995; however, the losses then were only a fraction of what was experienced in the 2022 to 2023 period. Besides, the 1994-1995 period was associated with FASB's 1995 re-adoption opportunity, which allowed banks that used HTM in 1994 to reclassify in 1995 without any financial reporting repercussions (Hodder et al., 2002). In 2023, it was not so much the use of HTM that led to the panic, but the liquidity crunch that was created when depositors became nervous, creating bank runs and forcing banks to attain loans and liquidate HTM securities (Giang & Dang, 2023).

A similar increase in interest rate magnitude occurred during the June 2004 to June 2006 period when the federal fund rate rose by 4.2%. This increase occurred over two full years

instead of one year and, more importantly, led to virtually no change in long-term yields. Ahmed et al. (2023) compared this period with the 2022-2023 period and reported that both periods saw increases in loan growth and income, a slowdown in deposit growth, and an increase in unrealized losses. “The unrealized losses in 2022 were significantly higher than during the previous two decades, including during the 2004 cycle, partly due to larger securities holdings. Banks responded to the surge in liquidity from higher deposits in 2020 and 2021 primarily by increasing their investment in longer-term securities rather than loans,” (Ahmed et al., 2023, p. 62). The losses from 2022 to 2023 were further exacerbated by the fact that banks held a greater share of longer-term securities in 2022 relative to 2004 or any other year. The 2004-2006 losses were not significantly different than any other year (less than \$10 billion), while the losses in 2022 exceeded \$600 billion. These unrealized losses exceeded 30% of Tier 1 capital by the end of 2022, and the unrealized losses on HTM were larger than those on AFS (Marsh & Laliberte, 2023).

Taking a different path from existing literature on the use of HTM that mainly focuses on its causes, rationale, resulting bank fragility, loan growth, and other operational risks (Beatty, 1995; Hodder et al., 2002; Lifschutz, 2010; Granja, 2023; Kim et al., 2023; Mishler, 2024; Jiang et al., 2024), this paper examines HTM effects on banks’ stock valuations. To what extent did the magnitude of HTM affect regional bank stock returns during the SVB collapse, or did all regional banks get lumped together and suffer similar losses? Were large non-regional banks left mostly unscathed?

This study finds that, despite a major increase in banks’ adoption of HTM securities in 2022, investors ignored possible future costs to banks as HTM is found to be an insignificant explanatory factor in banks’ market-adjusted stock returns after accounting for the price to earnings (PE) ratio, market capitalization, and earnings per share (EPS) growth. Thus, it seems that there was value in “hiding” losses, at least in terms of stock valuations.

This worked until it did not. As SVB folded in March 2023, HTM became a significantly negative factor in bank stock returns over the following three months, with an approximate 2% loss for each 10-percentage point increase in the HTM to total securities ratio (*HTM/Securities*). Compared with regional banks, large banks with higher *HTM/Securities* were not immune to losses during this period and suffered the same effect relative to HTM holdings. However, their overall magnitude of loss was smaller, -14% compared to -36% for regional banks. As for regional banks being lumped together regardless of their HTM holdings, 98% of regional bank stocks fell at least 10%, and 88% declined at least 20% during the March to May 2023 period. The 38% recovery of regional banks over the remaining months of 2023 is not associated with HTM, and only EPS growth is a significant explanatory factor of returns during the recovery. Thus, by the end of 2023, the stock prices of banks with higher *HTM/Securities* had remained negatively affected.

The remainder of this study reviews the background that set the stage for what occurred in 2023, followed by a description of the data and methodology used to estimate the effects of HTM on regional banks’ stock performance. Results are then presented, followed by a summary.

2. Setting the Stage

In 2021, as America was moving out of the throes of a global pandemic, and the soon-to-be-proved persistent inflation was still “transitory”, banks began to give thought to rebalancing their bond portfolios. As the inevitable and prevailing interest rate increases happened, along with other events, bond pricing and yields became a top-line topic of conversation.

Rates began to increase dramatically by the end of the first quarter of 2022. Higher interest rates should signal greater ultimate profitability and expansion for commercial banks. At the same time, banks were flush with deposits and an excess of lendable capital (Castro et al., 2022; Harris et al., 2023). While capital markets were bulging with cash, business loan underwriting had not reached pre-pandemic homeostasis, i.e., there was an excess of money chasing credit deals. To deploy capital, banks bought more bonds, most of which were treasury and agency debt. From the end of 2019 through the first quarter of 2022, deposit growth eclipsed loan growth by more than \$4.5 trillion (Sovall, 2022). At that time, banks could foresee that the mountains of loanable, undeployed cash would be a persistent state of being, since there was no reason to expect an appreciable increase in loan demand.

According to Generally Accepted Accounting Principles (GAAP), accumulated comprehensive other income flows through to impact common equity. Although this may not have been an issue for banks with plenty of Tier 1 capital and no merger and acquisition plans, it certainly could affect valuations and would be a factor in pricing those deals. Moving debt securities from AFS to HTM allows banks to avoid showing unrealized losses on those securities. It was a legitimate and, as many would argue, prudent accounting technique, as banks influenced FASB to leave the mixed measurement model as is (VanDenburgh & Harmelink, 2024). Banks that moved bonds to HTM status could not typically sell those bonds without at least the tacit agreement of the regulators. Bonds reclassified from HTM status back to AFS status would, of course, be reflected in the company's quarterly filings.

While reasonable people can have differing opinions, it is indisputable that HTM is an allowable form of marking securities and, in some cases, helps banks avoid taking necessary write-downs to common equity. A more valid, or perhaps relevant argument, is whether HTM securities provide the true, expressed measure of liquidity in the banks that hold them. Regardless of the method of accounting, SVB, for example, would have been just as illiquid, no matter where debt securities could have been marked.

In March of 2023, SVB cast a new light on investment strategies regarding bank bond portfolios. It took a series of events to highlight SVB's capital issues, and the resulting publicity caused a deposit run. This prompted analysts to take a closer look at banks in similar situations, and problematic banks were pointed out in public media resources (Buchwald, 2023; Cox, 2023). Other banks, including Signature Bank and First Republic Bank, subsequently failed and were purchased by larger, more soundly capitalized banks.

Fearing a contagion of bank deposit runs, the Federal Reserve (Fed) and the Federal Deposit Insurance Corporation (FDIC) took unprecedented action. First, they agreed to cover 100% of the customers' deposits, even those outside of the normal FDIC coverage limits. (It should be noted that 80% of SVB's deposits were not insured.) Second, and more germane to the topic, the Fed enacted the Bank Term Funding Program, which would loan money to banks with large unrealized bond losses to help stave off deposit runs (Federal Reserve, 2023). In effect, the Fed passively took on some banks' maturity risk. Regardless, regional banks' stocks proceeded to decline by 36% over the next three months.

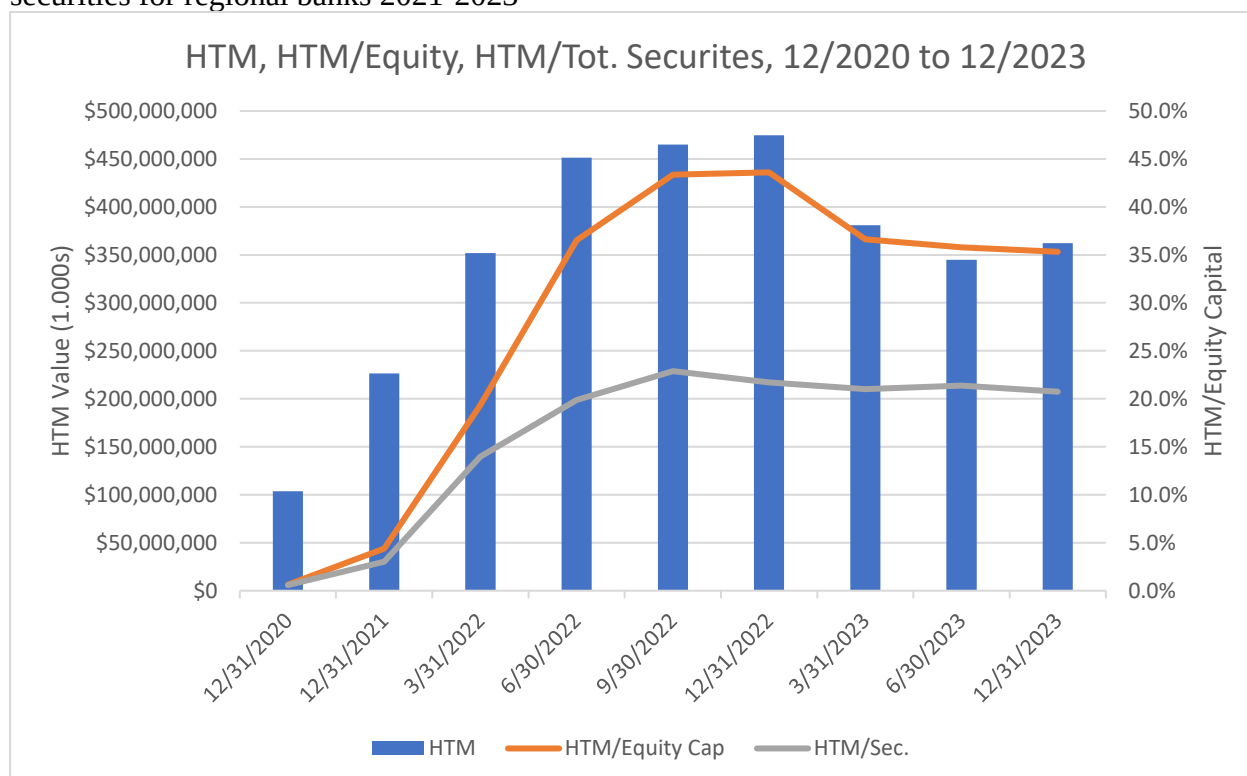
3. Data and Methodology

Regional bank stocks are identified by the constituent holdings in December 2022 and 2023 of State Street Global Advisors' regional banking ETF (KRE). Their holdings are based on Standard & Poor's regional banks' sub-industry, which is part of the financial sector. This led to 151 identified regional banks with a median market capitalization of \$2.1 billion, ranging from \$167 million to \$63 billion, with only three banks having over \$25 billion in capitalization as of December 2022. HTM data for each bank was attained using the Uniform Bank Performance Reports found at the Central Data Repository's Public Data Distribution (Federal

Financial Institutions Examination Council, 2024). Data about the market, stock, and bank-related characteristics were attained from the Center for Research in Security Prices and the Gurufocus database.

The use of HTM by regional banks before the Fed began increasing interest rates in March of 2022 was minimal. Figure 2 shows the percentage use of HTM relative to total equity and total securities held for the median bank increased from less than 5% to over 43% and 21%, respectively, from the beginning to the end of 2022. In absolute terms, regional banks' HTM securities more than doubled from \$226 billion to \$474 billion in 2022.

Figure 2: Held-to-maturity securities and their value relative to equity capital and total securities for regional banks 2021-2023



With the large increase in interest rates in 2022, I-shares 7 to 10-year Treasury Bond ETF (IEF) fell by 15%, which coincides with the approximate 10-year average maturity of AFS securities that banks held at the end of 2021 (Kim et al., 2024). This 15% loss is what Granja (2023) estimates for bank capital in 2022, while Jiang et al. (2024) calculate losses of 10% in aggregate bank capital. Based on these estimated losses, equity capital for the median regional bank could be overstated by six percentage points or more (15% loss multiplied by 43% in HTM). This reduces the equity-to-asset ratio from 10% (Dec. 2021 and Dec. 2022 average) to 4%, placing many of these banks in danger of violating Basel III minimum capital ratio requirements.

To estimate the effect of HTM on regional banks' stock prices, three time periods are examined: 1) Jan. 1, 2022 to Feb. 28, 2023; 2) Mar. 1, 2023 to May 31, 2023, which encompasses SVB's bankruptcy and the 36% decline in regional banks' stock values; and 3) the last seven months of 2023, when regional bank stocks rebounded 38% as represented by State Street's regional bank ETF (KRE).

To estimate the effects of large amounts of HTM securities on regional banks' stock performance, market-adjusted returns are calculated for every bank over each period as the

difference between the bank's observed return and the capital asset pricing model's (CAPM) estimated return. The equation is shown below:

$$(1) Ret_i = Bank Ret_i - (R_f + \beta(R_m - R_f))$$

where β is the CAPM's beta, R_f is the risk-free return estimated using 30-day T-bills, and R_m is the market return during each period. These adjusted returns are then regressed on the HTM to total securities ratio, PE ratio, market capitalization, and EPS growth. Adjusted returns are used as this removes the market effect while allowing the inclusion of size in the regression. Including size and beta in regressions is known to cause multicollinearity issues. Using the HTM to total securities ratio makes economic sense in terms of the proportion of HTM being used and follows previous research such as Lifschutz (2010). Large banks are also analyzed to compare with regional bank performances. The comparison sample is composed of large banks with more than \$100 billion in assets that are not defined as regional banks. This led to a comparison sample of 24 large non-regional banks.

The base regression is as follows:

$$(2) Ret_i = \alpha + \beta_1 \left(\frac{HTM}{Securities} \right) + \beta_2(PE) + \beta_3(Ln(Market Cap)) + \beta_4(EPS Growth) + \beta_5(Big Non regional) + \varepsilon_i$$

where Ret_i is the bank's market adjusted return from Jan. 1, 2022 to Feb. 28, 2023, from Mar. 1, 2023 to May 31, 2023, or from Jun. 1, 2023 to Dec. 31, 2023; $HTM/Securities$ is the Held-to-Maturity securities divided by total securities held; PE is the Price to earnings ratio; $Ln(Market Cap)$ is the total market capitalization, converted to the natural logarithm form; $EPS Growth$ is the growth of earnings per share over each of the periods that would be known, including Dec. 31, 2021, to Dec. 31, 2022, Dec. 31, 2022 to Mar. 31, 2022, and Mar. 31, 2022 to Sep. 30, 2022, respectively; $Big Non-Regional$ is the dummy variable that is equal to 1 if the bank is large non-regional, and 0 otherwise. This dummy variable is used to test for a change in the intercept and the interaction terms to further investigate the effect of $HTM/Securities$ when it is significant.

4. Results

General Overview

Table 2 provides an overview of the data during the three distinct periods from January 1, 2022, to December 31, 2023. From January 1, 2022, to February 28, 2023, the Fed increased the primary credit rate eight times from 0.25% to 4.75%, indirectly causing the 10-year Treasury yield to rise from 1.52% to 4.57%. This resulted in bond losses represented by the iShares 7 to 10-year Treasury ETF (IEF) of 15.0% and their 20+ Treasury ETF (TLT) of 29.6%. During this period, State Street's regional bank ETF (KRE), the broad market represented by CRSP's Value Weighted Market Index, and the S&P 500 declined by, respectively, 11.0%, 15.9%, and 15.2%.

From January to December 2022, regional banks increased their designated HTM securities by \$248.3 billion (from \$226.5 billion to \$474.8 billion) and reduced their designated AFS securities by \$242.8 billion (from \$952.4 billion to \$709.6 billion), suggesting that most of the increase in HTM was securities being recharacterized from AFS.

During the regional bank stock correction from March 1 to May 31, 2023, the Fed increased the primary credit rate two more times to 5.25%, which added to investors' concerns

about unreported bank losses for HTM securities despite a slight decline in the 10-year Treasury yield during this time. Although the market increased by 3.3% over the period, KRE dropped by 36.2%.

Fortunately, the remainder of 2023 was quite positive from an investor's standpoint. The market increased by 15.0%, KRE was up 38.2%, 10-year Treasury yields, despite hitting 5% in October 2023, were back down to 3.88%, and securities categorized as HTM by regional banks declined to \$362.3 billion.

Table 2: Selective statistics from January 2022 to December 2023

	12/31/2021	12/31/2022	12/31/2023
Total HTM (1,000s)	\$226,485,573	\$474,754,177	\$362,263,713
Total AFS (1,000s)	\$952,356,463	\$709,591,536	\$646,334,580
HTM/Securities*	13.95%: 3.01%	24.42%: 21.75%	24.64%: 20.73%
HTM/Assets*	3.23%: 0.57%	5.59%: 4.18%	4.93%: 3.88%
HTM/Equity*	32.87%: 4.39%	64.48%: 43.60%	58.38%: 35.32%
Primary Credit Rate	0.25%	4.50%	5.50%
10-year T-bond	1.52%	3.88%	3.88%
	1/1/22 to 2/28/23	3/1/23 to 5/31/23	6/1/23 to 12/31/23
Market Return	-15.88%	3.34%	15.01%
XLF (Financials)	-6.63%	-10.65%	20.04%
KRE (Regional Banks)	-11.02%	-36.17%	38.15%
24 Large Non-Regional	-3.46%	-14.03%	25.35%
IEF (7-10 Yr. T-notes)	-15.00%	3.06%	0.37%
TLT (20-30 Yr. T-bonds)	-29.60%	2.02%	-1.65%

HTM and AFS are securities categorized as Held-to-Maturity and Available-for-Sale, respectively.

*Ratios show average and median values, respectively.

Regression Results

Regression results are shown for three time periods (before, during, and after the crisis), where banks' market adjusted returns are regressed on their HTM to total securities ratio, the natural logarithm of total market capitalization at the beginning of the period, PE at the beginning of the period, the growth of EPS over the period, and the dummy variable for large non-regional banks with assets greater than \$100 billion. The regressions are not prediction models per se, as earnings growth cannot be known at the beginning of the period, but are rather an attempt to explain the effects of HTM securities on regional banks' stock returns. *HTM/Securities* was known before the end of the first period, before the start of the second period, and towards the beginning of the final period.

Pre-Silicon Valley Bankruptcy

From January 2022 through February 2023, investors demonstrated little concern about banks categorizing securities as HTM since the coefficient on *HTM/Securities* is statistically insignificant. In essence, bank managers were, by accident or design, "getting away" with using

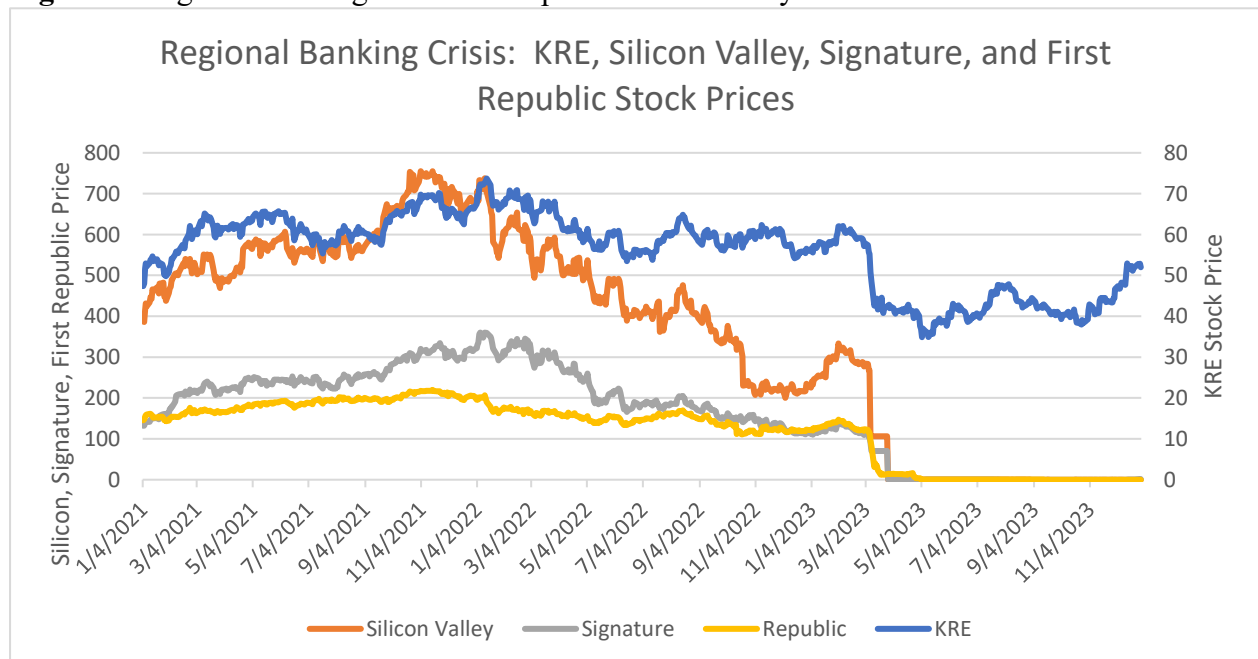
HTM. Bank size also has no significant effect on stock returns. The main drivers of returns over this period appear to be the PE ratio and earnings growth. Bank stocks reporting low PEs at the beginning of the period outperformed, consistent with broad-based findings in previous studies (Aydoğan & Güney, 1997; Aydoğan & Gursoy, 2000; Keimling, 2016; Siegel, 2016). Meanwhile, every 10-percentage-point increase in earnings growth is associated with a statistically significant 1.3 percentage point increase in the bank's stock return. The dummy variable for large non-regional banks shows no significant difference between large banks and regional banks during the pre-crisis period.

Table 3: Regressions of stock returns on HTM to total securities ratio, controlling for PE, size, and EPS growth, for the January 2022 to February 2023 period

1/1/22 to 2/28/23, 175 Observations, R-squared = 0.24		
Dependent Variable	1/1/22 to 2/28/23 Returns	
Independent Variables	Coefficient	t-stats
Constant	0.2532**	2.54
HTM/Securities Dec. 2022	-0.0362	-0.67
PE Dec. 2021	-0.0105***	-6.07
Ln(Market Cap) Dec.2021	0.0018	0.14
EPS Growth 2022	0.1301***	3.39
Big Non-Regional	0.0444	0.78

***, **, * indicate significance at the 1%, 5% and 10%.

Figure 3: Regional banking crisis: Stock prices from January 2021 to December 2023



Regional Banking Crisis

In March of 2023, Silicon Valley Bank collapsed, followed by Signature Bank and Republic Bank. Figure 3 displays the 2021-2023 stock prices of these three banks, all of which ended in bankruptcy, compared with KRE. The outcome was especially harsh for SVB investors as it had once posted a \$750+ stock price just a little more than two years earlier. As a reference, these banks' HTM to total securities ratios were, respectively, 78%, 30%, and 89%, with Signature and SVB having the highest ratios at the end of December 2022. This contrasts with 34 other regional banks that did not have any securities listed as HTM.

With Silicon Valley Bank's rather abrupt decline into bankruptcy, the implication of what HTM entailed was revealed during the March to May 2023 period. Table 4 Panel A shows a 2.01 percentage point decrease in return for every additional 10 percentage points in the HTM to total securities ratio, with the coefficient being statistically significant at the 1% level.

Table 4: Regressions of stock returns on HTM to total securities ratio, controlling for PE, size, and EPS growth, for the March to May 2023 period

Panel A: 3/1/23 to 5/31/23, 175 Observations, R-squared = 0.26		
Dependent Variable	3/1/23 to 5/31/23 Returns	
Independent Variables	Coefficient	t-stats
Constant	-0.2964*	-1.93
HTM/Securities Dec. 2022	-0.2011***	-3.97
PE Mar. 2023	0.0040*	1.65
Ln(Market Cap) Mar. 2023	-0.0048	-0.45
EPS Growth Jan. to Mar. 23	0.0868***	3.01
Big Non-Regional	0.2148***	4.64
Panel B: 3/1/23 to 5/31/23, with interaction terms, 175 Observations, R-squared = 0.34		
Dependent Variable	3/1/23 to 5/31/23 Returns	
Independent Variables	Coefficient	t-stats
Constant	-0.1785	-1.18
HTM/Securities Dec. 2022	-0.1746***	-3.24
PE Mar. 2023	0.0056**	2.40
Ln(Market Cap) Mar. 2023	-0.0145	-1.36
EPS Growth Jan. to Mar. 23	0.2679***	5.37
Big Non-Regional	0.2435***	4.42
Big Non-Reg.*(HTM/Sec.)	0.0125	0.10
Big Non-Reg.*EPS Growth	-0.0709	-0.31
EPS Growth*(HTM/Sec.)	-0.4337***	-4.37

***, **, * indicate significance at the 1%, 5% and 10%.

EPS growth remains significantly positive, suggesting fundamentals still mattered during the crisis period. The significant and positive coefficient for the large non-regional banks dummy indicates that large banks were somewhat insulated and lost 21% less than regional banks, everything else being equal. With First Citizens Bank acquiring Silicon Valley

in late March 2023 and JPMorgan Chase acquiring First Republic on May 1, 2023, it might even be suggested that some large banks prospered.

As SVB went under, the Fed stepped in to assure investors that their deposits were safe and implemented the Bank Term Funding Program used by 1,804 depository institutions (Saphir, 2024), nine of which are in this study. Larger financial institutions such as JPMorgan, Bank of America, Citigroup, Wells Fargo, Goldman Sachs, and Morgan Stanley, with assets from \$1 trillion to almost \$4 trillion, were not immune to the spillover effects of the regional banking crisis. Bank of America, for example, held more securities in HTM at the end of 2022 (\$632 billion) than all the regional banks combined, and the six banks listed above held over \$1.65 trillion in HTM. The big difference beyond the bank size is that these large banks had been using HTM for years (\$1.55 trillion in 2021) and did not move securities from AFS to HTM in response to rising interest rates, as regional banks did in 2022.

To further investigate the effects of HTM on large banks and stock returns relative to earnings, Table 4 Panel B adds interaction terms between the dummy variable for large non-regional banks with *HTM/Securities*, between the dummy with *EPS Growth*, and between *HTM/Securities* and *EPS Growth*. The interactive variable, *EPS Growth*(HTM/Securities)*, examines whether a high HTM to total securities ratio detracts from any positive stock market reaction to a bank's high EPS growth during the crisis.

The cost of HTM to stock returns is not different between large national banks and regional banks, as the interaction between the dummy variable for *Big non-regional banks* and *HTM/Securities* is not statistically significant. The interaction term, *Big non-regional*EPS Growth*, is also insignificant, suggesting the benefit of earnings growth to stock performance for large national banks is not different from that of regional banks. Meanwhile, the significant and negative coefficient of the interaction between EPS growth and the HTM to total securities ratio shows that high EPS growth banks with more HTM did significantly worse than high EPS growth banks with lower or zero HTM. During this period, if a bank had an extra 10-percentage point increase in earnings growth, holding everything else constant, its stock would gain 2.68 percentage points. However, if this same bank increased its *HTM/Securities* by 10 percentage points, it would lose 4.34 percentage points, leading to a total loss of 1.66 percentage points (4.34 minus 2.68) in stock returns.

The Recovery

For investors willing to invest in regional banks during the height of uncertainty, the rest of 2023 was stellar, with KRE returning 38.2%. Although most regional banks crashed from February through May 2023 (98% and 88% declined by at least 10% and 20%, respectively), 95% recovered by 20% or more from June to December 2023.

Table 5 Panel A shows that neither HTM, PE, nor size is statistically significant in explaining stock returns during the recovery. As expected, earnings growth is again significantly positive.

Large banks also did well during the June to December 23 period with an average increase of 25%; nonetheless, their average return is significantly less than regional banks, as shown by the significantly negative coefficient for the dummy variable of big non-regional banks. However, they also did not suffer the decline regional banks experienced in the previous period. In general, the 38% absolute return of regional stocks over this period is probably a return to more normal valuations as investors considered the liquidity crunch to be less dire.

The insignificance of the coefficient for the HTM to total securities ratio over the June to December 2023 period shows there was no additional bounce back for those banks that were significantly harmed during the regional banking crisis in the previous period. For comparison, Table 5 Panel B shows regression results for the entire March 1 to December 2023 period with

HTM/Securities being significantly negative, *EPS Growth* significantly positive, and *Big non-regional* marginally positive. Given the bankruptcies, these results may be obvious, but more importantly, they suggest that the overall recovery for banks over the last part of the year was for those banks with low HTM to total security ratios. Even after removing the bankrupt banks from the sample, untabulated results show that *HTM/Securities* remains significantly negative from March to December 2023, indicating that, even during the recovery, banks with HTM were discounted.

Table 5: Regressions of stock returns on HTM to total securities ratio, controlling for PE, size, and EPS growth, for the June to December 2023 period, and the March to December 2023 period

Panel A: 6/1/23 to 12/31/23, 170 Observations, R-squared = 0.11		
Dependent Variable	6/1/23 to 12/31/23 Returns	
Independent Variables	Coefficient	t-stats
Constant	0.4792*	1.85
HTM/Securities Jun. 2023	0.0693	0.77
PE Jun. 2023	-0.0030	-0.74
Ln(Market Cap) Jun. 2023	-0.0131	-0.71
EPS Growth Mar. to Sep. 23	0.0073**	2.45
Big Non-Regional	-0.1634**	-1.98
Panel B: 3/1/23 to 12/31/23, 175 Observations, R-squared = 0.15		
Dependent Variable	3/1/23 to 12/31/23 Returns	
Independent Variables	Coefficient	t-stats
Constant	-0.1034	-0.43
HTM/Securities Dec. 22	-0.2377***	-3.02
PE Mar. 2023	0.0012	0.34
Ln(Market Cap) Mar. 2023	-0.0091	-0.55
EPS Growth Mar. to Dec. 23	0.0158***	4.13
Big Non-Regional	0.1204*	1.67

***, **, * indicate significance at the 1%, 5% and 10%.

Robustness Test: Panel Data Regression

To check the robustness of the results, this section shows the effects of HTM on bank stock performance using panel data analysis to mitigate any potential concerns about the small sample sizes in the main regressions. To establish the panel data sample, all the market-adjusted returns for every bank in each studied period between January 2022 and December 2023 were pooled into one variable, *Returns*, along with their corresponding (lagged) independent variables, including the HTM to total securities, PE ratio, market capitalization, EPS growth, and the dummy variable for big non-regional banks. In addition, new dummy variables, *Precrisis*, *Crisis*, and *Recovery*, were created to indicate if the return observation occurred during the, respectively, January 2022 to February 2023, March to May 2023, and June to December 2023 periods. *Returns* were then regressed on all these independent

variables and some of their interaction terms, except for *Precrisis*, which is used as the base group. Table 6 shows the results for the panel data regression, which are consistent with the previous sections' main findings.

Table 6: Panel data regressions of stock returns on HTM to total securities ratio for the January 2022 to December 2023 period

1/1/22 to 12/31/23, 515 Observations, R-squared = 0.62		
Dependent variable	Returns	
Independent variables	Coefficient	t-stats
Constant	0.0300	0.51
HTM/Securities	0.0053	0.11
PE	-0.0056***	-3.48
Ln(Market Cap)	0.0206***	3.22
EPS Growth	-0.0294*	-1.76
Big Non-Regional	-0.0049	-0.17
Recovery	-0.0322	-0.67
Crisis	-0.569***	-11.13
Crisis*(HTM/Securities)	-0.1925**	-2.26
Crisis*EPS Growth	0.2837***	3.94
(HTM/Securities)*EPS Growth	0.0527	0.86
Crisis*(HTM/Securities)*EPS Growth	-0.3600**	-2.39

***, **, * indicate significance at the 1%, 5% and 10%.

As expected, all banks did poorly during the crisis, with the average bank losing 0.6 percentage points in stock returns between March and May 2023, compared with the precrisis period. The coefficient for *Crisis* is statistically significant at the 1% level. More importantly, the stock of banks with higher *HTM/Securities* underperformed that of the average bank during the crisis, demonstrated through the significant and negative coefficient on the interactive variable, *Crisis*(HTM/Securities)*. For each additional 10 percentage points in the HTM to total securities ratio, a bank stock would earn 1.93 percentage points less than the average bank during the crisis.

Confirming previous results in this paper, a bank with higher EPS growth earned higher stock returns during the crisis, with the coefficient on the interaction between *Crisis* and *EPS Growth* loading positively and significantly at the 1% level. Specifically, a 10% increase in earnings growth is associated with 2.84 extra percentage points in stock return. Nonetheless, a 10% increase in *HTM/Securities* will lead to a 3.6 percentage point decline in stock returns for these high earnings banks. The coefficient for the three-way interaction term, *Crisis*(HTM/Securities)*EPS Growth*, is statistically significant at the 5% level.

Meanwhile, the coefficient on the dummy variable, *Recovery*, is insignificant, and neither is its interaction with HTM/Securities (untabulated results). Overall, banks' stock performance in the recovery period was not different from that during the precrisis period, and HTM had no significant influence on banks' stock returns beyond the crisis.

As banks recovered, there have been several proffered changes to HTM accounting, with the goal of a clearer representation of a bond portfolio's market value. One suggestion is to eliminate the HTM designation. One commentator stated: "The disclosures inside and outside the financial statements don't give investors sufficient insight into the asset liability management of the bank" (Peters, 2023).

The second idea is the additional restriction of HTM classification usage to mollify market anxiety. GAAP standards dictate that a bank's management must have both 'the positive intent and ability to hold to maturity.' They further direct that HTM may not be used for securities if 'a firm intends to hold for only an indefinite period,' or 'it may be required to sell for liquidity or other reasons' (Walker, 2023).

A third option is to require banks to include unrealized gains and losses on HTM securities in the Common Equity Tier One capital ratio calculation. This would effectively separate accounting classification from the measurement of required regulatory capital. These proposals may carry issues of capital volatility and accounting mismatches. Further guidance by regulators or FASB would be necessary. Additionally, there could be a deleterious effect on the liquidity of small, community banks, causing them to incur higher liquidity costs or lose their borrowing ability altogether (Walker, 2023).

5. Conclusion

A confluence of events including massive deposit inflows in 2020-2021, near zero short term interest rates, banks' use of longer-term treasuries, and the sharpest rise in the Federal Funds rate and longer-term treasury yields since the introduction of FASB's 115 statement in 1993 led to massive losses (over \$600 billion) in security holdings. The incentive to use HTM to avoid reducing the book value of equity for banks had never been larger with 10-year Treasuries losing 16% over this period. The previous largest loss during rate increases was 3% during the 1994-1995 cycle.

In total, HTM securities increased by more than \$900 billion in 2022, which, intended or not, sheltered security losses due to the rise of interest rates (Granja, 2023). Charles Schwab classified \$148 billion as HTM just by itself. Not to be outdone, regional banks held in State Street's KRE accounted for a \$248 billion increase in HTM during 2022, resulting in a total of \$474 billion classified as HTM by the end of 2022. In total, banks had classified \$6 trillion of securities as HTM. This runup went relatively unnoticed and had no mass effect on share prices in this study's sample group before the regional banking crisis.

Only after SVB's collapse did HTM become an important factor. Specifically, regional and large non-regional banks lost approximately 2% for every 10-percentage point increase in their HTM to total securities ratio. However, large non-regional banks only fell 14% over this period, compared with the 36% loss incurred by regional banks. A major difference between the large non-regional banks and the regional banks is that the value of HTM securities changed little during 2022 for the large national banks, while it more than doubled for regional banks.

For the remainder of 2023, as rates became more stable, concern over HTM seemingly dissipated as HTM once again became an insignificant factor during the rebound in regional bank stocks. However, banks with higher HTM to total securities ratios remained discounted even by the end of 2023. Currently, nothing has changed relative to FASB 115. Perhaps nothing needs to be done, as FASB reaffirmed the HTM classification in December of 2023, and 2022 seemed to be a unique event.

However, the argument continues as to the appropriateness of allowing HTM accounting rules to continue. It seems prudent that going forward, the disclosure of unrealized bond losses on HTM portfolios (at least to the Fed, FDIC, and Office of the Comptroller of the Currency), combined with more competent and timely oversight, might mitigate a future

recurrence of a bank run due to HTM usage. As the accounting standards currently stand, astute investors should be wary of banks, large or small, moving large amounts of securities from AFS to HTM in times of rising interest rates. This latest crisis shows that interest rate risk on even the "safest" treasury bonds can lead to an unmitigated disaster when liquidity is threatened, and banks are forced to convert HTM to AFS and realize large losses. The solvency of banks is at risk, and, at the very least, banks' stock prices will be negatively affected, increasing the costs of capital when it may be needed most.

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