

Duration Gap Disclosure: A Modest Proposal to Prevent Another SVB

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What caused the dramatic collapse of Silicon Valley Bank (SVB)? The reasons are all too familiar to students of banking history. SVB's managers were gambling on short-term interest rates remaining lower than long-term rates, investing heavily in long-term mortgages and government bonds funded with short-term deposits. The sharp increase in interest rates caused asset values to plummet, eroding the bank's equity capital. As during the 1980s--when bets on interest rates led to the S&L crisis and the near bankruptcy of the mortgage giant Fannie Mae--it was a classic case of purposeful "duration mismatch" between assets and liabilities. The strategy would be profitable if rates stayed flat or fell, and if not, the government would share in the losses.

While the mechanics behind SVB's failure are straightforward, it is much harder to understand why it was allowed to happen. Commercial banks like SVB are highly regulated. The bank's larger investors and regulators were reportedly well aware of its elevated risk exposure. Unlike credit risk, interest rate risk exposure is relatively easy to identify, quantify, and hedge against. It was no secret that the Federal Reserve was committed to a series of rate hikes to combat inflation, or that longer-term rates could rise sharply if investors came to believe that inflation would persist.

Were SVB's regulators asleep at the wheel? While perhaps they had the discretion to have done more, there appears to have been no explicit rule that should have been enforced but wasn't. In fact, surprisingly few regulations are directed at formally measuring and controlling interest rate risk. Bank capital requirements are primarily linked to credit risk. In response to SVB's failure liquidity requirements were expanded for medium-sized banks such as SVB, but still no requirement addresses interest rate risk head-on. Regulatory stress tests, which take interest rate conditions into account, may not always incorporate scenarios with rapidly rising rates.³

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³ Some have suggested that stress tests failed to alert regulators to the situation because of the focus on scenarios that feature heightened credit losses. Credit losses tend to occur in downturns, when rates are falling rather than rising.

Although the S&L bailouts and near-bankruptcy of Fannie Mae in the 1980s did not give rise to the direct regulation of interest rate risk, it did cause a significant change in the disclosure policies of the government-sponsored enterprises Fannie Mae and Freddie Mac (the GSEs). The GSEs agreed to regularly report their duration gap in their quarterly financial statements. The duration gap is roughly proportional to the losses that would result from an upward shift in interest rates (technically, a parallel shift of the yield curve). Not only did adopting this disclosure policy make it much easier for regulators and investors to gauge the GSEs' risk exposure, it changed behavior. When interest rate risk-taking became more transparent, the GSEs voluntarily did less of it.

Our modest proposal is to require medium and large-sized commercial banks to regularly report their duration gap in their quarterly financial statements. The disclosure would make it more apparent to regulators and investors when a bank is taking significant interest rate risk. It would serve as an incentive to limit interest rate risk in order to avoid regulatory action and bad publicity.

The duration gap provides new information that even the most astute market analysts would not be able to infer from currently mandated disclosures. Technically, calculating the gap requires knowing the maturity structure of a bank's assets and liabilities and the effects of swaps and other derivatives on that maturity structure. Banks already have all the necessary information to do that calculation, making the incremental regulatory burden modest.

In sum, we can go a long way to preventing another Silicon Valley Bank (SVB) fiasco with a simple requirement that banks disclose how future changes in interest rates will affect the value of equity. With this requirement the market would help quickly discipline any bank taking excessive interest rate risk. The result would be a much safer banking system without increases in capital requirements or more supervision.

Duration as a Measure of Interest Rate Risk

Basic bond math establishes the inverse relation between interest rates and bond values: when rates rise, bond values fall, and vice versa when rates fall.⁴ The sensitivity of a particular bond's value to a interest rates can be approximated using its duration, which is defined as the percentage change in bond value for a small change in rates.

The concept of duration applies to all types of fixed income securities or portfolios, and also to derivatives such as interest rate swaps. Duration depends on maturity, coupon rate, the general level of interest rates, and any associated options. Importantly, duration is positively related to maturity. Deposits and short-maturity debt have short durations and their value is fairly insensitive to interest rate changes. Treasury bonds and mortgages have longer durations and greater value sensitivity to interest rates.

⁴ There are several ways duration is measured. For duration gap calculations, the concept of effective duration yields the most accurate results. See, e.g., Tuckman and Serat 2012.

The value of bank equity is the difference between the value of assets and liabilities. The exposure of equity to interest rate changes is proportional to a bank's duration gap—the difference between the duration of its assets and liabilities. When a bank funds long-duration assets like mortgages and Treasury securities with short-duration liabilities like deposits, the duration gap can be significant. The larger the duration gap, the more exposure a bank's equity has to interest rate changes.

What Is Missing from Existing Disclosures?

Accurately estimating a bank's duration gap requires detailed information about the maturity structure of its assets and liabilities, the associated rates paid and received, and the nature of prepayment options, swaps and other derivatives. Bank financial statements typically only provide coarse information about these characteristics, for instance dividing loans into broad maturity buckets. Information about derivatives is particularly limited.

For publicly traded banks, another potential source of information about a bank's duration gap comes from the equity market. The sensitivity of the market value of a bank's equity to rate changes could offer a clue as to how investors perceive the bank's exposure to interest rate risk. To explore this possibility, we collected historical data on interest rate changes and the subsequent change in the market value of equity relative to asset value for the largest U.S. banks. While the relation between equity value changes and interest rate changes is on average negative as theory predicts when the duration gap is positive, the relation is very noisy. Figure 1 provides an example, showing the relation between the value of equity for Bank of America and changes in 5-year Treasury rates. Finding minimal effects could be because these large banks in fact hedge most interest rate risk. It could also be because interest rate changes not only affect the value of existing assets, but also the value of future investment opportunities.

SVB's Interest Rate Risk Exposure

That SVB was half giant (\$117B of long-term securities out of \$212B in assets) 1980's savings & loan (S&L) and half lender to Silicon Valley innovators was hiding in plain sight. SEC disclosures (10-Qs and Ks) and FDIC call reports show the SBV has \$82.7 billion in residential mortgage backed securities with a disclosed duration of 5.7 years. Under generally-accepted account principles (GAAP) these positions were either held to maturity and thus carried at book value or available for sale where the value is lower of book or mark-to-market (MTM), but where the losses do not go through earnings and hence do not affect shareholder's book equity. The disclosed overall losses for SVB on a fair value basis were \$15.2 billion or 95% of shareholder equity (\$16.0 billion).

Were these positions hedged with long-term liabilities and derivatives? Again piecing together the disclosures, the answer is no. Most liabilities (\$173.1B) were short term deposits that depositors were able to withdraw in a matter of days. Other liabilities

included \$13.6 billion in short term borrowings, largely advances from the Federal Home Loan Banks. Long-term debt with maturity over one year comprised only \$5.4 billion of liabilities.

As for derivative positions, as of December 31, 2022 the total notional value of derivatives (excluding those held for customers) was just \$550 million, a tiny fraction of SVB's asset value. The notional value of derivatives had dropped from \$10.7 billion a year earlier, and the CEO discussed taking off the hedges on an earnings call. All this was disclosed.

Using this information, we can estimate that the duration gap between assets and liabilities was in the range of 3 to 4 years.⁵ A one-percentage point increase in interest rates would lead to fair value losses of approximately \$6 to \$8 billion or approximately half of GAAP shareholder equity. A two-percentage point increase would put SVB on the edge of insolvency.

While this calculation suggests that analysts and regulators can roughly estimate duration gaps from existing bank disclosures, such informal estimates are unlikely to garner enough attention to influence banks' risk management practices. For institutions that make heavy use of derivatives, such estimates are likely to be unreliable.

Interest Rate Risk in S&Ls and GSEs 1980's-2000

This duration gap indicates an unacceptable level of interest rate risk, similar to what we saw in the 1970s and 80s with the S&L industry that funded mortgages with short term deposits. When interest rates rose starting in 1979, the industry was insolvent on a mark-to-market basis. While many gambled for resurrection with bad credit bets, the seed of the \$150 billion S&L debacle was an interest rate risk mismatch.

With the demise of the S&L industry, by the 1990s the largest mortgage portfolios were those of the government sponsored enterprises (GSEs), Freddie Mac and Fannie Mae. In 2000, their mortgage assets totaled \$1 trillion or approximately one-sixth of mortgage debt outstanding. Concern began to grow that these two institutions would suffer the same fate as the S&Ls because of their large mortgage portfolios. While the GSEs issued some long-term debt and partially hedged with derivatives, GAAP at the time had even less information about mark-to-market values and derivative positions than today. Thus, the level of interest rate risk in the GSEs was unknown to the public and policymakers.

Voluntary Disclosure of Interest Rate Risk by GSEs

⁵ SVB disclosed that 55% of its assets (117/212) were long term, with duration (on most) of 5.7 yrs. Assuming those assets were financed by very short-term deposits, that alone implies a duration gap 3.14 years when everything else is matched, i.e., its commercial loans had same dollar duration as the liabilities funding those loans. Alternatively, assuming commercial loans have a 1-year duration and that the liabilities backing them have a close to zero duration, the estimated duration gap increases to 3.6 years.

In October 2000, facing mounting criticism about their mortgage portfolios, the GSEs announced a package of “voluntary” reforms that included disclosure of duration gaps. These disclosures are still done today and go beyond what are done by other financial institutions. The GSEs disclose the duration gap between their assets and liabilities monthly on their website.

Here is Fannie Mae’s January 2023 disclosure:

Table 8. INTEREST RATE RISK DISCLOSURES			
	Market Value Sensitivity (\$ in Millions)		Duration Gap (in years)
	Rate Level	Rate Slope	
	Shock (50 bp)	Shock (25 bp)	
January 2022	(60)	9	(0.05)
February 2022	(71)	(6)	(0.05)
March 2022	(56)	(10)	(0.03)
April 2022	(39)	(4)	(0.03)
May 2022	(43)	(5)	(0.03)
June 2022	(27)	(5)	(0.02)
July 2022	(41)	(8)	(0.04)
August 2022	(31)	(7)	(0.03)
September 2022	(23)	(6)	(0.02)
October 2022	(18)	(4)	(0.01)
November 2022	(13)	(5)	0.01
December 2022	(15)	(7)	0.01
Full Year 2022	(36)	(6)	
January 2023	(27)	(12)	0.02
YTD 2023	(27)	(12)	

The GSEs now run duration gaps close to zero. It wasn’t always the case and these disclosures played a role in reducing interest rate risk. In September 2002, Fannie Mae reported a gap of 14 months and the market reacted negatively—its debt spreads widened and the stock price dropped. Fannie Mae quickly announced that it was reducing the duration gap.⁶

Simple Reform for Banks

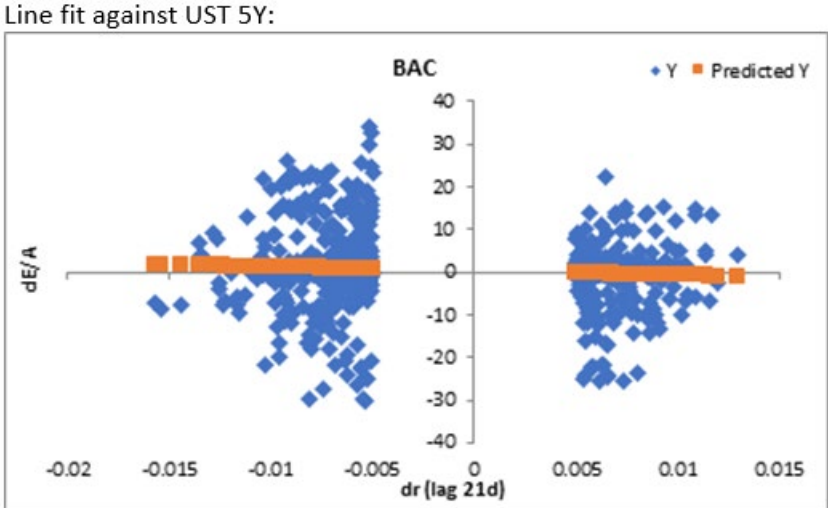
All medium and large banks should be required to periodically disclose their duration gap. As explained earlier, that statistic would provide new information to regulators and investors that can’t be accurately inferred from current financial reports or market data. Smaller banks could also be encouraged to report their duration gap, but the information is less critical because systemic risk is less of a concern.

The additional regulatory burden would be modest. Banks already calculate their duration gap for internal purposes (or should). We believe that this disclosure would have gone a long way in preventing what we saw with SVB. And this reform could be accomplished in matter of weeks.

⁶ <https://www.marketwatch.com/story/fannie-mae-says-duration-gap-is-narrowing-shares-rise>

Simple disclosure would alert the market and regulators to emerging problems as it did with the GSEs over 20 years ago. Once the disclosures become standardized and widely accepted, bank regulators could provide a stronger and more uniform incentive for risk avoidance by tying capital requirements directly to a bank's duration gap.

Figure 1: Relation between equity and interest rate changes



Notes: Interest rate changes are over 21 days. Changes of less than 50 basis points are excluded. The equity response is measured over the 21 days following the interest rate change period.

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