Cut to the Chase Finance:
Bank Interest Rate Risk and Mr. Powell's Wild Ride

by Christopher Laursen

Regulatory Supervision of Interest Rate Risk in Banks

Given the recent declines in bond values within banks' Available for Sale ("AFS") and Held to Maturity ("HTM") portfolios, I have been asked about how banks manage and how examiners assess Interest Rate Risk ("IRR"). The topic brings me back to my days as an OCC and Federal Reserve examiner starting in the early 1990s. Even then, community bank examinations always included an assessment of the impact of IRR on banks' financial condition and overall risk. In fact, in 1997 bank regulators added an "S" to the traditional "CAMEL" bank-rating system, making it "CAMELS," to explicitly rate Interest Rate "Sensitivity," which had previously only been a consideration within the other component ratings.[1]

Parallel Interest Rate Shocks

Bank examiners expect banks to use a variety of methods to quantify IRR depending on bank complexity and size. One basic method examiners have long relied upon, even at the smallest banks, is the parallel rate shock. With this approach, bankers and examiners assess the impact of immediate hypothetical parallel shifts in market interest rates: for instance, +/-100, +/-200, +/-300 basis points. Though not necessarily realistic, the parallel shocks provide insight as to potential changes in the market value of bank assets, liabilities, and equity in an environment where rates are changing quickly. Of course, larger banks as well as those offering products with significant optionality and/or with derivatives exposures are expected to go well beyond simple rate shocks and consider non-parallel shifts in yield curves.[2]

> "The scenarios an institution specifies for assessing the market risk of its securities and derivative products should be sufficiently rigorous to capture all meaningful effects of any options. For example, in assessing interest-rate risk, scenarios such as 100, 200, and 300 basis point parallel shifts in yield curves should be considered as well as appropriate nonparallel shifts in structure to evaluate potential basis, volatility, and yield curve risks."
>
> *Federal Reserve's Commercial Bank Examination Manual*

[1] The CAMELS rating system is used by the three federal banking supervisors (the Fed, the FDIC, and the OCC) to provide a confidential summary of a bank's overall condition at the time of an exam. The components that are assessed are **C**apital Adequacy, **A**sset Quality, **M**anagement, **E**arnings, **L**iquidity, and **S**ensitivity to Market Risk (primarily interest rate risk). See FR Doc. 97-155, filed January 3, 1997.

[2] Board of Governors of the Federal Reserve System, *Commercial Bank Examination Manual*, Section 2500.1, p. 25.

Interest Rate Risk GAP Analysis

Another traditional IRR monitoring method used even in small and non-complex banks is the so-called Interest Rate GAP analysis. A GAP analysis provides a rough estimate of how sensitive a bank's net interest income is to changes in interest rates over various timeframes.[3]

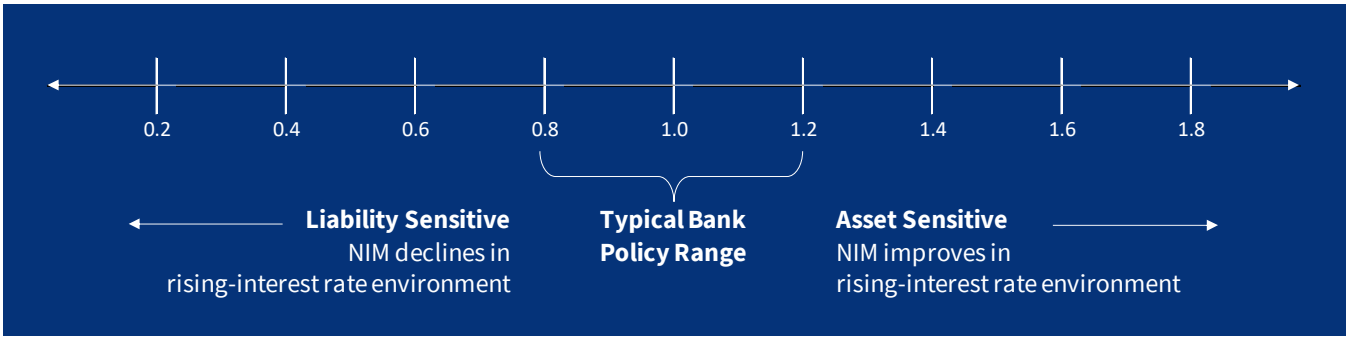
The output of a GAP analysis is a net asset sensitivity ratio, which is simply defined as:[4]

$$\frac{Rate\ Sensitive\ Assets - Rate\ Sensitive\ Liabilities}{Earning\ Assets}$$

"Rate sensitive" indicates that the cashflows associated with an asset or liability will change when market interest rates change. For a bank, a floating-rate loan to a customer is a rate sensitive asset, while a fixed-rate loan with 5 years to maturity is not rate sensitive. A customer's interest-bearing money market deposit account is an interest sensitive liability, while a 5-year fixed-rate CD liability is not rate sensitive.[5]

Figure 1 below illustrates a GAP ratio spectrum. As a rule of thumb, many banks limit their near-term GAP ratio to a maximum of 1.2 and a minimum of 0.8. If bank management expects a change in market interest rates going forward, they can adjust the bank's product/investment mix and hence the GAP ratio, such that the anticipated rate change will result in more positive financial results. It should be noted that the GAP analysis has limitations; though relatively simple to prepare and interpret, a GAP analysis typically does not measure the impact of embedded options, yield curve twists, and basis risk.[6]

Figure 1: GAP Ratio Spectrum



[3] For example, 0-3 months, 0-6 months, 0-1 year, 0-2 years, 0-5 years.

[4] Federal Deposit Insurance Company's *RMS Manual of Examination Policies,* Section 7.1: Sensitivity to Market Risk.

[5] Fixed-rate loans and deposits ultimately reprice at maturity and can reprice sooner if the instruments allow optionality (e.g., ability to prepay a loan or withdraw a CD early). Financial contracts often embed fees (e.g., loan prepayment fees or CD early withdrawal penalties) that provide banks compensation should a customer exercise optionality.

[6] See "Nowhere to Go but Up: Managing Interest Rate Risk in a Low-Rate Environment," FDIC Supervisory Insights, updated January 4, 2010.

A bank that is net "liability sensitive" (i.e., ratio below 1) would be expected to suffer in terms of its net interest margin ("NIM") and its "economic value" during a rapidly rising interest rate environment, because the bank's liabilities will reprice[7] higher in the near term while its assets will not. For example, a bank using floating-rate deposit liabilities to fund long-term fixed-rate bonds and loan assets will be liability sensitive and thus in an undesirable position when rates rise.[8]

> "At the most basic level, mismatches or gaps in long-dated time bands can provide insights into the potential vulnerability of the economic value of relatively noncomplex institutions."
>
> *Federal Reserve's Commercial Bank Examination Manual, Interest Rate Risk Management*

Altering a Bank's Interest Rate Sensitivity

Prudent bank management should assess the current economic environment and outlook and adjust interest rate sensitivity accordingly. Over the past few years, the interest rate environment has certainly warranted close monitoring given the uncertain impacts of massive government fiscal and monetary stimulus provided as a result of the COVID pandemic. As COVID subsided and lockdowns ended, pent-up demand among well-funded US consumers, along with producer supply chain problems, led to inflation levels that had not been seen in the US for decades. At the end of 2021, the Federal Reserve's Federal Open Market Committee ("FOMC") abandoned its view that the inflation witnessed would be "transitory," and began implementing a "tapering" policy where monetary stimulus would be cut (indicating interest rates would rise).[9] In January 2022, the FOMC signaled that it would "soon be appropriate" to raise rates to battle inflation.[10] Certainly, by March 2022, when the FOMC raised the target Fed Funds rate and indicated further rate increases at future meetings, bank risk managers would have understood that an asset sensitive position would likely be beneficial while a liability sensitive position could be deleterious.[11]

Significantly altering a bank's interest rate sensitivity position to become more asset sensitive can be slow, costly, and can create or increase other risk types. However, the near-term cost of hedging or reducing interest rate risk exposure is often preferable to incurring unknown future losses in a potentially volatile environment. Below in Figure 2 are a few examples of how banks can increase asset sensitivity:

[7] Liabilities and assets "reprice" if associated interest rates float, or if they mature.

[8] Notably, demand deposits, which do not have fixed maturities, add a layer of complexity to model assumptions, as the maturities of these liabilities must be estimated based on their perceived "stickiness." This is discussed further below.

[9] See FOMC's policy statement on December 15, 2021. Tapering policy is a gradual reduction in the pace of the Fed's securities purchases.

[10] See FOMC's policy statement on January 26, 2022.

[11] See FOMC's policy statement on March 16, 2022: "…the Committee decided to raise the target range for the federal funds rate to 1/4 to 1/2 percent and anticipates that ongoing increases in the target range will be appropriate. In addition, the Committee expects to begin reducing its holdings of Treasury securities and agency debt and agency mortgage-backed securities at a coming meeting."

Figure 2: Bank Actions to Increase Asset Sensitivity

Action to Increase Asset Sensitivity	Associated Cost/Risk to Bank
Move bank investment portfolio holdings into shorter-term securities (e.g., replace 30-year fixed rate Mortgage-Backed Securities with 6-month T-Bills).	This can require locking in unrealized losses on long-term securities and accepting a lower yield/interest rate on the shorter-term replacement securities (thereby reducing near-term interest margins).
Offer or incentivize customers to enter into floating-rate loans rather than fixed-rate loans.	Shifting the balance sheet through this method can take time. Furthermore, some loan types are traditionally fixed-rate, so convincing retail or business customers to switch to floating-rate terms can be difficult. Importantly, when a bank provides floating-rate loans, borrowers themselves become subject to the risk of rising interest rates. If rates rise, the loan payments required of borrowers increase while the income available for debt repayment may not. As a result, in an effort to reduce interest rate risk by holding more floating-rate loan assets, a bank may increase its credit risk.
Enter into "pay fixed - receive floating" interest rate swaps or similar derivative contracts.	By the time it is clear that interest rates are rising, "receive floating" derivative instruments can be quite expensive. Additionally, a bank entering into bi-lateral derivative contracts exposes itself to counterparty credit risk.[12] If the counterparty paying the floating rate defaults, the benefit of the swap can disappear just when it is most valuable.

Interest Rate Risk Simulation Models

Above and beyond the basic IRR measures noted above, large banks, and even some mid-to-large sized community banks use more detailed IRR simulation models to estimate the granular impacts of non-parallel interest rate moves. These models can estimate a bank's earnings at risk as well as potential changes in a bank's economic value of equity under a variety of rate scenarios or stresses. It is a given that the future hypothetical interest rate curves chosen by banks for modeling will not prove exactly correct. However, software-driven IRR simulation models can reveal important sensitivities within sub-sets of assets and liabilities (e.g., commercial real estate loans, money market deposit accounts) and indicate which particular interest rate scenarios may be most problematic. Potential non-linear financial results that can occur as a result of embedded financial contract options and significant market rate moves may not be obvious to bank management and boards but can be captured in simulation models. As such, when used correctly, IRR models can give bank management a better view into IRR as well as liquidity risk. They can also help pinpoint specific portfolio adjustments, hedges, or other actions that could best mitigate existent risks.

[12] The risk that a derivative counterparty fails to meet its contractual obligations.

IRR Model Assumptions: Deposit Stickiness

It is important to note that bank IRR and liquidity simulation models embed numerous assumptions that can significantly impact results. These assumptions are the most interesting part of examining bank IRR models. From an examiner standpoint, there is always the risk that bankers running IRR models either purposely or unconsciously reverse-engineer results by tweaking key assumptions. Deposit elasticity or "stickiness" is one key assumption within bank IRR simulation models. Many bankers assume that the level of no-cost or low-cost deposits will, at worst, remain stable, regardless of the external rate environment or competitive conditions; that is, they assume their deposits are extremely sticky. Common banker rationales for this view include:

- We have personal relationships with our depositors which they value;
- Competitor banks are worse in terms of deposit pricing, and we will always keep pace with competitor deposit pricing; or
- We provide a variety of lending and other services to our customers, making it too inconvenient for them to move their deposits.

Often these general points have merit, and it can be difficult to refute deposit elasticity assumptions under normal circumstances. However, under severe economic environments or idiosyncratic circumstances, a bank's deposit stickiness can change quickly. As such, examiners should make sure appropriate stress and sensitivity testing is performed with respect to deposit assumptions and determine what contingency liquidity sources are available. In circumstances where replacement funding is needed to cover deposit outflows, a bank's net interest margins can become depressed; this is an example of interest rate risk being realized. Of course, in circumstances where replacement funding is needed but is not available, FDIC receivership can result - this is the prime example of bank liquidity risk. Ultimately, without prudent assumptions and sensitivity analysis, bank IRR and liquidity models can be "GIGO": garbage-in, garbage out.

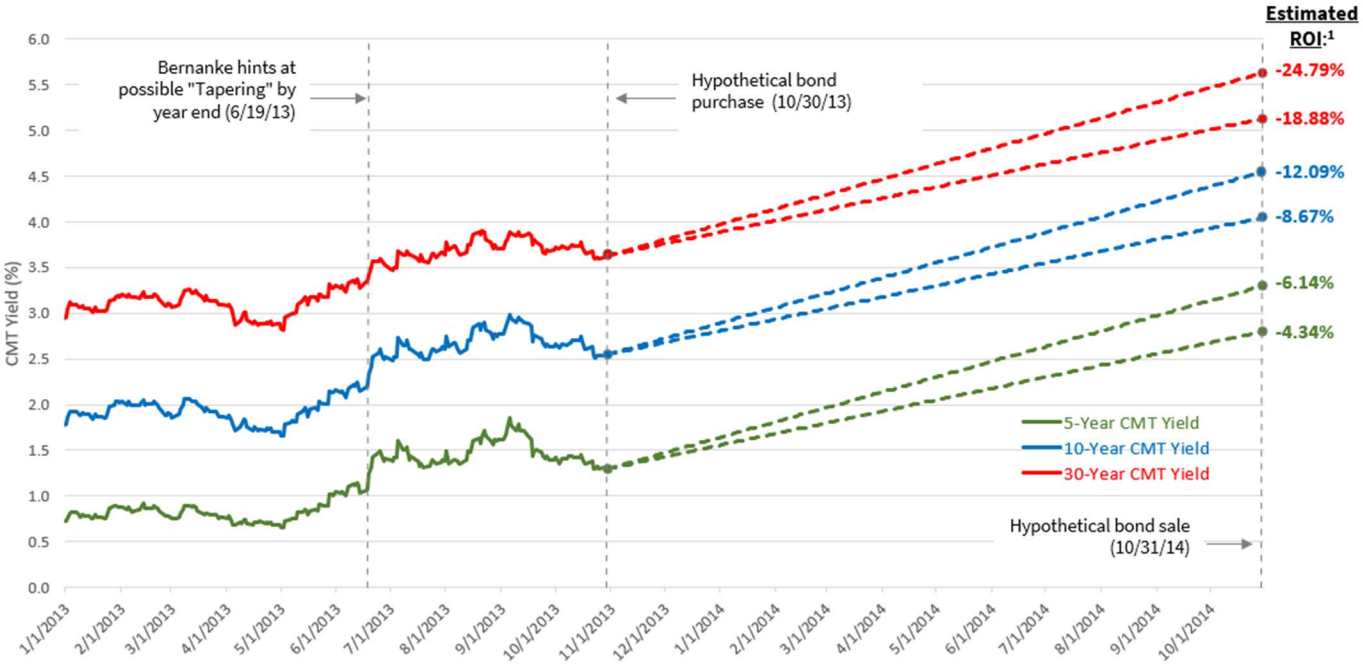
"Safe" US Treasury Bond and Mortgage-Backed Securities

In late 2013, I made a few presentations on the risks facing fixed income mutual funds and closed-end funds. One risk I highlighted was interest rate risk, particularly with respect to portfolios concentrated in longer-term fixed-rate US government backed securities. I warned that funds with disclosures stating or strongly implying that such portfolios were "safe" or "low risk" could be in for litigation trouble, particularly if market interest rates were to increase rapidly. Though funds comprised of US government backed securities may in fact be "low risk" in terms of credit risk, disclosures indicating that such funds are "safe" in all market scenarios could be viewed as materially misleading. Recent market turmoil stemming from losses in US bank bond portfolios has reminded some market participants, and taught others, about the mark-to-market impact of rising interest rates.

2013 Interest Rate Risk Shock Analysis

An example of a chart I used in 2013 detailing the potential impact of rising interest rates on bond returns is included below as Figure 3. At the time, a hypothetical interest rate increase of 200 basis points (2.0 percentage points) over a one-year period would have resulted in a return on investment of approximately negative 25% for a 30-year US Treasury bond.

Figure 3: 2013 Hypothetical IRR Scenario
Yields on 5, 10, and 30-Year US Treasuries
January 1, 2013 through October 30, 2014



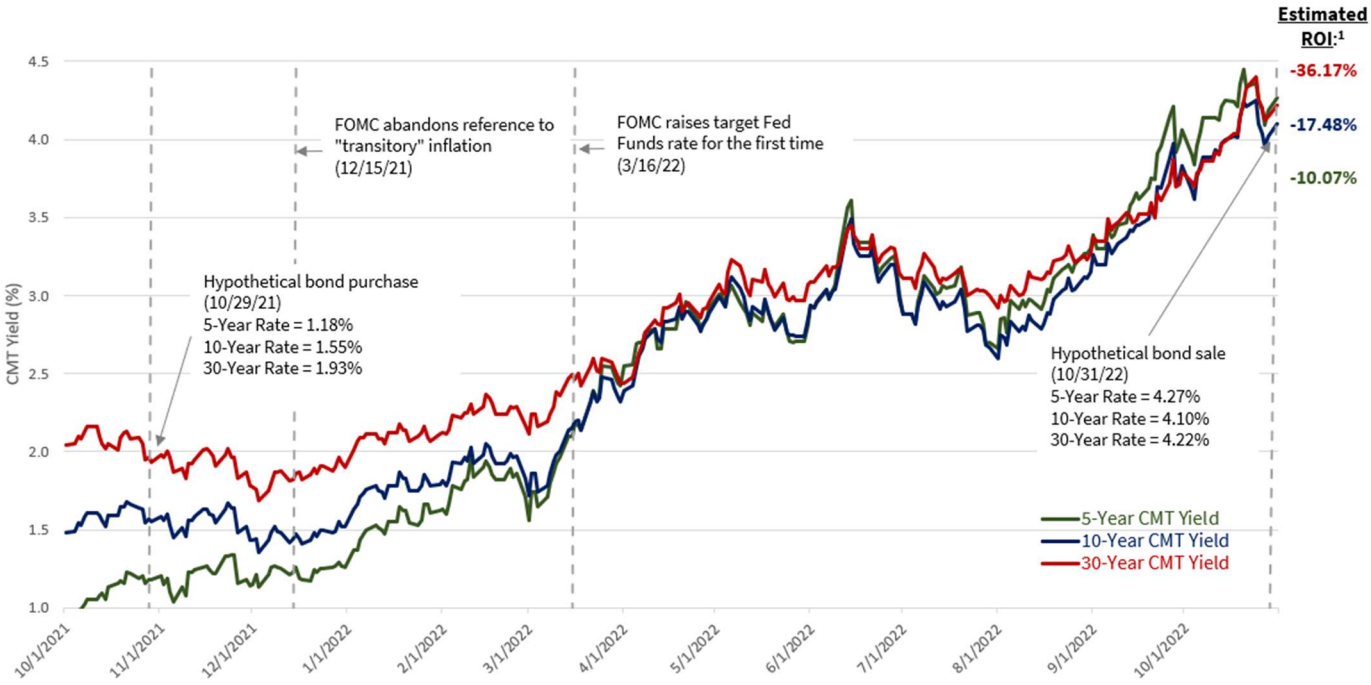
Notes and Sources: Data from Federal Reserve Economic Data (FRED), https://fred.stlouisfed.org. (1) Return on investment is estimated assuming investors purchased treasuries on 10/30/13, received two coupon payments, and sold the treasuries on 10/30/14 at market value, as rates increased by a hypothetical 150 or 200 basis points over the course of the year.

The hypothetical increases in interest rates I chose in 2013 did not come to be realized during 2014. Though US Treasury yields increased in some brief periods between 2014 and the start of the COVID lockdowns, relatively low and/or declining US Treasury yields generally persisted as the Fed remained largely accommodative with the US economy slow to regain traction after the global financial crisis.

Impact of Actual Rate Increases During 2022

However, starting in early 2022, actual US interest rates increased even faster and further than my previous hypothetical shocks. In Figure 4, I chart the path of US Treasury bond yields during late 2021 and into 2022. The chart shows that the yield on a 30-year US Treasury bond increased from approximately 1.93% to 4.22% over the one-year period starting on October 29, 2021. This 229 basis point increase is not even a peak to trough increase within the period. An investor who purchased and sold such a bond over that period would have experienced a return on investment of approximately negative 36%. It was not simply the rapid nominal increase in bond yields that hurt the bond valuation, but because yields rose from such historically low levels, the negative mark-to-market impact was massive.

Figure 4: 2021-2022 Actual IRR Condition
Yields on 5, 10, and 30-Year US Treasuries
October 1, 2021 through October 31, 2022



Notes and Sources: Data from Federal Reserve Economic Data (FRED), https://fred.stlouisfed.org. (1) Return on investment is estimated assuming investors purchased treasuries on 10/29/21, received two coupon payments, and sold the treasuries on 10/31/22 at market value, as rates increased over the course of the year.

Recent Banking Industry Impacts

Though the recent rapid increases in bond yields may not have been fully anticipated, from a banking industry perspective, there were a number of warning signs that make it surprising that certain banks were apparently over-exposed going into 2023. First, as noted above, the Federal Reserve did signal the market before it began market operations to significantly increase rates.[13] Warnings began in late 2021 and continued into early 2022 via regular FOMC meeting releases, press conferences, and other statements by Fed officials. Second, interest rate risk management is a well-developed field in the bank risk management arena. As discussed, even smaller banks have the capacity to measure, monitor, and manage interest rate risk. Finally, financial accounting and regulatory accounting standards detailing how banks must account for investment securities held in their AFS and HTM portfolios have remained relatively consistent for years. In fact, many of the same issues regarding unrealized losses and bank capital, securities impairment, and potential gaming by management were closely examined during and after the global financial crisis fifteen years ago.

[13] For example, increases to the target Fed Funds rate and Quantitative Tightening.

Positively, the recent banking market turmoil experienced does not appear to have resulted from a broad swath of banks performing empirically worse than would have been expected, given the interest rate environment. Rather, fear and uncertainty that arose from a few "surprise" situations within atypical banks led to a temporary broader panic, with some depositors and investors exiting immediately rather than taking any chances. At present, with the help of some intervention from the Federal Reserve and FDIC, anxiety in the banking market has subsided.

Meet the Expert

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Christopher Laursen is the President of CSL Consulting, where he provides expert witness, advisory and training services. Mr. Laursen formerly served as the Manager of Risk Policy and Guidance, and the Head of Trading and Capital Markets Risk in the Supervision Division of the Federal Reserve Board. He also served as an examiner with three Federal Reserve Banks and the OCC. Mr. Laursen has an MBA with a concentration in finance from the Wharton School of Business and a BBA from the University of Miami.