**RiskGPS: Net Interest Margin (NIM) Simulations**

**Regulatory Expectations and Methodology**

Regulators expect banks to manage both short- and long-term exposure to changing market interest rates. To assess short-term risk, regulatory guidance emphasizes the use of **rate-shocked margin analysis** as the primary tool, with supplemental methodologies encouraged for broader perspective.

**Static vs. Dynamic Analysis**

Regulators recommend using **static analysis**, where the balance sheet remains “frozen.” Maturing, repricing, or paid-off instruments stay in the same category; only the income or cost changes due to rate fluctuations. Though static analysis doesn’t reflect volume changes or growth, it minimizes complexity and subjectivity, making it easier for examiners to compare results across institutions.

Dynamic models can be used as **supplements** but should not replace static methods.

**Parallel vs. Non-Parallel Rate Shocks**

* **Immediate and Sustained:** All rate changes occur on day one and remain constant for the duration of the analysis. However, not all instruments adjust immediately. There are fixed or adjustable rate instruments that don’t change their rates until their maturity, payment, or re-pricing dates.
* The amount of the yield change for the bank’s balance sheet categories might be less than the amount of the ‘market’ rate change because banks can limit some price changes due to product characteristics, local competition, or customer insensitivity to price.
* **Parallel Movements:** All market rates shift by the same number of basis points. However, due to product features or market behavior, yields may not respond equally.
* **Non-Parallel Movements:** Short- and long-term rates may shift by different amounts or in opposite directions. RiskGPS supports simulation of two stress scenarios commonly mentioned by examiners:
  + Short-term rates rise while long-term rates remain flat.
  + Long-term rates fall while short-term rates remain flat.

**Regulatory Recommendations for Shock Analysis**

Regulatory guidance suggests:

* Running simulations over **one- and two-year periods**.
* Applying shocks in **100 basis point intervals** from **-400 to +400 bps**, including a no-change baseline—yielding **nine distinct scenarios**.
* Accounting for negative shocks that result in a 0% market interest rate. These negative shocks should still be calculated as some rates will show changes across the entire range. Even if the negative shocks produce results that are unrealistic, the scenarios should still be tested. Banks should define **policy limits** for both parallel and non-parallel shocks to manage acceptable levels of change or exposure.

RiskGPS meets these regulatory standards and provides tools in the Executive Summary and “Rate Shocked” section of the BankersGPS Risk Module to support this analysis.

**Using the "Rate Shocked" Reports in RiskGPS**

**1-Year NIM Simulation (Page 15a)**

At the bottom of this report page, a graph displays the projected **Net Interest Margin (NIM)** under nine different rate shocks. This shows the bank’s exposure occurring the first year after an immediate change in market interest rates. Key features include:

* **Yellow Triangle Line:** Indicates simulated NIM at each shock level.
  + An upward-sloping curve from the center suggests positive exposure. Most banks will show improvement in only one direction, while declining in the opposite rate environment.
  + A symmetrical upward curve (a “smile”) implies benefit from both rising and falling rates.
  + A downward curve (a “frown”) reflects **negative convexity**, where margin deteriorates in both directions. While typically unfavorable, this may indicate prudent modeling of customer behavior and product optionality.
* **Red Square Line (Margin Risk Tolerance):** Flat line representing the minimum NIM needed to:
  + Cover overhead.
  + Support after-tax earnings for projected dividends.
  + Maintain required capital levels.

If the yellow line falls below the red line at any shock level, the bank is not generating sufficient income and should review its strategy.

Each triangle is labeled with the corresponding NIM value, allowing easy comparison with internal **policy minimums**.

**Data Table Review**

Above the graph:

* **Net Interest Income Change:** Measures the dollar difference in income vs. the no-shock scenario.
* **Percent of Risk:** Shows the cumulative percentage change in income across shock levels.
  + Some banks set limits (e.g., max 5% change per 100 bps, 10% for ±200 bps, 20% for ±400 bps).
  + Some institutions focus limits on **negative shocks** only; however, large changes in either direction may also indicate margin instability or assumption errors.
* **Income/Expense Details:** Review all the other line items in the table to see if the projected interest income and expense are realistic for the rate environments that are projected.

**Pro Tip:** If the income in the “no change” column looks inaccurate, verify the data in the last column of the **Yields and Costs Report (Page 7)**. Yields and costs are calculated directly from call report information. Common errors include:

* Misstated average balances in Schedule RC-K.
* Accrued interest reversals from loans placed on non-accrual.

**2-Year NIM Simulation (Page 15b)**

This page expands the one-year analysis to cover a two-year horizon. Key distinctions:

* Captures instruments that reprice or mature within the second year.
* Shows **cumulative** interest income and expenses over two years.
* Values are roughly double those of the one-year simulation—unless amortization, repricing, or optionality materially change flows.
* For categories like investments, loans and CDs, the amount of interest income or expense will be impacted by the impact of amortizing or repricing balances. Often the differences in net interest margin on the graph and interest income and expense in the chart will be small, but not for all banks.

Review the page for consistency with one-year results. Significant discrepancies warrant deeper analysis.

**Yield Curve Risk Assessment (Page 17)**

This section simulates **non-parallel shocks**, examining how NIM behaves under extreme slope changes in the yield curve.

**Simulated Scenarios:**

1. **Short-Term Rising / Long-Term Flat**

Interest rates on 3- month and six month maturities increase by 200 BP, while other rates ramp to the current yield for 10-year treasuries. The green line represents the actual rates for treasury obligations of various maturities that existed on the last day of the quarter; the blue line shows what would result from non-parallel movement where short-term rates increase, leveling off at the level of the 10-year treasury. When short-term rates are much lower than long term rates, this results in a very steep rise for short term rates to that level of long term rates. If the difference between actual quarter end and long term rates is less than 200 BP, the blue line will show an “inverted” yield curve – which means that short term rates will be higher than the long term rates. While that is an unusual situation, it can happen - especially during times when the market supports high short-term rates with the expectation that rates in the future rates will drop significantly.

These scenarios are extreme and unlikely, but possible. Another issue is that call reports do not include enough data to determine how rates are tied to the various maturities along the yield curve, so RiskGPS takes the most adverse possibility for these relationships. That means that liabilities price off the short end of the curve and the assets at the extreme long term. While no bank may experience that exact mismatch, that can be used as a stress test. *The purpose of running these non-parallel scenarios is to determine the impact of an extreme rate shock, to make sure the bank can survive those extreme situations.*

So then, for the “long-term flat, short-term rising” scenario, asset yields stay at the zero shock level, or in other words as if rates didn’t change at all, but all the liabilities are re-priced as if market rates increased by 200 basis points.

1. **Short-Term Flat / Long-Term Falling**

In this scenario, asset yields decline as if rates dropped by 200 basis points, but liability yields don’t drop at all. **Analysis Results**

* Base case net interest income is the net interest income shown under the “Current” column of the flat rate scenario on the one year parallel rate shock analysis on page 15a.
* The next line down in the report, Net Interest Income, will always be lower than Flat Net Interest Income for both non-parallel scenarios. The question is – can the bank survive the extreme impact of these scenarios.
* “Dollars at Risk” shows the dollar difference in net interest income from the flat parallel rate shock analysis. Keep in mind that, like all static rate analysis, these amounts are based upon a frozen balance sheet. If the bank expects growth, a dynamic simulation will show less of a loss because the bank would benefit from the margin on the additional assets. A more detailed breakdown of balance sheet pricing over the full range of the yield curve would also show a smaller loss than the way this is calculated.
* The percentage change from the base case is useful for understanding the severity of the scenario impact. In addition, many banks have policy limits setting a maximum change in net interest income caused by non-parallel scenarios. Oftentimes, that limit is a more liberal limit -or may be equal to the limit on the extreme positive and negative parallel shocks.

**Risk-Adjusted Earnings and Dividends**

This section evaluates whether the bank’s capital remains sufficient under worst-case non-parallel scenarios. When looking at a calculation that shows the change in capital by deducting net overhead and dividends from the worst-case analysis of net income, we arrive at the worst-case adjustment to equity. If that number is positive, capital will increase even under this extreme scenario. But if the adjustment is a negative number, there will be some decline in the bank’s capital position. The question is whether the bank has enough surplus capital to absorb the loss and still maintain adequate capital protection. The last line in the section shows the dollar amount of equity at the end of the worst-case simulation, as well as the ratio of that equity to total assets. This ratio is very helpful because it can be compared against any standards you have in your capital policy minimum tier one equity. While not an identical calculation, it is similar.

**Risk to Current Equity – Worst Case**

This section compares the worst case equity just calculated to the bank’s actual equity at the end of the most recent quarter.

**Risk to Minimum Equity – Worst Case**

This section compares the equity position from the simulation to the equity percentage of assets specified in the RiskGPS Risk Tolerance section. If the bank does not enter a minimum equity assumption, RiskGPS defaults to a 7% capital standard. If the last line is positive, the means the bank has a “cushion” to absorb additional risk and still stay above their minimum capital ratio. If the result is negative, the bank has a shortfall. If the shortfall is significant, management and the board should develop a plan to deal with this contingency, which means either figuring out a way to improve performance under this scenario or to have some additional capital to absorb this risk.

**Conclusion**

RiskGPS offers a comprehensive suite of tools to simulate and analyze Net Interest Margin and capital adequacy across a range of realistic and adverse interest rate scenarios. These tools help institutions:

* Meet regulatory expectations.
* Establish effective risk limits.
* Make informed ALCO and board-level decisions.