



WHITE PAPER

Managing Risk in a Dynamic Rate Environment

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Executive Summary

Interest rates are fundamental to the business of banking. Rapid changes in rates can place stress on a financial institution's (FI) net interest income and other sources of revenue, while lowering the total value of its assets and liabilities. Without having prudent risk management strategies in place, such changes can have significant impact on an FI's financial safety and soundness.

With the current rising rate environment and recent banking turmoil, FIs are at risk of being significantly impacted. In addition to monitoring risk profiles, profits and capital levels, it is important now more than ever for FIs to understand their interest rate risk exposure, as well as the appropriateness and efficacy of their interest rate risk management process. By monitoring the industry's and their own balance sheet and income statement trends, FIs can gain visibility into their levels of interest rate risk exposure and establish sound asset-liability management strategies to mitigate such risk.

In this white paper, we examine the impacts of changes in the interest rate environment and offer some recommendations for how banks can maintain

net interest margin (NIM) by utilizing asset-liability management (ALM) techniques and understanding developments in the banking industry.

STRATEGIES PRESENTED INCLUDE:

1. **Understanding and Identifying Interest Rate Exposure**
2. **Evaluating Interest Rate Risk**
3. **Identifying the Causes for Interest Rate Risk within Portfolio**
4. **Measuring Interest Rate Risk**
5. **Applying Interest Rate Risk Learnings to Portfolio Strategy**

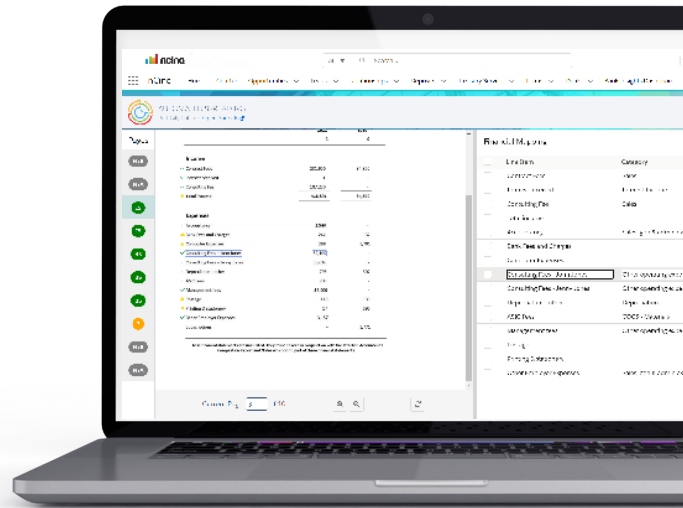
By employing one or more of these strategies, FIs can refine their current risk management processes to more effectively identify and manage interest rate risk.



Introduction: A Macroeconomic View

From the 2008-09 Great Recession through the onset of the pandemic in 2020, the U.S. enjoyed one of the longest periods of low interest rates in its history. However, tectonic shifts in the macroeconomic environment from COVID-induced supply chain issues, the war in Ukraine and a tight labor market marked by low unemployment have led to rapidly rising inflation, as marked by the highest rates of growth in the Consumer Price Index seen in four decades. Using monetary policy as a tool to curb inflation, the Federal Reserve began raising its benchmark Federal Funds Rate at the FOMC meeting on March 16, 2022, and continued to implement rate hikes through March 2023, currently at 5%, the highest level since 2007.

Historically, the short-term impact of rate hikes has been a leading indicator of an approaching recession. Amid a rising rate environment, it is imperative for financial institutions to monitor their own—as well as the industry’s— balance sheet and income statement movements to determine the industry’s overall interest rate risk exposure and management.



Understanding Interest Rate Risk in Today’s Environment: What History Has Shown Us

Historical perspective is an important tool for assessing present risk. Although the current Federal Funds Rate hike cycle can feel painful, it is important to note that the long-term trend has been a steady decline in the rate since the early 1980s (see Exhibit 1). Similarly, the 10-year Treasury bond rate peaked at over 15% in September 1981, and then fell steadily over time to a low of 0.57% in August 2020 (Exhibit 2).

EXHIBIT 1

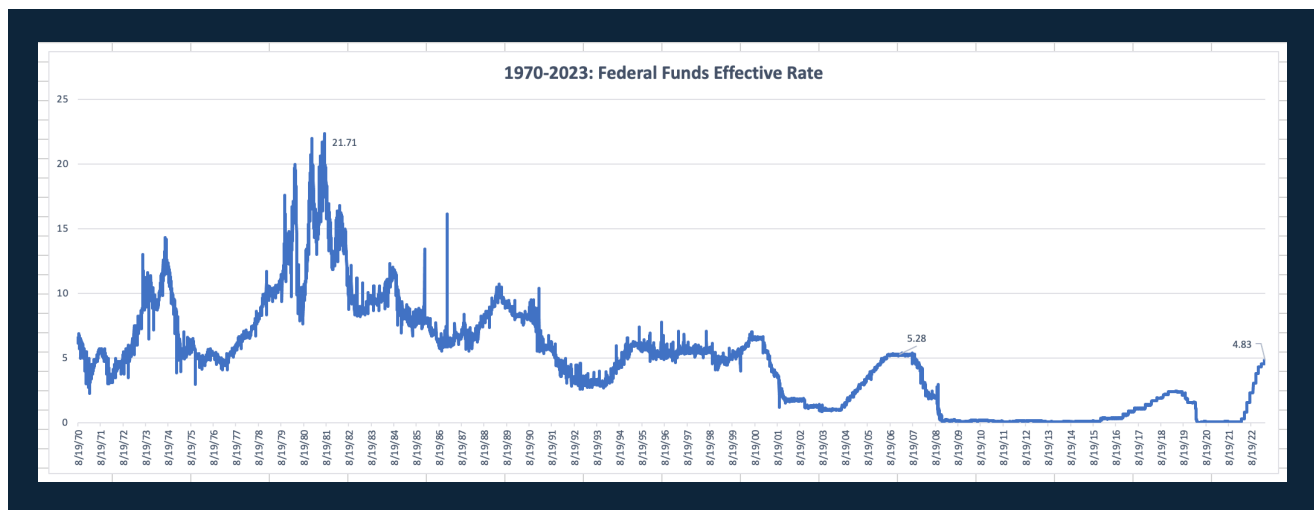


EXHIBIT 2



The impact of the 2022 rate hike cycle, which pushed the Federal Reserve Fund Rate to 475-500 bps, is already evident across the industry with 10-year Treasury peaking at 4% in the past 3 months and yield curves in negative since July 2022. As of March 24, the yield curve is -38 bps, resulting in an inverted yield curve. Looking forward, many market participants expect the Fed to put a temporary pause on rates with many expecting rates to fall toward the end of next year, per the CME FedWatch Tool. Over the past 40 years, a negative yield curve has anticipated each recessionary period (Exhibit 3).

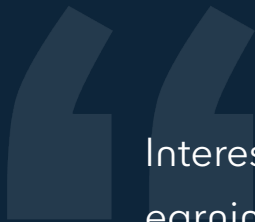
EXHIBIT 3



Understanding Interest Rate Risk in Today's Environment

Rapid changes in interest rates have significant impacts across the financial services industry. These rate changes can cause an institution's net interest income and other rate-sensitive income sources to decline, impacting the income statement and reducing the underlying value of its assets and liabilities. To prepare for inflections in the interest rate environment, FIs must clearly understand their interest rate risk, which is defined as the exposure a bank's current or future earnings and capital have to adverse changes in market rates.

In the recent release, "Recent Bank Failures and the Federal Regulatory Response," the FDIC noted that short-term interest rates increases, combined with longer asset maturities, may continue to increase unrealized losses on securities and affect bank balance sheets in coming quarters.



Interest rate risk is the exposure of an FI's current or future earnings and capital to adverse changes in market rates. This risk is a normal part of banking and can be an important source of profitability and shareholder value; however, excessive interest rate risk can threaten banks' earnings, capital, liquidity and solvency. Therefore, it is important to effectively identify, measure, monitor and control interest rate risk exposure through effective policies and risk management processes.

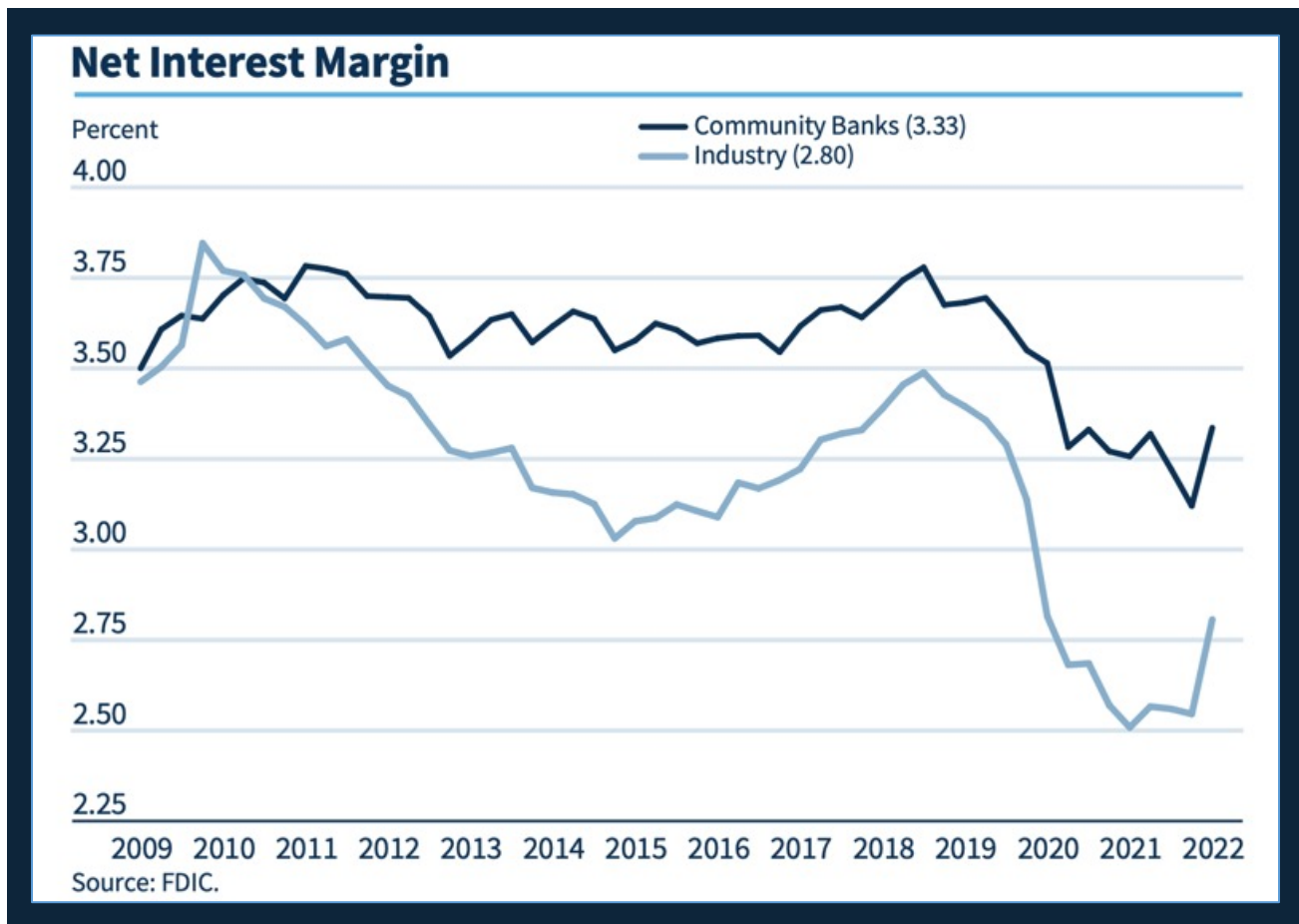
- FDIC

The Impact of a Rising Rate Environment

A rising rate environment, along with a continuous negative of the yield curve, creates the possibility of increased interest rate risk. A negative yield curve on its own places pressure on a financial institution’s margins, but rising rates add another layer of difficulty for institutions – especially those with a “liability-sensitive” balance sheet, meaning their liabilities reprice (or mature) more quickly than their assets. The magnitude of this imbalance between asset and liability repricing is a critical factor in determining an institution’s interest rate risk exposure.

The 2022 rate hike cycle has been a bit different. Today’s financial institutions face much higher interest rate repricing risk, as they have accumulated a lot of fixed-rate assets along with a healthy growth in deposits due to the government’s pandemic stimulus programs. These deposits tend to be highly risk-sensitive both to rates and inflation, as inflationary pressures have incited both retail and commercial customers to seek out higher deposit rates as a hedge against rising prices. In addition, the rise in fintechs and online banks that offer above-market deposit rates has introduced new competition for customers.

EXHIBIT 5: Net Interest Margin Comparison Between Community Banks and Industry³

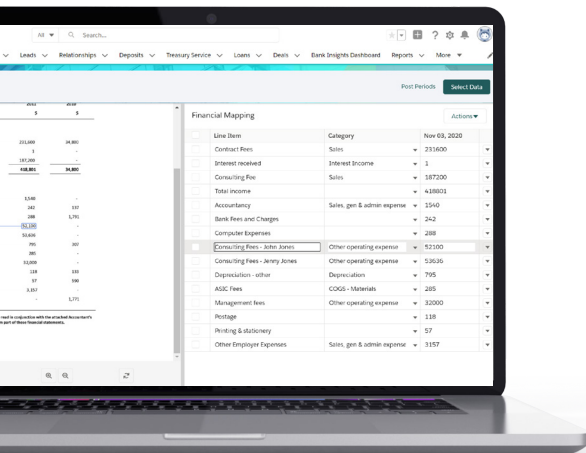


Understanding Interest Rate Risk Within the FI

Interest rate risk is a product of multiple macroeconomic and market factors, including:

- **Repricing Risk:** Repricing risk is the risk of an FI's assets and liabilities repricing at different times, which may negatively affect the institution's financial position by impacting their earnings and capital at risk. For instance, an FI may use non-maturity deposits to support long-term fixed-rate securities. If deposit rates rise, greater funding costs will likely lower fixed-rate securities' net yields.
- **Basis Risk:** Basis risk arises when the indices or market rates used by FIs to price assets and liabilities do not change in perfect or predictable correlation. An example could be if the deposit rates change by 50 bps while prime-based loan rates may only change by 25 bps in the same period.
- **Yield Curve Risk:** Yield curve risk indicates the risk of unanticipated changes in the yield curve's shape or slope and arises when assets and funding sources are tied to similar indices with varying maturities. The changes happen when the shape of the yield curve for a given market flattens, steepens or becomes inverted or negatively sloped during an interest rate change.

- **Option Risk:** Option risk stems from changes in cash flow of a financial instrument when the option holder is motivated to exercise their option by changes in market rates. For instance, a mortgage holder may elect to refinance or prepay a loan in a falling interest rate environment, which will reduce an FI's income.
- **Price Risk:** Price risk is the risk that the fair value of financial instruments will change when interest rates change. Generally, long-term assets have more price risk than short-term assets because as cash flows become more distant, the present value or price of the investment declines. When market interest rates rise, the market value of an FI's assets will typically decrease; when market interest rates decline, the market value of the FI's assets will typically increase.



Financial Products Affected by Interest Rate Risk

Per the Basel Committee on Banking Supervision's (BCBS) Interest Rate Risk in Banking Book (IRRBB) requirements, an FI should make judgements and assumptions about how a financial product's repricing, or real maturity behavior, may differ from the instrument's contractual terms due to interest rate fluctuations. Common products that may exhibit such behavior include:

- Fixed rate loans subject to prepayment and refinancing risk:** Financial Institutions should understand the nature of prepayment and refinancing risk in their portfolios and forecast prospective prepayments in a reasonable and cautious manner. Prepayment penalties or other contractual characteristics that alter the embedded optionality effect should be recorded, as should the assumptions that underpin the calculations. The FI's estimation of the effect of each interest rate shock and stress scenario on the average prepayment speed is influenced by several factors. Under each circumstance, an FI must analyze the projected average prepayment pace.
- Fixed rate loan commitments:** With a rising rate environment, fixed rate loans, especially when locked in for long-term, take a hit as funding costs run parallel to the market while interest income remains constant. FIs may market options to retail customers (such as prospective mortgage purchasers or renewers) that allow them to draw down a loan at a fixed rate for a limited time. Unlike corporate loan commitments, where drawdowns are heavily influenced by automated interest rate options, mortgage commitments (i.e., pipelines) to retail clients are influenced by various factors.
- Term deposits subject to early redemption risk:** Financial institutions may entice depositors with a contractual maturity term or step-up clauses that allow the depositor to adjust the speed of redemption at different time periods. Whether a term deposit is judged to be subject to redemption penalties or other contractual elements that preserve the financial instrument's cash flow profile, the categorization scheme should be documented.
- Non-Maturity Deposits (NMD):** FIs should document, track and update key assumptions for NMD balances and behavior in their Institutional Management System (IMS) on a regular basis. An institution should examine its depositor base to ascertain the proportion of core deposits before determining the right assumptions for its NMDs (i.e., NMDs which are unlikely to reprice even under significant changes in interest rate environment). Depositor characteristics (e.g., retail/wholesale) and account characteristics (e.g., transactional/non-transactional) should influence assumptions.



Recognizing Interest Rate Risk on the Balance Sheet

For institutions to effectively monitor and address potential interest rate risk in their portfolio, they must consider both the asset and liability sides of the balance sheet. Here are some considerations for recognizing such risk:

1. Understanding Asset Side Risk:

As a general rule, a rising rate environment will negatively impact the earnings and capital of a liability-sensitive organization. In comparison with institutions that have a shorter-term liability structure, a liability-sensitive FI has a long-term asset maturity and repricing structure. As rates rise, a liability-sensitive institution's NIM will deteriorate if its cost of funds rises faster than the yield on its assets (all other circumstances being equal). An FI's liability sensitivity may increase as its proportion of long-term assets rises.

To mitigate such increasing risk from the asset side, it's important for institutions to regularly monitor the mix of asset types in their portfolio, with a particular focus on the duration of fixed-rate assets. During periods of rapidly rising interest rates, an overweighting of longer-duration, fixed rate assets (such as commercial real estate loans and residential mortgages held on the books) can result in a mismatch with liability-side duration, particularly for liability-sensitive organizations.

2. Understanding Liability Side Risk

Whereas a maturity or repricing mismatch on the asset side of the balance sheet can potentially increase interest rate risk, institutions should not ignore the liability side of the equation. FIs that rely primarily on short-term and rate-sensitive borrowing sources are considered liability-sensitive and may see their funding costs climb significantly when interest rates rise. In these cases, increased asset yields may not be sufficient to compensate for higher funding costs.



Liability management begins with addressing the mix of primary and non-primary deposits in the portfolio. primary and non-primary deposits are most commonly defined as:

- **Primary Deposits:** This term refers to those balances held by customers who maintain their primary transactional (i.e., checking) accounts with the FI.
- **Non-Primary Deposits:** Non-core deposits are highly rate-sensitive and typically have a much shorter average term compared to core deposits. The customers in this category typically hunt for the best rates and are most likely to switch FIs due to market fluctuations.

Many FIs focus on converting non-primary deposit customers into primary deposit customers by offering them promotional rates on deposit accounts such as CDs, MMs or savings when they satisfy the conditions of the offer (e.g., maintain a minimum monthly balance in a primary checking account, have a defined dollar amount direct deposited into the account each month or complete a stated number of transactions using the debit card associated with the account each month).



Methods for Managing Interest Rate Risk

To detect, measure, monitor and regulate interest rate risk, an FI can employ a variety of methods and measurements depending on the size, risk level and complexity of the institution. Regardless of the methods used, an FI's interest rate risk measurement system should be sufficient to capture all material balance sheet items and to quantify exposures to both earnings and capital. The most common methods for measuring interest rate risk are:

- **Gap Analysis:** A gap analysis helps identify maturity and repricing mismatches among assets, liabilities and off-balance sheet instruments by separating rate-sensitive assets (RSA), rate-sensitive liabilities (RSL) and off-balance sheet instruments, and then adding up the repricing mismatches over specified time horizons. However, gap analysis has various flaws and is generally not sufficient as an FI's only interest rate risk measurement tool. Gap analysis can be used as a first step in finding interest rate risk exposures and as a check for the accuracy of more advanced types of interest rate risk measurement, especially in less complicated institutions with basic balance sheets.
- **Duration Analysis:** Duration analysis determines how much a slight shift in interest rates can affect the economic value of a financial instrument or position. It considers the magnitude and timing of cash flows that occur prior to the instrument's contractual maturity. A variety of duration analysis strategies exist, including Macaulay Duration, Modified Duration and Effective Duration. Duration Analysis may only accurately measure for small interest changes, and therefore institutions may have to frequently update duration measures during highly volatile interest rate periods.

- **Earnings Simulation Analysis:** Earnings simulation models (such as pro-forma income statements and balance sheets) estimate the effect of interest rate changes on net interest income, net income and capital for a range of scenarios and exposures. Simulations can be run for any length of time and are frequently used to examine different horizons in order to identify short-, intermediate- and long-term threats. Institutions can run static or dynamic simulations. However, these simulations are highly dependent on key variables and assumptions that are difficult to project with accuracy over an extended period.
- **Economic Value of Equity (EVE):** Despite their benefits, both static and dynamic earnings simulations have limitations in quantifying interest rate risk exposure. Economic value methodologies attempt to estimate the changes in an FI's economic value of capital caused by changes in interest rates. In contrast to gap models and earnings simulations, which often examine shorter-term balance sheet and earnings predictions, an economic valuation approach measures all expected changes to the balance sheet and earnings. Short-term measures can be supplemented by economic value approaches. However, with the EVE approach, cash flows can be difficult to assess accurately because EVE forecasts the future cash flows of the FI's financial instruments. This is particularly true for non-maturity deposits, which have inherently variable cash flows and durations. As a result, determining the worth of these accounts can be challenging and necessitates the employment of many assumptions.

Earnings simulation and EVE models, despite their various approaches, often produce a consistent perspective of interest rate risk trends. However, the two procedures may produce different results. Earnings simulation models often produce short-term outcomes, whereas EVE models produce a much longer-term risk profile. These divergent outcomes can result from a variety of factors, such as the structure of the balance sheet, including the FI's derivative positions and off-balance sheet items, the interest rate environment, the timing of asset/liability mismatches, the sensitivity of funding sources to interest rate changes and the volume of fixed- or floating-rate assets. Management should ensure that the models employed capture all significant risk factors because there are various variations of each model type available.



Conclusions

The onset of a rising interest rate environment and current trends in aggregate FI balance sheet and income statement data indicate the growing presence of interest rate risk. Because of many FIs' dependence on using low-cost deposits to fund long-term loans, rising rates and a negative yield curve could put pressure on their NIMs. This is especially true for institutions exposed to more volatile and rate-sensitive non-core deposit funding sources, with degrees of sensitivity not completely captured by current risk models. For these reasons, it is increasingly important for FIs to consider the following: first, FIs should fully understand their interest rate risk and analyze the rate sensitivity of the deposit balances presently on their books. Second, to ensure an appropriate and effective interest rate risk management strategy, FIs should continually monitor and analyze a broad range of assumptions. While Earnings Simulation Models and Earnings Simulation Analysis provide consistent views across interest rate risk trends, they may differ in outcomes. Lastly, FIs should ensure they have a comprehensive interest rate risk management process that captures all the data required to address the risk factors associated with their chosen models.



One important component of an institution's comprehensive risk management program is the ability to adjust loan pricing in real time to meet the needs of borrowers. Pricing with confidence, especially during a volatile rate environment, can help institutions maximize profitability based on the unique policies and financial targets. Institutions can partner with technology providers like nCino to support their pricing and risk management through an on-platform feature like Pricing and Profitability, which empowers the institution with an integrated feature to intelligently deliver optimized pricing. With this feature, FIs also benefit from a transparent, multi-factor understanding of the impact their risk profiles have on profitability in the context of a fast-changing rate environment.

When combined with robust enterprise risk and credit committee oversight, Pricing and Profitability serves as a powerful tool for managing interest rate risk within even the most challenging and volatile economic environments.



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Rohit Vashistha is a Principal Product Manager at nCino. He focuses on helping nCino customers build and implement pricing and profitability strategies across commercial loans, deposits and other financial products. Rohit has an MBA in Finance from Washington University in St. Louis and BE in Computer Science from Delhi University. Before nCino, he was leading deposits pricing at Santander Bank and regulatory reporting at Natwest Group.



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Colin Fernandes is Director of Product Management at nCino, and is currently focused on building and enhancing nCino's Commercial Pricing & Profitability Solution. He has nearly three decades experience in financial services, most recently at Fifth Third Bank where he was responsible for overall credit strategies and initiatives for wholesale banking, including portfolio management, risk appetite, single name risk, and sectors concentration limit management. He has advanced degrees in Mathematics from the University of Kansas and Kansas State.

Appendix

Exhibits

Exhibit 1: 10-Year Treasury Rate -40 Year Historical Chart <https://www.macrotrends.net/2016/10-year-treasury-bond-rate-yield-chart>

Exhibit 2: Atlanta Fed Market Probability Tracker <https://www.atlantafed.org/cenfis/market-probability-tracker>

Exhibit 3: Net Interest Margin Comparison Between Community Banks and Industry <https://www.fdic.gov/>

Exhibit 4: Assets with remaining term more than 5 years as a percentage of Total Assets Grouped by Asset Size <https://www.fdic.gov/>

Exhibit 5: Commercial Real Estate Loans As A Percentage of Total Assets Grouped by Asset Size <https://www.fdic.gov/>

Exhibit 6: 13 Year Historical Cost of Funds Grouped by Asset Size <https://www.fdic.gov/>

Other Sources

FDIC: Sensitivity To Market Risk <https://www.fdic.gov/regulations/safety/manual/section7-1.pdf>

NCUA Examiner's Guide: Interest Rate Risk https://publishedguides.ncua.gov/examiner/Content/ExaminersGuide/IRR/MethodsProcesses/Measure_Methods_Processes.htm

FDIC: Recent Bank Failures and the Federal Regulatory Response <https://www.fdic.gov/news/speeches/2023/spmar2723.pdf>