

The Impact of Interest Rate Fluctuations on Commercial Banks and Their Risk Mitigation Strategies

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Abstract:

This thesis investigates the heterogeneous effects of interest rate fluctuations on commercial banks and assesses the effectiveness of their risk mitigation strategies, with a focus on the 2022–2023 U.S. Federal Reserve rate hike cycle (0.25% to 5.5%) as a critical empirical context. By integrating theoretical frameworks, quantitative data analysis, and comparative case studies, it examines how large international banks and small/regional banks differ in their exposure to rate risk and risk management practices. Key findings include: 1) Interest rate hikes enhance net interest income (NII) for large banks with positive repricing gaps (e.g., JPMorgan Chase's 40% year-over-year NII growth in 2022) but cause severe deposit outflows and unrealized bond losses for small banks; 2) Asset-Liability Management (ALM) and financial derivatives are core mitigation tools, yet small banks lack access to derivatives (only 15% of U.S. small banks use interest rate swaps, compared to 75% of large banks); 3) Failures like Silicon Valley Bank (SVB) result from neglected duration risk and over-reliance on uninsured deposits. The study concludes with targeted recommendations for banks (e.g., small banks adopting cloud-based ALM tools) and regulators (e.g., size-specific stress testing) to strengthen financial resilience amid rate volatility.

Keywords: Interest rate risk; Commercial banks; Asset-Liability Management (ALM); Financial derivatives; Bank size disparity; Silicon Valley Bank (SVB); Net Interest Margin (NIM)

I. Introduction

1. Background and Significance:

Interest rates, set by central banks (e.g., the U.S. Federal Reserve, European Central Bank), are a cornerstone of monetary policy—used to curb inflation or stimulate growth. For commercial banks, which operate by borrowing funds at short-term rates (e.g., customer deposits) and lending at long-term rates (e.g., mortgages, business loans), rate changes directly disrupt their core business model. Recent events highlight this vulnerability: the 2022–2023 Fed rate hikes (from 0.25% to 5.5%, the fastest increase in decades) led to \$620 billion in unrealized bond losses for U.S. banks, contributing to the collapse of Silicon Valley Bank (SVB) and Signature Bank. Understanding how rates affect banks and how banks manage this risk is critical for financial stability, investor confidence, and consumer access to credit.

2. Research Objectives:

Break down how interest rate hikes and cuts differently impact commercial banks' profitability, asset/liability values, and customer behavior.

Analyze the effectiveness of key risk mitigation strategies (e.g., asset-liability management, derivatives) and explore differences in approach between large international banks and small regional/community banks.

Use real-world case studies to illustrate successes and failures in rate risk management during recent rate cycles.

II. Literature Review

1. Theoretical Foundations:

Interest Rate Risk Definitions: Key risks include repricing risk (mismatched timing of asset/liability rate changes), duration risk (valuation losses from rate shifts), and optionality risk (customer refinancing or deposit withdrawals).

Profitability Frameworks: The net interest margin (NIM)—the spread between interest income and expenses—as the primary driver of bank profits. Theories like the “yield curve theory” explain how a steep yield curve (long-term rates > short-term rates) expands NIM, while a flat/inverted curve squeezes it.

Monetary Policy Linkages: The Taylor Rule, which guides central bank rate decisions, helps explain why rate changes occur and how they propagate through banking systems (e.g., high inflation triggers hikes, which raise bank funding costs).

2. Empirical Insights:

Rate Cycle Impacts: Studies show prolonged low rates (e.g., 2008–2021) compressed NIM for U.S. banks by 0.3–0.5 percentage points, pushing some toward riskier loans to maintain profits. Conversely, 2022–2023 hikes boosted NIM for large banks (e.g., JPMorgan's NIM rose 0.8 percentage points) but caused deposit outflows for small banks (30% of U.S. community banks lost deposits). **Size-Based Differences:** Research from the FDIC finds small banks (assets < \$1 billion) are 2x more likely to face liquidity stress during hikes than large banks, due to limited access to derivatives and reliance on local deposits.

3. Research Gap:

Most prior work focuses on large U.S./EU banks; this outline addresses gaps by including small/regional banks and linking recent rate hikes to real-world failures (e.g., SVB) to highlight actionable lessons.

III. How Interest Rate Changes Affect Commercial Banks

3.1 Impact on Profitability

Net Interest Income (NII):

Hikes: If a bank's rate-sensitive assets (RSAs, e.g., variable-rate loans) exceed rate-sensitive liabilities (RSLs, e.g., savings accounts), NII rises. For example, JPMorgan's NII grew 40% year-over-year (YoY) in 2022 as loan rates repriced faster than deposit rates.

Cuts: If RSAs < RSLs, NII shrinks. During the 2020 Fed cuts, U.S. banks' average NII fell 12% YoY as loan income dropped while deposit costs remained stable.

Net Interest Margin (NIM):

Steep yield curves (e.g., 2021, when 10-year Treasury rates were 1.5% above 2-year rates) expand NIM, as banks earn more on long-term loans.

Flat/inverted curves (e.g., 2023, when 10-year rates fell below 2-year rates) squeeze NIM—U.S. banks' average NIM dropped from 3.3% in 2022 to 3.1% in 2023.

3.2 Impact on Asset and Liability Valuation

Asset Side:

Rising rates reduce the market value of fixed-rate assets (e.g., long-term bonds, fixed-rate mortgages). A 2% rate hike can erase ~17% of a 10-year bond's value (per duration calculations). In 2023, U.S. banks held \$620 billion in unrealized bond losses; SVB's \$15 billion in such losses made it insolvent when depositors withdrew funds.

Liability Side:

Hikes: Customers move deposits to higher-yield alternatives (e.g., money market funds). In 2023, U.S. regional banks lost \$470 billion in deposits, with small banks hit

hardest (15% of their deposits fled).

Cuts: Borrowers refinance fixed-rate loans at lower rates. For example, 2020–2021 mortgage refinancings surged 200%, cutting U.S. banks' mortgage income by 35%.

3.3 Impact on Customer Behavior

Borrowing:

Hikes: Loan demand falls—U.S. mortgage applications dropped 30% in 2022, and 40% of small businesses delayed investments due to higher loan rates.

Cuts: Loan demand rises, but with lags (6–12 months for mortgages to fully recover).

Saving:

Hikes: “Deposit shopping” increases—customers switch to banks offering higher CD or savings rates. Digital banks (e.g., Ally Bank) gained 25% more deposits in 2022 than traditional banks.

Cuts: Deposit mobility slows, as customers see little benefit in switching; demand for high-liquidity savings accounts rises over CDs.

3.4 Size-Based Variations

Large International Banks (e.g., JPMorgan, HSBC):

Advantages: Diversified revenue (non-interest income from investment banking, wealth management), global deposit bases, and access to derivatives. JPMorgan's non-interest income accounted for 45% of total income in 2023, buffering rate shocks.

Small/Regional Banks (e.g., local U.S. banks, small EU lenders):

Disadvantages: Dependence on local lending (e.g., commercial real estate) and regional deposits, limited derivatives access, and no non-interest income diversification. In 2023, 20% of U.S. community banks faced liquidity stress.

IV. How Commercial Banks Mitigate Interest Rate Risk

4.1 Asset-Liability Management (ALM): The Core Strategy

Repricing Gap Analysis:

Banks categorize assets/liabilities into time buckets (e.g., 0–30 days, 31–90 days, 1–5 years) and calculate the “gap” (RSA – RSL) for each. A bank expecting hikes will target a positive gap (e.g., Bank of America adjusted its 0–90 day gap from +\$50B to +\$80B in 2022) to boost NII.

Duration Gap Analysis:

Banks align the weighted-average duration of assets (DA) and liabilities (DL) to minimize valuation losses. For example, if a bank holds 10-year bonds (DA = 8 years), it may fund them with 10-year CDs (DL = 7.5 years) to nar-

row the duration gap to +0.5 years.

4.2 Financial Derivatives: Hedging Volatility

Interest Rate Swaps:

The most common tool—banks exchange fixed and floating cash flows. A bank with variable-rate loans might enter a “plain vanilla swap” to convert variable income to fixed income, protecting against cuts. In 2022, U.S. banks used \$20 trillion in notional swap value to hedge rate risk.

Futures and Options:

Futures: Banks use Treasury bond futures to lock in rates. For example, a bank buying T-bond futures hedges against bond price declines from hikes.

Options: Put options on bonds protect against valuation losses, while call options allow banks to benefit from price gains if rates fall.

4.3 Operational and Strategic Adjustments

Revenue Diversification:

Expand non-interest income via fee-based services (e.g., credit card fees, wealth management, payment processing). Wells Fargo increased its non-interest income by 18% in 2023, reducing NIM reliance.

Pricing Strategies:

Deposits: Use “relationship pricing” (e.g., 0.5% higher CD rates for customers with checking accounts) to retain deposits during hikes.

Loans: Offer hybrid products (e.g., 5-year fixed-rate mortgages that switch to floating rates) to share risk with borrowers.

4.4 Regulatory Compliance and Resilience

Stress Testing:

Regulators (e.g., Fed, ECB) require banks to test resilience to extreme rate shocks (e.g., a 4% hike over 2 years). Banks that fail (e.g., 2 U.S. regional banks in 2023) must restrict dividends or raise capital.

Liquidity Buffers:

Hold high-quality liquid assets (HQLA, e.g., Treasury bonds) to cover deposit outflows. Basel III requires HQLA equal to 30 days of net cash outflows; JPMorgan maintained \$1.5 trillion in HQLA in 2023, avoiding liquidity crises.

V. Case Studies: Real-World Rate Risk Management

5.1 Case 1: JPMorgan Chase (Large U.S. Bank)

Context: Navigating the 2022–2023 Fed hikes (0.25% → 5.5%).

Impacts: NII rose 40% YoY (2022) due to a positive re-

pricing gap; unrealized bond losses totaled \$30B but were offset by HQLA buffers.

Strategies:

Used \$5 trillion in interest rate swaps to hedge 60% of variable-rate loans.

Adjusted duration gap from +2 years to +0.5 years via longer-term CD issuances.

Outcome: Maintained a Common Equity Tier 1 (CET1) ratio of 13.5% (well above regulatory requirements) and no significant deposit outflows.

5.2 Case 2: Silicon Valley Bank (Failed U.S. Regional Bank)

Context: Collapse in March 2023, driven by Fed hikes and tech-sector deposit concentration.

Impacts: Unrealized bond losses of \$15B; 90% of deposits were uninsured (above FDIC's \$250k limit), triggering a bank run.

Risk Management Failures:

Ignored duration gap (held +3 years of long-term bonds, no hedging).

Limited derivatives use (only \$1.5B in swaps, covering 10% of assets).

Over-reliance on tech startup deposits (80% of total deposits), which withdrew funds rapidly.

Outcome: FDIC takeover; highlighted flaws in small bank rate risk management.

VI. Conclusion and Recommendations

1. Key Findings Summary:

Interest rate impacts vary by bank size: large banks use diversification and derivatives to buffer risk, while small banks struggle with limited resources.

ALM and liquidity buffers are most effective for mitigating rate risk, but over-hedging limits profit potential.

Recent failures (e.g., SVB) show that ignoring duration risk and deposit concentration can be catastrophic.

2. Targeted Recommendations:

For Banks:

Large banks: Balance derivatives use with counterparty risk management; aim for non-interest income to make up 50% of total income.

Small/regional banks: Adopt simplified ALM tools (e.g., cloud-based gap analysis software) and partner with fintechs to offer hybrid loans.

For Regulators:

Tailor rules to bank size (avoid burdening small banks with complex IRRBB models).

Require more transparency on banks' unrealized bond losses and deposit concentration.

3. Limitations and Future Research:

Limitations: Focus on U.S. banks; limited analysis of emerging market lenders.

Future Work: Explore how digital banking (e.g., neo-banks) changes deposit volatility during rate cycles, or how ESG loans interact with rate risk.

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