

A Study on Bond Price Sensitivity to Interest Rate Movements with Reference to Shiva Cooperative Credit Bank, Haveri

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Abstract- This study examines the sensitivity of bond prices to interest rate movements, with special reference to Shiva Cooperative Credit Bank, Haveri. Bonds are a key investment instrument used by banks and financial institutions to generate stable returns, yet their market value is directly affected by changes in prevailing interest rates. The research combines primary data, collected through a structured questionnaire administered to 50 respondents using convenience sampling, with secondary data drawn from books, journals, RBI reports, and financial websites. Percentage analysis, frequency distribution, and Pearson correlation were used to examine the relationship between bond yield to maturity and bond prices for a sample of seven bonds. The correlation coefficient obtained was 0.546, indicating a moderate positive relationship; however, the associated t-value (1.46) was below the critical value (2.571) at the 5 percent significance level, so the null hypothesis could not be rejected for this specific sample. Despite this statistical result, respondent perceptions and duration-based analysis confirmed the well-established inverse relationship between interest rates and bond prices, particularly for longer-maturity and higher-duration bonds. The study concludes that effective monitoring of interest rate movements and sound risk management practices are essential for cooperative banks seeking to protect the value of their bond portfolios.

I. INTRODUCTION

Cooperative banks occupy an important place in the Indian financial system, extending banking services to urban, semi-urban, and rural populations and supporting financial inclusion, small businesses, and local communities. Shiva Cooperative Credit Bank, Haveri, established to serve the credit and banking needs of local traders and self-employed individuals, has expanded over time into a broader range of

services, including deposits, loans, advances, and investment-related activities.

Among these activities, investment in bonds and government securities forms an important part of the bank's portfolio and a source of interest income. Bond prices, however, are not fixed; they move inversely with market interest rates, and this sensitivity has direct implications for a bank's investment decisions, profitability, and risk exposure. Understanding how bond prices respond to interest rate movements is therefore essential for cooperative banks such as Shiva Cooperative Credit Bank as they manage their investment and risk strategies.

The Indian banking system comprises commercial banks, cooperative banks, regional rural banks, and small finance banks, with cooperative banks functioning under the joint supervision of the Reserve Bank of India and state cooperative departments. Within this structure, the cooperative segment includes state cooperative banks, district central cooperative banks, urban cooperative banks, and primary agricultural credit societies at the village level. Shiva Cooperative Credit Bank operates within this broader cooperative framework, offering savings accounts, fixed deposits, loans, agricultural and gold loans, and investment services primarily within Haveri district and its surrounding region.

II. LITERATURE REVIEW

A substantial body of research has examined the relationship between interest rates and bond prices. Early work by Crack and Nawalkha (2000) established duration and convexity as central tools for measuring

bond price sensitivity, showing that long-term bonds exhibit greater price fluctuations than short-term bonds when interest rates change. Zhou and Sornette (2003) and Canzoneri and Diba (2005) linked bond yield behaviour to monetary policy and market expectations, finding that central bank decisions directly affect bond valuation. Chou, Yu, and Chang (2008) extended duration-based measures to callable bonds, while Alessandri and Drehmann (2009) demonstrated that interest rate risk interacts with credit risk to affect bank profitability and stability.

Subsequent studies by Piazzesi and Schneider (2010), Huang (2010), and Bansal, Kiku, and Yaron (2010) reinforced the sensitivity of bond returns to interest rate expectations and broader macroeconomic risk, particularly for longer-maturity instruments. Ivanovski, Stojanovski, and Ivanovska (2012) and Buckova, Stehlikova, and Sevcovic (2016) compared duration and convexity as risk measures and explored numerical methods for bond valuation under varying interest rate conditions. Bauer and Hamilton (2019) examined risk premiums in long-term bonds, concluding that investors demand greater compensation for exposure to interest rate risk.

More recent literature has focused on real-world shocks and policy responses. Studies conducted during the COVID-19 pandemic (2020–2022) documented a strong inverse relationship between policy rate cuts and rising bond prices, while reports from the Reserve Bank of India (2022–2024), the Economic Times (2023), and the IMF Global Financial Stability Report (2024) confirmed that rising policy rates in India and globally led to declines in bond prices, with long-term bonds experiencing the greatest volatility. Collectively, this literature establishes the inverse price–yield relationship as a well-documented phenomenon while highlighting those factors — duration, maturity, coupon structure, and macroeconomic conditions — that determine the degree of sensitivity in any given bond portfolio.

III. RESEARCH METHODOLOGY

Statement of the Problem

This study investigates bond price sensitivity to interest rate movements with special reference to Shiva Cooperative Credit Bank.

Objective

To examine how bond prices held by Shiva Cooperative Credit Bank respond to changes in interest rates.

Hypotheses

- H₀: Bond prices of Shiva Cooperative Credit Bank are not significantly sensitive to interest rate movements.
- H₁: Bond prices of Shiva Cooperative Credit Bank are significantly sensitive to interest rate movements.

Data and Sampling

The study is descriptive and analytical in design. Primary data were collected through a structured questionnaire administered to 50 respondents selected using the convenience sampling method. Secondary data were drawn from books, journals, research articles, RBI reports, newspapers, and financial websites. Data were analysed using percentage analysis, frequency distribution, tabulation, and Pearson correlation, with Microsoft Excel used as the primary analytical tool.

Scope and Limitations

The study is confined to Shiva Cooperative Credit Bank, a single cooperative credit institution operating at the district level in Karnataka, India, and does not extend to other cooperative banks across the state or nation. Limitations include a sample size restricted to 50 respondents, limited access to confidential institutional financial data, reliance on respondent perceptions, and the exclusion of detailed mathematical bond-valuation models.

IV. DATA ANALYSIS AND RESULTS

To test the stated hypotheses, Pearson correlation analysis was applied to bond yield-to-maturity (X) and bond price (Y) data for a sample of seven bonds drawn from the bank's portfolio, as presented in Table 1.

Table 1. Bond Yield to Maturity and Bond Price Data (N = 7)

Bond	Yield to Maturity (X) %	Bond Price (Y)
Bond 1	7	999.84
Bond 2	7	1107.65

Bond 3	6	1000.13
Bond 4	6	1084.38
Bond 5	8	1000.19
Bond 6	7	104.07
Bond 7	6	95.80

Applying the Pearson correlation formula, $r = \frac{[N\sum XY - (\sum X)(\sum Y)]}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}}$, to this data yields a correlation coefficient of $r = 0.546$, indicating a moderate positive relationship between yield to maturity and bond price in this sample. To test the significance of this correlation, a t-test was applied using $t = r\sqrt{(n-2) / (1-r^2)}$, which produced a calculated t-value of 1.46 with 5 degrees of freedom ($df = n - 2 = 5$). The critical t-value at the 5 percent significance level for 5 degrees of freedom is 2.571.

Since the calculated t-value (1.46) is less than the critical value (2.571), the null hypothesis (H_0) is accepted and the alternative hypothesis (H_1) is rejected for this specific seven-bond sample: the correlation between yield to maturity and bond price, while moderate, is not statistically significant at the 5 percent level within this small dataset.

This result should be interpreted alongside the broader survey findings and the theoretical duration analysis presented in the Annexure, which together indicate that differences in coupon rates, maturities, and face values — rather than yield to maturity alone — account for a substantial share of the variation in bond prices observed in the sample.

V. FINDINGS

- Bond prices and interest rates exhibit a well-established inverse relationship: rising interest rates are associated with falling bond prices, and vice versa.
- Bonds with longer maturities and higher duration are more sensitive to interest rate changes than short-term, lower-duration bonds.
- Fixed-rate coupon bonds are particularly affected by changes in market interest rates.
- Duration is confirmed as an effective and widely used measure for assessing bond price sensitivity and interest rate risk.
- The Pearson correlation coefficient between yield to maturity and bond price for the sampled bonds

was 0.546, a moderate positive relationship that was not statistically significant at the 5 percent level ($t = 1.46 < t\text{-critical} = 2.571$).

- The bond portfolio of Shiva Cooperative Credit Bank is exposed to interest rate risk arising from ongoing market fluctuations.
- Respondents broadly understand the inverse relationship between interest rates and bond prices and view interest rate fluctuations as influential for investment decisions and banking profitability.

VI. SUGGESTIONS

- Regularly monitor interest rate movements to assess their impact on the bond portfolio.
- Maintain a balanced mix of short-term and long-term bonds to reduce interest rate risk.
- Favour lower-duration bonds during periods of anticipated interest rate increases.
- Periodically review and rebalance the investment portfolio in line with market conditions.
- Diversify bond holdings across different instrument types to minimise concentration risk.
- Apply duration and sensitivity analysis systematically in investment decision-making.
- Strengthen asset–liability management practices to manage interest rate fluctuations effectively.
- Conduct periodic risk assessments of the bond portfolio to identify and mitigate potential losses.

VII. CONCLUSION

This study concludes that interest rate movements influence bond prices held by Shiva Cooperative Credit Bank, with the degree of sensitivity varying according to a bond's coupon rate, maturity period, and duration. While the Pearson correlation analysis on the seven-bond sample did not reach statistical significance at the 5 percent level, duration-based analysis and respondent perceptions consistently support the theoretical inverse relationship between interest rates and bond prices, with longer-duration bonds showing greater price fluctuation than shorter-duration bonds. These findings underscore the importance of effective interest rate risk management and portfolio diversification for maintaining investment stability. The bank is accordingly advised to monitor interest rate trends on an ongoing basis and

to apply duration-based analysis when making bond investment decisions, in order to strengthen the overall performance and resilience of its bond portfolio.

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