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Inflation's Impact on the Investment Strategies of Scheduled Commercial Banks

A Regression Analysis

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Abstract : The study investigates the impact of inflation on the investment strategies of Scheduled Commercial Banks (SCBs) in India, utilizing regression analysis. By analyzing data from 2018 to 2023, the research explores whether there is an impact of inflation on the allocation of various financial instruments, including statutory liquidity ratio (SLR) securities, commercial papers, and bonds issued by public and private sectors, in SCBs' investment portfolios. The findings indicate that inflation significantly affects certain investment categories, suggesting that SCBs must consider inflation forecasts in their strategic planning to optimize returns and manage risks effectively. This research provides critical insights for policymakers and bank portfolio managers in refining investment strategies under varying inflationary conditions.

IndexTerms **- Inflation, Scheduled Commercial Banks, Investment Strategies, Bank Investments, Time Series Analysis.**

I.INTRODUCTION

Investment is the way of acquiring some assets in order to generate some income or realise some gains. Every individual and corporate in India is engaged in investing. The selection of instruments for investing may vary according to the availability of funds, the expected returns, the ability to take risk, the wisdom to select the appropriate instrument, the availability of support mechanism to make adequately wise choices etc. One of the commonly used methods of investing taken up by individual as well as corporate is to invest in Banks in the form of savings bank deposits, current account or fixed deposits. It is an option exercised by everyone with different motives, some do it with the aim to put money in safe custody, while for others it is a way to earn returns with minimum risk, for some it is the easiest way of maintaining liquidity in a secured environment. The Indian Banking system has played a vital role in the growth of the Indian Economy. The Indian Banking system comprises of the Reserve Bank of India at the helm of affairs and a network of scheduled and non-scheduled banks. The network of scheduled commercial banks mainly comprises of about 12 public sector and 21 private sector banks, other than many regional rural banks, small finance banks, payment banks and foreign banks. The RBI governs the functioning of all these banks and mandates the requirement of maintaining investments in certain specified instruments. This is essentially required to keep the money of the depositors safe. The scheduled commercial banks (SCB) make investments in a variety of investment instruments in such a manner that they are able to comply to the statutory requirements, mitigate risks and at the same time are able to earn sufficient returns. The investment portfolio of the SCBs has to be planned with utmost care as it can be influenced by general macro-economic conditions of the economy, besides the overall resource position of the commercial banks. Inflation is the change in the prices from year to year. It generally reflects the loss of purchasing power or decrease in the real value of investments. The inflation rate may be an indicator to the investor to determine how much return should be generated by the investment in order to give the same value to the investor to maintain the same standard of living. As inflation increases, purchase power decreases so to maintain the same standard of living one need more amounts of money. Generally, with increase in inflation, investors trend to reduce the level of savings or investment to maintain the standard of living thereby reducing the availability of deposits with the commercial banks. The depositors may borrow money from the banks but to discourage this, the bank increases the rate of interest on loans. This controls the quantum of money in the economy and manage inflation rate. This also creates an impact on the availability of funds available for investment as well as retention of available invested funds with the banks. Consumer Price Index is calculated by taking price changes for each item in the predetermined basket of goods and averaging them based on their relative weight in the whole basket. The current study is an effort to understand the pattern of investment used by the scheduled commercial banks and also identifying the relationship of inflation and the level of these investments. The banks need to optimise their investment portfolios so as to increase their returns to the maximum level possible with the level of risk being kept at the least. They may adopt the strategies of increasing their holdings in certain types of securities to mitigate the risk during rising inflation.

II.LITERATURE REVIEW

Although multiple studies have been conducted regarding performance (Dr. S.R. Bakhale, 2017; Ibrahim, 2011; Jegadeeshwaran & Priya, 2017; Maria & Hussain, 2023), profitability (Kheechee, 2011; Ramachandran et al., 2006) or valuation of investment avenues of scheduled commercial banks but none of the study has been found regarding inflation and its connect with the various investment instruments of scheduled commercial banks.

III.METHODOLOGY

3.1 Objectives of the Study

- Study the pattern of investments of SCBs
- Study the effect of inflation on various investments of SCBs

3.2 Data Description

The dataset for this study spans from 2018 to 2023. It includes a variety of financial securities investments of Scheduled Commercial Banks and inflation rate. Both set of data have been taken on monthly basis for the entire period of study.

Data Sources: The data on Scheduled Commercial Banks' investments was sourced from Database on Indian Economy by Reserve Bank of India. The Rate of Inflation was sourced from Labour Bureau, Ministry of Labour and Employment, Government Of India.

The key variables in the dataset are:

- SLR Securities: Statutory Liquidity Ratio investments, which banks are mandated to hold.
- Commercial Paper: Short-term unsecured promissory notes issued by companies.
- Shares issued by PSUs: Equity investments in Public Sector Undertakings.
- Shares issued by Private Corporate Sector: Equity investments in private companies.
- Shares issued by Others: Equity investments not classified under PSUs or private corporate sector.
- Bonds/Debentures issued by PSUs: Debt instruments issued by Public Sector Undertakings.
- Bonds/Debentures issued by Private Corporate Sector: Debt instruments issued by private companies.
- Bonds/Debentures issued by Others: Debt instruments issued by entities not classified under PSUs or private corporate sector.
- Instruments issued by Mutual Funds: Investments in mutual fund instruments.
- Instruments issued by Financial Institutions: Investments in financial institutions' instruments.
- Inflation Rate: The annual inflation rate, which serves as the independent variable in the analysis.

3.3 Data Cleaning and Transformation

- Handling Missing Values: Missing data points were identified and dropped.
- Transformation: Various transformations (e.g., log, square root, Box-Cox) were applied to stabilize variance and normalize distributions. This was essential for accurate regression and time series analyses.

3.4 Analytical Techniques

- Time Series Analysis: To analyze trends, patterns, and seasonality within inflation, seasonal decomposition of time series (STL) was utilized. This involved breaking down the series into trend, seasonal, and residual components to better understand underlying patterns.
- Ordinary Least Squares (OLS) Regression: OLS regression was used to model the relationship between the inflation rate and each type of financial security. Different transformations of the dependent variables were tested to identify the best fit model.
- Model Evaluation Metrics: R-squared is used to measure the proportion of the variance in the dependent variable that is predictable from the independent variables. Adjusted R-squared adjusts the R-squared value for the number of predictors in the model. F-statistic test assesses whether at least one independent variable is significantly related to the dependent variable. Prob (F-statistic) is used to assess whether at least one independent variable significantly predicts the dependent variable.
- Statistical Tests: Breusch-Pagan (BP) test P-value to check for heteroscedasticity, White Test P-value to check for the presence of heteroscedasticity and the appropriateness of the model's specification, Durbin-Watson Stat for autocorrelation of the residuals and Shapiro-Wilk P-value to assesses the normality of the residuals are used. Heteroscedasticity occurs when the variance of the residuals is not constant across all levels of the independent variables. If heteroscedasticity is present, the standard errors of the regression coefficients may be biased, leading to incorrect inference about the significance of the predictors. Autocorrelation occurs when the residuals are correlated with each other. In regression analysis, this violates the assumption that the errors are independently distributed. If autocorrelation is present, the standard errors of the coefficients may be biased, affecting the reliability of the model's predictions and the significance of the predictors. Normality of residuals is crucial because many statistical tests and inference procedures in regression analysis assume that the residuals are normally distributed. Deviations from normality can lead to incorrect confidence intervals, hypothesis tests, and predictions. The Shapiro-Wilk test helps verify if the residuals are approximately normally distributed.

3.5 Future Explorations of Study

To further enhance the study and its implications there is a possibility of conducting studies with extension of the time period of the study, also thereby improving the chances of comprehensive understanding for future predictions.

There is scope for conducting studies on impact on specific sectors of investment portfolio of the banks.

The comparative analysis of impact of inflation on different segments of the scheduled commercial banks can be undertaken.

Inclusion of other macro-economic factors or indicators along with inflation on banks investment portfolio might suggest more alternative investment models.

IV. DATA ANALYSIS

4.1 Description of Data

Summary of the key variables in the dataset is given in Table 4.1.

Table 4.1: Data Description

Features	count	mean	std deviation	min	max
Inflation Rate	60	5.838833333	1.279311377	3.15	9.63
SLR Securities	60	9122596.732	2103305.278	6712980.09	15344862.95
Investment in other Government Securities (Non- SLR)	60	59261.16233	139732.3921	0	532899.81
Commercial Paper	60	191205.3707	62695.84617	100049.91	388425.44
Shares issued by PSUs	60	23940.81667	5141.08315	15217.9	36594.28
Shares issued by Private Corporate Sector	60	153753.5242	28224.14484	128480.68	221534.83
Shares issued by Others	60	11553.33117	2239.239986	8509.52	18619.23
Bonds/Debentures issued by PSUs	60	261065.3192	53980.59681	179073.44	402409.94
Bonds/Debentures issued by Private Corporate Sector	60	615754.2647	145579.4053	435456.77	1013180.59
Bonds/Debentures issued by Others	60	306823.9782	83722.61393	183211.47	591698.89
Instruments issued by Mutual funds	60	105581.289	28217.90403	59849.43	216296.8
Instruments issued by Financial Institutions	60	285524.993	111176.7361	155273.05	568642.52

4.2 Time Series Analysis of Inflation Rate

The trend line in Figure 4.1 shows the underlying direction in which the inflation rate is moving, disregarding short-term fluctuations and seasonality. The inflation rate increased until around 2020, then decreased and stabilized, with a slight increase toward the end of the period. Monthly periodic fluctuations occur. The seasonal component shows a consistent pattern every year, indicating a recurring cycle in the inflation rate. The residual plot indicates the presence of irregularities, with noticeable spikes around 2020, suggesting some events or shocks (year of COVID-19) affecting the inflation rate that are not part of the trend or seasonal patterns.

Figure 1. Decomposition of Inflation

4.3 Year wise analysis of Financial Instruments in the Investment Portfolio

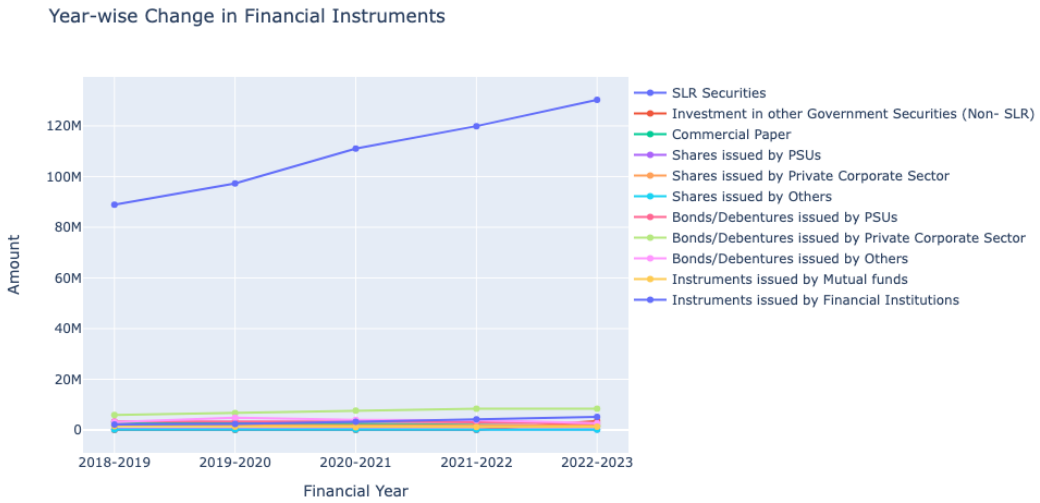

Figure 4.2. Year-wise Change in Financial Instruments

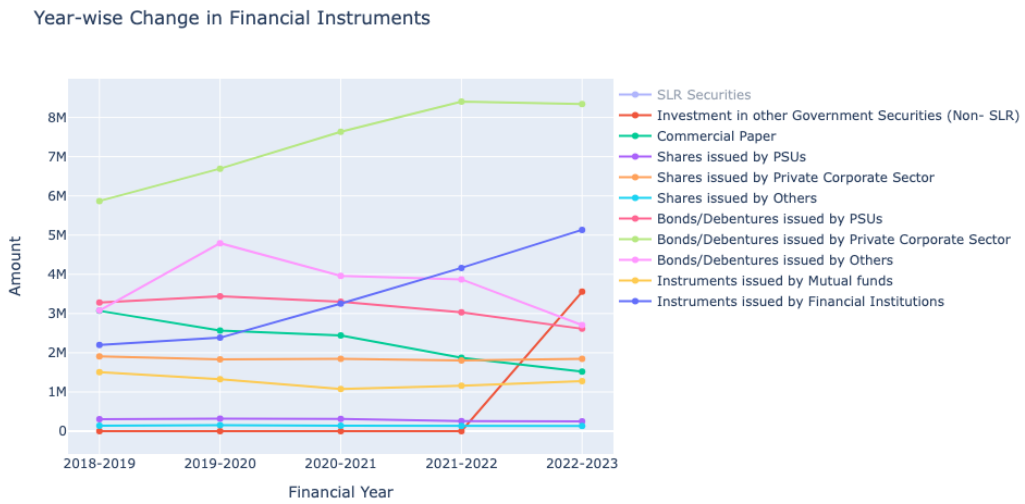

Figure 4.3. Year-wise Change in Financial Instruments without SLR

Trend over the years is depicted in Figure 4.2. Since SLR Securities have a substantially high proportion as compared to the rest of the investment avenues, Figure 4.3 is plotted without SLR Securities.

1. SLR Securities: There is a steady upward trend, making it the instrument with the highest amount by 2022-2023, reaching over 8 million.
2. Investment in other Government Securities (Non-SLR): This category shows a significant increase in the final year, with a sharp upward trend starting from 2021-2022.
3. Commercial Paper: Exhibits a general declining trend over the years, indicating reduced investments, ending with around 2 million in 2022-2023.
4. Shares issued by PSUs: The investment in these shares has remained relatively stable with minor fluctuations, maintaining around 3 million throughout the period.
5. Shares issued by the Private Corporate Sector: There is a slight decreasing trend, with values consistently below 1 million.
6. Shares issued by Others: This category shows a generally increasing trend, peaking slightly in 2021-2022 before declining slightly in the next year.
7. Bonds/Debentures issued by PSUs: Investments in these bonds have remained stable, hovering around 1 million with minimal fluctuation.
8. Bonds/Debentures issued by the Private Corporate Sector: This category shows a steady decrease over the years, falling below 1 million by 2022-2023.
9. Bonds/Debentures issued by Others: Remain relatively stable but at the lower end of the spectrum, consistently below 1 million.
10. Instruments issued by Mutual Funds: These show a minor increase and stable trend over the years, staying below 1 million.
11. Instruments issued by Financial Institutions: Exhibit a slightly increasing trend but remain consistently low, below 1 million.

Overall, SLR Securities and other Government Securities (Non-SLR) show the most significant positive trends, whereas Commercial Paper and Private Corporate Sector instruments show declining trends.

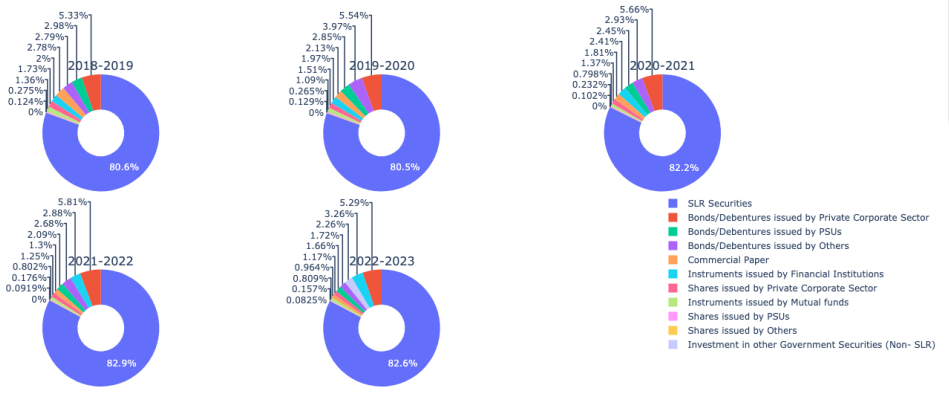

Figure 4.4. Composition of Financial Instruments Across Years

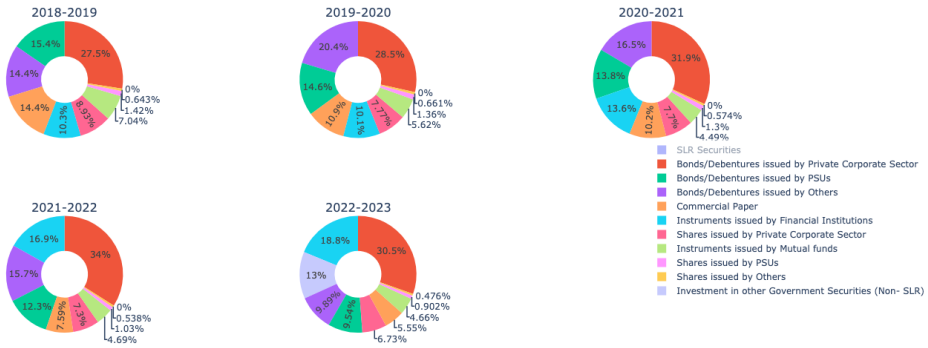

Figure 4.5. Composition of Financial Instruments Across Years without SLR securities

Figures 4.4 & 4.5 indicate the proportion of Investment Instruments across the five-year period. Figure 4 shows SLR securities consistently constitute over 80% of the portfolio across all years. This indicates a significant allocation to these secure and low-risk instruments, due to regulatory requirements. In Figure 5, by not considering SLR securities proportions of instruments within 18-20% of the portfolio not taken up by SLR securities are observed. Here, Bonds/Debentures issued by Private Corporate Sector emerge as the most substantial component, ranging from 27.5% to 34% over the years, highlighting a significant investment in corporate debt. Instruments issued by Financial Institutions and Shares issued by Private Corporate Sector also hold notable percentages, indicating strategic investments in these sectors. Bonds/Debentures issued by others is also a significant investment avenue although the percentage of investment has continually variated through ups & downs during the period of study. Investment in Bonds/Debentures issued by PSUs decreased on a YoY basis. Investment in other Government Securities (Non- SLR) was seen only in FY2022-23 at a miniscule 0.47%.

4.4 Regression Model

Ordinary Least Square Regression method is used to test the effect of Inflation on various investment instruments.
The general form of the OLS regression model in our case is:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \epsilon_i$$

Where:

- Y_i is the dependent variable. (Each instrument considered separately)
- β_0 is the intercept term.
- β_1 is the coefficient for the independent variable. (Inflation Rate)
- X_{1i} is the independent variables. (Inflation Rate for observation i)
- ϵ_i is the error term. (for observation i)

Model Metrics are given in Table 4.2.

Table 4.2: Ordinary Least Square Regression Model

Instrument	Transformation	R-squared	Adj. R-squared	F-statistic	Prob (F-statistic)	Significant Impact
Bonds/Debentures issued by Others	None	0.097228631	0.081663607	6.246609919	0.015295567	YES
Bonds/Debentures issued by PSUs	None	0.002325579	-0.014875704	0.135198014	0.714440697	NO
Bonds/Debentures issued by Private Corporate Sector	Log	0.015688163	-0.001282731	0.924415831	0.340309526	NO
Commercial Paper	None	0.004198314	-0.01297068	0.244528839	0.62282201	NO
Instruments issued by Financial Institutions	Box-Cox	0.048654116	0.032251601	2.966259491	0.090347393	NO
Instruments issued by Mutual funds	Box-Cox	0.025037591	0.008227894	1.489473081	0.227237009	NO
SLR Securities	Box-Cox	0.037389122	0.020792383	2.252799255	0.138797577	NO
Shares issued by Others	Box-Cox	0.082583769	0.066766247	5.221030989	0.02599048	YES
Shares issued by PSUs	None	0.000383213	-0.016851559	0.022234861	0.881981281	NO

Shares issued by Private Corporate Sector	Log	0.005388212	-0.011760267	0.314209319	0.577267591	NO

Cross Validation metrics is given in Table 4.3.

Table 4.3: Cross Validation of OLS Regression Model

Instrument	Transformation	BP Test P-value	White Test P-value	Durbin-Watson Stat	Shapiro-Wilk P-value
Bonds/Debentures issued by Others	None	0.365566594	0.221410764	1.177418671	0.00187205
Bonds/Debentures issued by PSUs	None	0.614983858	0.790198269	1.91640864	1.78545E-07
Bonds/Debentures issued by Private Corporate Sector	Log	0.479801611	0.668062177	1.308081176	0.004144501
Commercial Paper	None	0.300562241	0.583883244	0.789963875	0.008284152
Instruments issued by Financial Institutions	Box-Cox	0.621937255	0.310694015	0.458981829	0.085385673
Instruments issued by Mutual funds	Box-Cox	0.150786247	0.356118207	1.08682502	0.682504892
SLR Securities	Box-Cox	0.732644152	0.668086083	1.179516811	0.245001227
Shares issued by Others	Box-Cox	0.383900003	0.591144738	1.616126565	0.004158529
Shares issued by PSUs	None	0.883751147	0.829063727	1.602860564	1.65952E-05
Shares issued by Private Corporate Sector	Log	0.994722563	0.963034873	2.266419128	3.91521E-10

- **Bonds/Debentures issued by Others:** The model explains 9.72% of the variability in the dependent variable, indicating a statistically significant impact. There's no significant heteroscedasticity, but there may be mild autocorrelation and the residuals are not normally distributed.
- **Bonds/Debentures issued by PSUs:** The model explains only 0.23% of the variability, suggesting weak predictive power. It is not statistically significant, and there are no major issues detected in terms of model assumptions.
- **Bonds/Debentures issued by Private Corporate Sector:** This model shows low explanatory power (1.57% variability explained) and is not statistically significant. There are no major issues with heteroscedasticity or model specification, but residuals may not be normally distributed.
- **Commercial Paper:** The model explains 0.42% of the variability, indicating minimal impact and no statistical significance. There are no major issues with heteroscedasticity or model assumptions.
- **Instruments issued by Financial Institutions:** The model explains 4.87% of the variability but lacks statistical significance. There are no significant issues with heteroscedasticity or model assumptions.
- **Instruments issued by Mutual Funds:** This model explains 2.50% of the variability but lacks statistical significance. There are no significant issues with heteroscedasticity or model assumptions.
- **SLR Securities:** The model explains 3.74% of the variability but lacks statistical significance. There are no significant issues with heteroscedasticity or model assumptions.
- **Shares issued by Others:** The model explains 8.26% of the variability and shows a statistically significant impact. There is no significant heteroscedasticity, but there may be mild autocorrelation and the residuals are not normally distributed.
- **Shares issued by PSUs:** The model explains only 0.04% of the variability, suggesting very weak predictive power. It is not statistically significant, and there are no major issues detected in terms of model assumptions.
- **Shares issued by Private Corporate Sector:** This model shows low explanatory power (0.54% variability explained) and is not statistically significant. There are no major issues with heteroscedasticity or model specification, but residuals may not be normally distributed.

V. RESULTS

The regression analysis indicates that inflation has a statistically significant impact on bonds/debentures issued by others and shares issued by others, with R-squared values of 0.097 and 0.083, respectively. This suggests that inflationary pressures may lead banks to adjust their portfolios, particularly favoring or disfavoring specific types of investments. Figures 5.1 and 5.2 illustrate the relationship between inflation rates and these investment instruments, showing noticeable trends that align with economic theories on inflation and investment behavior.

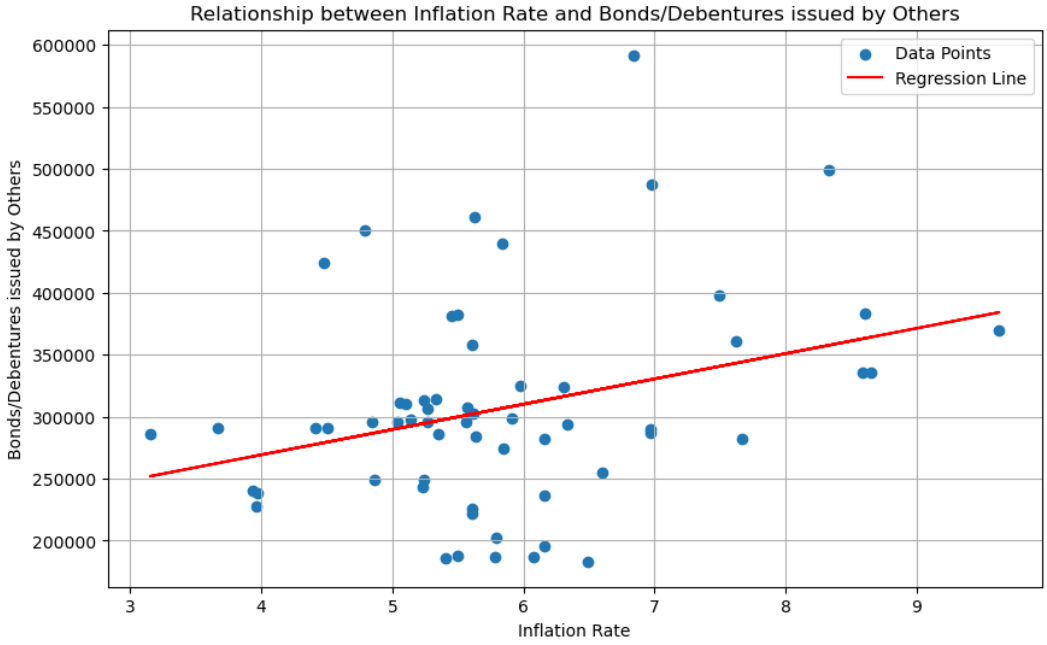

Figure 5.1. Relationship between Inflation Rate and Bonds/Debentures issued by Others

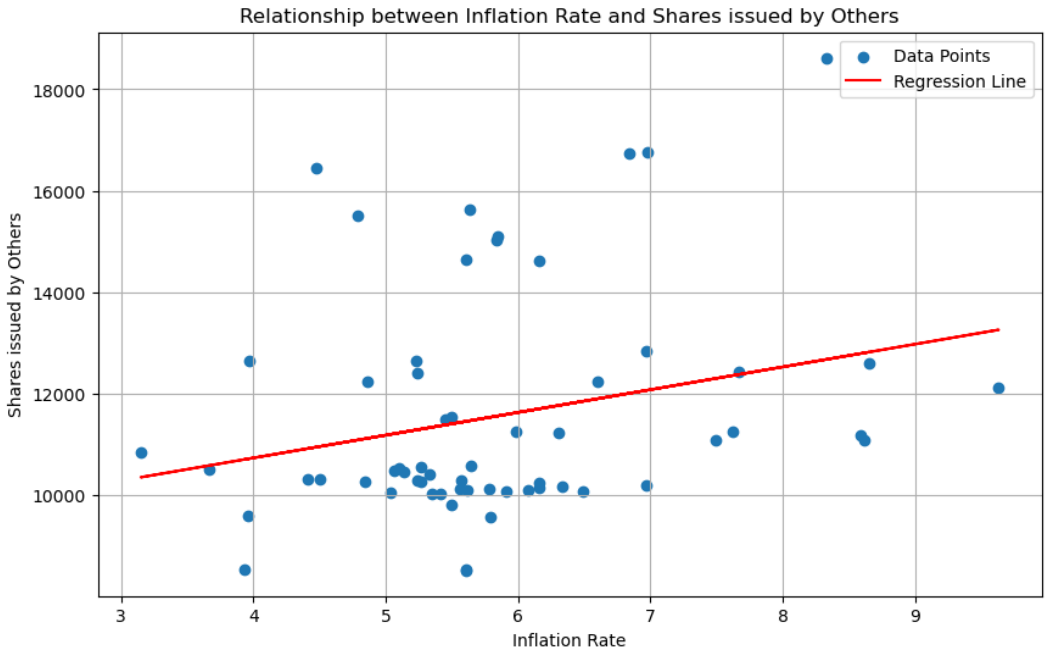

Figure 5.2. Relationship between Inflation Rate and Shares issued by Others

VI. CONCLUSION

In summary, the study shows the SLR securities are the most favoured investment avenue with an ever-growing percentage of investments in these by Scheduled commercial banks. It is followed by investment in Bonds/debentures of Private Corporate sector. A growing interest for investing in the instruments issued by financial institutions is also seen. The analysis demonstrates that inflation significantly affects certain investment instruments of scheduled commercial banks but not all. Significant impact on bonds/debentures issued by others and shares issued by others is evidently observed thus cautioning the SCBs to be vigilantly investing in these during growing inflation. This finding has critical implications for policymakers and bank managers, suggesting a need to consider inflation forecasts in strategic planning. Future research can explore the long-term effects of inflation on other financial instruments and consider a broader range of macroeconomic variables to build a more comprehensive understanding of investment dynamics.

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