

A Study on Correlation between Indian Monetary Policy changes and its Yields

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Abstract - The study aims to find out the correlation between t monetary policy changes and government securities yields of different maturities. A theory related to fluctuations in bond yields is that rising market interest rates cause bond prices to fall, which in turn causes bond yields to rise. However, it is difficult to obtain evidence for this theory. In view of this, this research focuses to analyse the impact of drivers on the return of G-Sec in a mature range in the Indian context, and to understand the correlation between these factors and the return. The research is quantitative correlation research and is mainly based on secondary data. To get a statistical result, correlation analysis was performed. The research is limited to 10-year data released by the RBI from July 2011 to July 2021, and looks at the impact of changes in policy repo rate, CRR and SLR. This study will help determine the path of the economy and information about the significant impact on investment returns and offer an idea of how interest rates will vary in the future and how the economy will perform.

Keywords: monetary policy, government securities, yields, economy, treasury bills, policy changes

I. RESEARCH METHODOLOGY

This study explores the relationship that the changes in the monetary policy have with bond yields. RBI policy activities generally comprise change of Repo rate and CRR and sometimes SLR which can be justified with the help of the data and the reports published by the RBI Therefore, the monetary policy initiatives taken by the RBI impact bond yields in one way or another. That being the case, it is essential to understand the relationship between policy changes and yields. To this end, a few hypotheses will be picked and analyzed to arrive at conclusions. Moreover, the research will conclude with some crucial results that bondholders can use to foresee the future.

1.1 Research Objectives

The focus of the research is to study the correlation between the G-sec yields of different maturities and the changes in monetary policy made by the RBI between July 2011 to July 2021. The objectives of the research are framed keeping in mind this aim.

- 1) To analyze the different policy actions taken by the RBI which impact bond yields.
- 2) To calculate and analyze the correlation between the changes in Indian monetary policy and bond yields over the past ten years from July 2011 to July 2021
- 3) To determine the change which majorly affects the bond prices and its yields.

1.2 Scope of Research

The scope of the study refers to the extent to which the research area will be explored as well as the parameters that will be operating within the study.

- The study aims to cover analyze the policy changes and the bond yields of India.
- The study significantly aims to study the correlation between the monetary policy changes and the yields and the effects of these changes on the government and investors of India for the past ten years, from July 2011 to July 2021.

1.3 Research Hypothesis:

The study addresses the problem through the main hypothesis.

- 1) To understand the outcome for the objective to calculate and analyze the correlation between the changes in monetary policy and bond yields over the past ten years from July 2011 to July 2021. The relationship between the variables is established as follows:
 - The independent variable here is the changes in monetary policy and that the dependent variable here is the Government yields of different maturities.
 - The independent variable here is the monetary policy changes, such as Cash Reserve Ratio,

Statutory Liquidity ratios, and the policy repo rate. The dependent variable here is the Government Securities yields of different maturities such as 91-Day Treasury Bill (Primary) Yield, 182-Day TBs, 364-Day TBs Yield, 364-Day TBs Yield, and 10-Year G-Sec Yields.

- The dependent variable is the G-sec yields of different maturity because a slight change in monetary policy can cause an effect on the yields of the Government securities.

H0= There is no correlation between the changes in monetary policy and the Government securities yields.

H1= There is a correlation between the changes in monetary policy and the Government securities yields.

1.4 Type of Research

The study was Quantitative Correlational Research. Correlation research is a non-experimental research method. Researchers measure two variables, understand and evaluate the statistical relationship between them. They are not affected by any external variable.

The quantitative part was done with the help of statistical tools to measure the relationship between the variables and find out if the independent variable has a statistically significant effect on the dependent variable.

The research was minutely also based on theoretical data, which gave some findings and conclusions.

1.5 Data Collection

The procedure of gathering, measuring, and analysing accurate insights for research purposes using standard validated techniques is referred to as data collection. The data collected should be rich with information and reliable.

Primary Data:

Unstructured interview with the seniors and observation was done to collect data.

Secondary data:

The independent variables such as CRR, SLR and Policy Repo Rate and the government yields of different maturities were collected from the reports published by RBI

1.6 Data Collection Tool

To empirically explore the drivers of yields, the researcher has undertaken Correlation Analysis to measure the strength of the linear relationship between two variables and compute their association. In order to carry out this calculation, the SPSS software has been used.

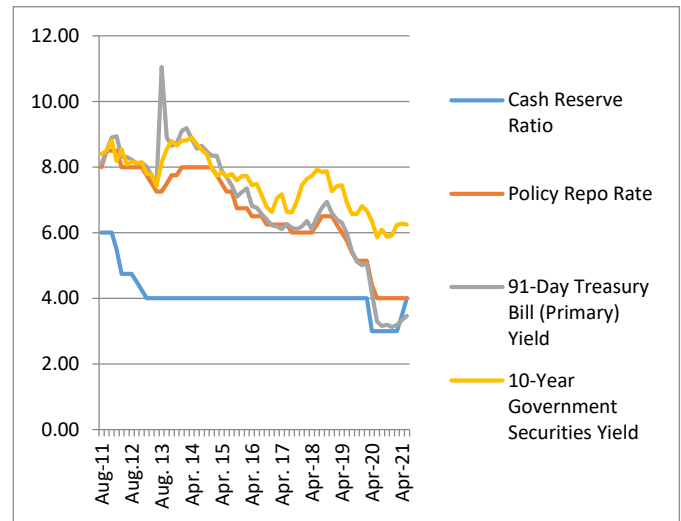
II. ANALYSIS OF FINDINGS

Effect of changes in the policy on the G-sec Yields

In order to analyze the movement of policy changes with the yields and to know the impact of these changes on the yields

the following graph has been made using the data collected from the report published by RBI from July 2011 to July 2021.

Graph 1: Movement of policy changes with the yields



Source: as per data collected from reports published by RBI

The chart shows the movement of 3 months and 10-year G-sec yield and repo rate and CRR during different RBI policies from July 2011 to July 2021

- The above chart shows that 3-month G-sec yield moves more in line with policy action than 10-year G-sec yield.
- Policy changes affect all the maturities yields; however, the effect reduces with an increase in maturities.
- According to a paper published by Estrella and Trubin (2006), If economic growth exceeds its limit and there is pressure of inflation, the central bank is expected to make changes to control it. As a result, the short-term rate increases rapidly in proportion.
- As time passes, the market expects future growth to slow down, inflationary pressures will ease, and the central bank's tightening stance will be reversed. Therefore, the medium and long-term interest rate is expected to be less than the change in the short-term interest rate.
- Therefore, policy actions may have a more significant and faster effect on the current interest rates, and the magnitude of the impact will weaken as maturity increase

This theory can be made more clearer by analyzing the repo rate and the yields of 91 Treasury Bill and 10 Year G-sec Yields. The table below shows the Policy Repo Rate and yields of 91 Treasury Bill and 10 Year G-sec Yields from December 2014 to April 2018.

Table1: Policy Repo Rate and Yields from December 2014 to April 2018.

	Policy Repo Rate	91-Day Treasury Bill (Primary) Yield	10-Year Government Securities Yield
Dec. 14	8.00	8.35	7.99
Apr. 15	7.50	7.89	7.85
Aug. 15	7.25	7.44	7.79
Dec. 15	6.75	7.23	7.72
Apr. 16	6.50	6.81	7.45
Aug. 16	6.50	6.56	7.13
Dec. 16	6.25	6.23	6.63
Apr. 17	6.25	6.11	7.18
Aug. 17	6.00	6.15	6.62
Sep. 17	6.00	6.11	6.79
Oct. 17	6.00	6.11	6.95
Nov. 17	6.00	6.11	7.22
Dec. 17	6.00	6.19	7.45
Jan-18	6.00	6.36	7.26
Feb-18	6.00	6.36	7.64
Mar-18	6.00	6.15	7.59
Apr-18	6.00	6.11	7.73

Source: as per data collected from reports published by RBI

The Reserve Bank decreased its policy rate by 200 basis points (bps) between Dec 2014 and Aug 2017, and the yield on 10-year Central government securities (G-Secs) declined by roughly 140 basis points (bps), as seen in the table above. Conversely, between August 2017 and April 2018, the yield on 10-year G-Secs increased by around 110 bps, even as the Reserve Bank’s policy repo rate was unchanged at 6 per cent over this period. During both of these instances, however, yields on short-term treasury bills (TBs) increased in lockstep with the policy repo rate. As a result, in the past, there has been a poor link between the policy rate and the rates on longer-dated government bonds.

Correlational Analysis

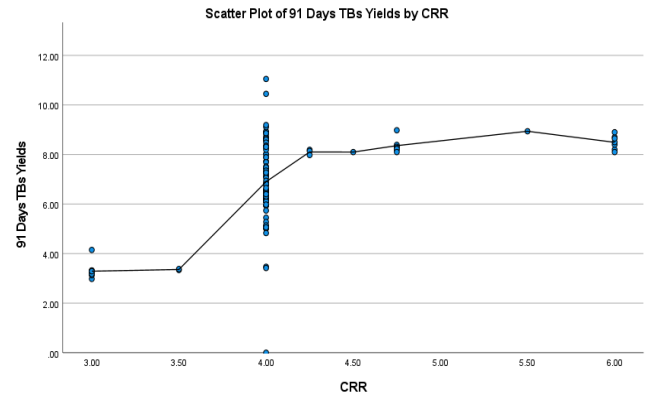
1. Correlation analysis of the changes in monetary policy and the 91 Treasury yields for the year July 2011 to July 2021

Table 2: Correlation between monetary policy changes with 91 TBs

	91 Days TBs Yields	CRR	SLR	Policy Repo Rate
Pearson Correlation	91 Days TBs Yield	1.000	.589	.813
	CRR	.589	1.000	.692
	SLR	.813	.692	1.000
	Policy Repo Rate	.894	.699	.936

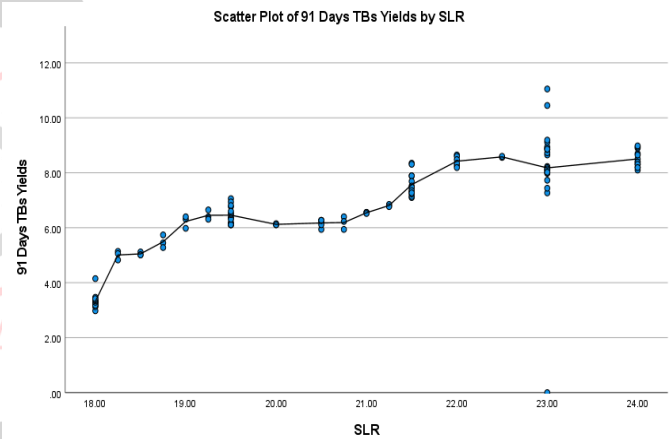
Source: as per data collected from reports published by RBI.

Graph 2: Graphical Representation of the correlation between CRR and 91 Day Treasury Bill (Primary) Yields



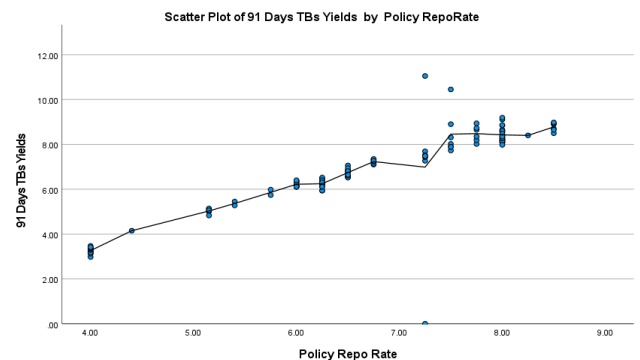
Source: as per data collected from RBI reports

Graph 3: Graphical Representation of the correlation between SLR and 91 Day Treasury Bill (Primary) Yields



Source: as per data collected from RBI reports.

Graph 4: Graphical Representation of the correlation between Policy Repo Rate and 91 Day Treasury Bill (Primary) Yields



Source: as per data collected from RBI reports

Analysis:

The above table and graph show the correlation between the economic changes and the 91-Day Treasury Bill (Primary) Yields. The table suggests that the Pearson Coefficient for the relationship between Cash Reserve Ratio (CRR) with 91-Day Treasury Bill (Primary) Yields is **0.589**. The table also suggest the Pearson Coefficient for the relationship between that Statutory Liquidity Ratio (SLR) with 91-Day Treasury Bill (Primary) Yields is **0.813** and the Pearson Coefficient for the relationship between Policy Repo Rate with 91-Day Treasury Bill (Primary) Yields 0.894 respectively based on n = 121.

Hence it can be inferred that all the variables are positively correlated with the 91-day Treasury Bill. That means that both variables move in tandem—that is, in the same direction. Hence if there is an increase in CRR, SLR OR Policy Repo Rate, the Yields of 91 TBs will also increase and if CRR, SLR OR Policy Repo Rate decrease, then the Yields of 91 Days TBs will also decrease. Out of all the variable, Policy Repo Rate has the highest degree of positive correlation with 91 Days TBs which means that it has the strongest relationship with 91-Day Treasury Bill (Primary) Yields. The reason for this can be that policy repo rate and interest rate have inverse relationship because when interest rates rise, investors can get a better rate of return elsewhere, so the price of original bonds adjust downward to yield at the current rate.

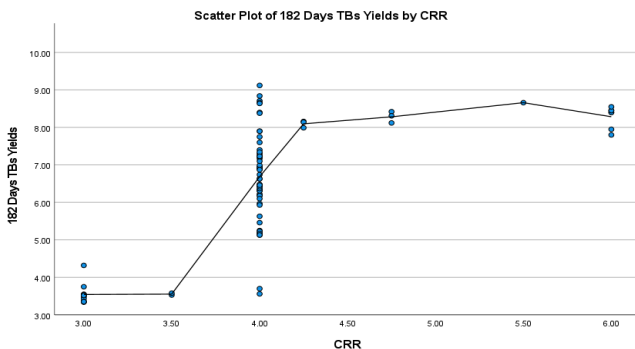
2. Correlation analysis of the changes in monetary policy and the 182 Days Treasury yields for the year July 2011 to July 2021

Table 3: Correlations between policy changes and 182 Treasury Bill

		Yield			
		182 TBs Yields	CRR	SLR	Policy Repo Rate
Pearson Correlation	182 TBs Yields	1.000	.696	.878	.981
	CRR	.696	1.000	.758	.764
	SLR	.878	.758	1.000	.934
	Policy Repo Rate	.981	.764	.934	1.000

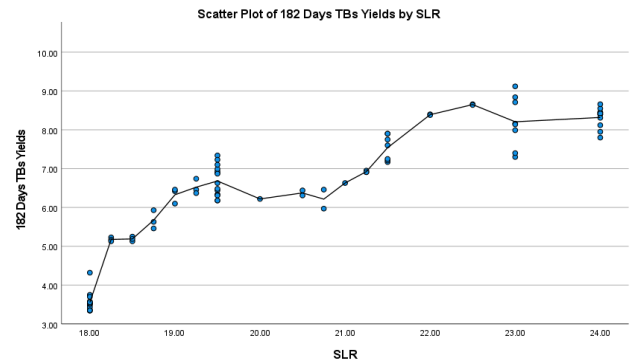
Source: as per data collected from RBI reports

Graph 5: Graphical Representation of the correlation between CRR and 182 Days Treasury Bill (Primary) Yields



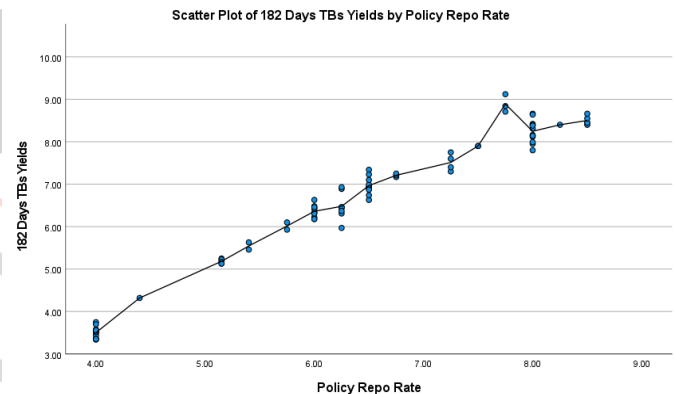
Source: as per data collected from RBI reports

Graph 6: Graphical Representation of the correlation between SLR and 182 Days Treasury Bill (Primary) Yields



Source: as per data collected from RBI reports

Graph 7: Graphical Representation of the correlation between Policy Repo Rate and 182 Days Treasury Bill (Primary) Yields



Source: as per data collected from RBI reports.

Analysis:

The above table and graph shows the correlation between the economic changes and the 182 -Day Treasury Bill (Primary) Yields. The table suggests that the Pearson Coefficient for the relationship between Cash Reserve Ratio (CRR) with 182-Days Treasury Bill (Primary) Yields is **0.696**. The table also suggest the Pearson Coefficient for the relationship between that Statutory Liquidity Ratio (SLR) with 182-Days Treasury Bill (Primary) Yields is **0.878** and the Pearson Coefficient for the relationship between Policy Repo Rate with 182-Days Treasury Bill (Primary) Yields is **0.981** respectively based on n = 121.

Hence it can be inferred that all the variables are positively correlated with the 91-day Treasury Bill. That means that both variables, in the same direction. Hence if there is an increase in CRR, SLR OR Policy Repo Rate, the Yields of 182 Days TBS will also increase and if CRR, SLR OR Policy Repo Rate decrease, then the Yields of 182 days TBs will also decrease. Out of all the variable, Policy Repo Rate has the highest degree of positive correlation with 182 Days TBs

which means that it has the strongest relationship with 182 - Day Treasury Bill (Primary) Yields as compared to others. The reason for this can be that policy repo rate and interest rate have inverse relationship because when interest rates rise, investors can get a better rate of return elsewhere, so the price of original bonds adjust downward to yield at the current rate.

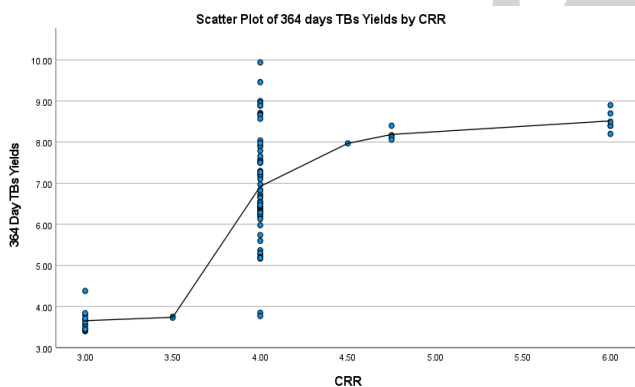
3. Correlation analysis of the changes in monetary policy and the 364 Days Treasury yields

Table 4: Correlations between policy changes and 364 TBs Yields

		364 Days TBs Yields	CRR	SLR	Policy Repo Rate
Pearson Correlation	364 Days TBs Yields	1.000	.663	.881	.967
	CRR	.663	1.000	.719	.730
	SLR	.881	.719	1.000	.935
	Policy Repo Rate	.967	.730	.935	1.000

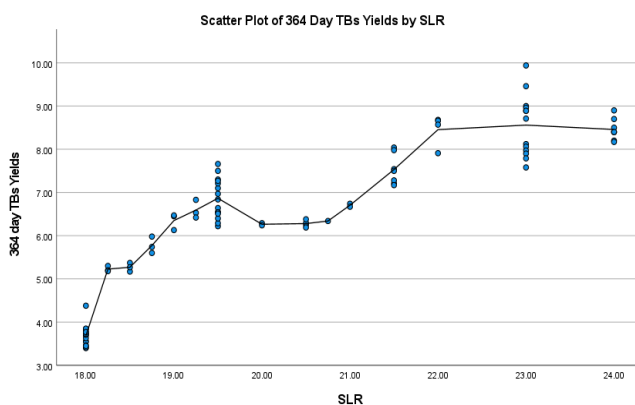
Source: as per data collected from RBI reports

Graph 8: Graphical Representation of the correlation between CRR and 364 Days Treasury Bill (Primary) Yields.



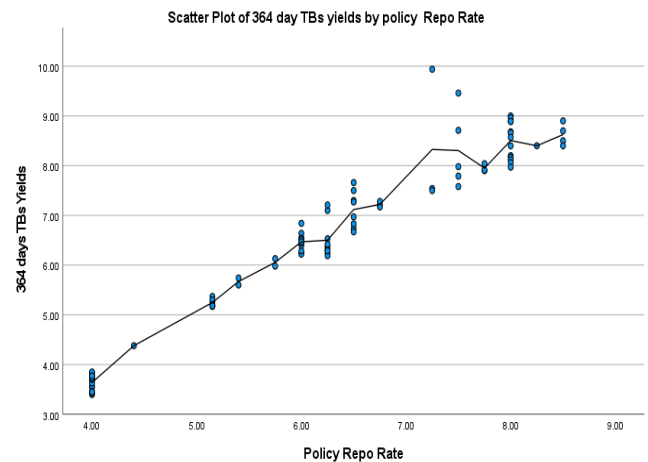
Source: as per data collected from RBI reports

Fig 9: Graphical Representation of the correlation between SLR and 364 Days Treasury Bill (Primary) Yields



Source: as per data collected from RBI reports

Graph 10: Graphical Representation of the correlation between Policy Repo Rate and 364 Days Treasury Bill (Primary) Yields



Source: as per data collected from RBI reports

Analysis:

The above table and graph shows the correlation between the economic changes and the 364b-Day Treasury Bill (Primary) Yields. The table suggests that the Pearson Coefficient for the relationship between Cash Reserve Ratio (CRR) with 364-Day Treasury Bill (Primary) Yields is **0.663**. The table also suggest the Pearson Coefficient for the relationship between that Statutory Liquidity Ratio (SLR) with 364-Day Treasury Bill (Primary) Yields is **0.881** and the Pearson Coefficient for the relationship between Policy Repo Rate with 364 -Day Treasury Bill (Primary) Yields **0.967** respectively based on n = 121.

Hence it can be inferred that all the variables are positively correlated with the 91-day Treasury Bill. That means that both variables move in tandem—that is, in the same direction. Hence if there is an increase in CRR, SLR OR Policy Repo Rate, the Yields of 364 Day TBs will also increase and if CRR, SLR OR Policy Repo Rate decrease, then the Yields of 91 Days TBs will also decrease. Out of all the variable, Policy Repo Rate has the highest degree of positive correlation with 364 Days TBs which means that it has the strongest relationship with 364-Day Treasury Bill (Primary) Yields as compared to others. The reason for this can be that policy repo rate and interest rate have inverse relationship because when interest rates rise, investors can get a better rate of return elsewhere. So the price of original bonds adjust downward to yield at the current rate.

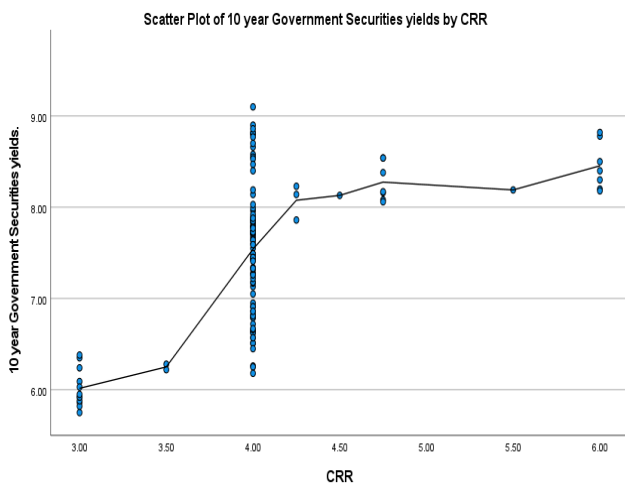
4. Correlation analysis of the changes in monetary policy and the ten-year Government Securities yields for the year July 2011 to July 2021

Table 5: Correlations between policy changes and 10-year G-sec Yields

		Ten-year G-sec Yields	CRR	SLR	Policy Repo Rate
Pearson Correlation	Ten-year G-sec Yields	1.000	.606	.839	.912
	CRR	.606	1.000	.692	.699
	SLR	.839	.692	1.000	.936
	Policy Repo Rate	.912	.699	.936	1.000

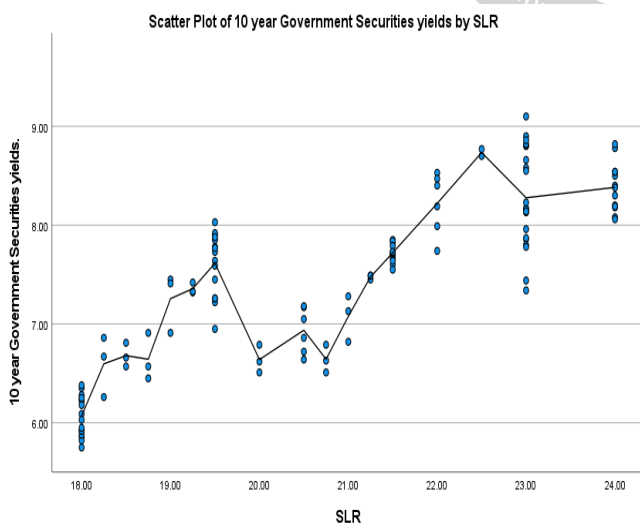
Source: as per data collected from RBI reports

Graph 11: Graphical Representation of the correlation between CRR and ten-year Government Securities yields.



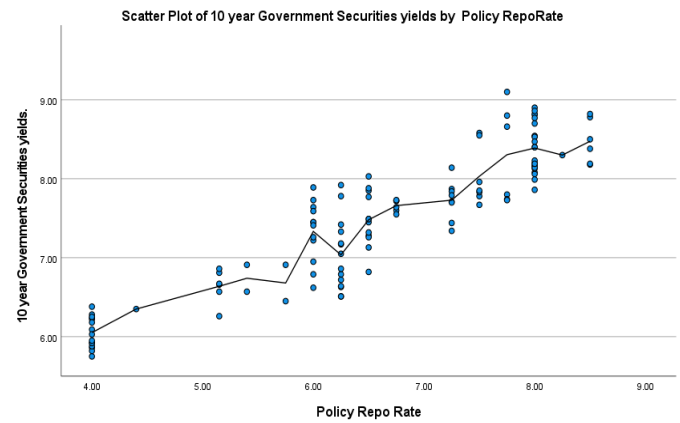
Source: as per data collected from RBI reports

Graph 12: Graphical Representation of the correlation between SLR and ten-year Government Securities yields.



Source: as per data collected from RBI reports

Graph 13: Graphical Representation of the correlation between Policy Repo Rate and ten-year Government Securities yields.



Source: as per data collected from RBI reports.

Analysis:

The above table and graph shows the correlation between the economic changes and 10 Year G-sec Yields. The table suggests that the Pearson Coefficient for the relationship between Cash Reserve Ratio (CRR) with 10 Year G-sec Yields is **0.606**. The table also suggest the Pearson Coefficient for the relationship between that Statutory Liquidity Ratio (SLR) with 10 Year G-sec Yields is **0.839** and the Pearson Coefficient for the relationship between Policy Repo Rate with 10 Year G-sec Yields **0.912** respectively based on n = 121.

Hence it can be inferred that all the variables are positively correlated with the 10 Year G-sec Yields. That means that both variables move in the same direction. Hence if there is an increase in CRR, SLR OR Policy Repo Rate, the Yields of 10 Year G-sec will also increase and if CRR, SLR OR Policy Repo Rate decrease, then the Yields of will also decrease. Out of all the variable, Policy Repo Rate has the highest degree of positive correlation with 10 Year G-sec Yields which means that it has the strongest relationship with 10 Year G-sec Yields as compared to others. The reason for this can be that policy repo rate and interest rate have inverse relationship because when interest rates rise, investors can get a better rate of return elsewhere. So the price of original bonds adjust downward to yield at the current rate.

III. FINDINGS

After analyzing and interpretation of the ten-year data and the graphs, the study found set of results including:

- The government securities market is an essential for transmitting monetary policy impulses to the extensive real economy because it acts as a benchmark for pricing other financial instruments such as commercial paper, corporate bonds, and derivative products.

- The findings for the objective to analyse the different policy actions taken by the RBI which impact bond yields suggested that there are many drivers which affect the G-sec yields of different maturities such as reserve requirements, Policy rate, open market operations, foreign portfolio investment (net inflows) in domestic debt securities and Government's gross market borrowings
- After statistically examining the 10-year data of G-Sec yield for the objective to determine the change which majorly affects the bond prices and its yields, the findings suggested that the policy repo rate is the critical driver in the fluctuation of G-sec Yields
- It was also found that between December 2014 and August 2017, the Reserve Bank cut its policy rate by 200 basis points (bps) and the yield on 10-year Central government securities (G-Secs) fell by around 140 bps. Conversely, between August 2017 and April 2018, policy repo rate was unchanged over this period but the yield on 10-year G-Secs increased and yields on short-term treasury bills (TBs) over both these episodes, moved broadly. So it was found out that policy actions affect short-term yields and long-term yields differently. Policy actions directly influence short-term yields, while policy changes marginally influence long-term yields
- The null hypothesis for the objective to calculate and analyze the correlation between the changes in monetary policy and bond yields over the past ten years from July 2011 to July 2021 rejected and the alternative hypothesis is accepted. It was found out that the changes in policy repo rate, CRR and SLR have a positive correlation with the yields of different maturities G-sec namely 91 days treasury bill yields, 182 days treasury bill yields, 364 days treasury bill yields and 10-year Government securities

IV. CONCLUSION

The government securities market, which is often the predominant segment of the overall debt market in many economies, plays a crucial role in the monetary policy transmission mechanism. The market constitutes a key part of the financial market, providing almost types of highly liquid financial instruments with no credit risk which market participants are more willing to transact. There are many factors which affect the yields generated from Government Securities. These factors include inflation, economic growth and also the changes in monetary policy. This research studies the correlation between these monetary policy changes and the Government Securities Yields of different maturities.

It was found out that policy repo rate is the critical driver in the fluctuation of G-sec Yields. It was also found that policy

actions affect short-term yields and long-term yields differently. Policy actions directly influence short-term yields, while policy changes marginally influence long-term yields. Also, policy repo rate, CRR and SLR have a positive correlation with the yields of different maturities G-sec namely 91 days treasury bill yields, 182 days treasury bill yields, 364 days treasury bill yields and 10-year Government security

This study provides a good understanding of how the changes in monetary policy such as fluctuations in (CRR), (SLR) and Policy Repo Rates affect the Government security bonds of different maturities namely, 91Days Treasury Bills, 182 Days Treasury Bills, 364 Days Treasury Bills and 10 Year Government Securities Bills. The study focused on analyzing and calculating that to what extent these changes will affect the yields and whether these changes will affect the long-term securities more or short-term securities. This will help to provide valuable insights of how these two factors are correlated.

The research is confined to only 10 years of data that is from July 2011 to July 2021 published by the RBI and only analyzes the effects of fluctuations in CRR, SLR and Policy Repo Rates. Hence there is scope of future research with larger input data. Overall, this study can be used to determine the path of the economy and provide information about the significant impact on investment returns. It will also help investors to know the present situation and make investment decisions regarding the same and forecast the future.

V. SUGGESTIONS

Referring to the conclusions, the following recommendation for Government as issuer, the investors and future researchers for improvement can be proposed:

1) This research discusses about the drivers which affect the G-sec yields of different maturities. This can help the Government to look at variables mentioned in the paper as part of mitigation effort and also as a part of the strategy for issuing Government bond. The government can develop a scenario or stress-test framework to anticipate a surge in interest expenditures.

2) As this research is confined to only changes of CRR, SLR and Policy Repo Rate with 10 years tenor as a benchmark, the researcher can use other instruments with different denominations. For instance, in subsequent studies the researcher can look at other variables beyond the variables mentioned in this study in order to see their impact on G-sec Bond yields.

3) As this research suggested that the policy changes have a greater effect on short term yields hence the investors can be suggested that if the repo rate is high, exposure to 10-year G-sec should be reduced as MTM impact will cause volatility in the bond portfolio.

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