

## Impact of Monetary Policy Indicators on Volatility of Bank Nifty Index

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### Abstract

Banks play a major role in the liquidity of the economy as it holds funds of the individuals and companies in the form of various accounts. The amount of the funds held by the bank and the value of transactions undertaken determine capability to invest on new opportunities. The investment process leads to the determining the strength of the economy and its stability. The two major folds that determine the financial stability of the country are its Monetary Policy and Stock Market, Bank Nifty to be specific. The Monetary Policy should aim at maintaining a balanced liquidity position in the economy. To meet these objectives the central bank of the country, the Reserve Bank of India (RBI) formulates and implements monetary policies through its indicators. The Monetary indicators which the RBI uses for determining liquidity includes Repo Rate, Bank Rate, Standing Deposit Facility (SDF), Reverse Repo, Marginal Standing Facility (MFS), Cash Reserve Ratio (CRR) and Statutory Liquidity Ratio (SLR). Any change in the base points lead to volatility in the Bank Nifty as these monetary tools are implemented on the banks directly. The market is efficient, if the reaction to market prices to new information should be instantaneous and unbiased. All publicly available information is reflected in the security's current market price. This paper therefore undertakes empirical research to understand the volatility of Bank Nifty and as well as to quantify the impact of revised monetary policy indicators on volatility of bank nifty index. The objectives stated will be achieved through collection of relevant data, analysis and interpretation of the data collected with summarization of findings, and concluding remarks.

**Keywords:** *Banks, Monetary Policy Indicators, Liquidity, Bank Nifty, Volatility*

A strong economy is the result of a good banking system, wherein the financial activities are taken good care by the banks. Banks accept the deposits from the individuals and the companies and the deposits are then diverted for investments leading to steady growth of the economy as well as maintenance of liquidity in the economy. The money supply in an economy is controlled by the central bank of that particular economy and in India it is the Reserve Bank of India (RBI). RBI ensures stability in the economy by making changes to the interest rate or the inflation rates. RBI uses monetary policy for the same with the help of indicators like that of Repo rate, Bank rate, Standing Deposit Facility (SDF), Reverse Repo, Marginal Standing Facility (MSF), Cash Reserve Ratio (CRR) and Statutory Liquidity Ratio (SLR). The usage of these

indicators stimulates the economic activities and the stock market too gets affected with these. Hence the effort is made to study the impact of monetary policy indicators on volatility of Bank Nifty Index.

## Review of Literature

1. **(Joshi, 2015)<sup>1</sup>** examined the role of macro-economic variables on the stock market as well as examined the relationship that exists between the fiscal policy variables and the stock market. The study also examines the relationship between sectoral stock market and the sectoral macroeconomic parameters.
2. **(Mrityunjaya B Chavannavar, 2016)<sup>2</sup>** in their study identified that an established relationship between monetary policy and the stock market, helps the investors in investing in the stock market. The study also found the monetary policy effect on Nifty 50 and sectoral indices and from the study it was found that there was no significant difference in the Nifty 50 and sectoral indices movement in the short run due to monetary policy tools, but there was difference in the long run.
3. **(D, 2016)<sup>3</sup>** examines the impact of interest rates and exchange rate changes on stock prices in order to formulate investment strategies and also for effective monitoring of the stock markets by the policy makers. The study is aimed at primarily establishing the relationship between stock process and interest rates and exchange rates and at the same time analysing the long run and short run relationship with the same. The study found the existence of a long run impact on stock indices with respect to Auto, Bank, FMCG and realty sectors while the short run impact can be found in the IT and realty sector. Also, it was inferred that the interest rates do not have either long run or short run impact but the exchange rate changes did show its impact both in the long run and the short run.
4. **(Singh, 2017)<sup>4</sup>** aimed their study at identifying and analysing the financial factors in the stock markets of U.S, Us and India and to analyse the impact of financial factors on these stock markets. The researcher has used descriptive statistics, Economic regression model, Augmented Dickey Fuller Test, Johansen Co-integration model and Granger Causality to achieve the objectives. From the study it was found that the policy makers need to set the stage for promoting investments from the investors as there is a strong linkage between the financial factors and the stock market and also economic growth is linked to the financial factors and any change in these factors impact the economy.

From the review of articles, it was found that although many studies have been undertaken on finding the impact of monetary policies, there was no effort made to study the impact of monetary policy on Bank Nifty alone. The concern is identified as banks and the banking activities serve as the important indicator for knowing the health of any economy and knowing its behaviour when there is a change in the monetary policy. The data collected for the study in the previous articles were all in the consolidated form to perform the statistical tests, whereas the researchers in the present paper have taken the raw data for knowing the objectives thus expecting a more accurate result. Hence this study is taken up under the volatility of Bank nifty and to quantify the impact of monetary policy on bank nifty index.

## Objectives of the study

The following are the objectives stated for the present study:

1. To understand the volatility of the Bank Nifty Index.
2. To quantify the impact of revised monetary policy indicators on volatility of bank nifty index.

## Methodology

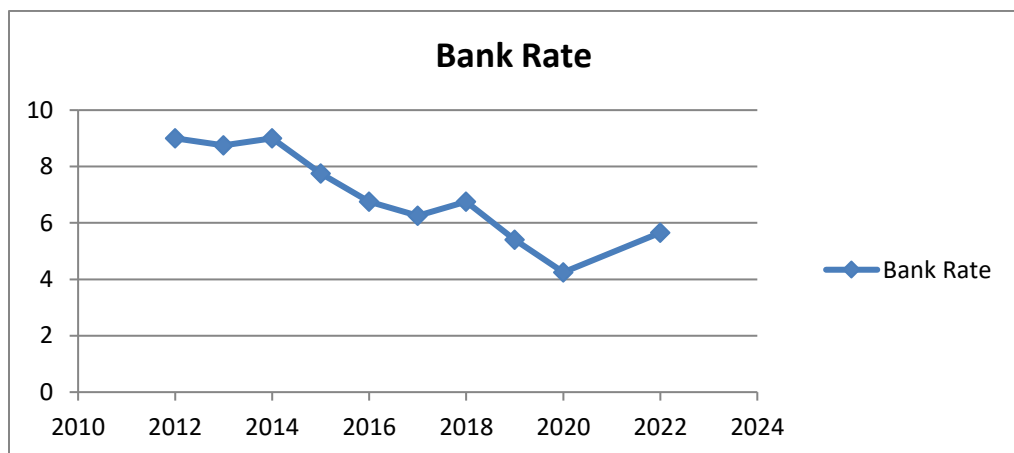
The present study has adopted the empirical research to fulfil the objectives framed by the researchers. The bank nifty movement data is collected from April 2012 to September 2022. The data has been classified into two groups, where the first group is for knowing the variance after announcement of monetary policy and the second group identifies the variance on the rest of the day. The researchers in order to know if the variables are stationary or non-stationary and two-tailed F-test is applied to find the variance. Correlation is applied to identify the linear relationship with respect to changes in monetary policy and the Bank Nifty.

**Volatility:** In this paper we have classified and defined volatility in to three categories, namely

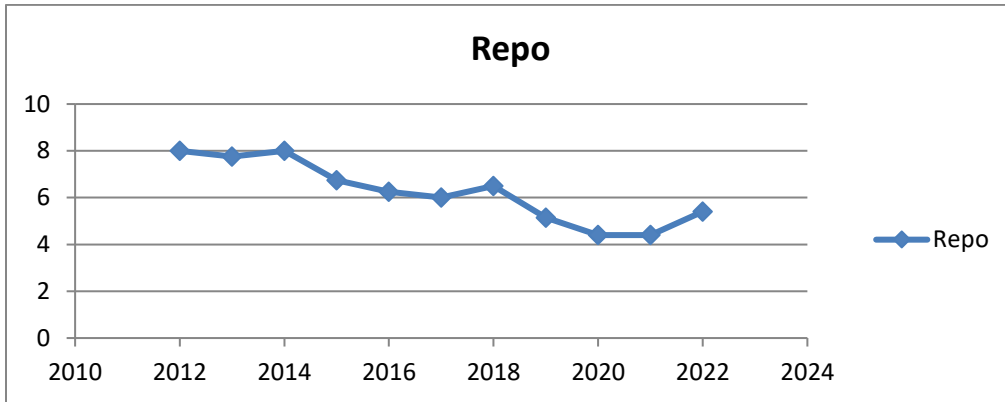
1. **Volatility of Returns:** It is the usual measure of return where it is computed by measuring the difference between the closing return of the previous day and the closing return of the current day.
2. **Volatility of High-Low:** Here /the volatility is measured by the difference between the highest value of the current day with the lowest value of the current day.
3. **Volatility of Open-close:** In this case volatility is measured by the difference between the Open price (index value at 9:08 am morning after pre-open session) and the current day closing return.

## The movement of various monetary policy indicators

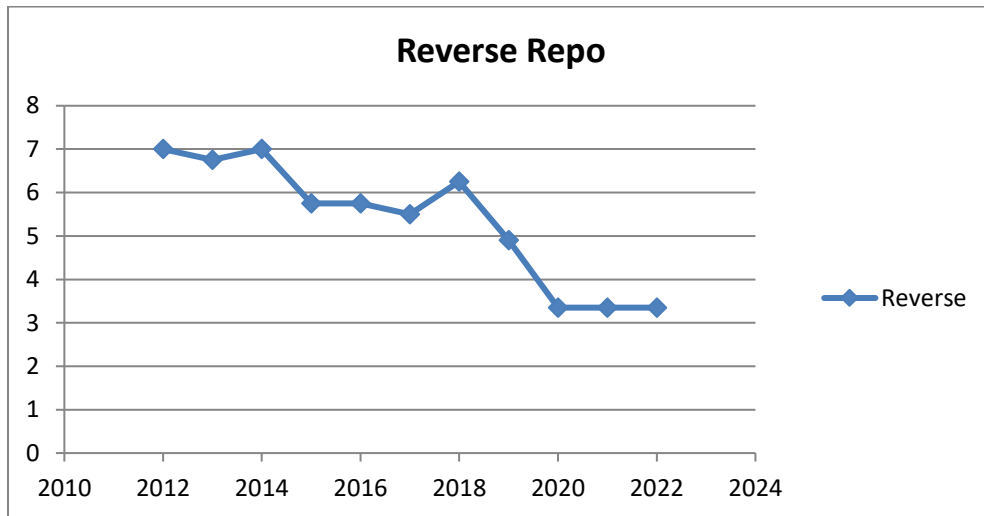
The below charts depict the movement of the monetary policy indicators during the study period.



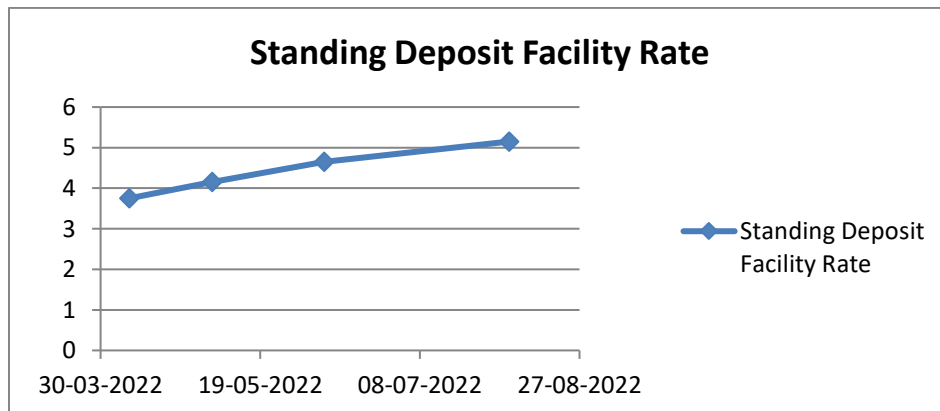
Source: Reserve Bank of India



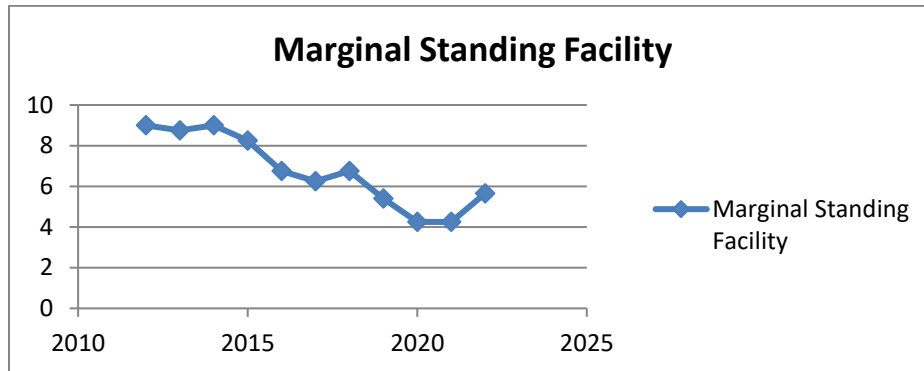
Source: Reserve Bank of India



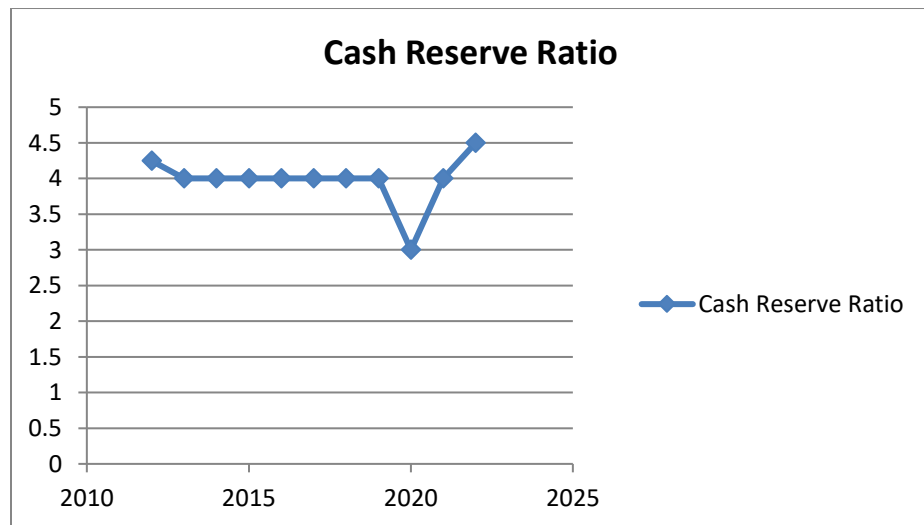
Source: Reserve Bank of India



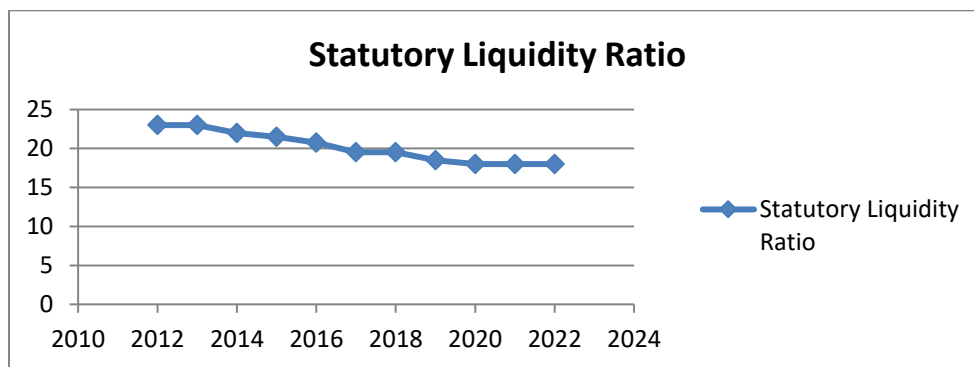
Source: Reserve Bank of India



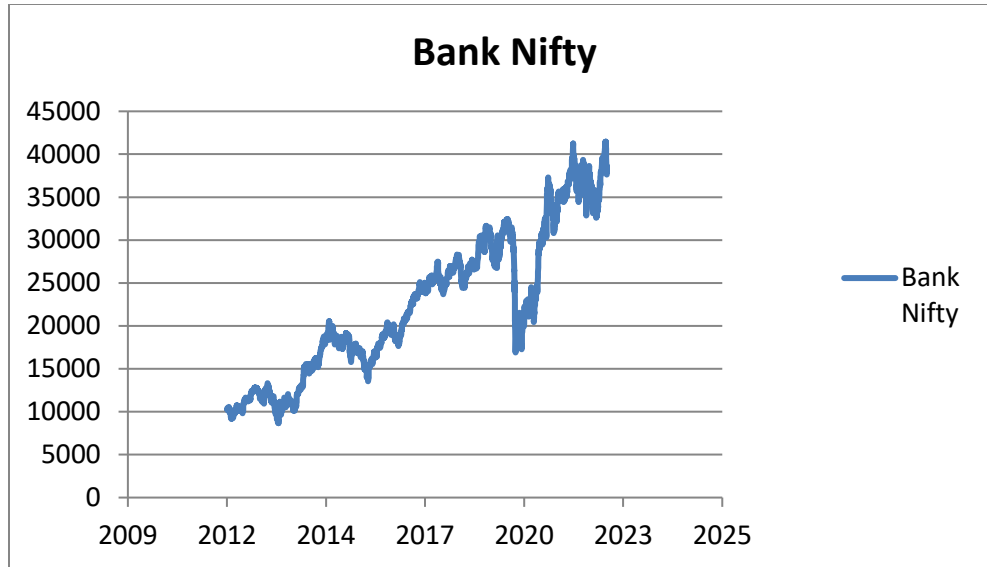
Source: Reserve Bank of India



Source: Reserve Bank of India



Source: Reserve Bank of India



Source: NSE

## Data Analysis and Interpretation

### Augmented Dickey-Fuller Test

When the data is stationary, the effect of unexpected change will reduce gradually, whereas if data is non-stationary, the effect of unexpected change is permanent. Hence unit root test is conducted to identify whether the data is stationary or not. Here as the data is large, Augmented Dickey-Fuller Test is applied to check the unit root.

$H_0$ : Series has unit root (series is non-stationary)

Results of Augmented Dickey-Fuller Test of Bank Nifty Index showed as below:

Coefficient	-0.93989
Standard error	0.01958
t-test	-47.9992

Critical value at 5% level of significance sample size at  $\infty$  being -1.94, -2.86 and -3.41

As the observed data is more negative than the tabulated critical value the null hypothesis of a unit root will be rejected.

### F-Test

To identify the variance of two samples drawn from the same population, F-Test is conducted. F-Test is conducted based on following information of data

1. In this paper volatility is measured in 3 terms Volatility of Returns, Volatility of High-Low and Volatility of Open-close, hence F-Test is conducted in all three stages.

2. The period of study being April 2012 to September 2022 is gathered which has a data of 2,601 stock market working days.
3. During these 2601 stock market working days, the RBI has revised its monetary policy in 56 different days.
4. The study is conducted based on major monetary policy rates namely Bank Rate, Repo, Reverse Repo, Standing Deposit Facility Rate, Marginal Standing Facility, Cash Reserve Ratio and Statutory Liquidity Ratio.
5. To study the variance, we have classified the entire data into two groups: Monetary Policy Data (MP Data) and Non-monetary Policy Data (NMP Data) which are 56 and 2545 respectively.
6. If stock market is closed on the date of Monetary Policy revision day, then the next working stock market day is considered for data classification.
7. Finally, the Variance of MP Data is compared with NMP Data

### **F-Test on Volatility of Returns (Overall Monetary Policy changes)**

H<sub>0</sub>: Variance of MP and NMP Data are same.

H<sub>1</sub>: Variance of MP Data is more than the Variance of NMP Data

**Table No. 1: F-Test Two-Sample for Variance**

	<b>MP Data</b>	<b>NMP Data</b>
Mean	-64.69821429	12.5902947
Variance	193305.3622	116709.2715
Observations	56	2545
Df	55	2544
F	1.656298251	
P(F<=f) one-tail	0.001844173	
F Critical one-tail	1.338245799	

### **Analysis and Inference:**

- Table 1 analysis indicates that the mean of MP is significantly less than the NMP Data. Further the Variance is more in MP data than NMP.
- F Ratio is 1.656298251 which is comparatively more than the F Critical one-tail 1.338245799 and p-values are less than significant level of alpha of 0.05, thus rejecting the null hypothesis, proving that variance of MP is more than variance of NMP.

### **F-Test on Volatility of High-low (Overall Monetary Policy changes)**

H<sub>0</sub>: Variance of MP and NMP Data are same.

H<sub>1</sub>: Variance of MP Data is more than the Variance of NMP Data

**Table No. 2: F-Test Two-Sample for Variance**

	MP Data	NMP Data
Mean	508.1669643	377.3026326
Variance	133202.1615	81422.26654
Observations	56	2545
df	55	2544
F	1.635942687	
P(F<=f) one-tail	0.002340735	
F Critical one-tail	1.338245799	

### Analysis and Inference

- Table 2 analysis indicates that the mean of MP is more than NMP Data. Further the Variance of MP Data is also more than that of NMP Data
- F Ratio is 1.635942687 which is comparatively more than the F Critical one-tail 1.338245799 and p-values are less than significant level of alpha of 0.05, thus rejecting the null hypothesis, proving that variance of MP is more than variance of NMP.

### F-Test on Volatility of Open-Close (Overall Monetary Policy changes)

H<sub>0</sub>: Variance of MP and NMP Data are same.

H<sub>1</sub>: Variance of MP Data is more than the Variance of NMP Data.

**Table No. 3: F-Test Two-Sample for Variance**

	MP Data	NMP Data
Mean	135.6991071	11.12640472
Variance	137001.7255	82925.20413
Observations	56	2545
df	55	2544
F	1.652112008	
P(F<=f) one-tail	0.00193738	
F Critical one-tail	1.338245799	

### Analysis and Inference

- Table 3 analysis indicates that the mean of MP is more than NMP Data. Further the Variance of MP larger than that of NMP Data
- F Ratio being 1.652112008 which is comparatively more than the F Critical one-tail 1.338245799 and p-values are less than significant level of alpha of 0.05, thus rejecting the null hypothesis, proving that variance of MP is more than variance of NMP.

### F-Test on Volatility of Returns (Individual Monetary Policy changes)

H<sub>0</sub>: Variance of MP Data (Individual) and NMP Data are same.

H<sub>1</sub>: Variance of MP Data (Individual) is more than the Variance of NMP Data.

**Table No. 4: F-Test on Volatility of Returns (Individual Monetary Policy changes)**

Type of Data	Mean	Variance	Observation	df	F	P(F<=f) one-tail	F Critical one-tail	Null Hypothesis
<b>NMP Data</b>	12.59029	116709.3	2545	2544				
<b>Bank Rate</b>	-104.408	165829	30	29	1.420873	0.067609	1.471967	Accepted
<b>Repo</b>	-63.3375	246192.3	28	27	2.109449	0.000722	1.490089	Rejected
<b>Reverse Repo</b>	587.6	150906.6	25	24	1.293013	0.154427	1.521591	Accepted
<b>SDF</b>	78.98	453413.9	5	4	3.884986	0.003771	2.375426	Rejected
<b>MSF</b>	-104.408	165829	30	29	1.420873	0.067609	1.471967	Accepted
<b>CRR</b>	-39.9375	263399	8	7	2.256881	0.027354	2.013175	Rejected
<b>SLR</b>	-102.969	134927.5	16	15	1.156099	0.299709	1.670317	Accepted

### Analysis and Inference

In the case of measure of F-Test on Volatility of Return, it is found that the three Monetary Policy Indicators i.e., Repo, SDF and CRR has proved to have more variance than NMP Data. On the contrary five Monetary Policy Indicators i.e., Bank Rate, Reverse Repo Rate, SDF, and SLR have proved to have same variance on MP Data and NMP Data.

### F-Test on Volatility of High-low (Individual Monetary Policy changes)

$H_0$ : Variance of MP Data (Individual) and NMP Data are same.

$H_1$ : Variance of MP Data (Individual) is more than the Variance of NMP Data.

**Table No. 5: F-Test on Volatility of High-low (Individual Monetary Policy changes)**

Type of Data	Mean	Variance	Observation	df	F	P(F<=f) one-tail	F Critical one-tail	Null Hypothesis
<b>NMP Data</b>	377.3026	81422.27	2545					
<b>Bank Rate</b>	586.1467	161900.5	30	29	1.988405	0.001314	1.471967	Rejected
<b>Repo</b>	646.4179	165342.2	28	27	2.030676	0.001317	1.490089	Rejected
<b>Reverse Repo</b>	219.6	144666.4	25	24	1.776743	0.011423	1.521591	Rejected
<b>SDF</b>	814.76	213785	5	4	2.625634	0.033004	2.375426	Rejected
<b>MSF</b>	586.1467	161900.5	30	29	1.988405	0.001314	1.471967	Rejected
<b>CRR</b>	460.4937	116559	8	7	1.431537	0.187957	2.013175	Accepted
<b>SLR</b>	348.2969	53930.26	16	15	1.509769	0.176581	2.068174	Accepted

### Analysis and Inference

Five out of seven Monetary Policy Indicators Data has more variance than that of NMP data, except CRR and SLR. Hence, stating that the variance of NMP Data is less than that of various monetary policy indicators Data.

### F-Test on Volatility of Open-Close (Individual Monetary Policy changes)

$H_0$ : Variance of MP Data (Individual) and NMP Data are same.

$H_1$ : Variance of MP Data (Individual) is more than the Variance of NMP Data.

**Table No. 6: F-Test on Volatility of Open-Close (Individual Monetary Policy changes)**

Type of Data	Mean	Variance	Observation	df	F	P(F<=f) one-tail	F Critical one-tail	Null Hypothesis
NMP Data	11.1264	82925.2	2545	2544				
Bank Rate	196.8067	187806.6	30	29	2.264771	0.000134	1.471967	Rejected
Repo	204.8946	203644.2	28	27	2.455757	4.4E-05	1.490089	Rejected
Reverse Repo	19649.63	44920803	25	24	541.7026	0	1.521591	Rejected
SDF	12.89	503874	5	4	6.076246	7.29E-05	2.375426	Rejected
MSF	196.8067	187806.6	30	29	2.264771	0.000134	1.471967	Rejected
CRR	-23.8687	54301.99	8	7	1.527111	0.289442	3.231547	Accepted
SLR	144.0594	76098.65	16	15	1.089706	0.456433	2.068174	Accepted

#### Analysis and Inference

Five out of seven Monetary Policy Indicators Data has more variance than that of NMP data, except CRR and SLR. Hence, stating that the variance of NMP Data is less than that of various monetary policy indicators Data.

#### Correlation between MP Data and NMP Data

##### Volatility of Returns

	MP Data	NMP Data
MP Data	1	
NMP Data	-0.17896758	1

Correlation between MP Data and NMP Data in volatility of returns is -0.17896758 which states there is no correlation between MP Data and NMP Data

##### Volatility of High-Low

	MP Data	NMP Data
MP Data	1	
NMP Data	-0.07508525	1

Correlation between MP Data and NMP Data in volatility of returns is -0.07508525 which states there is no correlation between MP Data and NMP Data

### Volatility of Open-Close

	MP Data	NMP Data
MP Data	1	
NMP Data	-0.27460308	1

Correlation between MP Data and NMP Data in volatility of returns is -0.27460308 which states there is no correlation between MP Data and NMP Data.

### Findings

1. With Augmented Dickey-Fuller Test this test it is found that the Bank Nifty's effect of unexpected change will reduce gradually (data is stationary) which in turn states that we can apply any statistical test on Bank Nifty and find the inferences.
2. F-Test (Overall) results of Volatility of returns, Volatility of High-Low and Volatility of Open-Close is found that Null Hypothesis is rejected which states that the variance of MP Data is more than the variance of NMP Data.
3. p-values in volatility of returns, volatility of High-Low and volatility of Open-Close are less than significant level of alpha of 0.05, thus rejecting the null hypothesis. Hence, the impact of monetary policy indicators is more on bank nifty.
4. F-Test (Individual) it is found that Repo Rates play a major role in the volatility of Bank Nifty Index. Further 13 out of 21 individual tests Null Hypothesis is Rejected. Showing that the variance is more, and remaining 8 indicators has not impacted on Bank Nifty.
5. The correlation test results lie between -0.5 and +0.5 stating that there is no correlation between the MP Data and NMP Data. Clearly stating that Bank Nifty movement on Monetary Policy Indicators disclosure date is not same as Non-Monetary Policy disclosure days.
6. Other Findings
  - a. 24(43%) Out of 56 Monetary Policy Indicators are revised on Saturdays where the stock markets are not operational. Stating that government is avoiding the sudden impact of monetary policy revision on stock market.
  - b. It is found that the Bank Rate, Repo Rate, Reverse Repo Rate and Marginal Standing Facility are more frequently revised than compared to CRR and SLR. Standing Deposit Facility has recently emerged and cannot determine the frequency of its changes.
  - c. Stock markets work on an average 248 days in a year. Bank Nifty Index provides an average return of Rs. 10.92 per day giving a return on investment of 26.18% per annum for past 10 ½ Years.

### Conclusion

Bank Nifty is sensitive towards any monetary policy changes and therefore, it is essential for the RBI to take necessary preventive measure before announcement of any changes. Also, it is essential to disseminate proper and timely information about the financial market to ensure and restore confidence among the investors to decide on their investment strategies. The RBI can also formulate few investment strategies for the investors to minimize the risk during any policy changes announced.

## References

- Joshi, P. (2015). Relationship between Macroeconomic Variables and Stock Market Development: Evidences from the Indian Economy. (Thesis), Birla Institute of Technology and Science, Pilani. Retrieved October 14, 2022
- Mrityunjaya B Chavannavar, S. M. (2016). Monetary Policy Effect on Nifty 50 and Sectoral Indices - A Study from Indian Stock Markets. International Journal of Latest Technology in Engineering, Management & Applied Science (IJLTEMAS), V(XII), 59-69. Retrieved October 17, 2022
- D, Sneha. (2016). Impact of Interest Rate and Exchange Rate Changes on Stock Prices : An Indian Context. (Thesis), Bangalore University, Department of Business Administration. Retrieved October 5, 2022
- Singh, A. (2017). Impact of Financial Factors on Stock Market: Empirical Evidences from India, U.S. and U.K. Thesis. Retrieved October 14, 2022
- Groww. (2016-2022). Impact of Commercial Banks in the Economy. Retrieved 2022 13, October, from Groww: <https://groww.in/blog/impact-of-commercial-banks-in-the-economy>
- N, D. K. (2017). Impact of Monetary Policy on Inflation and Stock Returns - An Empirical Study. (Thesis), Bangalore University, Department of Commerce. Retrieved September 29, 2022 (Singh A. , 2014)
- Singh, A. (2014). A Study of Monetary Policy Impact on Stock Market Returns. IRJA-Indian Research Journal, 1(5). Retrieved October 05, 2022
- A. Edwin Prabu, I. B. (2020). Impact of Monetary Policy on the Indian Stock Market: Does the Devil Lie in the Detail? Indian Economic Review. doi:10.1007/s41775-020-00078-2
- Reserve Bank of India. (2021). Monetary Policy Statement, 2021-22 Resolution of the Monetary Policy Committee (MPC). Reserve Bank of India. Retrieved September 13, 2022
- <https://dbie.rbi.org.in/DBIE/dbie.rbi?site=statistics> accessed as on 10th October 2022.
- [https://www1.nseindia.com/products/content/equities/indices/historical\\_index\\_data.htm](https://www1.nseindia.com/products/content/equities/indices/historical_index_data.htm) accessed on 5th October 2022.