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Exploring Exchange Rate–Stock Market Interactions: Evidence from Nifty via Toda–Yamamoto Technique

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Abstract

Purpose

The study aims to examine the causal relationship between exchange rates and stock market indices, specifically the Nifty index, while addressing the methodological limitations of traditional Granger causality approaches. It seeks to provide a more robust framework for understanding financial market interdependencies.

Research Methodology/Tool & Techniques

The research utilizes 20 years of daily time-series data (3rd April 2005–31st December 2025), comprising 4,671 observations. Stationarity is tested using the Augmented Dickey–Fuller (ADF) test. The Toda–Yamamoto causality test, an extension of the Vector Autoregression (VAR) model, is applied to detect causal linkages without imposing strict stationarity requirements. Additionally, the Impulse Response Function (IRF) is employed to capture the dynamic effects of unexpected shocks.

Major Findings

The analysis establishes bidirectional causality between exchange rates and the Nifty index. Movements in the Nifty index exert a stronger influence on exchange rates compared to the reverse. IRF results reveal that the Nifty index responds positively to its own shocks and marginally to exchange rate shocks, while exchange rates react negatively to shocks originating from the Nifty index. These findings highlight the asymmetric nature of financial market interactions.

Social Implications

The study underscores the importance of robust causality testing in financial research, offering insights for policymakers, investors, and regulators. By clarifying the dynamic interplay between currency markets and stock indices, the findings can inform strategies for managing exchange rate volatility, guiding investment decisions, and shaping economic policies that strengthen financial stability.

Keywords: *Exchange Rate, Nifty Indices, VAR Model, Toda–Yamamoto Test, Causality, Impulse Response Function*

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Introduction:

Exchange rate is a burning factor which influences the stock market at this time. We can see that US exchange rate with reference to Indian rupee is increasing day by day which represent the worst

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slump in Indian rupee in last four years. As per www.hindu.com, Indian currency depreciated by 7 % against US dollar since 2022 which is showing negative image of India. But on the other hand, this currency depreciation leads to more exports which improve balance of payment of the country and these things attracting the foreign investors to invest in Indian capital market. So we have included the US exchange rate and Nifty index in our study to examine the causality between them. As we have studied several literatures and found that most of the researcher applied Granger causality test to check the relationship between exchange rate and stock index. The drawback of granger causality is that it is applicable on stationary data only and does not follow lag selection criterion and because of these demerits test does not show appropriate causality. Change in exchange rates is one of the noteworthy components that influence stock prices, which in this way impacts a firm's showcase esteem. In spite of the truth that this point has been talked about around the world, there's still a lack of unanimity within the writing regarding the relationship between exchange rates and stock index **(Mourad, 2020).** As money related hypothesis depicts, the interest rates and exchange rates significantly influence the value of a firm and the upward and descending developments of the exchange rate play a essential part in deciding the stock prices. In both created as well as developing nations, the stock market plays a vital part as distant as monetary intermediation is concerned. It channels the stores in an economy from overflow units to deficit units through asset mobilization, which is basic within the handle of extension and development of an economy. Consequently, the stock market acts as a channel in mobilizing reserve funds and helps in the effective assignment of funds, thereby fostering economic growth **(Olugbenga & Anthony).** The trade of products gets to be appealing when there's devaluation in the nearby cash, and it leads to an increase in remote request. As a result, the income of a firm increases in value along with the appreciation within the firm's esteem and stock Prices. Similarly, when the local cash increases in value, it leads to a decline in benefits of a firm that exports goods as there's a decrease in its products' remote request **(Nath, 2003.).** An alternative approach is provided by the portfolio balance models that stressed the role of transactions in capital account in finding out the connection between stock costs and exchange rates. For instance, capital inflows from foreign investors are drawn by a pretty performance of a securities market that will increase the demand for domestic currency. On the opposite hand, the demand for the native currency depreciates once there's a fall in available costs because the foreign investors begin merchandising their stocks **(Adebiyi & Magnus Okoi Abeng, June 15).** Moreover, with time, foreign investment will increase in native equities as results of the profits of international broadening to foreign investors. Hence, the upward and downward movements of stock prices have an effect on the cash demand and exchange rates as a result of the liquidity demand and wealth of investors may be an element that affects the securities market performance **(Mishra, 2004).**

Several study have been conducted in past related to exchange rate and Nifty indices and some studies found a significant causality among the exchange rate and stock market indices Adebiyi et al., (2010); Syed Abul Basher et al., (2012); Ghosh, (2011); Walid et al., (2011) . Areli Bermudez Delgado et al., (2018) research investigation based on Mexico, revealed that, there is no cointegration or long run relationship among stock market returns, oil price and exchange rates and further, upswing in exchange rate cause a positive effect on stock market returns **(Delgado & Nancy & Bermudez Delgado, 2018).** Another study regarding the Indian securities market and exchange rates of USD, Euro, Yen, and pound sterling against the Indian rupee (INR) was conducted for a amount of five years, 2011–2015. The study used the granger relation check to seek out the cause and effect relationship between the securities market index and therefore the exchange rates. The study explains that the cause and impact between securities market indices (Sensex and NIFTY) shows an inverse relationship between returns from exchange rates USD, GBP,

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EURO, and YEN and therefore the relationship between currency returns to alternative currency returns against INR shows a positive relationship. This explains that the cause and impact relationship is unidirectional **(Kumarasamy & Umanath, 2017).** Similarly, a study explained the short-term and long-term causal relationship between securities market prices and exchange rates in China for a amount between 2002 and 2012 using co-integration tests, vector error correction (VEC) estimates, block exogeneity Wald tests, impulse responses, variance decomposition techniques, and structural break tests. The results showed a long-term relation from exchange rates to stock costs in Chinese stock markets and a short-term relation from Japanese yen and Korean won exchange rates to stock prices in Shanghai exchange strongly prevails, whereas within the Shenzhen exchange the relation is weak. The impact of the worldwide financial crisis from 2007 to 2009 on the Chinese stock markets was found to be insignificant **(Lee & Jung Wan, 2014).** A study on upward and downward movement of exchange rates and securities market returns in a very regime-switching atmosphere for BRICS countries for sixteen years (1997–2013) exploitation Mark off autoregressive model and VAR model. The results showed that the returns from the securities market were higher than exchange returns all told BRICS countries. Among BRICS countries, Republic of South Africa is a smaller amount volatile, and Russia is more volatile and changes in rate don't have an effect on the securities market come back of BRICS countries. Inversely, the impact from securities market returns to exchange rates is critical for all BRICS countries. Likewise, a study conducted for Karachi exchange (KSE one hundred Index, Pakistan) exploitation the Johansen co integration check and granger relation check showe d that there was no long-term relationship between exchange rates and therefore the securities market prices **(Chkili & Walid, . 2014). (Ihsan & Anjum,, 2015.)** in their study regarding exchange in India, found that there exists a one-way relationship between exchange rates and the slap-up Index. A study conducted in African country for the amount between 2001 and 2011 shows no significant relationship between rate and securities market prices. The results of the granger causality check indicates the absence of relation between the All Share Index (ASI) and exchange rates, that show the independence of exchange rates and securities market index in African country **(Zubair & Abdulrasheed., 2013).** The nature of the causative relationship between exchange rates and securities market performances of Switzerland and Poland from 2001 to 2008 was examined exploitation each linear and non-linear relation tests. The results showed that the performance of the stock market may be a determiner for changes in exchange rates (Portfolio approach) for Switzerland. For Poland, each portfolio and ancient approach wherever changes in exchange rates caused fluctuations available market prices had an effect on the exchange rates **(Gurgul & Henryk, 2012).** Another study to seek out a causative relationship between INR/Dollar exchange rates and securities market indices (SENSEX and NIFTY) for a period of 2004–2012 used granger relation and correlation analysis. Their results showed that there's a weak direct correlation between stock worth indices and exchange rates for the same period **(Gulati & Deepti, 2012).** In a study conducted by (Ibrahim (2000), the interactions between stock prices and exchange rates in Asian country were examined employing a Co integration and granger relation test. The study found no long-term relationship between stock costs and exchange rates,but proof for co-integration was ascertained once M2 cash in hand and reserves were included within the analysis. The study construed that the short-term exchange rates did impact the security market worth. Likewise, alternative studies conjointly supported that there's no important relationship between the exchange rate and securities market indices within the long-term **(Franck & Peter, 1972).** Another study analyzed the short-term and long-term effects between stock prices and exchange rates and therefore the channels throughout that exogenous shocks impact the

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markets of some Pacific Basin countries for amount between 1980 and 1998 and a structured co-integration associated variable granger relation che ck were used for the analysis and the results showed a positive long-term and short-term relation between stock prices and exchange rates **(Phylaktis & Kate, 2005)**.

We found that the topic is interesting and have greater presence in literature. We got several literatures on this topic and most of the literatures used traditional granger causality to know the causal relationship between the variables. But recent study said that it does not give accurate result about causality in between the variables because of some drawback like proper lag selection criteria, only applicable on stationary time series data etc. with traditional granger causality. So, to overcome these drawbacks we have used a new technique called Toda Yamamoto Test for examine the causality between exchange rate and Nifty indices. In the first and second part of the paper, we have covered introduction including literature review on exchange rate and Nifty indices as well as find the research gap. In the third part, we have discussed about objective, hypothesis of the study and Research Methodology. Fourth part includes analysis, model estimation and interpretation of the study. And in the last part, we have described the implication and conclusion of the study.

Research Gap:

After examine the previous literatures, we could understand that most of the literature used similar test i.e. Johansen Co-integration and Granger Causality for causality and co-integration to test short and long run relationship in between the selected variables. But drawback of Granger causality test is that, it does not show the controlling effect of other variables. So, in this study we are using a new technique i.e. Toda Yamamoto Test to short out this problem.

Objective of the study:

- To examine the Stationarity in time series by applying recent technique.
- To analyse causality between Exchange Rate and Nifty index by applying Toda Yamamoto Test over Traditional Granger Causality.
- To know the responsiveness of time series to the unexpected shocks in other time series.

Hypothesis:

- **H_{01}**: The data has unit root problem and not normally distributed.
- H02: There is no causal relationship between US Exchange rate and Nifty index.
- H03: There is no response of variable to unexpected shock.

Research Methodology:

- **Nature of the study:** the study is of Analytical and Descriptive nature.
- **Period of the study:** we have used daily time series data of 20 years from April 3, 2005 to Dec.31, 2025 covering 4671 observations for examine the causality.
- **Variables selection:** Daily Exchange rate and Nifty Index have been used.
- **Statistical and econometric tools:** We have applied ADF test for checking Stationarity in data set, Toda Yamamoto Test for Bi-variate causality over Traditional granger causality, Impulse Response Function to know the responsiveness of time series to the unexpected shocks and Variance decomposition used, which provides the variation proportion of movement in endogenous variables because of their own lagged shocks vs. lagged shock of remaining variables.

Brief description and Process of applying Toda and Yamamoto Test: Toda and Yamamoto (1995) in order to investigate Granger causality (1961), they developed a method based on the estimation of augmented VAR model (k+dmax) where k is the optimal time lag on the first VAR model and d-max is the maximum integrated order on system's variables (VAR model). The Toda and Yamamoto approach follows the steps below:

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- We find the integration order for each series. If the integration order is different we get the maximum (d-max).
- We create a VAR model on series levels regardless of integration order that we found.
- We define the order of VAR model (k) from lag length taken from LR, final prediction error (FPE), AIC, SC, HQ criteria.
- We test if VAR (k+dmax) (adjusted VAR model) is correctly specified.
- If series have the same integration order then we continue on co-integration test using Johansen methodology. Otherwise, we employ Pesaran et al. (2001) approach.
- No matter what the result will be on cointegration, we continue with causality test.
- We get VAR (k+dmax) model using suitable lags for every equation of the system.
- We apply Granger causality test for non-causality using pairwise equations and modified Wald test (MWald) for the significance of parameters on examined equations on number time lags (k+dmax).
- The modified Wald test (MWald) follows Chi-square ($\chi 2$) distribution asymptotically and the degrees of freedom are equal to the number of time lags (k+dmax).
- Rejection of null hypothesis entails the rejection of Granger causality.
- Finally, we check if there is co-integration on VAR model.
- If two or more series are co-integrated, then there is one causal relationship (unidirectional or bilateral) but not vice versa.

Analysis, Results and Discussion:

Table: 01 Descriptive Statistics

Variable	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	P Value
Exchange Rate	56.64841	11.82511	0.214729	1.534773	453.6366	0.000000
Nifty Index	7019.451	4095.488	0.785224	3.055898	480.6130	0.000000

Table-01 presents the higher volatility in the time series of the variables and series is leptokurtic because kurtosis value is more than and approximately 3 i.e. the distribution show high probability of return inclining to zero with a high positive and negative return. The statistics of Jarque-Bera show significant that is greater than zero (because of leptokurtic data). So Jarque-Bera depicts all the series are normally distributed.

Augmented Dickey–Fuller unit root test:

H_0: Variables have unit root Problem or data is not stationary.

Previous literatures confirmed that most of the financial time series is to be non-stationary or random walk when the series are in their original form. So we have examined unit root problem in the time series before applying any type of econometric technique in the study. The presence of non-stationary or random walk in the series may lead to fallacious inferences in the study. Thus, by applying augmented dickey-fuller (ADF) test, we have scrutinized the presence of unit root in the data set/ series. ADF test is to be expressed as:

$$\Delta y_t = c + \gamma T + \delta y_{t-1} + \sum_{j=1}^{p} \rho_j \Delta y_{t-j} + \varepsilon_t$$

Table: 02 Augmented Dickey–Fuller (ADF) test

	Augmented Dickey–Fuller (ADF) test		Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test		Result
Variables	**At level**	**At first difference**	**At level**	**At first difference**	**(Stationarity)**
Exchange Rate	0.2189	0.000	0.8331	0.068	At 1st difference
Nifty indices	0.0320	0.000	0.6416	0.073	At 1st difference

Source: 'The Author's'

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As per Toda Yamamoto test, first of all we have to generate log series of normal time series for analysis so we have taken simple log of exchange rate and Nifty indices. Here, applied ADF and KPSS test for unit root and Cross check and Table 1 is depicting that both the series are **I (1)** because it become stationary at first difference. As Log nifty is coming stationary at level but KPSS test showing non-Stationarity at level so both the test satisfying Stationarity at first difference. Finally we conclude that d-max is **one (1).** Now, we could precede further process and second step is to apply VAR.

Integrated VAR model: In Integrated VAR model, we take the time series at their level or without any differencing, irrespective of their order of integration and decide optimum lag length using AIC, SC and HQ criteria.

Table: 03

Vector Auto regression Estimates:		
	LOG_NIFTY	**LOG_EXCHRATE**
LOG_NIFTY(-1)	1.034032	-0.054797
	(0.01536)	(0.00460)
	[67.3170]	[-11.9220]
LOG_NIFTY(-2)	-0.035940	0.055101
	(0.01535)	(0.00459)
	[-2.34205]	[11.9997]
LOG_EXCHRATE(-1)	-0.055054	0.951181
	(0.05061)	(0.01514)
	[-1.08781]	[62.8106]
LOG_EXCHRATE(-2)	0.059782	0.048077
	(0.05062)	(0.01515)
	[1.18095]	[3.17396]
C	-0.001862	0.000501
	(0.00414)	(0.00124)
	[-0.45012]	[0.40432]
R-squared	**0.999527**	**0.999578**
Adj. R-squared	0.999526	0.999578

Source: 'The Author's'

Here, VAR estimate used to decide the order of exogenous and endogenous variables. Most probably more endogenous variable come first and more exogenous variable come last and the decision regarding selection of order is to be taken by using the value of R- squared. Here, table 2 is showing log nifty is more endogenous and log exchange rate is more exogenous because R^2 value **(0.999527)** of nifty is higher than the R^2 value **(0.999578)** of exchange rate. So log nifty should come first and log exchange rate at last. This estimation for deciding optimum order is so important because it affect the result of further analysis i.e. decide optimum lag length criteria and so on if we will not check this order of Endogeneity and Exogeneity.

Table 04 - Selection of Lag Length: In the study we have used VAR lag order selection criteria which consider different lag for select the optimum lag. By applying the democratic rule for selection of optimum lag as majority of criterion say so here **lag length 7** has been chosen for applying TD test.

VAR Lag Order Selection Criteria						
Endogenous variables: LOG_NIFTY LOG_EXCHRATE						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1420.155	NA	0.006323	0.612206	0.614980	0.613182
1	32003.77	66804.69	3.57e-09	-13.77433	-13.76601	-13.77140
2	32077.77	147.8428	3.47e-09	-13.80447	13.79060*	-13.79959
3	32089.77	23.95483	3.45e-09	-13.80791	-13.78849	-13.80108
4	32097.20	14.83735	3.45e-09	-13.80939	-13.78442	-13.80060

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5	32109.34	24.22426	3.44e-09	-13.81289	-13.78238	13.80216*
6	32111.80	4.907683	3.44e-09	-13.81223	-13.77617	-13.79954
7	32119.32	14.97635	**3.43e-09***	**13.81374***	-13.77213	-13.79910
8	32121.43	4.211981	3.44e-09	-13.81293	-13.76577	-13.79634
9	32122.64	2.401383	3.44e-09	-13.81172	-13.75902	-13.79318
10	32126.48	7.650497	3.44e-09	-13.81166	-13.75341	-13.79116
11	32132.05	11.08092*	3.44e-09	-13.81233	-13.74853	-13.78989
12	32133.04	1.983021	3.44e-09	-13.81104	-13.74169	-13.78664

Source: 'The Author's'

Note: *Indicates lag order selected by the criterion. **Bold:** indicates optimum lag selection which is adopted for further analysis.

Stability of Model: For checking the stability of estimated VAR model we used AR root table and AR root graph. As theory say if blue dots come within the circle then the model will be stable and we can proceed for further analysis. Here, graph is showing that one blue dot is on the border line of circle and it is difficult to confine that the entire root lies within the circle or not. So, for this confirmation we check the AR root table and we can see that table is depicting no root lies outside the unit circle and satisfying the stability condition.

Table: 05 AR root

Endogenous variables: LOG_NIFTY LOG_EXCHRATE	
Root	Modulus
0.999973	0.999973
0.996751	0.996751
0.638769	0.638769
-0.626413	0.626413
0.198893 – 0.566545i	0.600443
0.198893 + 0.566545i	0.600443
-0.220578 - 0.506388i	0.552343
-0.220578 + 0.506388i	0.552343
-0.439937 - 0.282869i	0.523029
-0.439937 + 0.282869i	0.523029
0.445509 - 0.263629i	0.517666
0.445509 + 0.263629i	0.517666
0.000154 - 0.497217i	0.497217
0.000154 + 0.497217i	0.497217
No root lies outside the unit circle.	
VAR satisfies the stability condition.	

Source: 'The Author's'

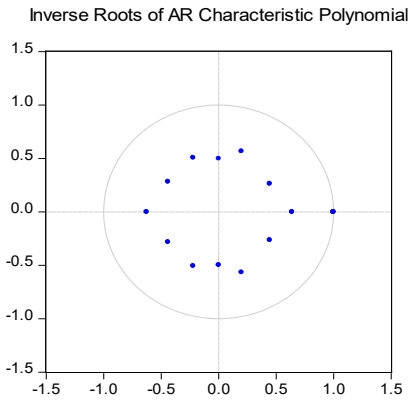

Figure: 1 AR root Graph

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Table 06- Auto Correlation LM Test:

VAR Residual Serial Correlation LM Tests

Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	1.276250	4	0.8654	0.319050	(4, 9276.0)	0.8654
2	5.595289	4	0.2315	1.399093	(4, 9276.0)	0.2315
3	2.458526	4	0.6521	0.614647	(4, 9276.0)	0.6521
4	2.028670	4	0.7305	0.507168	(4, 9276.0)	0.7305
5	1.644037	4	0.8009	0.411001	(4, 9276.0)	0.8009
6	6.214800	4	0.1837	1.554053	(4, 9276.0)	0.1837
7	3.523129	4	0.4744	0.880855	(4, 9276.0)	0.4744
8	3.692757	4	0.4492	0.923273	(4, 9276.0)	0.4492

Source: 'The Author's'

After checking the stability of model we further proceed for examine the serial correlation problem in the time series. Table 5 depicts that the time series are not serially correlated because p-value of all lag is greater than 0.05 and we accept the null hypothesis. It means the series has not affected from serial correlation problem and we can proceed for final estimation of Model.

Table: 07 VAR Granger Causality/Block Exogeneity Wald Tests: **Dependent variable:** LOG_NIFTY			
Excluded	**Chi-sq**	**df**	**Prob.**
LOG_EXCH. RATE	16.39357	7	0.0218
All	16.39357	7	0.0218
Dependent variable: LOG_EXCH.RATE			
Excluded	**Chi-sq**	**df**	**Prob.**
LOG_NIFTY	163.6892	7	0.0000
All	163.6892	7	0.0000

Source: 'The Author's'

The table 06 showing the final result of Toda Yamamoto Test (d-max) which is different from traditional granger causality test because of Chi-sq distribution. In normal granger causality F-stat has been used to analyses the causality but here chi-sq distribution is to be considered which gives more accurate result than F-stat. Here in first case Log Nifty is dependent variable and log exchange rate is independent variable and result depicts that exchange rate have significant impact on nifty index because p-value **(0.021)** is less than 0.05 as well as chi-sq value **(16.393)** is also greater than std value i.e. 3.84. In second case, exchange rate is dependent variable and nifty index as independent variable, table showing that nifty have high impact on exchange rate because p-value is coming under significant value i.e. 0.05 as well as Chi-sq value **(163.689)** is very much high than std value which quantify the significance level of causality in between the exchange rate and nifty index. Finally we can say, there is presence of bi-variate causality between log exchange and log nifty i.e. any change occurs in exchange rate affect nifty index significantly and vice-versa.

Impulse Response Function:

In order to study the responsiveness of a time series to the unexpected shocks in other time series in VAR approach, we have used impulse response functions. The impulse response helps in examining the responsiveness of the endogenous time series variables in the selected VAR system. Hence, for each endogenous time series from each equation in VAR system, we have injected a unit shock to the error. Examining the effect of the shock on different endogenous time series variables in the VAR system over time follows. The ordering of the selected endogenous time series variables may influence the results of impulse response; hence, we have used generalized impulses for the VAR analysis in order for neutralizing the ordering effect **(Chauhan & Chaklader, 2020).** Figure 2 represent pair wise accumulated response of exch. rate and nifty index between the selected time series i.e. log exch. Rate

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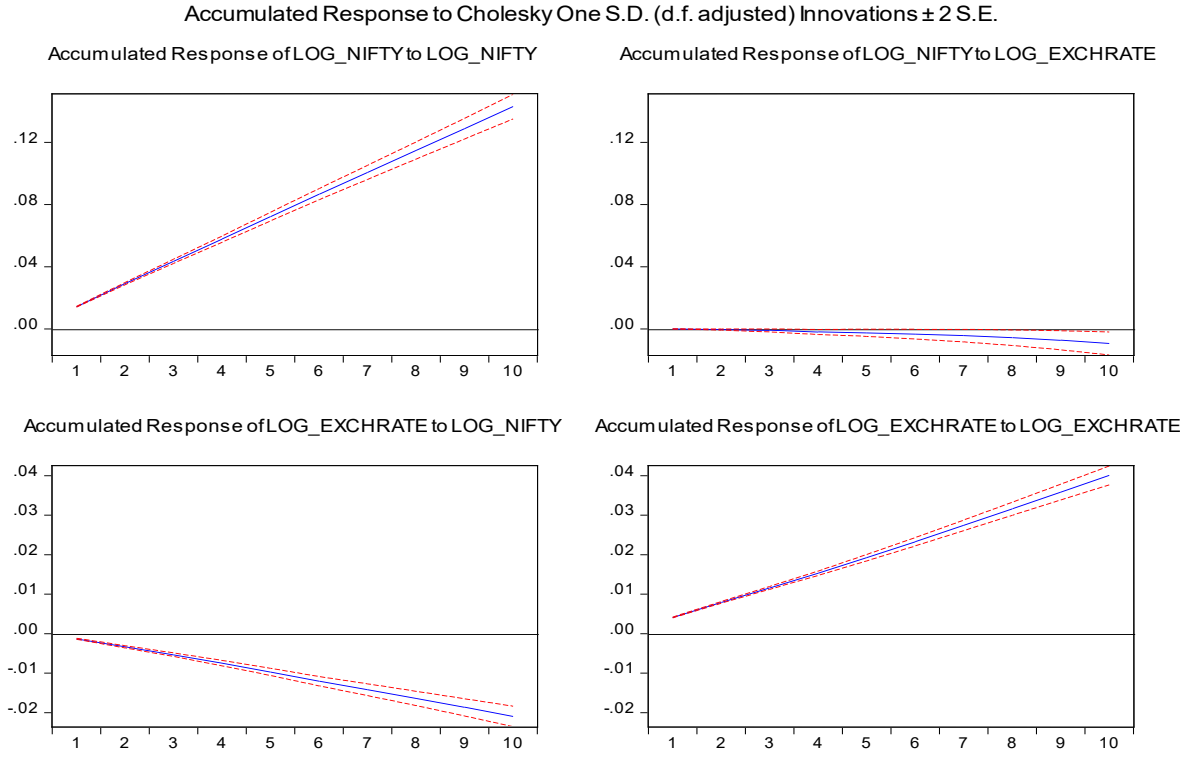
and log nifty. Figure indicates that there is negative response of exchange rate to nifty index and nifty is not responding significantly to change in exchange rate. From the results, we have arrived at conclusion that exchange rate involve negative feedback trading or value trading, as for as exchange rate increases the nifty index decrease and investor go for buying the stock for long run.

Figure: 2 Impulse Response Function between Exchange Rate and Nifty Index



Source: Author's own creation

Table- 08 Variance Decomposition Analysis:

Variance Decomposition of Log_Nifty				Variance Decomposition of Log_Exch. Rate		
Period	**S.E.**	**LOG_NIFTY**	**LOG_EXCHRATE**	**S.E.**	**LOG_NIFTY**	**LOG_EXCHRATE**
1	0.014325	100.0000	0.000000	0.004278	9.359217	90.64078
2	0.020667	99.97254	0.027456	0.006105	15.71063	84.28937
3	0.025174	99.92150	0.078502	0.007396	18.08051	81.91949
4	0.028968	99.82538	0.174616	0.008540	19.65071	80.34929
5	0.032420	99.82671	0.173288	0.009671	20.72392	79.27608
6	0.035489	99.79567	0.204327	0.010737	21.56611	78.43389
7	0.038200	99.76242	0.237581	0.011727	21.51173	78.48827
8	0.040712	99.73803	0.261969	0.012631	21.52313	78.47687
9	0.043073	99.72345	0.276548	0.013474	21.56909	78.43091
10	0.045295	**99.71156**	**0.288438**	0.014271	**21.60093**	**78.39907**

Source: Authors

Note: Cholesky Ordering: Log_nifty Log_Exch rate.

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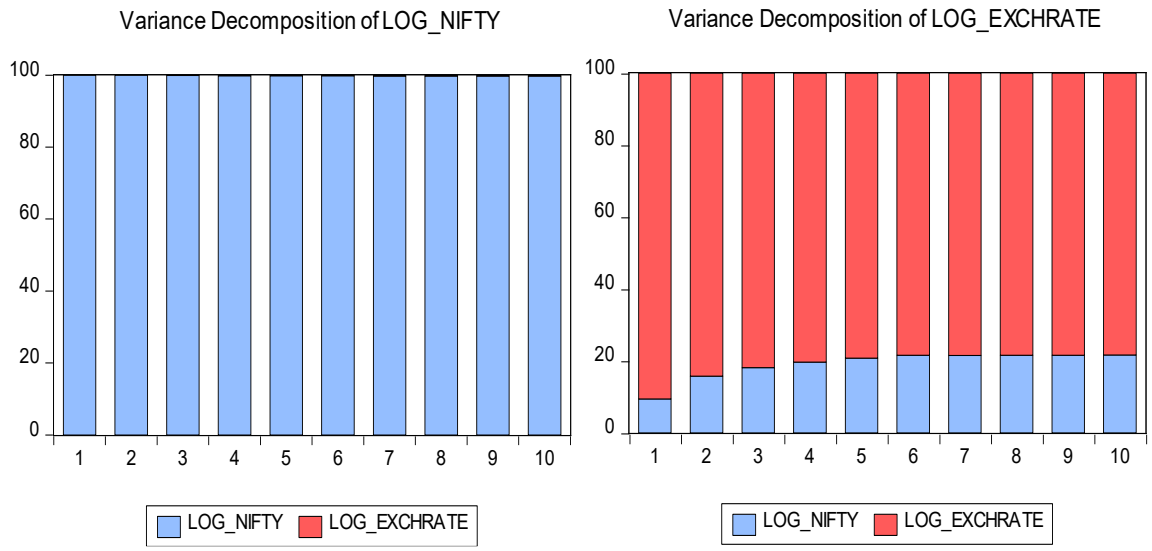
Figure: 03
Variance Decomposition using Cholesky (d.f. adjusted) Factors



Source: Authors creation

The Variance Decomposition function provides a little bit different way of examine the dynamics of vector Auto Regression system. The variance decomposition provides the ratio of variance change of movement independent variables that is due to own lagged shock against movement of lagged shock of other remaining variables in the system. Practically, the effect of shock is coming significance upto the 10 days. So, we have taken the effect of shock of own lag and lagged shock of other variables for 10 days.

Table-08 depicted that Nifty is explained 99 per cent by its own lagged variance and 0.28 per cent by exchange rate which express that variance in exchange rate causes to change in Nifty up to some extent. On the other hand, exchange rate is explained by its own lagged shock with 78.39 per cent and affected by 21.60 per cent in lagged variance of Nifty which shown variance in nifty have high impact on exchange rate. So, investors should take care about variation in Nifty and exchange rate before and after investment in stock market.

Conclusion:

Exchange rate remains one of the most influential variables shaping stock market performance and investor behavior. The present study sought to establish the causal relationship between exchange rates and the Nifty index by employing the Toda–Yamamoto causality test, which overcomes the limitations of the traditional Granger framework by incorporating both own-lagged effects and the lagged influence of other variables. The analysis confirms the existence of short-run negative causality: an increase in exchange rates leads to a decline in the Nifty index, and vice versa. Notably, variations in the Nifty index exert a stronger impact on exchange rates than the reverse. Impulse Response Function (IRF) analysis further reveals that the Nifty responds most positively to its own lagged shocks, with a modest response to exchange rate shocks. Conversely, exchange rates exhibit significant positive reactions to their own shocks but respond negatively to unexpected movements in the Nifty. This dynamic interaction suggests the presence of negative feedback trading or value trading strategies among investors over extended periods. The findings provide practical implications, offering investors valuable guidance in anticipating market behavior and making informed investment decisions in response to fluctuations in exchange rates or Nifty indices.

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Table- 08 Variance Decomposition Analysis

Figure: 01 AR root Graph

Figure: 02 Impulse Response Function between Exchange Rate and Nifty Index

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