Are the Monetary Policy Indicators Useful in Explaining Exchange Rates?- Evidence from India

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Abstract

The monetary policy of a country is a tool to manage economic fluctuations and target price stability. Central banks use monetary policy by adjusting the money supply through buying and selling of securities in the open market. It affects the interest rates, inflation rate and economic activity. These fluctuations affect many economic variables such as exchange rates which in turn, affects international trade. This study is an attempt to analyze the impact of fluctuations in monetary indicators on real effective exchange rate (REER) in India using ARDL approach. The independent variables used in the study are money supply, real gross domestic product, interest rate and inflation rate for the period from 1991 to 2021. The study revealed that all the independent variables are significantly affecting the real effective exchange rate in the long run. The error correction term is found to be negative and significant which indicates that the speed of adjustment towards the equilibrium. The model has passed all the diagnostic tests and stability tests. Granger causality tests also confirms short run causality between the monetary indicators and real effective exchange rate.

Keywords: Monetary policy, real effective exchange rate, inflation rate, ARDL, Real GDP, interest rate and money supply

Introduction

The real effective exchange rate (REER) represents a country's currency value relative to a basket of other currencies, adjusted for inflation differences. This metric offers a comprehensive view of a nation's trade competitiveness. Fluctuations in the REER influence various economic factors, including international investment portfolios, the competitiveness of exports and imports, the valuation of international reserves, debt payments denominated in foreign currencies, and the cost of international travel. Understanding the factors that drive movements in the REER is crucial for comprehending the dynamics of the foreign exchange market and a country's economic performance.

For a nation, economic stability is the main agenda as it accelerates the pace of economic development. The primary objective of the monetary policy is to maintain price stability while keeping in mind the objective of growth (Reserve Bank of India Act, 1934). The government of a country uses this demand-side economic strategy to meet macroeconomic objectives related to growth, inflation, consumption, and liquidity. A nation's monetary policy is a tool for controlling economic volatility and aiming for price stability. As part of their monetary policy, central banks buy and sell assets on the open market in order to change money supply which impacts economic activity, inflation, and interest rates. These fluctuations affect many economic variables such as exchange rates which in turn, affects international trade. There are many approaches to understand the movement in the exchange rates.

The monetary model of exchange rate determination posits a strong relationship between exchange rates and fundamental monetary variables, such as money supply, price levels, and interest rates. It assumes that exchange rates are primarily driven by the relative demand and supply of currencies, which in turn depend on the underlying monetary conditions of different countries. This model operates under the assumption of globally integrated markets and a stable money demand function. The exchange rate, according to the model, adjusts to equilibrate the relative prices of goods and services across countries, aligning with the theory of purchasing power parity (PPP) in the long run. Keynes' (1924) insight also reflects this view, as he highlighted that the value of a currency is determined by its supply in the market and the purchasing power the public wishes to hold. The monetary model serves as a useful framework for analyzing the role of monetary policies and inflation differentials in influencing exchange rate movements. However, its reliance on long-term equilibrium and assumptions of market efficiency often limits its application in explaining short-term exchange rate volatility.

The goal of this study is to examine how India's real effective exchange rate was determined between 1991 and 2021 by looking at monetary policy factors. The flow of rest of the research paper is as follows - Section 2 describes the review of literature. Data description and Methodology are explained in Section 3. Section 4 presents the Data Analysis and results; the last segment concludes the paper.

Review of Literature

A vast body of literature exists on the determinants of foreign exchange rates, employing various models of exchange rate determination. The following papers reviewed in this study focus specifically on the monetary model of exchange rate determination.

Macdonald &Nagayasu (2000) examined the long run relationship between real exchange rate and real interest rate differential for the period of 1976 -1997 for 14 industrialised countries using bilateral exchange rate against US dollar. Both time series cointegration test and panel cointegration test was performed to study the long run relation. There was a weak long run relationship between the real exchange rate and real interest rate under Johansen's test . Panel Cointegration test by Pedroni showed that there was a strong relation between the variables. Study also showed that coefficient of real interest rate differential (beta) is negative which is consistent with the previous studies.

Chul & Oh (2001) in their work analysed the impact of monetary parameters on exchange rate. The independent variables were money differential and income differential. Exchange rate used in the study was in denomination of US Dollar. Quarterly series were obtained for 8 nations namely Canada, France, Germany, Japan, Italy, Switzerland, UK and US for the period of 1973Q1-1997Q2. Augmented Dickey Fuller (ADF) test and Phillips Perron (PP) test were used to check the stationary of the variables, Panel Cointegration test and FMOLS (fully modified OLS) by Pedroni were used. Cointegration was performed on individual countries as well as on panel data. Study concluded that under panel cointegration tests, all variables were strongly cointegrated with exchange rate.

Crespo-Cuaresma.J et al. (2005) calculated the monetary exchange rate model for six Central and Eastern European nations (the Czech Republic, Hungary, Poland, Romania, Slovakia, and Slovenia) for the years 1994 to 2002 using panel cointegration method. The money supply, industrial production, interest rate, and price ratio are the explanatory variables that were used in this investigation. .The study used panel stationarity tests, the Fully Modified Least Square Estimator, the Dynamic Least Square Estimator, and the Pooled Mean Group estimator. The analysis came to the conclusion that real industrial production and the money supply can best explain nominal exchange rates.

Fizari et al. (2011) in their study examined the effect of interest rate and inflation rate on exchange rate volatility in Malaysia for the period of 1999-2009. Exchange rate is Malaysian Ringgit / US Dollar. Cointegration test and Vector Error Correction Model (VECM) results showed that there was a long run relationship between the interest rate, inflation rate and exchange rate. The Granger causality test revealed that the inflation rate influences the exchange rate, with a one-way causality from interest rate to inflation rate, and no causal relationship between interest rate and exchange rate.

Mayowag.A et al. E(2013) examined the impact of certain macroeconomic variables such as Government expenditure , money supply, openness of the economy, productivity index , and real interest rate on the exchange rate volatility for the period of 1981 to 2008 in Nigeria. Exchange rate used in the study is Naira/USD. GARCH model is used to generate real exchange rate from nominal Exchange rate. ADF and PP test were used to study the stationarity of the variables. To study the short term and long-term relationship between the variables, Error correction mechanism and cointegration test were used. Study revealed that government expenditure and real exchange rate has positive impact whereas openness of the economy and real interest rate has a negative impact on exchange rate volatility. Money supply and productivity index were not significant in their impact.

Adeoye.BW & Saibu. OM(2014) analysed the sources of fluctuations in exchange rate volatility from monetary policy shocks in Nigeria for the period of 1989 Q1 – 2015Q4. The explanatory variables in the study are Interest rate, money supply, price level as inflation rate , reserve money, real output. Exchange rate used in the study is Naira/USD. The granger causality test concluded that interest rate granger causes exchange rate volatility. The Engle-Granger cointegration and error correction mechanism analyses indicated the presence of both long-term and short-term relationships between monetary policy shocks and exchange rate volatility.

Tariq Mohammad Ali et al. (2015) studied the factors influencing exchange rate in Pakistan for the period from 2000 to 2009 using Johansen Cointegration test and vector error correction model. The explanatory variables are interest rate , money supply and inflation rate . The study concluded that interest rate and money supply negatively influence the exchange rate at significance level while inflation has significant positive impact on exchange rate. This shows the convergence towards equilibrium level.

Not many studies have been conducted to examine the determinants of real effective exchange rate of India using monetary policy indicators using econometric techniques. This study will be an attempt to find the determinants of real effective exchange rate of India using latest database.

Data and Methodology

Data

The independent and dependent variables are chosen for the study on the basis of review of literature. The annual data is obtained for the period from 1991 to 2021. The dependent variable, Real Effective Exchange Rate (REER) is the nominal index adjusted for relative changes in consumer prices; an increase / decrease represents an appreciation/depreciation of the local currency(World bank Databank). A detailed description of the independent variables is listed in Table 1.

Table 1 – Description of Independent Variables

Variable	Form of the variable	Data Source
Money Supply (MS)	Broad money supply (% of GDP)	World Development Indicators (WDI) of World Bank Databank
Real Gross Domestic Product (RGDP)	At constant prices, in US Dollar (in Log form)	WDI
Interest Rate (IR)	Lending interest rate (%)	WDI
Inflation Rate (INF)	Measured by Consumer Price Index (%)	WDI

Source-Author's Contribution

Methodology

For examining the determinants of the real effective exchange rate (REER), following regression equation is formed.

$$REER_t = \alpha_0 + \alpha_1 MS_t + \alpha_2 \ln RGDP_t + \alpha_3 IR_t + \alpha_4 INF_t + \varepsilon_t$$

where α_0, t and ε_t represents intercept, time (in years) and white noise error term. α_0 to α_4 are the parameters to be estimated. The time series analysis requires the study the nature of the variables using many econometric tests. All the variables are in percentage except GDP which is in log form.

The descriptive analysis of the variables is performed to study the fundamental behaviour of the variables using mean, mode and median. Jarque Bera test is performed to examine the normality of the variables. The correlation analysis is also done to examine the correlation among the variables.

Unit root test

The initial step in conducting time series analysis is to test for the presence of a unit root in the variables to determine whether they are stationary. Non-stationary time series can lead to spurious results, rendering the findings inconsistent and biased. To assess the stationarity of the variables in this study, the Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1979) and the Phillips-Perron (PP) test (Phillips & Perron, 1988) were applied.

Lag Length Selection

The ARDL model includes lagged value of dependent as well as independent variables. Before applying ARDL, the appropriate number of lags have to be determined on the basis of different criteria such as Akaike Information Criteria (AIC), Schwarz Information Criteria (SIC) , Hannan-Quin (HQ) Information criteria and many others. Optimal lag should be chosen which minimizes the selected criterion.

ARDL model

Auto Regressive Distributed Lag (ARDL) is a regression model that includes lagged value of dependent as well as independent variables. It is usually useful when series have random walk behaviour. ARDL model can be applied to the time series which are I(0), I(1) and combination of both. The only condition is that none of the variable should be I(2). The F-test statistic should establish that there is a long run relationship between the variables, then ARDL error correction representation become efficient. For examining the relationship between dependent and independent variables, ARDL model of (p, q_1, q_2, q_3, q_4) where p is the number of lags for dependent variable and q are the number of the independent variable. The ARDL equation can be written in the following manner –

$$REER_t = \alpha_0 + \sum_{i=1}^{p} \gamma_i REER_{t-i} + \sum_{j=0}^{q1} \theta_{1j} MS_{t-j} + \sum_{j=0}^{q2} \theta_{2j} \ln RGDP_{t-j} + \sum_{j=0}^{q3} \theta_{3j} IR_{t-j} + \sum_{j=0}^{q4} \theta_{4j} INF_{t-j} + u_t$$

where γ is the coefficient of the dependent variable and θ's are the coefficients of the independent variables. α_0 is the intercept and u_t is the white noise error term.

Bounds Cointegration test is used to find the long run relationship between the variables. The long run form or the conditional error correction regression is formed:

$$\Delta REER_t = \alpha_0 + \lambda_1 REER_{t-1} + \lambda_2 MS_{t-1} + \lambda_3 \ln RGDP_{t-1} + \lambda_4 IR_{t-1} + \lambda_5 INF_{t-1} + \sum_{i=1}^{p-1} \gamma_i \Delta \ln REER_{t-1} + \sum_{j=0}^{q1-1} \beta_{1j} \Delta MS_{t-j} + \sum_{j=0}^{q2-1} \beta_{2j} \Delta \ln RGDP_{t-j} + \sum_{j=0}^{q3-1} \beta_{3j} \Delta IR_{t-j} + \sum_{j=0}^{q4-1} \beta_{4j} INF_{t-j} + e_t$$

where the λ's are the long run multipliers.

The short run coefficients are provided by the error correction regression form of the ARDL model which can be presented mathematically as follows :

$$\Delta REER_t = \sum_{i=1}^{p-1} \gamma_i \Delta \ln REER_{t-1} + \sum_{j=0}^{q1-1} \beta_{1j} \Delta MS_{t-j} + \sum_{j=0}^{q2-1} \beta_{2j} \Delta \ln RGDP_{t-j} + \sum_{j=0}^{q3-1} \beta_{3j} \Delta IR_{t-j} + \sum_{j=0}^{q4-1} \beta_{4j} \Delta INF_{t-j} + \delta ECT_{t-1} + \varepsilon_t$$

ECT_{t-1} is the lagged value of the residual term obtained from cointegration equation and δ gives the speed of adjustment towards the equilibrium. The Error Correction Term (ECT) indicates the extent to which any imbalance from the previous period is being adjusted or how much of that disequilibrium is being corrected over time.

Residual Diagnostic and Stability tests

Several residual diagnostic tests are run to determine the model's robustness after the estimations of the long and short run coefficients. To check for the existence of serial correlation in the residuals, Breusch-Godfrey LM test is performed. Jarque Bera test is used to check for normality in the residuals. In order to check for the heteroskedasticity in the residuals, the Breusch-Pagan-Godfrey test is performed.

For checking the stability of the model, CUSUM and CUSUM of Squares tests are performed. These tests are based on cumulative sums of deviation from a reference value. The values are plotted together with 5 per cent significant values. For a model to be stable, the values should lie between the 5 per cent significant boundary. Any deviation from the boundary will lead to instability of the model. To check the model specification, Ramsey Regression Equation Specification Error (RESET) Test is performed.

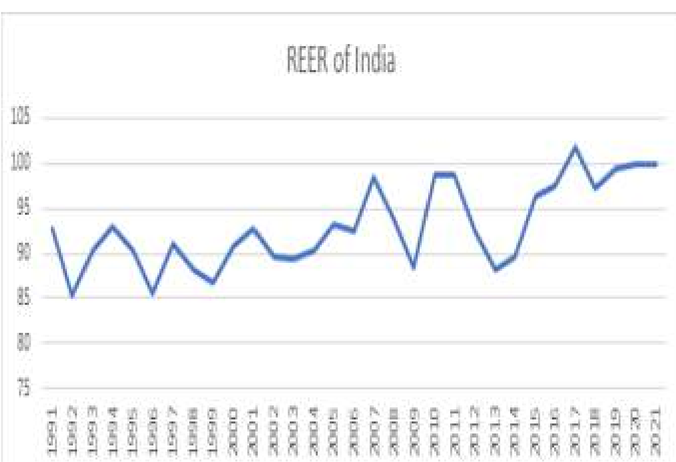
Granger Causality Test

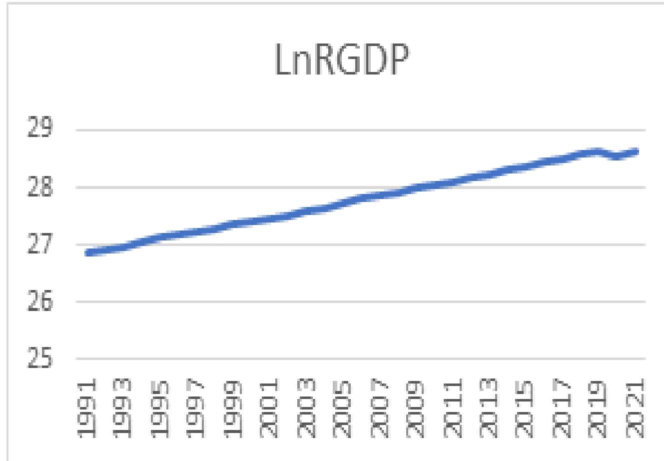
The Granger Causality test is used to study the causal relation between two variables. It is based on the idea that, if variable X "Granger causes" variable Y, then the past values of X should contain information that can be used to forecast the present and future values of Y in addition to what can already be predicted by the previous values of Y. Causality can be unidirectional i.e. running from only one variable to other and Bidirectional i.e. where both the variables are granger causing each other.

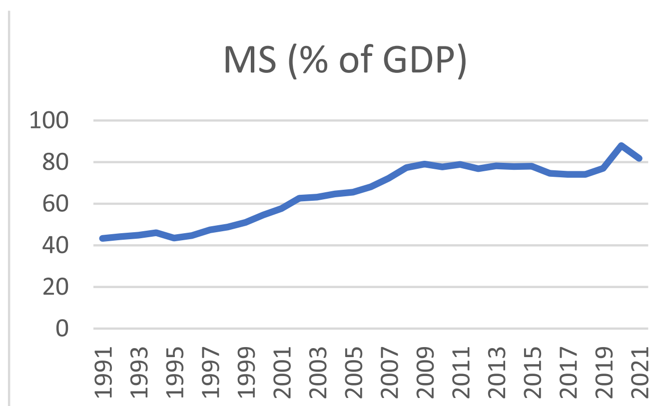
Data Analysis

Graphical Analysis of the variables

Trends of REER, INF, IR, MS and ln RGDP are depicted in figure 1.







The independent variables ln RGDP and MS demonstrate a consistent upward trend, whereas REER, IR, and INF experience variability during the study period.

Descriptive Statistics

The results of the descriptive analysis of the variables are presented in the Table 2.

Table 2- Descriptive Statistics

Variables	REER	MS	lnRGDP	IR	INF
Mean	93.011	65.047	27.788	5.241	7.144
Median	92.598	68.063	27.798	5.361	6.372
Maximum	101.886	87.912	29.633	9.191	13.870
Minimum	85.325	43.417	26.876	-1.983	3.328
Std. Dev.	4.648	14.258	0.563	2.703	3.174
Skewness	0.266	-0.326	-0.008	-0.855	0.567
Kurtosis	1.952	1.612	1.715	3.629	2.071
Jarque Bera	1.783	3.034	2.132	4.294	2.775
Probability	0.409	0.219	0.344	0.116	0.249

Source- Author's computation

According to the Jarque Bera statistics, all the variables are normally distributed. Skewness measures the deviation of the given distribution from the normal distribution. All the variables are negatively skewed except REER and INF. Kurtosis measures whether the data set is highly tailed or lightly tailed as compared to the normal distribution. In case of all the variables, kurtosis value is greater than zero, indicating leptokurtic nature of the variables.

Correlation Matrix

Table 3 presents the results of the correlation analysis between the variables.

Table 3- Correlation Analysis

Variables	REER	MS	lnRGDP	IR	INF
REER	1				
MS	0.627	1			
LnRGDP	0.698	0.934	1		
IR	-0.506	-0.477	-0.377	1	
INF	-0.298	-0.280	-0.389	-0.335	1

Source- Author's computation

It is clearly evident from the Table , that there is moderate degree of correlation between the variables.

Unit Root Test

The Phillips-Perron test and the Augmented Dickey Fuller (ADF) test have been used to verify the stationarity of the variables. Table 4 displays the outcomes of the ADF test.

Table 4- Augmented Dickey Fuller Unit Root Test

VARIABLE	Augmented- Dickey Fuller Test			
	Level		First difference	
	Intercept	Intercept & trend	Intercept	Intercept & trend
REER	-2.522	-4.351*	-6.591*	-6.540*
MS	-0.988	-1.463	-4.869*	-4.770*
LnRGDP	-0.846	-2.819	-5.007*	-5.037*
IR	-2.532	-3.147	-6.910*	-6.826*
INF	-6.514*	-6.421*	-7.083*	-7.016*

Source- Author's computation | Note- * represents level of significance at 1 percent

From Table4, it is apparent that according to ADF Test, REER and INF are stationary at level at 1 per cent significance level. All the other variables, MS, lnRGDP and IR are non- stationary at level and becomes stationary at first difference. It implies that INF and REER are integrated of order zero and all the other variables are integrated of order one.

The results of the Phillips- Perron test are presented in the Table 5.

Table 5- Phillips-Perron Unit Root Test

VARIABLE	Phillips- Perron Test			
	Level		First difference	
	Intercept	Intercept & trend	Intercept	Intercept & trend
REER	-2.522	-5.663*	-14.275*	-14.461*
MS	-0.986	-1.485	-4.869*	-4.766*
LnRGDP	-0.886	-2.066	-4.989*	-5.017*
IR	-2.555	-3.256	-7.130*	-7.024*
INF	-3.098	-3.062	-7.190*	-7.103*

Source- Author's computation

As shown in Table 5, the PP test indicates that all variables, except REER, are non-stationary at their levels but become stationary after taking the first difference. This suggests that REER is integrated of order zero, while the other variables are integrated of order one.

So the REER and INF are integrated of order zero and all the other variables are integrated of order one.

Lag Length Selection

For estimating ARDL model, the optimal number of lags for the variables is to be calculated. For this purpose, the Akaike Information Criterion (AIC) is preferable as it provides more better results as compared to other criterion. The results of the lag order selection are listed in Table 6.

Table 6 – Lag Length Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-309.941	NA	1864.663	21.720	21.955	21.793
1	-171.824	219.081*	0.786*	13.918*	15.333*	14.361*
2	-154.821	21.107	1.616	14.470	17.063	15.282

Source- Author's computation

From Table 6, it is obvious that all the criterions are indicating maximum lag length of 1 for estimation purpose.

Bounds Cointegration test

To test for the existence of long run relationship between REER and its determinants, Bounds Cointegration test (Pesaran et al., 2001)) is performed. The results are presented in the below Table7.

Table 7- Bounds Cointegration Test

TEST- STATISTIC	VALUE	SIGNIF.	I(0)	I(1)
F- statistic	8.474	10%	2.45	3.52
K	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

Source- Author's computation

The F- Statistic obtained (8.474) exceeds the upper bound significant values at all levels of significance. Thus, the null hypothesis is rejected at 1 % and it is evident that there is presence of long run relation between the REER of India and its determinants.

ARDL Long and Short Run Results:

Since the Bounds test affirms the long run relationship between the REER and its determinants, the next step is to estimate the long run coefficients and short run coefficients.

The results of the long and short run conditional error correction regression are presented in the Table 8.

Table 8- ARDL Long and Short run Results

Variable	Coefficient	Std. Error	T-statistic	Prob.
Part A- Normalised long run coefficients				
MS	-0.278	0.147	-1.888	0.0717
LnRGDP	9.991	3.570	2.797	0.0102
IR	-1.097	0.352	-3.110	0.0049
INF	-0.521	0.285	-1.825	0.0810
Part B- Error Correction Model				
D(MS)	0.106	0.164	0.647	0.5235
ECT	-0.904	0.128	-7.052	0.0000

Source- Author's Contribution

The results of the long run conditional error correction regression are presented in the upper part of the Table 8. As it is evident, lnRGDP and IR significant at 1 per cent level of significance in the long run. INF and MS are significant at 10 per cent level of significance in the long run.

RGDP in India positively associated with REER in India, which means one percent rise in RGDP will lead to 9.99 per cent rise in REER, indicating appreciation of the Indian Rupee. It is also in line with the theory which says that as GDP rises, demand for goods and services of the domestic economy in the international market also rises, which increases the demand of the domestic currency and this makes Indian Rupees to appreciate. IR in India is negatively related with REER of India, which means a one per cent rise in IR will lead to 1.097 per cent fall in REER, indicating depreciation of the Indian Rupees. INF in India is negatively related with REER of India, which means a one per cent rise in INF will lead to 0.521 per cent fall in REER, indicating depreciation of the Indian Rupees. This is in line with the theoretical argument that as inflation rises in the economy, prices of goods and services increases which reduces exports and increases imports. This cause value of domestic currency to depreciate and foreign currency to appreciate. MS in India is negatively related with REER of India, which means a one per cent rise in MS will lead to 0.278 per cent fall in REER, indicating depreciation of the Indian Rupees. The results are in line with the theoretical background, which leads to depreciation of the exchange rate with rise in money supply. With the increase in the money supply, the inflation in the economy also increases which leads to depreciation of the REER.

In the lower part of the Table 8, error correction model (short run) are presented. The short run coefficients are provided by the error correction regression form of the ARDL model. ECTt-1 is the lagged value of the residual term obtained from cointegration equation and δ gives the speed of adjustment towards the equilibrium.

The error correction term explains the speed of the adjustment towards the equilibrium. From Table 6.11, error correction term is negative and significant which specifies that there is 90.4 per cent adjustments takes place every year, which shows fast adjustment towards the equilibrium. There is only one short run determinant in this model i.e. MS which is insignificant in its impact. This implies that all the monetary variables have a long run impact on the REER in India. There is no short run impact of any of the variables on the REER in India.

Diagnostic tests results

The model is tested for the various diagnostic tests in order to ensure the robustness of the model. The summary results are presented in the Table 9.

Table 9- Diagnostic Tests Results

Test	Test Statistic	P value	Conclusion
Breusch-Godfrey Serial Correlation LM Test	F = 0.669	0.522	No Serial Correlation in the Residuals
Breusch- Pagan – Godfrey Heteroskedasticity Test	F= 0.447	0.839	No Heteroskedasticity in the residuals
Jarque Bera Test for Normality	JB= 0.461	0.793	Residuals are normally distributed

Source- Author's Contribution

It is evident from Table 9, that the estimated model is accurate and free of serial correlation and heteroskedasticity. Also, residuals are normally distributed.

Stability Test

To test the stability of the model, CUSUM and CUSUM of Squares test is performed. The CUSUM Test is depicted in the figure 2 and 3.

Figure 1 CUSUM Test

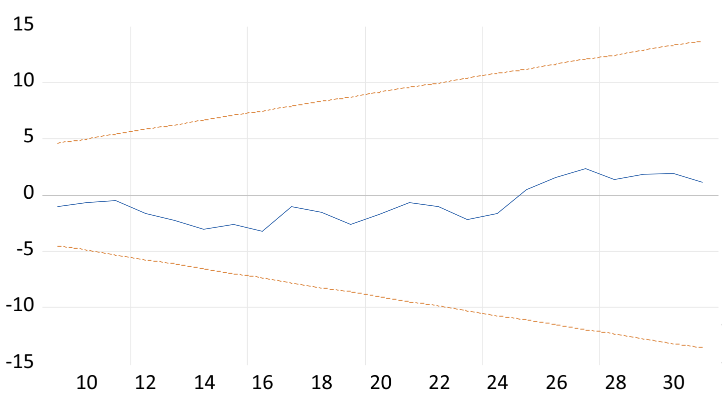
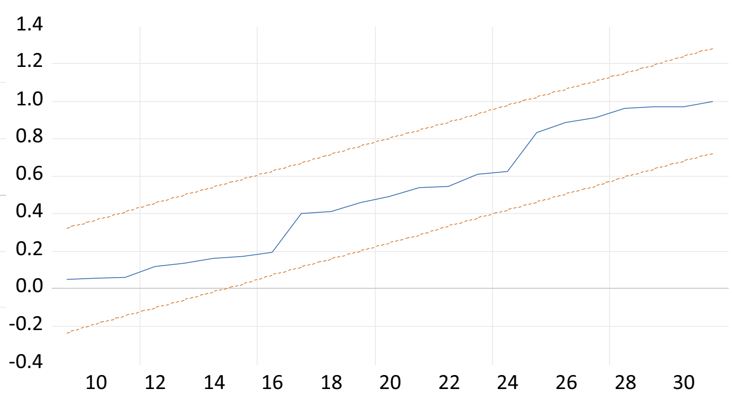


Figure 2 CUSUM of Squares Test



It is clear from the figure 2 and 3, the model is stable as it lies within the 5 per cent significant boundaries. It can be concluded from CUSUM and CUSUM of squares test that model is stable and provides robust results.

Ramsey Reset Test for Specification

To test for the model specification, Ramsey Reset Test is performed and the results are presented in the Table 10.

Table 10 Ramsey Reset Test

	Value	Df	Probability
t-statistic	0.101	22	0.920
F-statistic	0.010	(1,22)	0.920
Likelihood ratio	0.014	1	0.905

Source- Author's Contribution

It is clear from the Table 6.10 that since the p value is greater than 0.05, the null hypothesis is accepted and it can be concluded that the model is correctly specified.

Granger Causality test

The Granger Causality test is used to study the causality between the independent and dependent variables. The results of the Granger causality test are presented in the Table 11.

Table 11- Granger Causality Test

Null Hypothesis	F-statistic	P-value
MS does not granger cause REER	7.640	0.0102
REER does not granger cause MS	0.164	0.6887
lnRGDP does not granger cause REER	13.659	0.0010
REER does not granger cause lnRGDP	1.349	0.2555
IR does not granger cause REER	0.382	0.5415
REER does not granger cause IR	1.596	0.2172
INF does not granger cause REER	3.080	0.0906
REER does not granger cause INF	0.754	0.3927

Source- Author's Contribution

It is clear from the Table 11 , that unidirectional causality is observed between the REER and its determinants. At 1 per cent significant level, lnRGDP granger causes REER. At 5 per cent significant level, MS granger cause REER. INF also granger cause REER at 10 per cent level of significance.

Conclusion

To examine the relationship between REER of India and monetary policy indicators, namely MS, lnRGDP, IR and INF for the time period of 1991 to 2021, ARDL model is estimated. The stationarity of the variables is tested using ADF and PP test. Since variables were of different order of integration, ARDL model is established. The Bounds Cointegration test results support the existence of a long-term link between the REER and monetary policy indicators in India. There is a significant long run impact of all the monetary policy indicators on the REER in India. The Error correction term is negative and significant which further established short run relationship between the REER and its determinants. There is a insignificant short run impact of MS on the REER. The speed of adjustment, measured by the value of the error correction term shows fast adjustment towards the equilibrium. The model is further tested for various residual diagnostic test for checking the serial correlation, heteroskedasticity and normality of the residuals. The estimated model also has passed the stability test which is evident by the CUSUM and CUSUM of Squares test. The Ramsey Reset test suggested that model is correctly specified.

As regards to the responsiveness of the REER to its determinants, it is responsive to MS, lnRGDP ,IR and INF in the long run in the time period of the study. None of the variables is significant in the short run. From these results it can be concluded that to keep the REER in desirable bands, money supply and inflation rate should be in limit to check excessive depreciation in the Indian Rupee. An increase in GDP will ultimately result in higher demand for domestic goods in the international market, thereby strengthening the Indian Rupee. During the period from 1991 to 2021, monetary policy variables effectively explain the fluctuations in India's real effective exchange rate.

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