Does Gold and FPI Influence USD/INR Exchange Rates? Evidence from Autoregressive Distributed Lag Approach

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Abstract

Exchange rates have a major impact on a country's trade in not only ascertaining the prices but also deciding upon the hedging requirements in order to mitigate the risks associated with its fluctuations. These rates have key implications on the way a country's economy grows and performs. The present study examines the impact of important macro-economic indicators (Gold prices and Foreign Portfolio Investments (FPI)) on the exchange rates in the long run and short run. The monthly data was collected from 2003 to 2019. The study employed Auto Regressive Distributed Lag Model (ARDL), a Bounds test to find the long-run and short-run association among the macro-economic variables and the exchange rate. The results show that there exists a short-run and long-run relationship between the USD/INR exchange rate and the macro-economic indicators, Gold and FPI.

Keywords: Exchange rate, Gold prices, FPI, Autoregressive Distributive Lag (ARDL) model, Bounds Test

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1. Introduction

Exchange rates are one of the widely used economic indicators; they are the rates at which one country's currency can be converted into another currency. Ezzee Al. (2011) defined the exchange rate as the rate that takes into account the inflation differentials among the countries. Exchange rates are one of the monitored economic measures by the Government. They play a crucial role in a country's imports and exports, guide the direction of foreign trade and also impact financial inflows. The positive association between exchange rates and economic growth has been confirmed in literature by several researchers (Aslam M., 2016; Jayachandran G., 2013; Latief R. et.al, 2018; Sidheswar Panda, 2015). In another work carried out by Aron et.al (1998) it was stated that exchange rates directly influence a country's trade level, the balance of payments as well as the employment rate. Volatility in exchange rates affects international trade, particularly exports adversely. Earlier researches conducted by several authors Either (1973) and Cushman (1983) have proved negative effects of exchange rate volatility on international trade whereas subsequent researches conducted by Franke(1991) and Sercu(1992) report a small impact of the exchange rate volatility on trade. The recent researches conducted and concluded that exchange rate volatility impacts exports in the long run (Mohsen et al, 2017; Bernardin Senadza, 2017). Exchange rates keep fluctuating with the market forces of demand and supply of currencies from one country to the other. The unpredicted movements in the exchange rate due to variables like FPI, gold prices, current account deficit causes Exchange Rate Risk. Since Independence, the Indian rupee has seen 21-fold depreciation in its value against the US dollar. The year 2018 was no different, the Indian rupee witnessed high volatility against the US dollar. Its value depreciated up to 14% between the April and October months. This depreciation of the Rupee led foreign investors to withdraw funds from the Indian economy which impacted the economy adversely as depreciation in currency is seen as a reflection of non-performance of developing markets. A strong Rupee gives confidence to the investors who aim for investment for a long-term period of time. (Source: Care rating report, published on 16th November' 2018). As per the CRISIL

report on November 5th, 2018, the Indian rupee has experienced a fall in its value as compared to the US dollar thereby increasing the current account deficit (*Source: CRISIL website).* A hike in the Federal Reserve interest makes the US treasuries attractive, leading to a boost in dollar value. The rate at which a country exchanges its currency with the other country does not remain constant. These changes in the value of the exchange rate give an indication of a currency weakening or strengthening against the other.

Certain factors that contributed to the rupee depreciation against the dollar were a surge in crude oil prices, strong demand for the US dollar from importers and banks. An increase in gold prices and a weakening rupee makes imports costlier as India is a major importer of gold and is considered one of the major consumers of gold. Nair et al, 2015 in their research stated that the main rationale behind the association of gold and exchange rate is that gold is used as a hedge against the US dollar value appreciation. As the dollar price increases, gold becomes dearer to import. India has been facing the problem of the current account deficit since the last decade because of the volume of its imports exceeding its exports. The value of a currency increases when it exports goods. A country having a larger balance of current account deficit is at the risk of facing depreciation in its currency value. Government attracts Foreign Portfolio Investment as it plays a key role in managing the current account deficit. Fluctuating exchange rates act as a barrier to FPI as the foreign investors would expect higher returns for assuming additional risk arising due to the fluctuations.

Hence, it is important to analyse the factors that impact the exchange rate in the short run as well as the long run. In the Indian context, exchange rate management is regarded as an important policy objective to improve foreign exchange reserves, maintain stability in the exchange rate and promote healthy trade among the countries.

The study intends to examine the short-run and long-run impact of FPI and Gold on the USD/INR exchange rate. The variables (FPI and Gold) were selected as they are key factors that impact the fluctuation in the exchange rate of the Indian Rupee. Hence this study assumes a great significance in analyzing the unexplored relationship between the variables under study. While reviewing

the literature, we felt that the two variables identified i.e. Gold and FPI together which strongly affect the exchange rates have not been studied at all.

FPI is considered one of the most important sources of attracting foreign reserves and minimizing the current account deficit, thereby stimulating economic growth. Foreign Portfolio investors are motivated to participate in such countries where market returns are quite high. It has been increasingly reported that since developing countries have recognised the importance of FPI in economic development, the Government is finding ways to induce FPI. To promote and enhance the investment in the capital markets from overseas investors, the additional surcharge levied in the current Union Budget 2019-20 (which led to the withdrawal of funds by the foreign investors) was also removed by the Indian Finance Minister. These initiatives would promote investment not only in terms of outside investment in the Indian capital market, but also help in strengthening the Indian Rupee. Foreign investment can be promoted by reducing the volatility in the exchange rates. Several studies (Omorokunwa and Ikponnwosa, 2014; Guglielmo et al, 2013 and Ololade and Ekperiware, 2015) have observed that exchange rates are positively related to FPI in the long run and exchange rate volatility has a strong positive relationship with portfolio investment.

Another important factor contributing to the fluctuations of the exchange rate are Gold prices. Since the last quarter, the gold prices are constantly increasing in the Indian context and have touched Rs. 40,000 from Rs. 33,600 in July 2019. The major reason for the surge in these prices is that India is a major importer of gold and if the rupee depreciates against the US dollar, gold prices would start appreciating. When exchange rates fluctuate, the gold prices react very quickly. These prices can be stabilised by minimizing the exchange rate fluctuations (Ranjusha et al, 2017; Tripathi LK, 2014).

In this research, we applied a powerful econometric tool, the ARDL cointegration framework to study the long run and short-run relationship among the variables under study. The ARDL cointegration technique is used in determining the short-run and long-run relationship among variables regardless of their order of

integration/stationarity. (Pesaran and Shin 1999 and Pesaran et.al 2001).

USD/INR
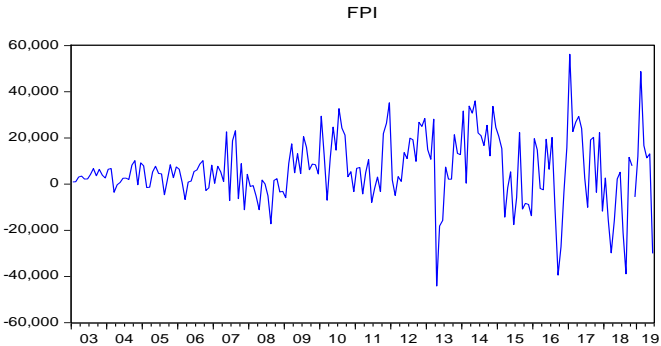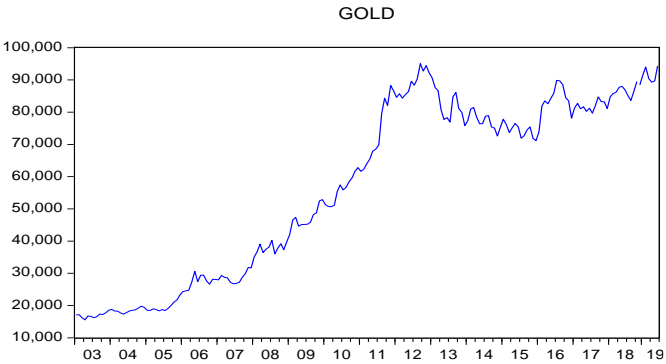

Fig 1: USD/INR Exchange Rates

GOLD

FPI

Fig 2: Gold Prices and FPI Inflow and Outflow since 2003

Figure 1 and Figure 2 show USD/INR exchange rates, Gold prices and FPI inflow and outflow from 2003 till 2019. These figures clearly indicate that exchange rates fluctuate with the change in gold prices and FPI inflow and outflow values.

Previous studies have confirmed Exchange rate risk factor is one of the prominent factors that Indian investors keep in mind for their investment returns. (Chiang at al., 2000; Mahapatra et al, 2019). Since the exchange rate is a key instrument used for risk hedging, hence traders are much fascinated in keeping an account of the variables that impact the USD/INR exchange rate. This study has been undertaken to keep the interest of the traders, Government and economists. This research would help the economists, policymakers and Government to analyse these factors causing variability and further help the investors, importers and exporters in taking appropriate hedging decisions. There are a few studies conducted in the Indian context with obvious limitations such as the time period of the study, the methodology employed and the non-inclusion of significant variables impacting exchange rates. The study is thus an attempt to add knowledge and thus bridge the gap in the existing literature.

The paper is structured as follows. Section 2 outlines the related conceptual and empirical literature, Section 3 and 4 describes the data and research methodology. In Section 5, the key findings are presented. Finally, Sections 6 and 7 provide the conclusion and managerial implications of the research.

2. Theoretical Background and a brief review of Literature

Exchange rates are one of the most widely discussed topics in currency markets, particularly for developing countries like India. As discussed earlier, exchange rates are influenced by factors like FPI and gold prices. For an economy to strategize better for its future and policy-making decisions, it is imperative to study the impact of factors impacting these rates. Gold and exchange rates have an inverse relationship because if the rupee depreciates against the dollar, the gold prices may increase in rupee terms and a falling rupee may reduce the demand for gold in the country as it requires more dollars to buy gold. Similarly, the relationship

between FPI and exchange rate volatility varies with the findings where some report a positive relationship where as others concluded an inverse relationship among them.

As per the Monetary Policy Report (MPR) of April 2019 and the RBI (Reserve Bank Report) report, the economic slowdown in India started in 2018-19 and extended to 2019-20. The GDP growth of the Indian Economy has touched a 25-quarter low in the first quarter of 2019-20 due to weak private consumption and investment. Further, it states that the global economy witnessing international trade tensions, volatility in crude oil prices and risk-on risk-off sentiment in financial markets due to geopolitical and economic tensions especially US and China trade war. Thus, global trade has impacted significantly on investments and production. Reflecting this, gold prices are rising on safe-haven demand.

Today's investors are mostly concerned about the safety of their investment and they look for volatility in exchange rates before making decisions about investment, portfolio diversification and hedging plans. Volatility in exchange rates stimulates uncertainty in the FPI flows and also if the home currency value depreciates as compared to the other country, it leads to an increase in the prices of gold which for import-dependent countries like India is not good. Hence these two factors were considered really essential to study their influence on the exchange rates. Identifying these variables is extremely important for managing exchange rates since stability in exchange rates are important for maintaining the price stability of a country. While India follows a market-determined exchange rate system (after the collapse of the Bretton Woods system) and not a pegged exchange rate system, all the determinants of the exchange rate that impact the demand and supply for foreign exchange are essential to be studied.

3. Studies on Factors (Gold and FPI) impacting Exchange Rates

There area plethora of studies on factors impacting exchange rates, but they did not take into account the most significant factors (Gold prices and FPI together) that impact exchange rates. However,

individual studies on Gold and exchange rates and also on FPI and exchange rates have been done by several authors.

Girish et al (2015) analyzed the relationship between gold prices and USD/INR exchange rates using the Johansen cointegration test and concluded that exchange rate plays an important role in determining the gold prices in India. Mohanamani et al (2018) found that the exchange rate is highly influenced by changes in gold prices and oil prices. Another study conducted by Capie et al, 2005; Sindhu, 2013; Sankararaman et al, 2018; Lan et al, 2019 proved that there is a negative correlation between gold prices and exchange rates i.e.increase in gold prices result in a decrease in dollar value. The substantial strong long-run relationship/association between gold prices and exchange rates was investigated by Patel, 2013; Apergis et al, 2013; Haque et al, 2015. Yet another set of studies carried by Omag, 2012; Kiohos & Sariannidis, 2010; Sjaastad, 2008; Tully & Lucey, 2007 analyzed the relationship of gold with the exchange rate and concluded that the most influential factor affecting the gold prices is the exchange rate. Since India is a major importer of gold, if the rupee depreciates, the value of imports increase leading to a rise in production costs. Various other studies highlighted the usage of gold as a hedging instrument to meet exchange rate fluctuations. (Capie, Mills, & Wood, 2005; Idris et al, 2013; Habibullah M, 2017)

While reviewing the literature on FPI, we saw that there is a close association between FPI and economic growth. Omkar et al (2013) noticed a close interlink between current account deficit, exchange rate and foreign investment. Rashid et al, 2017; Aranyarat, 2011 revealed in their study that Exchange Rate volatility and FPI have a negative relationship. Similarly, Nielsen, 2012 found that countries with stability in exchange rate policies bring in high levels of FPI. A study by Asif et al, 2013 analyzed the effect of exchange rates on foreign portfolio investment in Pakistan and suggested that exchange rates and gross domestic product are the most important variables impacting foreign investment in Pakistan. Another work done by Kumar et al, 2019; Agarwal 1997 highlighted that one of the major determinants of FPI in India is the rupee-dollar exchange rate. Mukherji R, 2009 studied the impact of FPI in the Ghana countries and found that exchange rate had a positive relationship

with FPI and suggested the need for having stability in exchange rates. Onurah et al (2013) used regression analysis to analyse the impact of macroeconomic variables on FPI and found that exchange rates directly impact FPI in the country. The relationship between FPI and exchange rate is two ways i.e. higher FPI appreciates the INR rupee value as compared to the US dollar and a strong rupee induces more foreign investment. Another study carried by Duasa et al, 2009 proved that FPI positively impacts the economic growth of a country. When investors plan to invest in another country, the demand for the currency of the country will rise, thus resulting in its currency appreciation. Sudden fluctuations in exchange rates affect the returns of investors' in their respective currencies and they expect a premium return due to the risk assumed. Hence, stability in exchange rates is considered an important factor in promoting foreign investment.

4. Studies on the relationship between Exchange Rate and GDP growth/exports/international trade

Exchange rate stability is considered as a key to a favourable trade balance and ultimately helps in boosting an economy's GDP. Several studies, including Jong et al, 2018; Ghulam et al, 2016; Qaiser et al, 2017) revealed a positive relationship between the exchange rate and export volumes/GDP growth of the country. In their study, Srinivasan et.al, 2012 indicated that exchange rate volatility has a negative impact on a country's exports in the short as well as long run. In another pioneer work by Baek (2012), it was proved that exports and imports between the Republic of Korea and the US of 71 products are affected by the level of exchange rates. In an extended work carried out by Sujit et al, 2011, Anuja R., 2016, it was stated that Gold prices, Oil prices and exchange rates together impact the stock market returns. Coric et al, 2008 used meta-regression analysis and conclude a negative effect of exchange rate volatility on a country's international trade. Interestingly, there are many other studies conducted on the relationship between exchange rates and economic growth in developing countries that prove the negative effects of real exchange rate volatility on the economic growth/employment growth/exports of a country. (Achouak et.al, 2018; Douganalr,

2002; Demir, 2010; Pino et.al, 2016; Raja, 2014) which makes it imperative to understand and analyse the factors impacting the exchange rates to help policymakers and Government to take measures to stabilize the prevailing rates.

India, being a gold dependant country, its price is exposed to fluctuations of the US dollar as the US is one of the largest import partners. A 1 percent change in the value of the US dollar leads to a more than 1 percent change in the gold price. If the dollar value depreciates, it results in an appreciation in the value of other trading partner country currencies. This leads to an increase in demand for commodities like gold. (Mongi et al, 2017). Gold is considered a safe alternative for risk-averse investors. As per the CARE report published on 25th July' 2018, the depreciation of the Rupee Vs. US dollar is due to various reasons including current account deficit, FPI and FDI. Increasing bond yields in US-made investment in the US are more attractive and because of that FPI inflow in the country is reduced. Due to the continuous decline of FPI in the country, the Rupee had weakened against the dollar. The strengthening of the rupee by attracting higher FPI flows into the economy will help to improve the balance of payments situation in the country. Hence prima facie there is a reason to believe that these two important variables (gold and FPI) impact exchange rates significantly.

5. Research Methodology
5.1. Data and Sources of data
The study collected the monthly values of USD/INR Exchange Rates(USD/INR), Foreign Portfolio Investments (FPI), Gold prices (GOLD) for the period of 198 months from January 2003 to June 2019. The below table describes the variables under study and the source of data.

Description of variables and data sources		
Variable	Description	Source
GOLD	Gold prices	World Gold Council
USD_INR	USD/INR Exchange Rates	Reserve Bank of India (RBI) Website
FPI	Foreign Portfolio Investment	National Securities Depository Limited (NSDL) Website

6. Analytical Tools

6.1. Augmented Dickey-Fuller (ADF)

The study used Augmented Dickey-Fuller (ADF) to test to verify whether variables are stationary or not.

6.2. Auto-Regressive Distributive Lag Model (ARDL)

ARDL model plays a very important role in the modelling of non-stationary time series data. In particular, "Bounds Tests" to analyse the long-run relationship among a group of time series variables, some of which may be integrated of 'zero' order while others are integrated of order 'one'. The general ARDL (p, q) model (Eq(1)) indicates that the current values of the Y variable are regressed with its own lagged values, current values and lagged values of the X variable. Π_0, γ and τ are parameters to be estimated. p and q are the optimum lag length to be used. e_t represents the error term or white noise disturbance.

A general ARDL (p, q) model is given as follow:

$$Y_t = \Pi_0 + \sum_{i=1}^{p} \gamma_i Y_{t-i} + \sum_{i=0}^{q} \tau_i X_{t-i} + e_t \qquad (1)$$

Model (2) represents a standard equation to test linear relationships for time series data. Model (3) represents the long-run model and model (4) is to test the short-run relationship using ARDL estimated equation. When non-stationary variables are regressed, we may get a spurious regression model. We can resolve this by differencing the data. The resolved regression model gives only a short run relationship. Many academicians and researchers are interested in a long-run relationship among the variables under the consideration. This can be resolved by incorporating the concept of co-integration and ECM. In this way, we can analyse both long-run and short-run relationships. Equation (4) represents the long-run co-integration relationship among the variables then it produces the Error correction representation. The error correction model indicates the speed of adjustment of disequilibrium back to long-run equilibrium.

The functional model specification is presented in the below equation:

$$\ln (USD\_INR_t) = f [\ln (FPI_t), \ln (GOLD_t)]$$

Where, $\ln (USD\_INR_t)$ — USD/INR Exchange Rates,

$lnFPI_t$ —Foreign Portfolio Investment, $\ln (GOLD_t)$ — Gold prices

$$\ln (USD\_INR_t) = \theta_0 + \theta_2 \ln FPI_t + \theta_3 \ln GOLD_t + e_t \qquad (2)$$

$$\Delta\ln (USD\_INR_t)$$
$$= \alpha_0 + \alpha_1 \ln USD\_INR_{t-i} + \alpha_2 \ln FPI_{t-i} + \alpha_3 \ln GOLD_{t-i}$$

$$+\sum_{i=1}^{p}\beta_i \, \Delta\ln (USD\_INR_{t-i}) + \sum_{i=0}^{m}\psi_i \, \Delta\ln (FPI_{t-i})$$

$$+ \sum_{i=0}^{n}\delta_i \, \Delta\ln (GOLD_{t-i}) + e_t \qquad (3)$$

$$\Delta\ln (USD\_INR_t)$$
$$= \beta_1 + \sum_{i=1}^{p}\beta_i \, \Delta\ln (USD\_INR_{t-i}) + \sum_{i=0}^{m}\psi_i \, \Delta\ln (FPI_{t-i})$$

$$+ \sum_{i=0}^{n}\delta_i \, \Delta\ln (GOLD_{t-i}) + \lambda ecm_{t-1} \qquad (4)$$

$$ECM_t = \ln (USD\_INR_t) - \alpha_1 \ln (FPI_t) + \alpha_2 \ln (GOLD_t) + \alpha_0 \qquad (5)$$

Where the symbol λ represents the magnitude of the speed of adjustment. The symbol Δ represents the sign of differencing and (e_t) is the error term or white noise disturbance. ECM is an error correction term obtained from the estimation of the ARDL equation (5). The lagged error correction term (residual) (ecm_{t-1}) denotes the disequilibrium in a long–run co-integration relationship.

Table 1: Shows the descriptive Statistics of Gold, Exchange rate and FPI.

	LGOLD	LUSD_INR	LFPI
Mean	10.8003	3.9581	10.72418
Median	11.06727	3.8855	10.80586
Std. Dev.	0.600873	0.1821	0.851607
Skewness	-0.6026	0.2835	-10.4022
Kurtosis	1.804503	1.5816	129.4947
Jarque-Bera	23.65461	19.151	134893.6
Probability	0.000007	0.000069	0.000000
Observations	198	198	198

Source: Author's own calculations

Table (1) clearly indicates that the mean value of exchange rate (USD_INR), gold and FPI, were 3.95, 10.80 and 10.72 respectively. Jerquer-Bera test results clearly indicate that macro-economic variables are not normally distributed. Further, FPI has more standard deviation (0.85%), followed by GOLD (0.60%)and USD_INR (0.18%).

Table 2: Shows the ADF test results.

	At Level			First Order Difference		
Variables	t	Prob.	Conclusion	t	Prob.	Conclusion
LUSD_INR	-0.2698	0.9256	Not Stationary	-3.5543**	0.0077	I[1]
LFPI	-12.7574**	0.0000	Stationary	---	---	I[0]
LGOLD	-1.5071	0.5281	Not Stationary	-13.0921**	0.0000	I[1]

** indicates significant at 1% level. Source: Author's own calculations.

Table (2) shows ADF Test Results. It clearly indicates that except FPI all other variables are non-stationary at level but USD_ INR and Gold are stationary at the first-order difference. Thus, it clearly

indicates that FPI is I [0] and all other variables are I [1]. The results are clearly indicating that none of the variables isintegrated of order 2 or above.

Table 3: Shows the VAR Lag Order Selection results

Lag	LogL	LR	FPE	AIC	SC
0	-266.5884	NA	0.003480	2.8527	2.9042
1	567.4449	1632.764	5.62e-07	-5.8777	-5.6799*
2	577.3759	19.12636	5.57e-07*	-5.8876*	-5.5273

Source: Author's own calculations

* Indicates lag order selected by the criterion.

Table (3) shows the results of optimum lag length to be used for co-integration models under the VAR environment. According to AIC criteria maximum of two lag lengths to be used to analyze the data.

Table 4: Results of the Bounds Test

ARDL Bounds Test		
Test Statistic	Value	k
F - statistic	6.676696	2
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.63	3.35
5%	3.1	3.87
2.50%	3.55	4.38
1%	4.13	5

Source: Author's own calculations

In the table (4) it can be seen that the F-statistic test value (5.5297) is larger than I (0) and I (1) bound values at 1% and 5% level of significance. Thus, it clearly indicates that there is a strong co-integration relationship between the USD/INR exchange rate and Gold and FPI.

Table 5: Long-run and short-run relationship coefficient results

Long Run Statistics			Short run Statistics		
Variables	Coefficients	Prob	Variables	Coefficients	Prob
LFPI	-0.4651*	0.0485	D(LFPI(-1))	0.0071**	0.0000
LGOLD	0.3682**	0.0017	D(LGOLD)	0.0917 *	0.0154
C	5.0113*	0.0289	CointEq(-1)	-0.0266 *	0.0000
Cointeq = LUSD_INR - (-0.4652*LFPI + 0.3683*LGOLD + 5.0114)					

Source: Author's own calculations

* and ** indicates significant at 5% and 1% level respectively.

Table (5) presented the results of long-run co-integration coefficients. The best ARDL (1, 2, 1) model is selected according to Akaike Information Criterion (AIC) criteria. The results of optimum lag length are presented in the table. The long-run co-integration coefficients results of the ARDL model indicates that Foreign Portfolio Investment (ln (FPIt)) and Gold (ln (GOLDt)) have a significant effect on USD_INR Exchange Rates(ln (USD_INRt)). The ARDL results found an inverse relationship between USD_INR Exchange rates and FPI. Further, the Direct relationship between USD_INR Exchange rates and Gold values was found.

Thus, a 1% increase in FPI value leads to a 0.465% decrease in USD_INR value vice versa. i.e.appreciation of INR against the US. Further 1% increase in gold values lead to a 0.368% increase in USD-INR values i.e. depreciation of INR against USD.

The ARDL short-run statistical results clearly indicate that FPI and Gold values have short-run effects on USD_INR Exchange Rates. Further, the error correction term represents the speed of adjustment found the coefficient of -0.0266 at significant at 1% level significance. Thus, it is negatively statistically significant. It is consistent with the results of (Pahalvani et al., 2005). It clearly indicates that 2.66% of disequilibrium is adjusted back to long-run equilibrium with a low speed of adjustment.

Table 6: Diagnostic test results of ARDL model

Heteroskedasticity Test: ARCH			
Obs*R-squared	0.928095	Prob. Chi-Square(1)	0.3354
Breusch-Godfrey Serial Correlation LM Test			
Obs*R-squared	3.285668	Prob. Chi-Square(2)	0.191
Ramsey's RESET Test			
F-statistic	0.416098	Prob	0.5197

<center>Source: Author's own calculations</center>

Table (6) represents Diagnostic test results. The study conducted diagnostic and stability tests to check the efficiency of the employed ARDL model. Probability values Chi-Square statistics of Heteroskedasticity and Serial Correlation LM test results in the table clearly indicate that residuals of the model are homoscedastic and do not have autocorrelation. Further, Ramsey's test results indicate that the model is free from specification error.

Foreign Portfolio Investments (FPI) has a very strong impact on the movement of the Indian Rupee against the US Dollar. Foreign Institutional investors (FIIs) are the major investors in the Indian stock market and their inflow and outflow significantly influence the domestic stock market and exchange rate. The results found a negative impact of FPIs on the exchange rate. The result was consistent with the theory which states that continuous decline in the Foreign Portfolio Investments (FPI) in the country contribute weakening of the Indian rupee against the US Dollar. Further, the results are also consistent with previous studies conducted by Srikanth and Kishore (2012), Ghosh and Herwadkar (2009) and Srinivasan and Kalaivani (2013) which proved an inverse relationship between FPI and Exchange rates.

Theory and previous literature clearly indicate an inverse relationship between gold and exchange rate (USD/INR) in rupee terms. The study found a direct and long term relationship between gold and USD/ INR exchange rates. These results are in consistent with previous literature and theory. However, the results are consistent with Girish et.al (2015) which found an exceptionally direct relationship between gold prices and the value of the US dollar during recession periods. Therefore during times

of global recession and economic slowdown, there may be times when both gold prices and dollar values appreciate and can have a direct relationship between them in rupee terms. This may be due to the investors intending to invest in safe assets during the crisis period.   The recessions (2007-08 & 2013) and various financial structural reforms took place in the Indian economy during the period of study. Major reforms were De-monetization which took place on November 8, 2016, and implementation of Goods and Service Tax (GST) from July 1, 2017, onwards which reflected in huge uncertainty behaviour patterns in the development of the Indian Economy. The findings are clearly indicating the significant impact of gold prices and FPI on exchange rates (USD/INR). Though The RBI increased forex reserve substantially to $448.28billion (November 15, 2019) from $293.36 billion (March 22, 2013), it must further strengthen the forex reserve in future to curb the exchange rate volatility.

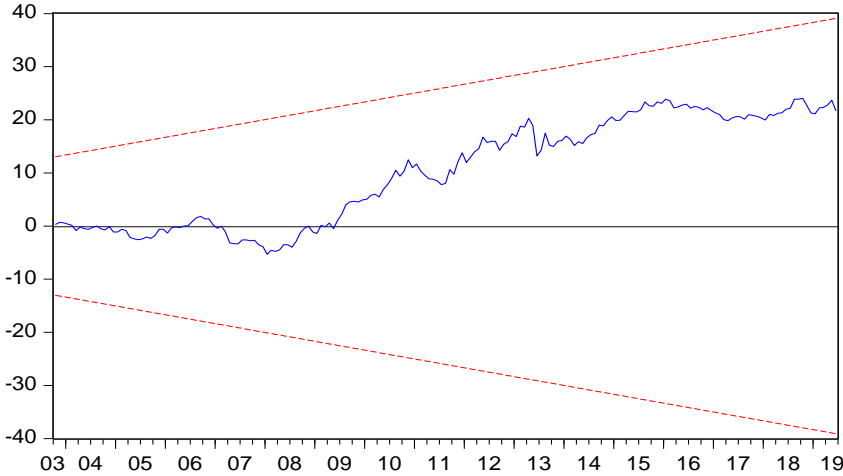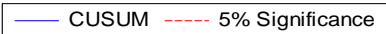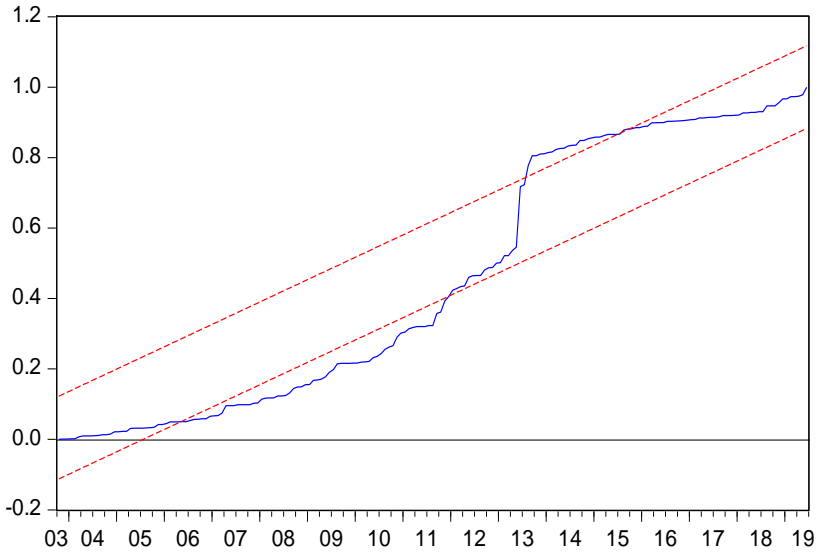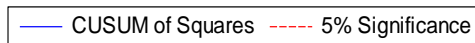Figures 3 and 4: The Plot of CUSUM and CUSUM Squares (Stability Test)

Figure 3

CUSUM   ----- 5% Significance

Figure 4

Source: Prepared by the authors

Figures 3 and 4 depict the stability test results of the model. CUSUM and CUSUMSQ plots are used to verify the stability of coefficients of the model. The CUSUM Plot clearly indicates the statistics (the blue line) are well within the critical region at a 5% level of significance. Further, the CUSUMSQ plot indicates the statistics are slightly crossed outside the critical bounds of a five percent level of significance. This is due to the presence of structural breaks in the data during the sample period such as the Great Recession period (2007–2009) and the second global recession.

7. Discussion and Managerial Implications

In his book on 'Guide to Exchange Rate Determination', Rosenberg, 2003 stated that getting the exchange rate right is a prime objective of all policymakers and investors. The macroeconomic variables studied in the research i.e. gold prices and Foreign Portfolio

Investments (FPI) can be used by traders and investors to forecast the future direction of the international trade market. It is essential to know the variables impacting exchange rates as it will enhance the volume and growth of trade transactions among countries. Also for investors and fund managers who are planning to invest in other countries, it will be useful for them in terms of planning an efficient portfolio optimization. The policymakers and the Central Bank should try to follow policies that aim to stabilize exchange rates by making suitable adjustments in the monetary and economic policies, as too much volatility in exchange rates can lead to slower economic growth and financial flows between countries. Panda and Narsimhanb also concluded in their study in 2007 that it is essential for policymakers to understand the movements of exchange rates, so as to stabilize inflation and attain higher economic growth. The results of this study have important inferences for the policymakers to design stable exchange rate policies and maintain a sufficient level of foreign exchange reserves in developing countries like India. If the Government maintains consistency in FPI and gold prices, then the rupee will appreciate against the US dollar. Appreciation of the Indian rupee signifies a well-performing economy and a positive sign of development in the economy. Appreciation of the Indian Rupee will make imports cheaper and will also lead to a favourable balance of payments in the country.

The findings have important theoretical and practical implications for countries that follow floating exchange rate systems to frame their hedging policies. The paper makes an important contribution to the literature by recommending the policymakers to ensure policies leading to stability in the exchange rate system that would not only reduce operational risk but also stimulate the development of a country. A combination of a stable exchange rate regime and a competitive currency will attract investment and improve the overall economic growth. The findings are also useful for the investors to access the currency risk exposure of the country while constructing their portfolios. In the highly competitive trading environment, countries try to bargain and enhance their market shares. In such cases, a slight change in a country's exchange rates can significantly impact exchange rate volatility (RBI report). In order to stabilize the exchange rates and increase

foreign capital inflows, RBI and monetary authorities must change their approaches towards addressing financial and economic problems by stabilizing the currency market, Provisions for relaxations in FPI, formulating strong macroeconomic policies, practicing timely and balanced interventions, developing strong financial institutions and adopting suitable regulatory frameworks for long term economic sustainability. Hence, the study suggests that policymakers and monetary authorities must formulate these policies to stabilize the exchange rate and improve FPI inflows so as to boost the market participant's confidence.

8. Conclusion

In conclusion, the paper analysed the short-run and long-run relationship within the Indian context, covering the monthly data from the year 2003 to 2019. To achieve the objective of this study, we employed the ARDL cointegration approach to analyse the relationship. In addition, the ADF test and ARDL model were employed and it was found that Gold and FPI have both long-run as well as the short-run relationship with the USD INR exchange rate. The findings are inconsistent with the other studies conducted by (Mongi et al, 2017) postulating the impact of the USD-INR prices with Gold and FPI.

The depreciation of the currency is an extremely worrying factor as it will have an impact on the Indian economy. The exchange rate stability is a very important factor for India as India is an import oriented country and less export-oriented. Substitution for imports and exports can be adopted. Another way to control currency depreciation is to form policies and restrictions on gold imports and to reduce domestic demand for gold. A study conducted by Manu K S, 2018 suggested that investors to invest in gold whenever there is an increase in USD/INR exchange rate value. Another study by Osemene et al, 2018 and Rashid et al, 2017 recommended that stability of the exchange rate is extremely important to attract FPI and boost investors'confidence. Based on the results obtained from the tests performed, it can be inferred that the USD/INR exchange rate is significantly impacted by the variables which are considered in the study. The study can be replicated in other countries using daily data and for a longer time period to test

whether the relationship between Gold prices and FPI with exchange rates hold true across different countries and may provide more viable results. The article has not covered other variables impacting exchange rates like the Indian basket of Crude oil prices, trade deficit, Nifty 50. These variables can be further studied as the future scope of research.

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