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EURO/INR futures and exchange rate volatility

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Abstract
Currency Futures trading was approved on Indian Exchanges following the recommendation of Internal Working Group RBI 2008. The arrival of currency futures has demonstrated as an efficient channel to absorb greater exchange rate volatility and shocks. The study was aimed to analyse the impact of EURO/INR futures on the exchange rate volatility. Econometric modelling of data was applied due to nature of financial time series data. The findings of the study concluded that futures' trading has led to marginal increase in the volatility.

Keywords: currency, EURO/INR, volatility, GARCH

1. Introduction
The currency derivative segment at NSE commenced operations on August 29, 2008 with the launch of currency futures trading in US Dollar-Indian Rupee (USD/INR). In the year 2010 three additional currency pairs were introduced for trading in currency futures i.e. GBPINR, JPYINR, and EURINR. The spot and futures markets offer investors an opportunity to trade in the same underlying security. It is quite logical, therefore, to anticipate a trading induced dynamic relationship between the two markets. Researchers have also concentred about impact of currency futures price on the spot price or vice versa. It is always a matter of debate that whether the futures trading stabilise or destabilise the spot market. In Indian context, currency futures were introduced with a view to curb the volatility of the spot market and to enhance the price discovery process. However, it is yet to be decided that whether the currency futures has served the purpose claimed by the regulators.

2. Literature Review
Various studies were conducted about the impact of currency futures on the spot market volatility. There is a mixed view of researchers in the concerned area. Chatrath, Ramchander and Song (1996) [1] examined the relationship between the volatility and trading volume and the results indicated that increase in trading volume lead the volatility in the exchange rate using GARCH (1, 1) model. Adrangi and Chatrath (1998) [2] examined the relationship between the changes of exchange rate and the number of contracts held by traders. The results suggested that speculative traders caused the increased volatility in the market. Gwilymand Buckle (2001) [3] showed that the FTSE100 derivatives markets lead the underlying stock index. Illueca and Lafuente (2007) [4] studied the relationship between futures trading volume and spot market returns. Results revealed that the spot returns be governed by on futures trading. Liu (2007) [5] specified that there is inefficiency in the currency market due to the introduction of derivatives. Cheng and Chung (2008) [6] investigated the relations between return, trading volume and market depth in currency futures market. Findings revealed that all the three variables are affected by a number of factors and respond in a different pattern respectively. Kumar and Hetamsaria (2010) [7] explored the relationship between the spot rate and the currency futures rates for USD/INR. Results specified that currency futures prices carry very little information about the spot exchange rate. Guru (2010) [8] empirically tested the impact of currency futures trading on volatility and returns of underlying spot exchange rates. Results indicated that both speculative and hedging activities in the futures market for currency had no influence on the volatility in the underlying exchange markets. The returns in futures markets were seemed to be driving the returns in spot markets, indicating the information advantage of the futures markets. Rastogi (2011) [9] concluded that introduction of currency futures had positively impacted the foreign exchange market in terms of volatility. Sharma (2011) [10] analysed the relation between volatility in the exchange rate in the spot market and trading activity in the currency futures. Findings indicated that volatility of spot exchange rate was greater after introduction of currency futures. Oduncu (2011) [11] studied the impact of introduction of currency future trading on the volatility of the underlying currency market for Turkey. Results explained that volatility of spot market was reduced due to the introduction of currency futures. Sarang (2012) [12] showed that there was an increasing trend in the growth of currency futures market and currency futures introduction had reduced volatility asymmetric. It also led to the enhancement in the quality and speed of market transactions and information. Sahu (2012) [13] examined the impact of currency futures on exchange rate volatility of EURO. Results explained that there was no significant change in the volatility of spot market after the introduction of currency futures and spot market become more efficient owing to the diminishing importance of old news and faster incorporation of recent news in exchange rates. Das and Chattopadhyay (2012) [14] examined the impact of stock derivative trading on spot price volatility in India in

its relatively matured stage. Study concluded that the introduction of futures and options contracts reduces the spot market volatility. Goyal and Mittal (2014) [15] investigated the impact of currency futures on the volatility of USD/INR exchange rate. It was concluded that there was an increase in the volatility of USD/INR spot market after the introduction of currency futures in India. Singh and Tripathi (2015) [16] examined the impact of currency derivatives on the spot market of EURO/INR. Time span was April, 2006 to December, 2014. Daily exchange rates of Euro against the Indian Rupee were used for estimating the volatility. GARCH (1, 1) model was applied and it was found that there is a decrease in the volatility of spot market for EURO/INR after the introduction of currency derivatives.

The studies on Indian markets, seems to be evidence that volatility in the spot market has marginally decreased or remained unchanged after the introduction of currency futures. The inconclusiveness on the subject calls for an empirical analysis to determine the impact of currency futures on the spot market volatility in India. So there is a need to study impact of currency futures on the spot market volatility in India.

3. Objective of the Study

To analyse the impact of currency futures on the spot market volatility in India with respect to EURO/INR currency pair.

4. Research Methodology

The present study follows Descriptive Research Design. The daily closing spot rupee exchange rate against Euro was used for estimating the volatility before and after the introduction of currency futures. Time span for the study was ten years i.e. April 1, 2005 to March 31, 2015. Total number of observations was 2,419, excluding public holidays.

These time series data of daily reference rates of RBI were collected from one of the most reliable sources in India, i.e., Reserve Bank of India online database. The present study employed GARCH (1, 1) model to study the impact of currency future on the spot market volatility and this Impact of currency futures was identified with the use of a dummy variable as a regressor in the conditional variance equation. Dummy variable was created by taking the value zero for the pre futures period and one for the post currency futures period. This dummy variable indicated the positive and negative impact of the introduction of currency futures on the spot market. A significant positive coefficient points towards an increase in volatility due to derivatives & vice versa.

5. Data Analysis & Interpretation

Most of the studies indicated that currencies exhibit the nonlinear price dependencies. Time series data should also be checked for long term dependencies in observations. Descriptive results indicated the presence of volatility clustering. In most of the time series, large and small values in the log returns have a tendency to occur in clusters. When volatility is high, it is likely to remain high and when it is low, it is likely to remain low. So these features of data demands for the econometric modelling of volatility by employing different ARCH family of models.

The Table 1 presents the results of GARCH (1, 1) of the EURO/INR return series. The □ coefficient represent constant in the variance equation and □ shows the impact of current news and β shows the impact of previous news on the current market volatility. The coefficient □ (dummy variable) is the measure of the effect due to introduction of currency futures.

Table 1: Analysis of GARCH (1, 1) Models for EURO/INR Returns (Period: April 2005 to March 2015)

Variable	Whole period
ω	5.22E-07 (0.0002)
α	0.054531 (0.0000)
®	0.931010 (0.0000)
γ	2.77E-07 (0.0170)
R-squared	0.000163
Adjusted R-squared	-0.000692
Log likelihood	8574.810
Durbin-Watson stat	2.010251
Akaike info criterion	-7.313538
Schwarz criterion	-7.296332

The coefficient of dummy variable □ was found positive and statistically significant. The value of coefficient is small (2.77E-07) but positively significant. It indicated that the introduction of EURO/INR futures trading has a negative impact on the level of price volatility of the underlying stock market. This result suggests that futures' trading has led to marginal increase in the volatility. Our findings seem to corroborate evidence of other studies like Sharma (2011) [11] and Goyal & Mittal (2014) [15] that there has been an increase in the volatility after the introduction of currency futures.

Table 2: Diagnostic Tests for EURO/INR GARCH (1, 1) Models

Residual Test	
Q (6) Stats	6.4042 (0.171)
Q2 (6) Stats	4.0806 (0.395)
ARCH LM Test	
F-Statistics	.059515 (0.8073)
ARCH-LM Statistics	.059564 (0.8072)

The fitness of model was tested by various checks. The Durbin Watson value was found close to 2, which is an indication that the GARCH (1, 1) model is a good fit. The Ljung-Box (LB) Q-statistic is conducted for checking serial correlation. ARCH LM test on residuals is done to see if there is any ARCH effect left. To choose the lag period Akaike information criterion and the Schwarz criterion was used. As per these criteria a lag of one period was found to be most suitable for testing ARCH effect. Exhibit 2 presents the results of Ljung-Box (LB) Q-statistic and ARCH LM test. The Q statistics for standardised residuals and squared standardised residuals were reported with a higher P value i.e. more than .05, so

the results indicated that residuals are not serially correlated. The F statistics and R squared value were not significant at 10 % level. This showed that there is no significant ARCH effect in the residual series.

6. Conclusion

The study examined the impact of EURO/INR futures on the spot market volatility of relative exchange rate in India. The results concluded that the currency futures had a disrupting impact on the volatility of EURO/INR substantiated with the results of Chatrath, Ramchander & Song (1996) [1], Sharma (2011) [11] and Goyal & Mittal (2014) [15]. It was determined that the volatility in Indian spot market for EURO/INR was destabilised after the introduction of currency futures market. An investor should be careful while trading in this market due to high volatility.

7. References

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