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Study of Call Rate Volatility in India

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ABSTRACT

The money market serves as a channel for the execution and transmission of monetary policy and as trading venues for the shortest-term instruments that anchor the entire term structure of interest rates. The objective of monetary policy by the Central Bank is to align Call rates with the key policy rates. Excessive Call rate volatility can give confusing signals about the monetary policy stance. Efficient functioning of the Call money market is thus important for the effectiveness of monetary policy.

In this paper, following the seminal work of Engle (1982) and Bollerslev (1986), we investigate the liquidity in the money market using the GARCH model. Using the daily data of the Call rates in India, we construct a GARCH model to study the relationship between volatility and factors affecting them. We further study the effects of different monetary policy instruments like CRR, Repo rate, Reverse repo rate, Bank rate and Marginal Standing facility on the Call rate volatility.

KEYWORDS Call rates, GARCH Model, Monetary policy

Introduction

The development of the money market is important for the transmission mechanism of monetary policy and improvements in market microstructure. A liquid money market is crucial for the effective transmission of monetary policy and for maintaining financial stability as these enable market participants to acquire required funding.

According to Van't (1999), most Central Banks favour a smooth trend in key short-term interest rates and are willing to act towards reducing volatility. This is because volatile interest rates are often seen as obscuring policy signals, while more orderly market conditions are often seen as promoting a more rapid and more predictable transmission of monetary policy.

Due to the increased importance of targeting a short-term interest rate in the transmission mechanism, it is appropriate to study the factors that influence this segment of the money market. According to Ghosh and Bhattacharyya (2009), due to volatility of short-term rates, a detailed analysis of market microstructure is pertinent. Work in the area is crucial as Central Banks try to extract information contained in money market rates to understand the thinking of market players. The development of autoregressive conditional heteroskedasticity (ARCH) and generalized autoregressive conditional heteroskedasticity (GARCH) models has enabled the estimation of the evolution of the short-run interest rate.

The objective of this article is to analyse the market microstructure of the overnight Call money market. We have considered the time period from April, 2004 to March, 2014 for our analysis. The main contribution of this paper is a detailed analysis of Call rate volatility considering a longer time series based on daily observations.

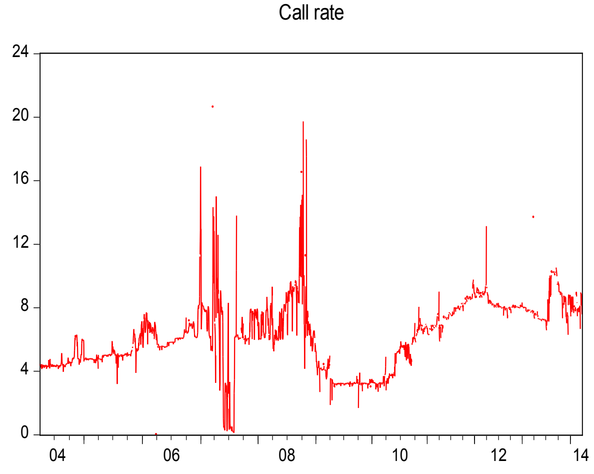
The rest of the article proceeds as follows; section 2 presents the empirical analysis for call rate and its volatility; section 3 studies the impact of monetary policy changes on Call rate volatility. Section 4 provides the conclusion and limitations of the study.

Section 2 Empirical Analysis

Data Description

The empirical exercise has been conducted by selecting data from the Call money market. The daily weighted average call rates as well as the major monetary policy rates have been obtained from the Handbook of Statistics on the Indian Economy. The total number of observations is 2709. Figure 1 shows the trends in Call rates.

Figure 1: Trends in Call Rates



Methodology

Engle (1982) introduced the autoregressive conditional heteroskedasticity (ARCH) model to study volatility. He modelled heteroskedasticity by relating the conditional variance of the disturbance term to the linear combination of the squared disturbances in the recent past. The key insight offered by the ARCH model lies in the distinction between the conditional and the unconditional second order moments. Bollerslev (1986) generalized the ARCH model by modelling the conditional variance to depend on its lagged values as well as squared lagged values of disturbances which is called generalized autoregressive conditional heteroskedasticity (GARCH). This GARCH specification asserts that the best predictor of the variance in the next period is a weighted average of the long-run average variance, the variance predicted for this period, and the new information in this period, and the new information in this period that is captured by the most recent squared residual.

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Table1: GARCH Model

Dependent Variable: ABS_DIFF				
Method: ML - ARCH (Marquardt) - Student's t distribution				
Date: 03/28/15 Time: 14:58				
Sample (adjusted): 4/15/2004 3/28/2014				
Included observations: 2701 after adjustments				
Convergence achieved after 77 iterations				
Presample variance: backcast (parameter = 0.7)				
t-distribution degree of freedom parameter fixed at 10				
GARCH = C(10) + C(11)*RESID(-1)^2 + C(12)*GARCH(-1)				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.017677	0.002815	6.280450***	0.0000
ABS_DIFF(-1)	0.431661	0.024793	17.41094***	0.0000
ABS_DIFF(-2)	-0.037662	0.022849	-1.648312**	0.0993
ABS_DIFF(-3)	0.057991	0.026061	2.225174***	0.0261
ABS_DIFF(-4)	0.011667	0.021926	0.532092	0.5947
ABS_DIFF(-5)	0.078786	0.018517	4.254825***	0.0000
ABS_DIFF(-6)	0.054152	0.015386	3.519505***	0.0004
ABS_DIFF(-7)	-0.008545	0.013954	-0.612377	0.5403
ABS_DIFF(-8)	0.025110	0.011097	2.262654**	0.0237
	Variance Equation			
C	0.000901	6.94E-05	12.98725***	0.0000
RESID(-1)^2	0.388423	0.021246	18.28232***	0.0000
GARCH(-1)	0.587777	0.009786	60.06460***	0.0000
R-squared	0.238480	Mean dependent var		0.249604
Adjusted R-squared	0.236217	S.D. dependent var		0.739155
S.E. of regression	0.645982	Akaike info criterion		-0.560754
Sum squared resid	1123.353	Schwarz criterion		-0.534535
Log likelihood	769.2983	Hannan-Quinn criter.		-0.551273
Durbin-Watson stat	2.029999			

(*), (**), (***) mean significant at the 10%, 5% and 1% levels respectively

The regression results show that the lagged Call rates have a significant positive impact on weighted call rates up to 8 lags. The variance equation shows a significant GARCH coefficient.

Section 3 Impact of policy announcements on money market volatility

The main objective of this section is to study the effect of monetary policy changes on the volatility of the spread and the Call rates. For estimating the impact of policy on the underlying volatility, we have considered changes in the Bank Rate, Repo and Reverse Repo rate, a CRR hike and the operation of the Marginal Standing Facility undertaken during the period of study. Since CRR changes take effect after the date of announcement, we have considered changes in volatility around the announcement date and the date of effective changes brought by the CRR. We have also considered the impact of expansionary and contractionary monetary policy. For empirical analysis, the GARCH volatility equation of the spread and the Call rate has been augmented to include monetary policy variables.

Table 2: Monetary Policy and Call rate

	C	CALL	C	Arch	Garch	MP
CRR-ANN	0.010000 (6866.60)	0.428570 (2644.51)	0.007603 (10.03)	2.437888 (7.24)	0.215566 (9.72)	-0.001234 (-0.12)
CRR-EFF	0.02677 (11.25)	0.450996 (19.13)	0.000936 (13.98)	0.376337 (20.17)	0.589942 (8..57)	0.012084 (4.23)
Repo Rate	0.025100 (11.19)	0.452767 (19.40)	0.000738 (13.26)	0.356804 (20.52)	0.606122 (86.87)	0.021497 (4.72)
Reverse Repo	0.010000 (4329.10)	0.427298 (86.24)	0.006786 (9.51)	3.054623 (7.45)	0.214209 (10.10)	0.148930 (1.43)
Bank Rate	0.010000 (4442.79)	0.0343740 (63.76)	0.004080 (9.75)	2.372232 (8.31)	0.264660 (13.27)	0.222955 (1.50)
MSF	0.021432 (6.81)	0.410383 (9.10)	0.000456 (7.56)	0.294164 (8.47)	0.574012 (36.51)	0.034817 (5.27)
Contractionary MP	0.010000 (8.51)	0.341552 (85.94)	0.005379 (8.51)	2.650655 (7.14)	0.283129 (12.13)	0.174882 (2.02)
Expansionary MP	0.010000 (3991.68)	0.400007 (1668.37)	0.005471 (9.43)	2.104845 (7.53)	0.276680 (11.94)	0.153401 (1.39)

In the case of the call rate, only the CRR announcement reduces volatility in the call rate. The other policy changes increases the volatility of the call rate .

Section 4 Limitations and conclusion:

Limitations:

Some limitations are as follows. The study has considered the impact of monetary policy only. There are also other macroeconomic variables which impact the money market which have not been considered in this study. Another important limitations is the lack of intraday day analysis of the spread and call rate volatility.

Conclusion:

This chapter is an attempt to understand the determinants of volatility in the overnight segment of the Indian money market using time series data based on daily observations. In addition, the impact of monetary policy changes on money market volatility has been analyzed.

The study finds the presence of volatility in the weighted Call rates. One of the highlights of the paper has been the attempt to study the impact of different monetary policy measures on money market volatility. The study shows the dominance of policy interventions in the money market. During most of the period, expansionary monetary policy reduced market volatility, while contractionary policy had a negative impact on volatility.

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