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CBLO and its Association with Repo Market: A Study of Indian Money Market

Jitendra Kumar Dixit and Dr. Sanjeev Gupta

Abstract

Money market plays a crucial role in the growth and development of financial system in a economy. Money market provides a platform for maintaining equilibrium between surplus fund and fund borrower for short-term ranging overnight up to a year. Repo market and Collateralized Borrowing and Lending Obligations (CBLO) segment plays anchor role in marinating liquidity in the financial system.

In this paper an effort has been made analyze the association between both the short-term money market instrument, CBLO and repo. For the analysis, weekly data of trading volume of both the variables ranging from April 2012 to March 2014 is used. Repo rate and database of CBLO is collected from the web portals of Reserve Bank of India (RBI) and CCIL. For the analysis, unit root test followed by co- integration is used to examine the relationship between repo market and CBLO. The Vector Auto Regressive (VAR) model is used investigate the dynamic inter relationship between repo and monetary CBLO.

Key words: *CBLO, Repo Market, VAR, Money Market.*

INTRODUCTION

Money market is the backbone of financial system in a economy. Money market provides a platform for maintaining equilibrium between surplus fund and fund borrower for short-term ranging overnight up to a year. Money market aims efficient flow of liquidity among economic agents with in the economy. Money market plays central role in the monetary policy transmission mechanism by providing a key link in the operations of monetary policy to financial market and to the real economy. Money market rates provide a platform for setting long-term interest rates. The Indian Money Market consists of both organized and unorganized segment. The organized

Jitendra Kumar Dixit
Assistant Professor
Institute of Business Management
GLA University
Mathura, Uttar Pradesh
jitendra.dxt@gmail.com
jitendra.dixit@gla.ac.in

Dr. Sanjeev Gupta
Professor
Department of Commerce
MLB Govt. College of Excellence
Gwalior, Madhya Pradesh
sanjeevgupta67@gmail.com

segment includes the Reserve Bank of India, State Bank of India, Public Sector as well as Private Sector Banks, Regional Rural Bank, Commercial Banks including Foreign Banks, Non-Scheduled Commercial Banks and other Non-Bank Financial Intermediaries such as LIC, GIC, and UTI etc. On the other hand, the unorganized segment consists of indigenous bankers, money lenders and other non-bank financial intermediaries. Money Market instruments mainly include Government securities, securities issued by private sector and banking institutions. Call/Notice/Term money market, Repurchase Agreement (Repo and Reverse Repo) market, Treasury bill market ,Commercial Bill market, Commercial paper market ,Certificate of Deposit market, Money Market Mutual Fund and Collateralized borrowing and lending obligations(CBLO) are different segment of money market segments, where respective money market instrument are traded. Repo and CBLO both are the instrument of short-term money market. In this study, the association of both the instrument is analyzed in terms of trading volumes.

Repo Market: Repo markets are markets in which securities are exchanged for cash with an agreement to repurchase the securities at a future date. Repo is a financing arrangement used primarily in the government securities markets whereby a dealer or other holder of government securities sells the securities to a lender and agrees to repurchase them at an agreed future date at an agreed price which will provide the lender with an extremely low risk return. Such a transaction is called a repo when viewed from the perspective of the supplier of the securities (the party acquiring funds) and a reverse repo or matched sale-purchase agreement when described from the point of view of the supplier of funds. Repos are hybrid transactions that combine features of both secured loans and outright purchase and sale transactions. The repo buyer's right to trade the securities during the term of the agreement, by contrast, represents a transfer of ownership that typically does not occur in collateralized lending arrangements makes the instrument more attractive. Repo transaction involves the sale of an asset under an agreement to repurchase the asset from the same counterparty, interest is paid on the amount of funds lent. Repo transactions may be of any maturity, but are generally of a short maturity, between overnight and 14 days in India and in other developed countries even up to 1 year. The maturity of repo agreements can fall into at least three descriptive categories: overnight, open and term. Overnight refers to repos with a single-day maturity whereas term maturity refers to repos that have a fixed maturity longer than one day.

Collateralized Borrowing and Lending Obligations (CBLO): CBLO is another money market instrument introduced by the Clearing Corporation of India Ltd. (CCIL) in Jan 20, 2003. CBLO is designed for the benefit of the entities who have either no access to the inter bank call money market or have restricted access in terms of ceiling on call borrowing and lending transactions. CBLO is a discounted instrument available in electronic book entry form for the maturity period ranging from one day to ninety days (up to one year as per RBI guidelines). By participating in the CBLO market, CCIL members can borrow or lend funds against the collateral of eligible securities. CBLO, as a product has an edge over the Repo as it overcomes the restrictions in the traditional Repo. Unlike the Repo, the CBLO allows an exit route for the borrowers and lenders during the contract period.

OBJECTIVES OF THE STUDY

The purpose of the study is to analyze the association of CBLO with Repo market.

RESEARCH METHODOLOGY

Sampling Design

Sampling Design for the present study was as follows:

a) For analysis, we have used the log value of weekly data (trading volume) of CBLO and Repo markets.

b) Selection of sample for analysis has been judgment sampling.

Statistical Design

The statistical design used for the study is as follows:

a) For the analysis of association among money market segment (CBLO and Repo), weekly data of trading volume has been taken from the web portals of CCIL and Reserve Bank of India (RBI).

b) Weekly data related to money market segment (CBLO and Repo) is collected from April 2012 to March 2014.

c) Statistical measures like Johansen co-integration test, VECM, Impulse response function is used through E-Views 7.

ANALYSIS AND FINDINGS

For the analysis of time series, stationary of the series is the minimum requirement. Stationary of time series refers, mean and variance should be constant and co-variance depends on the distance of two time periods. The Augmented Dicky-fuller unit root test (Dicky and Fuller, 1979) is used to check stationary of the time series. Weekly volume of CBLO market is stationary at 1st difference, so CBLO is integrated of order one i.e. I(1). Weekly volume of repo market is stationary at 1st difference, so Repo market is also integrated of order one i.e I(1).

For applying VAR model, We select the optimal lag for which Akaike information criterion and Schwarz criterion have smallest value (Grasa, 1989; DeJong *et al.,* 1992; Maddala and Gujarati, 2003). In this study lag selection is based on five criteria; Sequential modified LR test statistics, Final prediction error (FPE), Akaike information criterion (AIC), Schwarz criterion (SC) and Haman-Quinn information criterion (HQ) that is suggested by Lutkepohl (1993). For the present study selected optimal lag is 5.

Johnson co-integration test is applied on the times series to decide which one VAR or VECM suitable analysis to analyze the relation between both the variables.

Table No. 1 (a): Unrestricted Co- integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigen Value	Trace Statistics	0.05 Critical Value	Prob.**
None	0.095996	14.98948	15.49471	0.0595
At most 1 *	0.050702	5.099161	3.841466	0.0239

Note: Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table No. 1 (b): Unrestricted Co-integration Rank Test (Maximum Eigen Value)

Hypothesized No. of CE(s)	Eigen Value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.095996	9.890323	14.26460	0.2192
At most 1 *	0.050702	5.099161	3.841466	0.0239

Note: Max-eigen value test indicates no cointegration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table 1 (a) and 1(b) reflect the output of Johansen co-integration test. Maximum eigen value statistics and trace statistics both indicate no co-integration exist between the variables at 5% significance level.

As no co-integration exist among both the variables,VAR(vector auto-regression) model is preferable over ECM (error correction model). Application of VAR results following system of equations between trading volume of CBLO and repo.

REPO = C(1)*REPO(-1) + C(2)*REPO(-2)+ C(3)*REPO(-3)+C(7)*CBLO(-2)+ C(8)*CBLO(-3) + C(11) .....(1)

CBLO = C(15)*REPO(-4) + C(16)*REPO(-5)+ C(17)*CBLO(-1)+C(20)*CBLO(-4) .....(2)

The system of equations reflect that both repo market and CBLO are associated with each other.

Impulse Response Function

As from Figure 1 (impulse response function), when a 1S.D. shock is given to repo market (self shock), there is sharp decline in trading volume of repo market but afterwards, the impact start declining and becomes negative in 10th week.

But when a 1 S.D. shock is given to CBLO, variation in repo market oscillates between positive and negative and becomes significant after ninth week. Innovation to CBLO market has long term impact on repo market. Shock in repo market add some positive fluctuation in CBLO market and its become more significant after ninth week.

Impulse response function gives an indication about the integration of both the market. An innovation in any of the market has long term impact on one another.

Variance Decomposition Analysis

Variance decomposition measures the percentage of forecast error of variation that is explained by another variable with in the short-run dynamics and interactions. Since the results may be sensitive to ordering of the variables, the most widely used orthogonalisation procedure is the choleski decomposition which eliminates ant contemporaneous correlation between a innovation series.

In the short run from period one to fifth, impulse or innovation or shock to repo market account for up to 94.33% variation of the fluctuation in repo (own shock). Shock to CBLO can cause only up to 5.66% fluctuation in repo market. But from fifth week to tenth week, repo's contribution decreases from 94.33% to 82.76% and CBLO contribution in fluctuation increases from 5.66% to 17.23% in tenth week.

In the long run means in tenth week, impulse or shock to repo accounts for 82.76% variation of the fluctuation in repo (own shock).Shock to CBLO can cause 17.23% of fluctuation in repo.

In the first week, shock to CBLO accounts for 91.99% variation of the fluctuation in CBLO (own shock), shock to repo can cause 8.00% fluctuation in CBLO.

In the short run from week one to eight, impulse or innovation to CBLO account for up to 91.75 variation of the fluctuation in CBLO (own shock). Shock to repo can cause only up to 8.24 % fluctuation in CBLO.

From seventh week to tenth week, CBLO contribution decreases from 91.75% to 85.23% and repo contribution in fluctuation increases from 8.24% to 14.76% in tenth week.

In the tenth week, impulse or shock to CBLO account for 85.23% variation of the fluctuation in CBLO (own shock). Shock to repo causes 14.76% of fluctuation in CBLO.

CONCLUSION

CBLO has been a new entrant to the money market that provides an exit route to investors in a Repo like transaction. CBLO is a tripartite tradable Repo. The trade in CBLO is done through an open limit order book where the matching of bid and offer orders is done through anonymous and transparent trading system. Both CBLO and Repo are collateralized. CBLO is an order driven multi-lateral market while Repo is a bilateral market and hence CBLO rate is expected to be finer and lower than the Repo rate. That reflects from the trading volume of both the instruments. Average trading volume of CBLO is higher than the CBLO. As the rate in CBLO is lower than the repo market, so the participants have both the options. Both the instruments are positively correlated as reflected from the study but their association is not so strong. As the participants in both the segment are common, transaction volume of one segment tells the story of another segment. CBLO being an open limit order book driven market would attract more market participants in comparison to Repo market.

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APPENDIX A

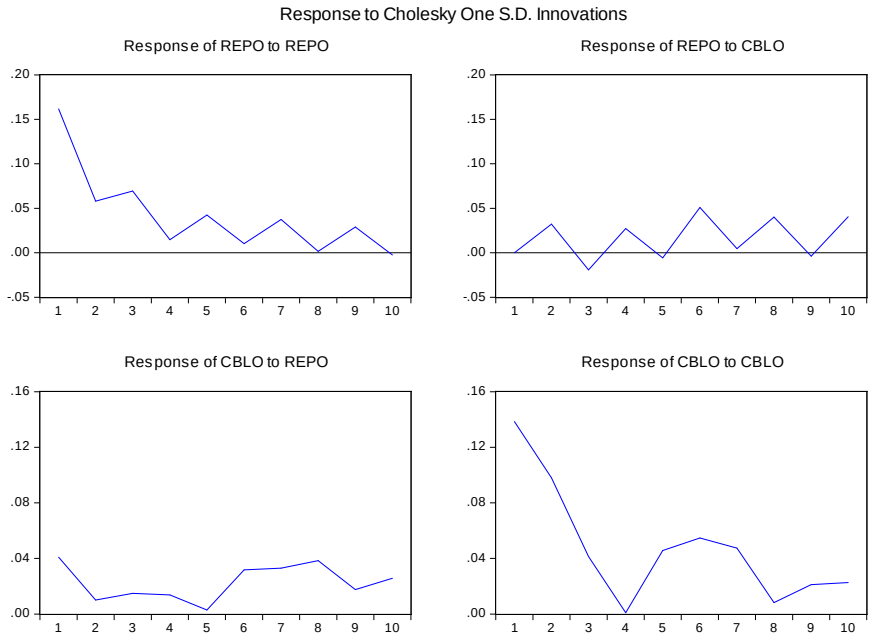

Figure 1: Impulse Response Function

Table A1: Augmented Dickey-Fuller Unit Root Test Results

Null Hypothesis: D(CBLO) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.79287	0.0001
Test critical values:	1% level	-3.497029	
	5% level	-2.890623	
	10% level	-2.582353	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CBLO,2)
Method: Least Squares
Date: 09/01/14 Time: 15:19
Sample (adjusted): 4/30/2012 3/24/2014
Included observations: 100 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CBLO(-1))	-2.263368	0.176924	-12.79287	0.0000
D(CBLO(-1),2)	0.877560	0.131087	6.694497	0.0000
D(CBLO(-2),2)	0.532426	0.081901	6.500821	0.0000
C	0.014068	0.015346	0.916703	0.3616

R-squared	0.743782	Mean dependent var	0.006165
Adjusted R-squared	0.735776	S.D. dependent var	0.298026
S.E. of regression	0.153194	Akaike info criterion	-0.875048
Sum squared resid	2.252960	Schwarz criterion	-0.770842
Log likelihood	47.75242	Hannan-Quinn criter.	-0.832874
F-statistic	92.89387	Durbin-Watson stat	1.979491
Prob(F-statistic)	0.000000		

Table A2: Augmented Dickey-Fuller Unit Root Test Results

Null Hypothesis: D(REPO) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.798305	0.0000
Test critical values:	1% level	-3.497029	
	5% level	-2.890623	
	10% level	-2.582353	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(REPO,2)
Method: Least Squares
Date: 09/01/14 Time: 15:20
Sample (adjusted): 4/30/2012 3/24/2014
Included observations: 100 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(REPO(-1))	-2.139648	0.243189	-8.798305	0.0000
D(REPO(-1),2)	0.493788	0.194145	2.543396	0.0126
D(REPO(-2),2)	0.375202	0.097918	3.831787	0.0002
C	0.007854	0.017635	0.445375	0.6571

R-squared	0.915443	Mean dependent var	-0.003343
Adjusted R-squared	0.912800	S.D. dependent var	0.594178
S.E. of regression	0.175459	Akaike info criterion	-0.603650
Sum squared resid	2.955426	Schwarz criterion	-0.499444
Log likelihood	34.18252	Hannan-Quinn criter.	-0.561476
F-statistic	346.4409	Durbin-Watson stat	1.938913
Prob(F-statistic)	0.000000		

Table A3: Coefficient Table

Dependent Variable: REPO
Method: Least Squares

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.300368	0.113939	2.636214	0.0099
C(2)	0.401445	0.116995	3.431306	0.0009
C(3)	-0.266802	0.119653	-2.229793	0.0283
C(4)	0.181241	0.112497	1.611080	0.1107
C(5)	-0.031334	0.111257	-0.281638	0.7789
C(6)	0.232502	0.118925	1.955029	0.0538
C(7)	-0.373347	0.129050	-2.893041	0.0048
C(8)	0.339811	0.128329	2.647967	0.0096
C(9)	-0.113123	0.132901	-0.851184	0.3970
C(10)	0.125181	0.119876	1.044251	0.2992
C(11)	1.353141	0.613077	2.207133	0.0299

R-squared	0.628900	Mean dependent var	6.754328
Adjusted R-squared	0.586729	S.D. dependent var	0.251509
S.E. of regression	0.161685	Akaike info criterion	-0.701891
Sum squared resid	2.300507	Schwarz criterion	-0.413545
Log likelihood	45.74361	Hannan-Quinn criter.	-0.585226
F-statistic	14.91328	Durbin-Watson stat	1.911430
Prob(F-statistic)	0.000000		

Table A4: Coefficient Table

Dependent Variable: CBLO
Method: Least Squares

	Coefficient	Std. Error	t-Statistic	Prob.
C(12)	-0.116902	0.101755	-1.148863	0.2537
C(13)	0.134204	0.104483	1.284452	0.2024
C(14)	0.065698	0.106858	0.614820	0.5403
C(15)	-0.213966	0.100466	-2.129726	0.0360
C(16)	0.277397	0.099359	2.791867	0.0064
C(17)	0.707367	0.106207	6.660239	0.0000
C(18)	-0.173945	0.115250	-1.509287	0.1348
C(19)	-0.129693	0.114605	-1.131649	0.2609
C(20)	0.495665	0.118688	4.176191	0.0001
C(21)	-0.121259	0.107057	-1.132660	0.2604
C(22)	0.555489	0.547514	1.014565	0.3131

R-squared	0.705905	Mean dependent var	6.902960
Adjusted R-squared	0.672486	S.D. dependent var	0.252311
S.E. of regression	0.144395	Akaike info criterion	-0.928093
Sum squared resid	1.834785	Schwarz criterion	-0.639747
Log likelihood	56.94062	Hannan-Quinn criter.	-0.811428
F-statistic	21.12234	Durbin-Watson stat	2.002418
Prob(F-statistic)	0.000000		

Table A5: Impulse Response Function

(a) Response of Repo

Period	REPO	CBLO
1	0.161685	0.000000
	(0.01149)	(0.00000)
2	0.058062	0.032201
	(0.01847)	(0.01663)
3	0.069421	-0.01926
	(0.01995)	(0.01638)
4	0.014631	0.027265
	(0.02003)	(0.01652)
5	0.042503	-0.00578
	(0.01888)	(0.01621)
6	0.010150	0.050818
	(0.01705)	(0.01471)
7	0.037504	0.004713
	(0.01641)	(0.01486)
8	0.001612	0.040114
	(0.01503)	(0.01388)
9	0.028845	-0.00377
	(0.01313)	(0.01239)
10	-0.00243	0.040586
	(0.01270)	(0.01230)

Response of CBLO

Period	REPO	CBLO
1	0.040848	0.138496
	(0.01422)	(0.00984)
2	0.009993	0.097968
	(0.01864)	(0.01627)
3	0.014875	0.041444
	(0.01979)	(0.01712)
4	0.013785	0.000886
	(0.01926)	(0.01584)
5	0.002940	0.045703
	(0.01910)	(0.01581)
6	0.031736	0.054745
	(0.01711)	(0.01520)
7	0.033042	0.047451
	(0.01776)	(0.01619)
8	0.038397	0.008243
	(0.01548)	(0.01538)
9	0.017559	0.021104
	(0.01398)	(0.01431)
10	0.025757	0.022592
	(0.01363)	(0.01389)

Table A6: Variance Decomposition Table

Variance Decomposition of REPO

Period	S.E.	REPO	CBLO
1	0.161685	100.0000	0.000000
2	0.174786	96.60596	3.394036
3	0.189051	96.06121	3.938785
4	0.191567	94.13831	5.861686
5	0.196310	94.33158	5.668418
6	0.203035	88.43632	11.56368
7	0.206523	88.77160	11.22840
8	0.210389	85.54508	14.45492
9	0.212391	85.78469	14.21531
10	0.216248	82.76476	17.23524

Variance Decomposition of CBLO

Period	S.E.	REPO	CBLO
1	0.144395	8.002863	91.99714
2	0.174778	5.789206	94.21079
3	0.180239	6.124777	93.87522
4	0.180768	6.670550	93.32945
5	0.186479	6.293072	93.70693
6	0.196923	8.240567	91.75943
7	0.205237	10.17849	89.82151
8	0.208960	13.19554	86.80446
9	0.210756	13.66579	86.33421
10	0.213523	14.76909	85.23091