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Looking Inside Liquidity of Scheduled Commercial Public Sector Banks: An ARDL Approach

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ABSTRACT

Banks area unit are providing less liquidity to lenders; however the demand for funds by the lenders has been increasing day by day which ends in serious losses in fastened financial gain. The impede in Repo rate decrease the bank's disposition to supply liquidity in fastened financial gain markets as marginal profits reduces. Liquidity management was ready to expeditiously mitigate liquidity risk. Hence, thereought to judge the liquidity of scheduled business public sector banks. The adoption of the Descriptive Research Design was appropriate and effective in the present study. The study has been conducted for the period from 2006-07 to 2015-16 for all scheduled commercial public sector banks. The study specifically aims to evaluate the liquidity of scheduled commercial public sector banks. The choice of variables was based on previous relevant studies. Panel Autoregressive Distributed Lag model (ARDL) model is used. Error correction representation of the ARDL model showed the short-run elasticity. Results represented that in the short-run D(SLR(-3)) is the most significant factor (with the negative coefficient and largest t-ratio) to assess liquidity. It implied that there is negative (-0.045) and significant (0.000) relationship between Statutory Liquidity Ratio at lag 3 and Liquidity at 5% level of significance.

Keywords: Banks, Liquidity, Public, Commercial.

INTRODUCTION:

A shaping characteristic of the latest monetary crisis was the synchronic and widespread disturbance in funding markets, which adversely affected monetary stability in absence of appropriate liquidity risk management and guidelines responses. Specifically, banks' common quality exposures and their magnified reliance on short funding with high control levels helped spread rising counterparty jeopardy as a result of bigger interdependency among the economic system. Amid bigger uncertainty concerning hard-to-value assets, lenders were additional doubtless to extend haircuts on repo funding, limit eligibility of collateral, or stop rolling over short funding altogether so as to offset associate quality shock by suggests that of de-leveraging their balance sheets (Shin, 2009; Shleifer and Vishny, 2010). As such activities occurred jointly, coordination failure directed to liquidation of assets vulnerable sale conditions (Coval and Stafford, 2007), that additional depressed quality costs, and induced downward liquidity spiral, inflicting system liquidity to dry up, with pessimistic consequences for economic condition.

The devastating impact of general liquidity events conjointly illustrated the shortcomings in existing liquidity laws. underneath traditional circumstances, banking regulation ensures, as so much as attainable, that maturity and liquidity transformation in conducted safely with the mandatory access to financial organization loaning facilities and investor protection preventing fast run-offs of liabilities that would spend the supply of spare funding underneath stress (Zhang, S. 2018).

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the bank's disposition to supply liquidity in fastened financial gain markets as marginal profits reduces. Liquidity management was ready to expeditiously mitigate liquidity risk. Hence, there's ought to judge the liquidity of scheduled business public sector banks.

REVIEW OF LITERATURE:

Nimalathasan et al. (2013) compared the money position of state and private sector banks in Srilanka from 2006-2010. The study analysed the potency of the banking sector in Sri Lanka exploitation Bankometer approach. Bankometer ratios area unit derived from each the CAMELS and CLSA assay parameters with some modifications. On the premise of the Bankometer results it's found that state banks area unit in a very sounder financial condition position as compared to non-public sector banks.

Toby, A. J. (2008) discussed that there was a statistically noteworthy relationship among selected measures of profitability, efficiency and indebtedness and measure of liquidity in Nigerian quoted manufacturing companies. The impact of one per cent increase in average liquidity measures produces a more significant increase in indebtedness (16.6 per cent), average profitability (21.9 per cent), and efficiency (16.1 per cent).

Owolabi, S. A., & Obida, S. S. (2012) in their article titled "Liquidity Management and Corporate Profitability: Case Study of Selected Manufacturing Companies Listed on The Nigerian Stock Exchange" an effort is made to examine the relationship between corporate profitability and liquidity management using data from selected manufacturing companies taken from the floor of the Nigerian Stock Exchange. The result was obtained using descriptive analysis and the finding reveals that liquidity management deliberated in terms of the companies Cash Conversion Cycle, Credit Policies, and Cash Flow Management has significant impact on company profitability. It has found that managers can augment profitability by implementing short cash conversion cycle, effective cash flow management, and good credit policy procedures.

Pervej, M. (2017) evaluated the financial position and profitability of selected cement companies in India through employing various financial ratio and applied correlation, standard deviation, mean, and variance. The study used profitability and liquidity ratios for assessment of influence of liquidity ratios on profitability performance of selected cement companies.

Materials and Methods:

Liquidity is a bank's capability to finance the assets and realize both anticipated and unanticipated cash and collateral commitment as they become due (Bhati, S. et al., 2015). Liquid assets comprises of cash, bank balance with Reserve Bank of India, money at call and short notice and bills purchased. The liquidity ratio provides the information about banks' capability to meet its liabilities in short term. The higher is the amount of liquid assets in total assets; more is the bank's capability to meet its liquidity needs in short term. The high value of liquid assets may also be considered as banks ineffectiveness of the bank as liquid assets generate less income for the bank. The choice of variables was based on previous relevant studies. Panel Autoregressive Distributed Lag model (ARDL) model is used.

The adoption of the Descriptive Research Design was appropriate and effective in the present study. The study has been conducted for the period from 2006-07 to 2015-16 for all scheduled commercial public sector banks. The study specifically aims:

To evaluate the liquidity of scheduled commercial public sector banks.

Since all the scheduled commercial public sector banks are being included in the study, hence, no sample is required. The research is purely based on Census as this method leads to great level of accuracy. The major sources of data is secondary data that would include various national/ international journals, books, earlier related studies, reports, press releases, newspapers, periodicals among other sources and also the use of various relevant and useful sites in relation to present study. However major sources are Handbook of RBI, Indian Bank's Association, Published Annual Financial Statements of the selected banks, RBI Reports on Currency and Finance (several years), RBI Annual Reports (several years), RBI Reports on Trends and Progress in banking (several years).

STATISTICAL FRAMEWORK:

Auto Regressive Distributive Lag Model:

Engle and Granger test (1987), Maximum Likelihood (ML) test (1988, 1991) and Johansen test (1990) are the most commonly used methods to examine the long-run equilibrium relationship among variables. The assumption of these methods impose that all the variables in the model must be stationary at first difference. Another limitation is the poor performance in the case of modest sample. Autoregressive distributed lag

(ARDL) model avoids the said limitations. Pesaran and Shin (1996) and Pesaran et al. (1999) formulated this approach while Pesaran et al. (2001) amended it further. This model unlike the other models does not require all the variables to be stationary at the same order. This model is equally superior if all variables in the model are I(1) or I(0) or even mixture of I(1) and I(0) (Pesaran and Pesaran, 1997). Pesaran and Shin (1999) concluded that ARDL model provides robust results in case of small samples of the long-run coefficients.

Model Specification:

The ARDL ($liq,q_1,q_2.....q_k$) model specification is given as follows:

$$\phi\,(L, liq)y_t = \sum_{i=1}^{n} \beta_i(L, q_i)x_{it} + \delta\omega_t + \mu_{it}$$

Where ϕ (L,liq) = 1- $\phi_1 L$- $\phi_2 L^2$ - …….- $\phi_p L^p$

β(L,q) = 1- $\beta_1 L$- $\beta_2 L^2$ - …….- $\beta_q L^q$

L is a lag operator; ω_t is an intercept term with the fixed lags. i=1,2….,k, P=0,1,2…,n, q=0,1,2….,n, The maximum lag order, n is selected by the user. Sample period, t = n+1, n+2….,m. μ_{it} is the error term

Or ARDL specification is:

LIQUIDITY = C(1)*LIQUIDITY(-1) + C(2)*LIQUIDITY(-2) + C(3)*LIQUIDITY(-3) + C(4)*LIQUIDITY(-4) + C(5)*LIQUIDITY(-5) + C(6)*NPATA + C(7)*NPATA(-1) + C(8)*ROE + C(9)*ROE(-1) + C(10)*SIZE + C(11)*SIZE(-1) + C(12)*SIZE(-2) + C(13)*SIZE(-3) + C(14)*SIZE(-4) + C(15)*SIZE(-5) + C(16)*CR + C(17)*CR(-1) + C(18)*CR(-2) + C(19)*CR(-3) + C(20)*CR(-4) + C(21)*CRR + C(22)*CRR(-1) + C(23)*CRR(-2) + C(24)*CRR(-3) + C(25)*CRR(-4) + C(26)*CTA + C(27)*CTA(-1) + C(28)*CTA(-2) + C(29)*CTA(-3) + C(30)*CTA(-4) + C(31)*CTA(-5) + C(32)*GDP + C(33)*SLR + C(34)*SLR(-1) + C(35)*SLR(-2) + C(36)*SLR(-3) + C(37)*SLR(-4) + C(38)*SLR(-5) + ε

Where,

LIQUIDITY=Bank liquidity (liquid assets over total assets)
NPATA= Non-performing assets to total assets
ROE=Return on Equity
CR=Call Rate
SIZE=Bank size (natural log of total assets)
CTA=Capital to total assets
CAR=Capital adequacy ratio
GDP=Gross domestic product
CRR=Cash reserve ratio
SLR=Statutory liquidity ratio
ε=Error term

ANALYSIS:

The descriptive statistics are exhibited in table 1 and showed that the average of liquidity is 0.107 with standard deviation of 0.042. The average for Non-performing Assets to total Advances is 1.562 with standard deviation of 1.197, the average for ROE is 12.73 with the standard deviation of 8.909, the average for Call rate consumption is 6.824 with standard deviation of 1.46, the average capital to total asset is 0.0047 with standard deviation of 0.005 and the mean for GDP growth is 7.348 and its standard deviation 1.799 and mean for Size is 6.662 with standard deviation 0.470. Moreover, mean for Cash Reserve Ratio and Statutory Liquidity Ratio is 5.1788 and 23.282 respectively with standard deviation 1.0449 and 1.5581 respectively.

Table 1: Statistical Analysis of Selected Variables

	Liquidity	NPATA	ROE	CR	CTA	GDP	Size	CRR	SLR
Mean	0.10763	1.56280	12.7314	6.8241	0.0047	7.3483	6.6626	5.1788	23.282
Std. Dev.	0.04215	1.19736	8.9099	1.4638	0.0058	1.7990	0.4704	1.0449	1.5581

Source: Compiled from the data taken from RBI statistical tables related to banks in India through EViews 9 (×64).

Panel Unit Root Test:

Table 2 presented the outcome of the panel unit root test performed for all the variables both at their levels and first differences and second differences correspondingly. The tests are carried out for all the public sector banks from the years 2006-07 to 2015-16. The unit root tests conducted to seek cognizance of these variables of the data used. The

results showed that the variable Gross Domestic Product is stationary at level. The variables Liquid assets/ total assets, Capital to total assets, NPA to total advances, Return on Equity, Size, and Call rate are stationary at their first difference with individual effects and individual linear trends. Furthermore, Cash Reserve Ratio and Statutory Liquidity Ratio are stationary at level. The variable Non-performing loans to total loans are stationary at second difference. Hence, this variable has excluded (Choi, I., 2001). To evaluate the liquidity of scheduled commercial public sector banks the panel Auto Regressive Distributive Lag (ARDL) test has been employed.

Table 2: Panel Unit Root Test

Variable	Level	LLC	B-stat	IPS	ADF	PP
Liquid assets/ total assets	At Level	-9.46697 (0.0000)	-0.90019 (0.1840)	-1.69558 (0.0450)	87.2938 (0.0016)	149.586 (0.0000)
	First Differencing	-13.1657 (0.0000)		-5.65374 (0.0000)	133.87 (0.0000)	150.437 (0.0000)
Non Performing loans to total loans	At Level	7.74719 (1.0000)	12.3960 (1.0000)	5.70038 (1.0000)	17.9492 (1.0000)	29.4996 (0.9950)
	First Differencing	2.86626 (0.9979)		2.36861 (0.9911)	60.1934 (0.2035)	61.2630 (0.1778)
	Second Differencing	-7.62901 (0.0000)		-5.33463 (0.0000)	138.931 (0.0000)	148.149 (0.0000)
NPA to total advances	At Level	-14.4389 (0.0000)	4.90439 (1.0000))	0.88459 (0.8118)	52.8487 (0.4411)	63.3094 (0.1175)
	First Differencing	-10.868 (0.0000)		-3.6230 (0.0001)	105.296 (0.0000)	133.215 (0.0000)
Return on Equity	At Level	-1.51520 (0.0649)	8.68662 (1.0000)	2.12310 (0.9831)	37.8846 (0.9288)	72.0368 (0.0343)
	First Differencing	-7.40957 (0.0000)		-2.48426 (0.0065)	100.907 (0.0001)	133.819 (0.0000)
Size	At Level	-3.25618 (0.0006)	-5.48981 (0.0000)	0.29947 (0.6177)	38.9347 (0.9100)	38.6220 (0.9159)
	First Differencing	-13.7933 (0.0000)		-5.32523 (0.0000)	125.786 (0.0000)	138.341 (0.0000)
Call rate	At Level	-6.54392 (0.0000)	-5.87960 (0.0000)	0.59616 (0.7245)	33.5549 (0.9780)	27.6046 (0.9978)
	First Differencing	-16.1406 (0.0000)		-6.60940 (0.0000)	148.550 (0.0000)	180.529 (0.0000)
Capital to total assets	At Level	-3.72186 (0.0001)	0.77446 (0.7807)	0.83523 (0.7982)	12.9695 (0.9340)	11.0933 (0.9734)
	First Differencing	-5.49214 (0.0000)		-1.84263 (0.0327)	23.6096 (0.0230)	28.7005 (0.0014)
Gross Domestic Product	At Level	-26.0423 (0.0000)	-8.92227 (0.0000)	-5.75673 (0.0000)	204.008 (0.0000)	265.119 (0.0000)
Cash Reserve Ratio	At Level	-24.821 (0.0000)	-1.4173 (0.0782)	-3.7734 (0.0001)	144.049 (0.0000)	20.130 (1.0000)
Statutory Liquidity Ratio	At Level	-16.7198 (0.0000)	-3.4804 (0.0003)	-5.2507 (0.0000)	161.491 (0.0000)	369.21 (0.0000)

Source: Compiled from the data taken from RBI statistical tables related to banks in India through EViews 9 (×64).
Note: LLC, B-stat, IPS, ADF and PP implies Levin, Lin and Chu Test; Breitung t-stat; Im, Pesaran and Shin W-stat; ADF - Fisher Chi-square; PP - Fisher Chi-square Tests respectively. The number in parenthesis represents the probability value.

Diagnostic Tests:
Serial Correlation: For analyzing serial correlation, Breusch-Godfrey Serial Correlation LM Test has been applied.
H_o= There is no serial correlation
H_a= There is serial correlation in the model

Table 3: Breusch-Godfrey Serial Correlation LM Test

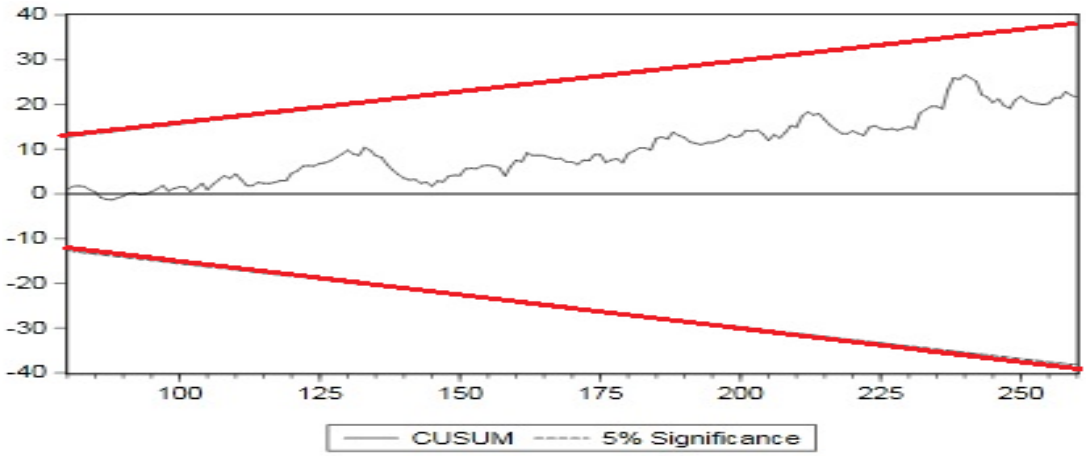
F-statistic	2.299034	Prob. F(2,214)	0.1028
Observed R-squared	5.363758	Prob. Chi-Square(2)	0.0684

Source: Compiled from the data taken from RBI statistical tables related to banks in India through EViews 9 (×64).

As per Table 3, the Probability Chi-Square value of Observed R- squared is 0.0684; hence null hypothesis is accepted, meaning that there is no serial correlation exists in the model.

Stability Test: For diagnosing the stability, CUSUM Recursive estimates Test has applied. According to Figure 1, the line (black) should be within two red lines. It has found that the line is in between 2 red lines; therefore, the model is stable (Figure 1).

Figure 1: Recursive Estimate CUSUM test



Source: Compiled from the data taken from RBI statistical tables related to banks in India through EViews 9 (×64).

Appropriate/ Optimal number of Lags in the ARDL Model:

In dynamic balanced Panel ARDL Model, it is essential to attain unbiased evaluation of coefficients to inculcate it with the estimators. In Panel data for avoiding the biased results relates to estimation of model coefficients, the number of optimal lags of the model according to the number of variables and the number of cross-sections should be chosen. The Results of long-run relationship are responsive to lag-length preferred in the model (Bahmani-Oskooee and Bohal, 2000). A vital step in the specification of the ARDL model is finding out the lag length as all results are based on the correct chosen of this factor. There are various criteria for selecting of optimal lag length such as Akaike information criterion (AIC), Schwarz information criterion (SIC) etc. AIC has been used (Liew, V. K. S., 2004). The Five lag is the best measure for this ARDL model (Table 4).

Table 4: Optimal Lags

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1370.921	NA	4.23e-07	10.86552	10.99086	10.91594
1	-402.3146	1860.944	3.90e-10	3.876493	5.129879*	4.380715*
2	-300.9184	187.6228	3.33e-10	3.715893	6.097327	4.673915
3	-208.5774	164.3234	3.06e-10	3.626594	7.136075	5.038415
4	-84.18271	212.5484	2.20e-10	3.284903	7.922432	5.150524
5	12.31329	158.0407	1.98e-10*	3.162887*	8.928464	5.482308
6	84.41761	112.9824*	2.18e-10	3.232932	10.12656	6.006153

Source: Compiled from the data taken from RBI statistical tables related to banks in India through EViews 9 (×64).
Note: * indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Bound Test:

Table 5: F-Statistic for Testing the Existence of Long-Run Relationship

Test Statistic	Value	k
F-statistic	12.29661	8
Critical Value Bounds		
Significance	**I0 Bound**	**I1 Bound**
10%	1.95	3.06
5%	2.22	3.39
2.5%	2.48	3.7
1%	2.79	4.1

Source: Compiled from the data taken from RBI statistical tables related to banks in India through EViews 9 (×64).

Table 5 is explaining the bound test results just to know either the co-integration exists or not. If co-integration exists only then ARDL can be applied. The guideline is when the F-statistics calculated value is more than the upper bound value, reject the null hypothesis.

H_o: No long-run relationships exist

If F-Statistics calculated value comes in the bound test more than the upper value (I1 Bound), it implied that the co-integration exists. The F- statistics value is 12.296. The upper bound value is 3.39 at 5 per cent significance level. The F- statistics value comes higher than the upper bound value hence, co-integration exists. There is a long run relationship among the variables. It can be concluded that long run and short run ARDL model can be applied.

Long-Run Coefficients of ARDL (5, 1, 1, 5, 5, 4, 4, 5, 0) Model Dependent Variable Liquidity:

Table 6: Long run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NPATA	0.006520	0.002530	2.577623	0.0106
ROE	0.000716	0.000466	1.538184	0.1255
SIZE	-0.007739	0.011803	-0.655680	0.5127
SLR	-0.005638	0.003597	-1.567338	0.1185
CR	-0.001068	0.001787	-0.597489	0.5508
CRR	0.011206	0.005400	2.075180	0.0392
CTA	1.744719	0.721153	2.419344	0.0164
GDP	0.003278	0.002006	1.634516	0.1036
C	0.186302	0.081753	2.278855	0.0237

Source: Compiled from the data taken from RBI statistical tables related to banks in India through EViews 9 (×64).

Table 6 reveals that Non-performing Assets to total Advances are the most significant factor of Liquidity variable in Public sector banks in India. The effect of Non-performing Assets to total Advances on Liquidity is significant at five percent level of significance. The coefficient (0.0065) of NPATA shows that one percent increase in Non-performing Assets to total Advances leads to 0.0065 percent increase in liquidity in the long-run. Capital to total asset is another significant factor of Liquidity in Public sector banks. At five percent level of significance the effect of Capital to total asset on liquidity is positive. The coefficient (1.744) of CTA indicates that one percent increase in Capital to total asset level improves the Liquidity by 1.744 percent in the long-run. Cash Reserve Ratio again has significant effect on liquidity. The coefficient (0.039) of CRR implied that one percent increase in cash reserve ratio leads to 0.039 percent increase in liquidity in the long-run. The results signified the importance of Non-performing Assets to total Advances, Capital to total asset and Cash Reserve Ratio in evaluating the liquidity.

Table 7: Error Correction Representation of the Selected ARDL (5, 1, 1, 5, 5, 4, 4, 5, 0) Model Dependent Variable Liquidity

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LIQUIDITY(-1))	0.016180	0.079470	0.203606	0.8389
D(LIQUIDITY(-2))	-0.239719	0.071683	-3.344143	0.0010

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LIQUIDITY(-3))	-0.096127	0.057157	-1.681827	0.0940
D(LIQUIDITY(-4))	-0.262842	0.049124	-5.350544	0.0000
D(NPATA)	0.001620	0.002150	0.753429	0.4520
D(ROE)	0.000248	0.000300	0.825952	0.4097
D(SIZE)	0.046445	0.006254	7.426599	0.0000
D(SIZE(-1))	-0.002064	0.005754	-0.358674	0.7202
D(SIZE(-2))	0.016591	0.005608	2.958260	0.0034
D(SIZE(-3))	0.022554	0.005594	4.031869	0.0001
D(SIZE(-4))	0.030334	0.006011	5.046717	0.0000
D(SLR)	-0.025733	0.006315	-4.074710	0.0001
D(SLR(-1))	0.020098	0.006326	3.177052	0.0017
D(SLR(-2))	0.003151	0.006439	0.489290	0.6251
D(SLR(-3))	-0.045460	0.006340	-7.170005	0.0000
D(SLR(-4))	-0.010038	0.005543	-1.811131	0.0715
D(CR)	-0.001401	0.002858	-0.490222	0.6245
D(CR(-1))	-0.001133	0.003206	-0.353597	0.7240
D(CR(-2))	0.003191	0.003222	0.990319	0.3231
D(CR(-3))	-0.006851	0.002758	-2.483716	0.0138
D(CRR)	-0.007028	0.006319	-1.112226	0.2673
D(CRR(-1))	0.009669	0.006247	1.547774	0.1231
D(CRR(-2))	0.002523	0.006282	0.401686	0.6883
D(CRR(-3))	-0.034487	0.005431	-6.349860	0.0000
D(CTA)	-0.136661	0.319208	-0.428124	0.6690
D(CTA(-1))	0.235605	0.273376	0.861836	0.3897
D(CTA(-2))	-0.029608	0.275887	-0.107319	0.9146
D(CTA(-3))	-0.781261	0.287088	-2.721329	0.0070
D(CTA(-4))	-0.737545	0.299046	-2.466328	0.0144
D(GDP)	0.003017	0.001803	1.673492	0.0957
ECT(-1)	-0.920433	0.097144	-9.474922	0.0000

$R^2 = 0.687$, Adj. $R^2 = 0.632$, F -statistic = 12.51, Prob (F-stat) = 0.000, DW = 1.847

Source: Compiled from the data taken from RBI statistical tables related to banks in India through EViews 9 (×64).

Table 7 contains the results of error correction representation of the ARDL model. Coefficients of the variables showed the short-run elasticity. Results represented that in the short-run D(SLR(-3)) is the most significant factor (with the negative coefficient and largest t-ratio) to assess liquidity. It implied that there is negative (-0.045) and significant (0.000) relationship between Statutory Liquidity Ratio at lag 3 and Liquidity at 5% level of significance. Likewise, There is negative and significant relationship of Liquidity at lag 2, Liquidity at lag 4, Statutory liquidity ratio at zero lag, Call Rate at lag 3, Cash reserve ratio at lag 3, Capital to total assets at lag 3 and Capital to total assets at lag 4 with the dependent variable i.e. Liquidity. Negative coefficient means the independent variables are converging to the equilibrium.

However, there is positive and significant relationship of Size at lag 0, 2, 3 and 4, Statutory Liquidity Ratio at lag 1 with the dependent variable i.e. Liquidity. It implied that the independent variables are diverging to the equilibrium. Non-performing Assets to total Advances, Return on Equity and Gross domestic product does not significantly affect the Liquidity even in the short-run. The coefficient of error correction term (-0.9204) is significant at five percent level. Highly significant negative symbol of the error correction term reinforces the persistence of long-run relationship between the variables. Moreover, the speed of adjustment from previous year's disequilibrium in liquidity to current year's equilibrium is 92 percent.

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