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Bank Specific Determinants of Liquidity of Public and Private Sector Banks

Puja Agarwal

Abstract: ***For the upliftment of an economy, a healthy and strong banking sector is of paramount importance. The efficiency and viability of banks is much affected by the liquidity level they possess. Liquidity refers to the assets that are either in form of cash or immediately convertible into cash without any serious loss of time and money. Direct cash holding in currency or holding creditworthy securities including government bills with short term maturities provides liquidity to a bank. This paper investigates the factors that determine liquidity of Indian banks and compares the determinants in case of public and private sector banks. Using panel data, empirical analysis is carried out on the commercial banks of India for the period 2005 to 2017. The bank specific factors included are bank size, deposits, cost of funds, capital adequacy ratio, non performing assets and ROE. The result shows determinants of liquidity vary for both banking groups. Public sector banks with an increase in their size, increases the amount of liquid assets adequately to manage liquidity risk. However, private sector banks relying more on financial markets with their increasing size holds less liquidity.***

Keywords: Liquidity, bank size, non performing assets, capital adequacy ratio, ROE

I. INTRODUCTION

Many economist regards liquidity as the lifeblood of a financial institution. Banks liquidity undoubtedly plays as a lever in the capacity of banks to provide funds in the economy. It is the availability of funds or the assurance of the availability of funds to meet banks cash flow commitments including the off balance sheet cash flow item whenever they fall due. When a bank can honor in full all its financial obligations, it develops a sense of customer's loyalty and satisfaction. On the other hand, a poor liquidity level could lead to failure of banks to meet their obligations. In such situations, customers losing their confidence on bank may engage in a run on the bank. A study of the variables affecting liquidity therefore becomes necessary owing to the importance liquidity holds for a bank.Studies of Melese (2015), Kaur
and Sharma (2017), Pushkalaet. al (2017) have shown liquidity of a bank increases with an increase in their assets, capital adequacy ratio and deposits. The present study tries to identify the determinants of liquidity of public and private sector banks operating in India.

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* Correspondence Author
Puja AgarwaL*, Assistant Professor **,** Dept. Of Economics, Naharkatiya college. Email id- pujaagarwal0608@gmail.com

Theoretical Background

According to the inventory theory of capital and liquidity buffer, the size of liquidity should show the
opportunity cost of holding liquid assets rather than loans.
The distribution of liquidity shock that the commercial banks can experience must also be taken in account.
Commercial banks can avert the liquidity risk by maintaining a stock of liquid assets.
As Baltensperger (1980) stated that holding liquid assets may be a costly affair for banks but it reduces the fear of being out of cash during massive deposit withdrawals.
Due to capital market imperfections and co-ordination failure in the interbank market, it may become difficult to raise liquidity in short notice giving rise to the problem of insolvency. It is necessary for banks to hold a sufficient liquid assets in order to be secure from unexpected cash withdrawals. Thus, banks hold a buffer of liquid assets as self-insurance that equals the additional benefit of keeping assets to the additional cost of alternative investments. (Mugenyah, 2015)

A similar theory to this, shift ability theory of liquidity was developed by Harold Moulton in 1915. The theory supported holding credit instruments as a form of liquidity to protect themselves from liquidity risk. Commercial papers, prime banker's acceptance and treasury bills were regarded as important liquidity reserves. This reserves are marketable due to their short term maturity and certainty of capital. The commercial bank's loan commitment practices that prevails today is due to the shift ability theory.

The last theory relating to liquidity is the risk absorption hypothesis. The hypothesis supported that through increasing the amount of capital it holds, bank can create more liquidity. Banks with more liquid assets may face greater losses when they have to sell illiquid assets to meet heavy withdrawals. Risk absorption effect is relatively more for large banks because of their regulatory market disciplines (Mugenyah, 2010). Higher capital ratios are positively related with liquidity level.

II. EMPIRICAL REVIEW

Akhtar, Sadeqat and Ali (2011) made a comparative study between the conventional and Islamic banks of Pakistan to identify the liquidity risk. The results showed that size of bank and net working capital to net assets shares an insignificant positive relationship with liquidity risk for both banking groups. For the conventional banks, capital adequacy and return on assets in case of Islamic banks were positive determinants of liquidity. Conventional banks were more involved in long term financing projects. Additionally conventional banks performed more well in terms of assets and return and were in a better
profitable position.

A panel of 27 banks active in Romania from 2002 to 2010 to was analysed by Munteanu (2012) to examine the factors influencing banks liquidity in the pre-crisis (2002-2007) and crisis years (2008-2010). The results showed an important measures of bank's stability, Z score significant in the crisis period and impaired loans i.e. the potential loss due to unfavorable market condition has a negative association with banks' liquidity.

Qin and Pastory (2012), in their paper, analysed the total deposits to core funding, liquid assets to demand liabilities and gross loans to total deposits. The study revealed that commercial banks maintained a strong liquidity level especially in terms of liquid assets to demand liabilities. In a similar study on determinants of liquidity in Hungarian commercial bank Vodava (2013), by applying panel data regression showed that capital adequacy of banks, interest rate on loans and bank profitability affects liquidity positively. Liquidity shares a negative relationship with the size of bank, interest margin and monetary policy interest rates.

While analyzing the liquidity of Moroccan banks Mehdi and Abderrassoul (2014), found the financial crisis to be negatively affecting the banking liquidity. There was a decrease in liquidity level during the study period. Bank size was found to be positively affecting liquidity. The study through panel technique found foreign direct investment, foreign assets, GDP, public deficit and M_3 to be the determining factors of bank liquid assets

Ramanarayan and Unas (2014), studied the components of liquidity management in Indian public sector banks such as the demand deposits to total deposits, liquid assets to total assets, advances to total assets. With decrease in investment with RBI, liquidity of bank have declined. A negative association between liquidity and management efficiency is been addressed by Belad, Bellouma, Omri (2016). Efficiently managed banks are able to maintain more liquid assets. Further, traditional banks relying more on lending activities have much lower liquidity risk.

Racia,Stanisic and Stanic(2016), empirically investigated the influencing factors for liquidity riskin the Republic of Serbia and compared it with banks from countries that have become a member of EU from socialist countries. With an increase in NPL, domestic banks are facing with decreasing lending activities which has led to higher level of liquidity. Larger banks with a wide diversification of loans maintain a high loan to deposit ratio. In addition to this, banks having more capital are save from liquidity risk exposure. With the growth in GDP, declining unemployment and exchange rate, risk of liquidity increases. During the expansion phase of business cycle, amount of liquid assets banks hold tends to fall with an increase in lending activities.

Ahmed and Rassol (2017), measured the bank liquidity with the help of stock approaches. Their study confirmed that larger banks with more assets invest more in risky assets and as such have less liquid assets as compared to the small banks. With the increase in GDP, growth rate and bank capital, there is an increase in bank's liquidity level. Non - performing loan is indirectly related to bank liquidity while the role of consumer price index and profitability is insignificant when dealing with liquidity.

The determinants of liquidity of the leading banks operating in Germany and UK was studied taking a sample of 14 banks from both the country by Elahi (2017). The study examined the effect of credit risk, bank size, profitability, financial leverage, income diversification and NIM on bank's liquidity. The results revealed that with the increasing net interest margins, bank involves themselves more in lending activities and hence have lower liquid assets at their disposal. For the Germen banks, liquidity is negatively affected by leverage ratio while the same was not a significant determinant for banks in U.K. All the other variables used in the study were found to be insignificant for both the countries commercial banks.

Pushkale, Mahamayi and Venkatesh (2017), in a comparative study between public and private sector banks regarding liquidity position answered that to meet demand deposits, private sector banks keeps significant level of liquid funds. Moreover, both public and private banks keep lesser liquid assets so as to maximize profits. In a similar comparison, Rashid, Ramchandra and Fawzy (2017) have stated that Islamic banks due to limited human resources and prohibition from sourcing short term capital from conventional market are facing difficulties in managing liquidity. They talked about both cash liquidity and investment liquidity. Profitability, loan loss provision, size of the bank, return on assets were disclosed as the important elements for liquidity determination. In order to lower liquidity risk, an integration between the policymakers and the managing body is required. Excess operating must be controlled so as to solve the liquidity problems

III. RESEARCH METHODOLOGY

To identify the factors affecting liquidity of both public and private sector banks, the technique of panel data is used. In the study balanced panel data of Indian public sector and private sector banks from the period pertaining from 2005-2017 has been considered. Hausman test was applied to check whether to select the fixed effect estimates or random effects estimates for the given set of data. Fixed effect estimates are usually correlated with the regressors (βs). The dependent variable considered in this study is liquidity which is defined as liquid asset (sum of cash in hand, available balance with RBI, balances with other banks and money at call short notice) over total assets.

IV. MODEL SPECIFICATIONS

Based on the theoretical framework, the following model has been formed to run our regression for public and private sector banks separately

$$\mathbf{LIQ_{it}=\alpha_{it}+\beta_1 SIZE_{it}+\beta_2 DEP_{it}+\beta_3 CoF_{it}+\beta_4 NPA_{it}+\beta_5 CAR_{it}+\beta_6 ROE_{it}+\varepsilon_{it}}$$

Where, $\beta_1,\beta_2,\beta_3,\beta_4,\beta_5$and $\beta_6$are the co-efficients of determinant variables and ε is the error term. A panel with i representing bank and t representing time (year) is constructed. The data comprised 21 public sector banks and 19 private sector banks separately within a time period of 2005-2017. The total number of observation is 273 for public and 247 for private sector banks.

- LIQ = Liquid assets/Total assets

Independent Variables:

- Size= Bank Size
- DEP= Deposits
- CoF= Cost of funds
- NPA= Net Npa (assets quality indicator)

- CAR= Capital Adequacy ratio
- ROE= Return of equity (Profitability indicator)

i represents Bank and t represents time (year)

Specification of the variable

The table below shows the independent variables and dependent variables and their measurement

Variable	Measurement
Dependent variable	
Liquidity	Liquid asset/Total asset (in million)
Independent variables	
Bank Size	Logs of total assets
Deposits	Sum of demand, saving and term deposits. (in million)
Funding Cost	Total interest expense/ total liability (in%)
Profitability	Return on Equity (in %)
Asset Quality	Net NPA/Net Advances (in %)
Capital Adequacy ratio	Tier I + Tier II capital (in %)

Analysis for Public Sector Banks:

As a first step descriptive statistics of the data is given in table 1. The table shows mean, standard deviation, minimum and maximum value for all the variables used in the study for the period 2005-2017. The total no. of observation is 273

Table 1
Descriptive statistics

Variable	Observation	Mean	Std. Dev.	Min	Max
Liquidity	273	.0850348	.0302572	.0382919	.236251
Bank size	273	445.9627	6962.815	11.96512	112286.2
COF	273	6.080345	.9204936	4.234837	8.159767
NPA	273	2.491923	2.599279	.15	13.99
Deposits	273	1586338	1280244	141706.6	6217040
ROE	273	11.18846	10.19594	-23.23493	31.62095
CAR	273	12.2585	1.303906	9.21	18

Source: Own estimation

The Hausman test was done to choose the appropriate model between fixed effects and the random effects model. The null hypothesis is that the preferred model is random effects with the alternative hypothesis being the model is fixed effect. If the p value is less than 0.05 we reject the null hypothesis and choose the fixed effect model.

Table 2
Hausman test results

Test Summary	Chi.sq. Statistics	Chi Sq. d.f.	Prob.
Cross Section Random	5.39	4	0.2494

Source: Own estimation

Results shows the p value is greater than the conventional significance level of 5% and thus we cannot reject the null hypothesis and accordingly the appropriate model for our study is random effect model.

Table 3 Diagnostic tests

a. VIF

Variable	VIF	1/VIF
ROE	4.15	0.240678
NPA	3.96	0.252633
CAR	1.33	0.752527
Deposits	1.15	0.868089
COF	1.14	0.874273
Banksize	1.03	0.971889
Mean VIF	2.13	

b. Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
chi2(1) = 12.12
Prob> chi2 = 0.0005

c. Breusch-Godfrey LM test for autocorrelation
H0: no serial correlation
Chi2= 29.068
prob>chi2= 0.000

Source: Own estimation

A series of diagnostics test was done. Firstly multicollinearity was tested through the variance inflation factor(VIF). VIF is tested for all the variables included in the model and results clearly depicts that none of the variables are collinear as the VIF value is less than the threshold value of 10. Secondly to detect heteroskedasticity, Breusch-Pagan / Cook-Weisberg test for heteroskedasticity was performed. According to the results the p value is less than the 5% level of significance and therefore the null hypothesis of constant variance is rejected. Hence, the model suffers from the problem of heteroskedasticity. Thirdly, to detect autocorrelation Breusch-Godfrey LM test for autocorrelation was performed. Here the null hypothesis is that there is no serial correlation. But the p value is 0.000 which is less than the 5% significance level so we reject the null hypothesis and conclude that the model suffers from the problem of autocorrelation also.

The results of diagnostic test clearly depicts that the model suffers from both the problem of autocorrelation and heteroskedasticity and hence we use the robust regression which solves these two problems in panel data. The results of robust regression of random effect model is given in table 4

Table 4
Robust Regression Results

Variables	Co efficient	Standard error	P value
Bank Size	1.15007	5.43008	0.022
Deposits	0.09461	0.041009	0.048
ROE	0.00039	0.000431	0.375
COF	-0.01406	0.002708	0
NPA	-0.00116	0.00215	0.559
CAR	-0.00062	14604	0.65
Cons_	0.183038	0.026831	0

R square = 0.4678 o. of observation = 273 Prob(f statistic) = 0.0000	

Source: Own estimation

The regression results shows a negative relation between banks liquidity and the capital adequacy ratio. This association may be attributed to the shareholders asking for higher profits. To meet the shareholder's requirement of high profitability banks have to invest in illiquid assets which gives higher return and less liquidity. Moreover, the coefficient of capital adequacy ratio is not statistically significant. The bank size is found to be significantly affecting liquidity positively. Similar results were also found by Melese, (2015) and Jhat et al (2018) in their respective studies. The results does not support 'the too big to fail' hypothesis. Again, the coefficient of NPA to net advances showed a negative relationship with liquidity. This means an increase in non -performing assets would lead to a decrease in the liquidity level of banks. Moreover, this results is not statistically significant.

Further, the regression analysis displays a negative relationship between profitability as proxied by ROE and liquidity. This can be due to the fact that to earn more profits, banks have to invest in illiquid assets that gives higher returns. The relationship between ROE and liquidity is not statistically significant. COF and liquidity is found to be sharing a statistically significant negative relationship. This results was against the conclusion found by Vodova (2011), That et al (2018) in their studies. Lastly, the coefficient of deposits is found to be positively affecting banks liquidity. The result is also statistically significant. Kaur and Sharma (2017), Pushkala et al (2017) discovered that banks with higher deposits maintain larger liquidity buffer.

V. Analysis for Private Sector Banks

As a first step descriptive statistics of the data is given in table 5. The table shows mean, standard deviation, minimum and maximum value for all the variables used in the study for the period 2005-2017

Table 5
Descriptive statistics

Variable	Observation	Mean	Std. Dev.	Min	Max
Liquidity	247	0.0897	0.053717	0.036	0.328
Bank size	247	12.61745	1.477403	9.071	15.972
COF	247	6.493113	1.148106	2.295	8.889
NPA	247	1.249399	1.161608	0.01	6.34
Deposits	247	614960.5	1003951	6630.345	6436397
ROE	247	12.73325	9.504917	-63.787	25.79
CAR	247	14.86134	4.936096	9.58	56.41

Source: Own estimation

The hausman test was done to choose the appropriate model between fixed effects and the random effects model. The null hypothesis is that the preferred model is random effects with the alternative hypothesis being the model is fixed effect. If the p value is less than 0.05 we reject the null hypothesis and choose the fixed effect model.

Table 6
Hausman test results

Test Summary	Chi.sq. Statistics	Chi Sq. d.f.	Prob.
Cross Section Random	1.51	5	0.9123

Source: Own estimation

Results shows the p value is greater than the conventional significance level of 5% and thus we cannot reject the null hypothesis and accordingly the appropriate model for our study is random effect model.

Table 7
Diagnostics tests

a. VIF Variable VIF 1/VIF ROE 2.00 0.500345 NPA 2.20 0.454239 CAR 1.21 0.829622 Deposits 3.37 0.296509 COF 1.12 0.895379 Banksize 3.63 0.275457 Mean VIF 2.25
b. Breusch-Pagan / Cook-Weisberg test for heteroskedasticity Ho: Constant variance chi2(1) = 156.68 Prob> chi2 = 0.0005
c. Breusch-Godfrey LM test for autocorrelation H0: no serial correlation Chi2= 77.283 prob>chi2= 0.000

Source: Own estimation

A series of diagnostics test was done. Firstly multicollinearity was tested through the variance inflation factor(VIF). VIF is tested for all the variables included in the model and results clearly depicts that none of the variables are collinear as the VIF value is less than the threshold value of 10.

Secondly to detect heteroskedasticity, Breusch-Pagan / Cook-Weisberg test for heteroskedasticity was performed. According to the results the p value is less than the 5% level of significance and therefore the null hypothesis of constant variance is rejected. Hence, the model suffers from the problem of heteroskedasticity.

Thirdly, to detect autocorrelation Breusch-Godfrey LM test for autocorrelation was performed. Here the null hypothesis is that there is no serial correlation. But p value is 0.000 which is less than the 5% significance level so we reject the null hypothesis and conclude that the model suffers from the problem of autocorrelation also. The results of diagnostic test clearly depicts that the model suffers from both the problem of autocorrelation and heteroskedasticity and hence we use the robust regression which solves these two problems in panel data. The results of robust regression of random effect model is given below

Table 8
Robust Regression Results

Variables	Co efficients	Standard error	P value
Bank Size	-0.02043	0.006239	0.001
			0.384
Deposits	0.45209	0.05200	
		.0003113	0.731
		.0017768	0.086
		.0027786	0.992
		.0002236	0.000
		.0693229	0.000
ROE	-0.00011		
COF	-0.00305		
NPA	2.63E-05		
CAR	0.002168		
Cons_	0.332953		
R square = .2871			
No. of observation = 247			
Prob(f statistic) = 0.0000			

Source: Own estimation

The regression results shows a positive relationship between banks liquidity and profitability. Banks with higher amount of returns may have more liquid assets as the returns cannot always distributed as soon as they are obtained. However, this results was not statistically significant. The cost of funds was found to be significantly affecting bank's liquidity. The relationship was negative. This results does not follow the prediction that with increasing funding cost banks raises their liquid assets buffer. Non-performing loans was found to be positively related to private bank's liquidity. Similar results was obtained for Slovakian commercial banks by Vodova (2011). However, the results was not found to be statistically significant.

The capital adequacy ratio was significantly affecting bank's liquidity positively. As banks capital ratio increased banks liquidity level also increased. This result is similar to studies of Vodova (2011). Sheefeni (2016). Capital adequacy ratio guarantees stability to financial system by lowering risk of insolvency which in turn reduces liquidity risk.

The regression results shows a negative relationship between bank size and liquidity. This results was also statistically significant at 5% significance level. This result is due to the fact that large banks can mobilize their deposits with less difficulty and are able to grant more loans which reduces its liquidity level. Studies of Vodova (2011); Singh and Sharma (2016) also found a negative relation between banks size and liquidity. Deposits of banks was found to be positively affecting liquidity in case of private banks. However, the result was not statistically significant.

VI. CONCLUSION

The panel data regression results show that the determinants of liquidity vary for both banking groups. Bank size as measured by logarithm of total assets is a significant determinant of liquidity of both public and private sectors banks. But in case of public sector banks with an increase in size, liquidity level also rises as the results shows a positive association. Public sector banks with an increase in their size, increases the amount of liquid assets adequately to manage liquidity risk. However, private sector banks relying more on financial markets with their increasing size holds less liquidity (Lastuvkova, 2016). Likewise with increase in deposits, public sector bank liquidity level rises significantly as compared to private sector banks. Capital adequacy ratio guarantees stability reducing the risk of insolvency. A bank equipped with capital can meet its short term and financial obligations without any difficulty. Private sector banks with more capital adequacy can therefore maintain better liquidity positions. However, this ratio is not a significant determinant for public sector banks.

Moreover, the profitability and non performing assets shows insignificant results for both the sectors. This can be attributed to the fact that the additional returns earned might not be distributed as soon as they are obtained. Similarly the non performing assets may not affect liquidity if the funds are still available through deposits but loans are not increasing at the same time, the situation can be controlled.

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AUTHOR PROFILE

Puja AgarwaL, Assistant Professor **,** Dept. Of Economics, aharkatiya college. Email id- pujaagarwal0608@gmail.com