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Study of Determinants of Liquidity Risk in Context to Indian Banking Industry

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ABSTRACT

A strong liquidity position of banking industry is of paramount importance for the smooth functioning of the economy. The failure of the bank to manage its liquidity results into liquidity risk which further increases the probabilities of default (PD) in the banking industry. In fact the main trigger of all the negative events during the recent financial crisis was result of lack of liquidity in the Indian Banking Industry. Therefore it is very important to study the determinants affecting the liquidity in the banks. The present study is an attempt by the researcher to study the generic and unique variables affecting the liquidity in the banks taking into consideration the target population as the Indian Banking Industry for the duration from March,2006 till March,2016. To assess the impact of varied bank specific factors on the liquidity risks of the banks, OLS\Panel data Regression Model is applied.

Keywords: Liquidity Risk, Bank Performance, Financial Crises, Profitability, Bank- Specific factors etc.

1. INTRODUCTION

Banking Industry plays a vital role in the growth & development of the economy as itis the major source of finance in the economy. Ever since New Economic Policy, 1991 was introduced by Dr.Manmohan Singh there is great transformation in the Indian Banking sector. The banking industry has stepped from a regulated economy to a deregulated market economy. Moreover the financial crisis had a significant impact on the Indian Banking Sector. Therefore to sustain financial soundness of a bank in long run, there is dire necessity to focus on risk & distress in banking sector. Although the banks are exposed to varied types of risks. This paper is an attempt to focus on the liquidity risk in Indian Banking Industry.

Bank liquidity refers to the ability of the bank to convert its assets into cash & to meets its obligation on time. The failure of the bank to manage its liquidity results into liquidity risk which further increases the probabilities of default (PD) in the banking industry. Prior to the financial crises, the liquidity risk was considered to be the secondary risk. The financial Turbulences of 2007-08 have raised many questions on the liquidity risk management being performed by banks. In fact the main trigger of all the negative events during the recent financial crisis was result of lack of liquidity in the Indian Banking Industry.

Even though the banks have adequate capital and RBI initiated many steps in the form of Liquidity Coverage Ratio (LCR), most of the banks are exposed to financial distress as the result of poor liquidity management. The main reason for the poor liquidity management in the Indian banks is due to paucity of studies on liquidity management in Indian Context and unknown/unrecognized variable affecting the liquidity in Indian Banks. Post economic financial crisis the attention of most of the researchers, risk professionals have shifted on to the liquidity risk. The present study consists of the following sections. Section 2 deals with review of literature & theoretical framework. Section 3 deals with the objectives of the study. Section 4 describes research methodology to be adopted in the study. Section 5 deals with data analysis & interpretation. Section 6 deals with the major findings of the study. Section 7 deals with conclusion & scope of future study. Section 8 deals with references.

2. REVIEW OF LITERATURE & THEORETICAL FRAMEWORK

Many research articles & annual reports pertaining to the commercial banks in India are reviewed for the purpose of study. The various review of literature focused on Liquidity risk assessment & management are as follows:

Many authors (Santomero 1997; Fiedler et. al., 2002; Ringbom et. al. 2004; Gabbi 2004; Basu 2005, Vallabh 2005; Chatterjee 2006; Valla et. al., 2008; Ghosh 2011; Ratnovski 2013; Bonner et. al., 2015; Chiaramonte & Casu 2017; Abdel 2017) in the past have addressed on this subject in their papers and have highlighted on the importance & relevance of risk assessment and risk management. They have also focused on the importance of liquidity risk management in order to maintain financial stability in the economy. The financial crisis, 2008 has diverted the attention of all policy holders, scholars, researchers, academicians, bankers on the liquidity risk management.

Taking into consideration the condition pre-financial crises and post financial crises, many authors have highlighted on the development and formulation of an effective liquidity risk management policy & its impact on the bank's profitability. They have also focused on the hurdles faced in implementing such a policy. For instance, Gabbi (2004) worked upon for developing bank management framework for managing liquidity risk and the result suggested that cash flow management & stock & bonds should be centralized in order to minimise liquidity. There search of Franck & Krausz (2007) focused on the sample of 61 banks over a period of 7 years to study the varied risks faced by the banks. Other researchers Covitz & Downing (2007) applied simulation to analyse and develop effective liquidity risk management. Cornett et. al., (2011) using regression Robustness Test over a period of 3 years and attempted to formulate liquidity risk management policy. Basle Committee on Banking Supervision (2010) & Subramoniam (2015) recommended the maintenance of adequate level of liquidity. The research of Ismal (2010) studied the liquidity risk management Index in Islam taking into account 8 years. The research of Simplice (2010) examined the measures taken to manage liquidity risk, post crises and findings revealed that banks should

disclose measures they adopt to guarantee stakeholder liquidity. Varotto (2011) applied VAR Model & Sensitivity Analysis to estimate the liquidity risk taking sample of 5 years. Teply (2011) studied sample of 3 years to study the obstacles in the development of liquidity risk management and concluded that main issue behind it is lack of liquidity measurement, liquidity system, control & governance. Agbada & Osuji (2013) studied the impact of efficient liquidity management on the banking performance in Nigeria and commented that efficient liquidity management enhances the profitability of the banks. Alshatti (2015) analysed the impact of liquidity management on the profitability of commercial banks in Jordia and suggested that generalised framework should be adopted for managing liquidity.

The literature on the determinants of liquidity risk is very less in context to the Indian economy, in general it can be said that most of the research relating to liquidity risk are focused mostly on the case of developed. A series of studies have been done in developed countries on the determinants of liquidity risk. For instance, Vodová (2011) undertook a study to identify determinants of liquidity in the commercial banks of Slovakia. Applying panel data regression analysis on the data of 10 years, the study revealed higher the profitability, higher capital adequacy, greater the bank size will lead to decrease in banks liquid assets. Buch & Neugebauer (2011), using Regression Analysis Robustness Test on the bank specific factors affecting the liquidity in banks recommended the importance of bank specific factors in maintaining optimum liquidity in the economy. David & Samuel, 2011 examined liquidity management in Nigerian banks using OLS Regression Model and concluded that there is significant relationship between liquidity and profitability. Arif & Nauman (2012) examined the liquidity risk in 22 Pakistani banks and assess its impact on the bank's profitability, by applying series of Multiple Regressions, Panel Data Approach over a period of 6 years. The conclusion of the paper suggested that by maintaining sufficient cash reserve, increasing deposits, decreasing liquidity gaps & non-performing loans will lead to mitigation of liquidity risk. Anjum (2012), by applying Regression & Correlation Analysis on a sample of 23 banks for a period of 4 years studied the bank specific determinants leading to liquidity risk. The researcher made a comparison between liquidity risks of Islamic & Convectional Banks and concluded that Islamic banks depicted a better liquidity position in comparison to convectional banks. Munteanu (2012) determined the determinants of bank liquidity in commercial banks of Romania using Regression Analysis and suggested a decrease in inter-bank interest rate to minimise the liquidity. Vodova (2013), using Panel Data Regression Approach attempted to identify determinants of liquidity in Hungarian commercial banks. The research revealed a positive relationship between capital adequacy of banks, interest rate on loans, banks profitability and banks liquidity. Further it revealed a negative relationship between bank size, interest margin, monetary policy, interest rate and banks liquidity. Asongu (2013) studied the steps taken by banks post crisis to manage liquidity risk by investigating the sample of 20 banks. Ferrouhi (2014)ascertained the determinants of liquidity risk &investigated the link between financial performance & liquidity risk of commercial banks in Morocco using Panel Data Regression Analysis on the sample of 12 years. The study highlighted positive relationship between bank size and liquidity risk & a negative relationship between external funding total liabilities, bank capital and liquidity risk. Shaikh (2015), using Panel Data Approach using fixed effects and random effects on the sample of 5 Banks of Pakistan over a period of 7 years analysed the determinants of liquidity risk. The research pinpoints decrease deposits total capital ratio increases the liquidity risk & increase in capital to financing ratio decreases the liquidity ratio. Boumediene (2015) applied generalized autoregressive conditional heteroskedasticity model to manage liquidity needs of Islamic banks & revealed that budget deficit is a useful measure which can be implemented to mitigate liquidity risk.

Renata (2015) identified the determinants of liquidity risk in the 42 developed countries over a period of 12 years using the Panel Data Regression Analysis and the result of the study suggested that the global determinants of liquidity will be helpful in managing the liquidity risk.

Similar studies were done by El Khoury (2015)taking a sample of 23 banks of Lebane over a period of 9 years & the study highlighted bank size & loan growth as the main determinants of liquidity risk. Moussa (2015) investigated the factors affecting bank's liquidity in Tunisia and the research concluded that bank size, deposits have a negative impact on liquidity whereas return on assets, bank capital have positive impact on the liquidity. Roman &Sargu (2015) used OLS Regression Analysis on sample of CEE Countries over a period of 8 years. The research took into consideration both the internal 7 external factors influencing liquidity risk & concluded negative impact of depreciation on loans, moreover total capital ratio, return of average equity, ratio of impaired loans to total loans are the major factors that effects the overall liquidity of the banks. Umar & Sun (2016) studied the bank specific determinants of liquidity risk of the commercial banks CEE Countries over a period of 13 years by applying Multiple Linear Regression, Econometric Model. Findings revealed a positive relationship of liquidity creation & return on equity, bank size & a negative relation of liquidity creation & interest rate.

Singh & Sharma (2016) applied Pooled OLS Regression Method, Trend Analysis, and Panel Data Approach on 59 banks of BRICS Countries over a period of 12 years to study the impact of bank specific factors on the banks liquidity. The study depicted positive relationship of deposits, profitability, capital adequacy and bank's liquidity and a negative relationship between bank size and bank's liquidity. Sheefeni (2016) studied the bank specific factors affecting the commercial bank's liquidity in Namibia using ordinary least squares (OLS) technique over a period of 14 years. The result pinpoints a negative link between return on equity & commercial bank's liquidity and a positive relationship between capital adequacy, non –performing assets & commercial bank's liquidity.

The above review of literature concludes that there are limited studies that validate the influence of various factors over the liquidity of Indian Banking Industry and the liquidity risk is the major cause of bank failure in Indian Banking Industry. Therefore, the present study is an attempt to identify various factors affecting the liquidity risk of Indian Banking Industry. The study focuses to investigate upon the factors affecting the liquidity risk in the banks and to develop Liquidity Risk Management policy. Although there are various determinants of liquidity risk, the study will specifically emphasize to determine the relationship between the liquidity risk and bank- specific factors. For the purpose of computing the liquidity of the bank a common liquidity indicators is calculated represented by ratio of loans to total assets. Alongside this the other variables are also taken into consideration, which can be broadly classified into financial and non-financial performance indicators. The priority will be on the financial performance derived from the bank's balance sheet and income statements. Both the generic and unique variables are taken into consideration for the purpose of the study.

3. OBJECTIVES OF THE STUDY

The present study is an attempt to identify various factors affecting the liquidity risk of Indian Banking Industry. The study focuses to investigate upon the factors affecting the liquidity risk in the banks and to develop Liquidity Risk Management policy. Therefore, the overall objective of the present study is to study the factors affecting liquidity risk in context to Indian Banking Industry.

4. RESEARCH METHODOLOGY

The aim of the paper is to study the factors influencing the liquidity risk of the Indian Banks. Therefore, the target population for the present study is the Indian Banking Industry.

Data & Sample

The banks are selected on the basis of Market Capitalisation as quoted by BSE till March, 2017. To study the factors affecting liquidity risk in the commercial banks of Indian Banking Industry, the data for past 10 years ranging from March'2006 – March'2016 is collected. The data is collected from the annual reports of the Banks and PROWESS Database of CMIE.

Variable Descriptive: The various review of literature focuses varied variables pertaining to liquidity risk; some of them are quoted herewith. The variables under study are segregated into dependent and independent variables.

Variables (Dependent Variables)	*Proxy Measurement*	*References*
Liquidity	Liquidity= liquid assets/total assets.	Sheefeni (2016); Singh & Sharma (2016); Munteanu (2012); El Khoury (2015)
(Independent Variables)		
Bank Size	(Logs of Total Assets)	Vodova (2011); Chiaramonte & Casu (2017); Chouchène & Khiari (2017); Roman & Sargu (2015); León (2016); Singh & Sharma (2016); Choon (2013); Arif (2012); Khoury (2015) (Lebane); Ferrouhi (2014); Vodova (2014); Iqbal (2012).
Profitaibility	Return on assets (%age)	Vodová (2011); Sheefeni (2016); Chiaramonte & Casu (2017); Chouchène & Khiari (2017); Roman & Sargu (2015); León (2016); Singh & Sharma (2016); Moussa (2015); Choon (2013); Vodov (2013); Arif, & Nauman (2012); Khoury (2015) (Lebane); Ferrouhi (2014); Vodova (2014); Iqbal (2012)
Cost of Funding	(Total Interest Expense/Total Liability)	Singh & Sharma (2016)
Deposits	Deposits Over Total Assets (Millions)	Singh & Sharma (2016); Arif (2012)
Cost to Income Ratio (Millions)	Total Expense/Total Generated Revenue	Additional Variable taken into consideration by author
Liquidity Management (Millions)	Total Loans/Total Customer Deposit	Additional Variable taken into consideration by author
Bank Resilience Risk (Millions)	Equity Capital/Total Assets	Alshatti (2015)
Mgt. Efficiency (Millions)	Operating Expense/Total Deposit	Boadi & Lartey (2016); León (2016)
Quick Ratio (Times)	Quick Assets/Total Liabilities	Alshatti (2015)

Methodology

The present study analyse the balanced panel data of Indian commercial banks from the period pertaining from 2006-2016. Hausman test was applied to determine whether to select the fixed effect estimates &

random effect estimates are applied to the given data. Fixed effects estimates are usually preferred over the random effect estimates as the fixed effects yield consistent results. Moreover the foxed effects estimates are more robust in comparison to random effect estimates because they do not depend on the assumption of the individual error term.

5. DATA ANALYSIS & INTERPRETATION

Data analysis are segregated into three parts i.e., descriptive analysis, correlation analysis and empirical analysis.

1. Descriptive Analysis

In this part of the analysis, normality of the data is analysed using the following descriptive table.

	SIZ	*ROA*	*COF*	*DEP*	*CY*	*LIQ_MGT*	*BRR*	*MGT_EFF*	*QR*	*LIQ*
Mean	6.346	1.299	0.045	0.735	0.875	0.188	0.004	1.026	2.839	2.645
Median	6.450	1.330	0.046	0.760	0.869	0.130	0.002	0.717	2.500	2.130
Standard Deviation	0.548	0.467	0.008	0.096	0.045	0.137	0.008	1.135	1.793	1.774
Sample Variance	0.300	0.218	0.000	0.009	0.002	0.019	0.000	1.289	3.215	3.146
Kurtosis	0.509	3.038	0.308	–0.593	9.963	0.040	34.799	6.499	2.203	3.108
Skewness	–0.758	–1.027	0.290	–0.624	2.454	1.111	5.327	2.343	1.447	1.760
Range	2.735	2.910	0.041	0.351	0.295	0.518	0.064	6.420	7.970	7.970
Minimum	4.620	–0.780	0.025	0.522	0.811	0.031	0.000	0.040	0.420	0.420
Maximum	7.355	2.130	0.067	0.873	1.106	0.549	0.065	6.460	8.390	8.390
Sum	558.464	114.350	3.994	64.724	77.011	16.571	0.377	90.289	249.820	232.750
Count						88				

Note: LIQ is the ratio of liquid assets over total assets. SIZ is bank size, ROA is profitability, COF is cost of funding, DEP is deposits over total assets, CY cost to income ratio, LIQ_MGT is liquidity management, BRR IS bank resilience Risk, MGT_EFF is management efficiency, QR is quick ratio.

The following conclusion is drawn from the above mentioned table. The total number of observations is 88 and in order to simplify the data, logs are taken of few variables. The mean median ratio of the given data is nearly 1, which indicated the normality of the data. In comparison to mean and standard deviation, the value of the standard error is less which further depicts lesser coefficient of variation. Thus we conclude that the data is normally distributed and further the correlation & OLS Regression Model (panel data approach) is further applied for empirical analysis.

2. Correlation Analysis

The table below depicts the correlation matrix. It depicts the correlation between the dependent and independent variables. The variables having high degree of correlation are not considered in the study. The table shows no multicollinearity between the liquidity and other variables. The collinearity between the liquidity and quick ratio is 0.95 and the collinearity between deposits & quick ratio is 0.62. Thus, we conclude that the latter shows higher correlation. The coefficient value is less than 0.95 for all other variables, so we can say that these variables have no multicollinearity.

	SIZ	*ROA*	*COF*	*DEP*	*CY*	*LIQ_MGT*	*BRR*	*MGT_EFF*	*QR*	*LIQ*
SIZ	1									
ROA	–0.3821	1								
COF	0.1113	0.0980	1							
DEP	0.2062	–0.4177	–0.2732	1						
CY	0.2400	–0.8806	0.0962	0.2847	1					
LIQ_MGT	–0.1656	0.3129	0.3245	–0.9529	–0.2139786	1				
BRR	–0.7286	0.2486	–0.2424	–0.2194	–0.13373	0.1685	1			
MGT_EFF	0.5094	–0.3879	–0.1025	0.1058	0.20688228	–0.1460	–0.2592	1		
QR	0.4774	–0.6083	–0.1400	0.6196	0.42805084	–0.4607	–0.3384	0.1619	1	
LIQ	0.3412	–0.4895	–0.1280	0.5908	0.34189942	–0.4140	–0.2933	–0.0719	0.9462	1

Note: LIQ is the ratio of liquid assets over total assets. SIZ is bank size, ROA is profitability, COF is cost of funding, DEP is deposits over total assets, CY cost to income ratio, LIQ_MGT is liquidity management, BRR IS bank resilience Risk, MGT_EFF is management efficiency, QR is quick ratio.

3. Empirical Analysis (OLS Panel Data Approach)

Pooled Regression Model is applied on the assumption that all banks are same. Its result shows that Profitaibility, deposits, liquidity management, management efficiency have significant effect on the liquidity as its P-value is less than 5 %. The fixed effect estimates and random effect estimates are calculated &Hausman Test was applied to know to determine whether to select fixed effect estimates or random effect estimates.

Random effect estimates concludes that bank size, cost of funding, deposits, liquidity management, management efficiency and quick ratio have significant effect on the liquidity as its P-value is less than 5 %. On the other hand, profitability, cost to income ratio bank, resilience risk have insignificant effect on the liquidity. However, cost of funding, management efficiency have negative impact and bank size, cost of funding, deposits, liquidity management have positive effect on the liquidity.

Further fixed effect estimate model is applied that will allow heterogeneity among the data. Fixed Effects estimates concludes that management efficiency and quick ratio have significant effect on the liquidity, as the P-Value is less than 5%. Bank size, Profitability, Cost of funding, Deposits, Cost to income Ratio, Liquidity management, bank resilience risk have insignificant effect on the liquidity as the P-value is more than 5%. However management efficiency has negative effect and quick ratio have positive effect on the liquidity. Fixed effect estimates depicts the value of R-square is 0.96 which pinpoints the fitness of the model. The Durbin Watson value is 1.91, which depicts absence of autocorrelation among the variables.

Variables	*Panel data*		*Fixed effects estimates*		*Random Effect estimates*	
	co-efficient	*t-statistics*	*co-efficient*	*t-statistics*	*co-efficient*	*t-statistics*
C (LIQ)	–19.4536	–2.1597	–4.7130	–1.0304	–33.8462	–3.1858
SIZ	0.7770	2.0172	0.4117	1.5836	0.5371	4.0691
ROA	–0.9631	–1.2802	–0.1739	–0.5059	0.0356	–0.0336
COF	–25.2202	–1.4514	–6.9547	–0.7989	–27.8532	–1.2753
DEP	28.0288	5.8340	2.8552	0.7660	36.9288	2.4740

Variables	*Panel data*		*Fixed effects estimates*		*Random Effect estimates*	
	co-efficient	*t-statistics*	*co-efficient*	*t-statistics*	*co-efficient*	*t-statistics*
CY	–4.1685	–0.6314	0.5633	0.1961	3.7872	0.9265
LIQ_MGT	15.2592	4.7737	0.4860	0.2237	20.4033	1.6555
BRR	–2.3181	–0.1038	3.0231	0.3025	–3.9773	1.2449
MGT_EFF	–0.6703	–4.1524	–0.2189	–2.4490	–3.1022	–3.5795
QR	0.1085	1.6773	0.7259	13.4883	0.7364	16.6889
R-Squared		0.7051		0.9586		0.7300
Adjusted R-Squared		0.6711		0.9493		1.3400
Prob (F-Statistics)		0.0000		0.0000		0.0000
Durbin Watson Stat		0.6789		1.9135		1.9700

Note: LIQ is the ratio of liquid assets over total assets. SIZ is bank size, ROA is profitability, COF is cost of funding, DEP is deposits over total assets, CY cost to income ratio, LIQ_MGT is liquidity management, BRR IS bank resilience Risk, MGT_EFF is management efficiency, QR is quick ratio.

The Hausman Test was applied for choosing the most reliable test between the fixed effect estimates and random effect estimates. As the P-value is less than 0.05, its concludes that fixed effect estimates is more appropriate as compared to random effect estimates.

Hausman Test (Random Effects)

Test Summary	*Chi-Square Statistics*	*Chi Square Degree of freedom*	*Prob.*
Cross section Random	112.65	9	0

6. MAJOR FINDINGS

In the present study, an attempt is made to study the impact of bank specific factors on the liquidity risk of the banks. Many studies have studied the impact of bank specific factors on the bank liquidity. The research concludes that 5 % level of significance, management efficiency and quick ratio significantly effects the bank liquidity. Management efficiency has negative affect and quick ratio has positive effect on the liquidity. With the probability of 0, deposits and liquidity management significantly & positively affects bank liquidity. Similar results were shown by Singh & Sharma (2016).

7. CONCLUSION & SCOPE OF FUTURE RESEARCH

A strong liquidity position of banking industry is of paramount importance for the smooth functioning of the economy. The literature reveals that very limited research in this context has taken in India Therefore, we conclude that investigation into factors affecting the liquidity of the Indian Banks will be beneficial for banks managers in developing appropriate strategies to maintain adequate liquidity which will be helpful for them to face the future uncertainties and henceforth helpful in sustainable growth & development of the economy. The present study will be valuable for banks managers and policy makers in developing appropriate strategies to maintain adequate liquidity in the banks. This will be beneficial in facing the future uncertainties by forming a liquidity risk management policy. Thus, will pave a way in attaining sustainable growth & development in the economy. The present study has taken into consideration only 8 scheduled commercial banks out of which 4 are public and 4 are private sector banks by taking 9 bank specific variables.

In future, research could focus on all the scheduled commercial banks i.e. all the public & private sector banks considering all the bank specific factors in order to have holistic view of the overall effect of bank specific factors on the liquidity risk of the banks.

Present study is a compiled review comprising of references for which papers cited may be referred.

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