ASSESSING THE EFFECT OF LIQUIDITY AND CREDIT RISK ON BANKS' STABILITY

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ABSTRACT

The issue of financial stability is linked with banking stability. Banking stability is a yardstick to determine whether an economy is sufficiently strong enough to withstand any financial challenges. Banking stability in itself relies on parameters of individual banks like liquidity risk and credit risk. The present study is an attempt to study the relation between the two risk factors with stability of Public Sector Commercial banks in India during the period 2009-10 to 2017-18.The study uses Simultaneous Equation Approach and Generalized Methods of Moments approach for analyzing the relationship with credit and liquidity risk and their interaction on bank stability. The study shows that banks stability is significantly influenced by credit risk and liquidity risk along with growth of loan, size of bank, Return on Assets(RoA) and macroeconomic variables i.e. inflation.

Keywords: *credit risk, liquidity risk, PSBs, bank stability.*

I.   Introduction

The banking sector is the backbone of a country's economy. Any crisis in the banking sector hits the profitability of every other sector in the economy. A stable and profitable banking sector is not only important for the stability of the economy but also for the stability of the international market.The most active sector in the Indian financial system is the commercial banking sector consisting of the public sector, private sector and foreign banks. The commercial banks are the most dynamic financial intermediaries who perform crucial function like risk transfer, provide market transparency, matching of demand and supply management.

Banks operate on a high volatile market where financial risk, operational risk and market risk exists. Among all these, the credit risk and liquid risk are prime. The Basel Committee on Banking Supervision in 1999 classified that credit risk is the classic risk and the greatest risk faced by banks (Hull, 2012). As credit risk in Basel II has been described as the economic loss of the outstanding loan amount from the potential default by the counterparty or obligor, i.e non – repayment of the interest and principal due according to the schedule and terms agreed upon prior to granting the loan. Liquidity of the banking system is determined on the basis of supply and

demand for central bank's money. Liquidity at the bank is a measure of its ability to readily find the cash it may need to meet demands upon it.Dermine (1986) discussed liquidity risk as profit lowering cost or the chance that depositors will suddenly withdraw their deposits. In other words the chance of sudden withdrawal of deposits by the depositors of a bank is liquidity risk .

II.   Review of Literature

Acharya and et al. (2009) discusses how liquidity creation can lead to liquidity risk .Though liquidity creation is important from macroeconomic perspective, but measured liquidity creation is of utmost importance .This has led to the improvement of banks' asset's portfolio choice, risk management and regulatory monitoring. The instability in the banking sector deteriorates the asset quality of banks.

Eissa and et al.(2008) lay views on the determinants of liquidity of commercial banks in India. The result shows that bank specific factors such as CAR, Bank Size, operation efficiency and RoA have positive impact on liquidity including macroeconomic factors such as interest rate and exchange rate. On the other hand non-interest income, asset quality ratio, net interest margin ratio has statistically insignificant impact on bank liquidity .The research highlights empirical evidence on internal variables and external factors of listed commercial banks.

Duijm and et al. (2014) in their paper discussed that when the gap between a bank's actual liquidity ratio and its required ratio is below its long term average, banks adjust their balance sheet by adjusting the stable form of funding, while in such cases response of liquid assets is insignificant .The study shows that it tightens the liquidity regulations, effecting somehow the composition of both assets and liabilities.

Ghosh., et. al (1998) studied the narrow banking in India and asserted that an increased presence of NPA forced banks to select measures to reduce risk by investing in safe and liquid assets. Narrow banking may expose weak banks to immense market and interest rate risk and thus make it vulnerable to systematic risk arising from different macroeconomic factors.

Jayashree .M.andRadhika R.(2011) in the study analyzed the sector wise comparison of non-performing assets where it was highlighted that the non-performing assets were higher for newer private sector banks and foreign banks for the study period 2004-2009.The significance of the study was that new RBI guidelines and prudential norms regarding non-performing assets has a positive impact on banks.

Thiagarajan. S., et al(2011) carried an econometric tests for the public sector banks and private sector banks regarding determinants of credit risk where it was found that there has been inverse relationship between macroeconomic factors like GDP with credit risk of banks. The study revealed that macroeconomic and bank specific factors played a crucial role in determining credit risk of commercial banks in India.

Significance of the study

Loans and advances are the main business assets and sources of revenues (income) for the commercial banks should be well-managed (Kipyego and Moses, 2013). The commercial banks may be exposed to credit risk

due to mismanagement of loans and advances that are given to their customers and clients which may lead to reduction in the profitability of the banks (Ali, 2015). As credit disbursement is the main business and sources of revenues for commercial banks , so these are to be well managed. Because mismanagement of the same may lead to reduction of banks' profitability and may lead to instability of banks. This study is an attempt to analyse the factors that influences the credit and liquidity risk of the banks resulting in affecting the stability of banks.

Objective of the study

Previous studies have been carried out to estimate the joint influence of both public sector and private sector banks. But as the public sector banks are more vulnerable to credit default risk, since they are more exposed to priority sector lending, so the assessment of their stability is of utmost importance . The present study has been carried out -

      i.   To study the relationship between liquidity and credit risk of Public Sector Commercial banks in India.

      ii. To study the joint impact of these two risks on stability of banks.

III.   Data and Methodology

The quantitative research approach with survey method adapted for the study to meet the overall objective of the study. Quantitative method permits to test the empirical theories by building the cause and effect relation between the variables. For achieving this a sample of 21 public sector banks have been selected for the study period 2009-10 to 2017-18.The data has been collected from annual reports of banks,RBI database for selected banks. Equation approach has been used to investigate the reciprocal relationship between the variables which has been estimated by Generalized Methods of Moment (GMM) approach. To examine the relationship between liquidity and credit risks simultaneous equation model approach has been used.

$$Cr_{i,t} = C + \beta_1 CR_{i,t-1} + \beta_2 LR_{i,t} + \Sigma(j,j=1)\beta_j jBank^j_{i,t} \Sigma(l,l=1)\beta_1 Macro^1_{i,t} = \varepsilon_{i,t} \ldots\ldots\ldots(1)$$

$$Lr_{i,t} = C + \beta_1 LR_{i,t-1} + \beta_2 CR_{i,t} + \Sigma(p,p=1)\beta_j jBank^p_{i,t} \Sigma(q,q=1)\beta_1 Macro^q_{i,t} = \varepsilon_{i,t} \ldots\ldots(2)$$

Where i=1,… n denotes the bank and t=1,….t denotes the time period.$CR_{it}$and LR_{it}denotes credit risk and liquidity risk of the bank .Bank $J_{it}$and Bank P_{it} denotes the specific variables namely the Return on Assets(RoA) , Capital Adequacy Ratio(CAR), Bank size , Net Interest Margin(NIM), Loan Assets ,Assets growth, Priority sector lending and ownership type. Macroeconomic variables such as real GDP and Inflation rate have been used in the model.

The study followed the empirical model proposed by Imbiorowicz and Raugh(2014), which can be specified as

Z Score$_{it}$ $=\beta_0+\beta_1$ZScore$_{i,t-1}+\beta_2$LiquidityRisk$_{it}+\beta_3$CreditRisk$_{it}+\beta_4$LiquidityRisk*Credit Risk$_{it}+\beta_5$Loan Growth$_{it}+\beta_6$Size$_{it}+\beta_7$CAR$_{it}+\beta_8$NIM$_{it}+\beta_9$IncomeStructure$_{it}+\beta_{10}$Efficiency$_{it}+\beta_{11}$PSL$_{it}+\beta_{12}$RoA$_{it}+\beta_{13}$Inflation$_{it}+\beta_{14}$GDP$_{it}+\varepsilon_{it}$…………………(3)

Where i represents the bank (21 commercial banks), t represents the time (2009-10 to 2017-18), Z Score denotes bank stability at time t, Z Score $_{it-1}$ is the first lagged dependent variable ,b0 is the parameter to be estimated and ε is the error term.b2,b3,b4, ….b15 are coefficients to be estimated.

The dependent variable is bank ZScore which is the measure of bank distance to default. We use the Z Score as a measure of bank stability explained by Boyd and Graham(1993) and expressed as **Z Score= CAR+µRoA/σRoA**.Where µRoA and σRoA are the 3 years moving average Return on Assets and Standard deviation of assets . µCAR is the 3 years moving average CAR.

IV. Discussion and Analysis

Table 1:Descriptive Statistics of the study variables

Variables	Observations	Mean	Std Dev.	Minimum	Maximum
CAR	210	11.28	3.64	5.41	57.83
SIZE	210	4.61	.86	4.76	8.69
Liquidity	210	6.84	3.64	4.68	33.46
Credit Risk	210	2.64	2.68	.35	12.73
Loan Assets	210	53.32	6.57	35.49	65.92
Loan Growth	210	17.44	15.13	-23.98	172.82
NIM	210	2.18	.656	.45	4.61
RoA	210	1.24	1.64	1.54	3.21
Efficiency	210	18.46	6.73	8.61	43.55
PSL	210	29.76	5.87	12.54	49.32
GDP Growth	210	7.48	1.53	2.79	12.65

Inflation	210	6.53	1.94	5.69	11.91

The average of Capital Adequacy Ratio is 11.28 percent, average size of 4.61, while the average credit risk is 2.64 percent. Regarding the interaction or connection between liquidity and credit risks, the liquidity gaps , the Z Score , the priority sector lending, the inflation , and the GDP are sown while the banks have the highest volatility which is measured of standard deviation in terms of liquidity.

The Table 2 shows the results estimated by using 2SLS regression in which liquidity (inverse of liquidity ratio) is estimated by ratio of liquid asset to total assets and credit risk is estimated net non-performing loans to total loans.

Table 2: Modeling of Relationship Between Credit and Liquidity Risk

Independent Variables	Credit Risk		Liquidity	
	Coefficients	P values	Coefficients	P values
Constant	3.75	0.98	-12.64	1.25
Credit risk	-	-	0.52	0.61*
Liquidity	0.57	0.76	-	-
Size	1.26	0.06**	-2.59	0.24
RoA	-1.52	0.56***	0.48	0.43
NIM	-	-	0.19	0.97
Loan Assets	-0.83	0.34**	-	-
Income Structure	0.25	0.03**	-	-
Efficiency	1.54	0.47	-	-
Liquidity Gap	-	-	-3.42	2.65
Priority Sector Lending	1.258	0.00**	0.28	0.64

CAR	-	-	1.95	0.24*
Ownership Type	1.46	0.13***	-2.54	0.15*
GDP	-0.65	0.02***	0.64	0.00***
Inflation	-0.31	0.00***	-0.16	1.4
AR2 test	-1.79	1.46	-0.56	0.48
Hansen J Test	32.54	0.54	35.97	0.65

Note:*, **, *** denotes 10%,5% and 1% level of significance.

The Hansen J test has been used to test the over identifying restrictions. The Hansen J test results shows that the p values is greater than 0.10 and indicates that over identification restrictions are valid and the specified model is correct. These indicates that the instruments used in the specified models are valid. Table 2 shows the two models, the first model is of credit risk and the second model is of liquidity. The results of first model shows, that the impact of liquidity on credit risk is very little and insignificant at 10 percent significance level. The impact of credit risk on commercial banks liquidity is significantly positive at 10 percent level, which indicates that the reverse cause is positive but insignificant. The results shows that there is no statistically significant reciprocal relationship between credit and liquidity risk. This is in line with Ghenimi (2017) who concluded that there was no reciprocal relationship between credit and liquidity risks.

The importance of credit and liquidity risk on banks, it can be estimated by examining its joint impact on banks stability. For understanding the separate and joint impact of credit and liquidity risk on bank stability, the GMM estimation which was proposed by Arellano and Bond(1991) has been used. The Table 3 shows the results of the GMM estimation.

Table 3 GMM estimation of Bank Z score

Independent Variables	**Coefficients**	**P values**
LZ Score L2	-0.14	0.16***
Credit Risk	-0.05	0.26**
Liquidity	-0.28	0.16*
Interaction of CR*LR	0.06	0.12*

Size	0.87	0.02**
RoA	0.65	0.012***
Loan Growth	-0.036	0.26*
Income Structure	0.035	0.08
Efficiency	-0.31	0.84
Priority Sector Lending	-0.44	0.32
CAR	0.15	0.49
Ownership Type	0.05	0.56
Inflation	0.17	0.35
AR(1)	-3.87	0.01
AR(2)	-1.84	0.85
Hansen J test	32.54	0.81

Note-AR(2) test is the second order auto correlation in first difference .Hansen J test refers to the over identification test for the restrictions in GMM estimation .*,**,*** denotes 10%,5% and 1% level of significance.

The Hansen J test of over identification results shows the p value of the test is greater than 0.10 , so the over identification restrictions are true and valid , resulting in correct model specification. The p value of greater than 0.10 for AR(2) test shows that there is no auto correlation between banks. The dependent variable Z score -2 is significant at 1 percent level, which gives the dynamic view of the model .With regard to the credit and liquidity risks, they are negative -0.05 and -0.28 and significant at 5 percent and 10 percent level with the bank stability and indicate that these increase the risk of bankruptcy. When the liquidity is negative, it has significant impact on bank stability thus indicating that banks which are more liquid are more stable. This effect of interaction between liquidity and credit risk is significant at 10 percent level. This results shows that when the credit risk increases bank stability decreases .In regard to the bank specific variables, such as RoA, it has significant positive effect on bank stability at 1 percent level of significance showing that most profitable banks are more creditworthy and stable. And the size of the banks also has significant impact of stability of banks as larger banks are more stable as compared to smaller banks. The macroeconomic variables i.e. GDP has insignificant effect on stability of banks while inflation has positive effect on bank stability.

The study has been carried out to the issue of banking stability which is important in terms of financial stability. Bank stability parameter in considering the interaction between the factors such as credit risk and liquidity risk helps in establishing the soundness, efficiency and profitability of banking system. The study shows that credit risk is significantly influenced by the size of the banks,RoA,Loan growth, priority sector lending. Though the liquidity risk and credit risk don't have a meaningful economic reciprocal relationship, but each of the risk has a significant impact on stability of commercial banks. As the joint impact of credit default and liquidity risk increases bank stability significantly, the management of the same calls for better management of credit and liquidity by framing policies in line with regulatory framework of Basel III guidelines.

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