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The Impact of bank internal and external factors on the commercial bank's liquidity: Empirical evidence from Pakistan

Junaid Rasheed[1] | Zaheer Abbas[2] |

[1]Ph.D. Scholar, Faculty of Management Sciences, International Islamic University Islamabad
[2]Assistant Professor, Faculty of Management Sciences, International Islamic University Islamabad

Correspondence

Junaid Rasheed
(junaidrasheed446@gmail.com)
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ABSTRACT

The purpose of this research is to identify internal and external factors affecting the liquidity of Pakistani banks. Bank balance sheets and income statements were used to calculate study variables. With panel data, the random effect method was used to analyze data from ten domestic and international commercial banks active in Pakistan from 2011 to 2020. This study has analyzed liquidity, which has been measured by two liquidity ratios cash and marketable securities to total assets liquidity 1 and loans to deposits liquidity 2. In the study, internal factors include bank size, return on assets, and cost of funds, capital adequacy, and non-performing loans. The external factors are GDP and inflation. In this study, bank size increased liquidity 1 and decreased liquidity 2, but both were significant. The return on assets liquidity 1 has increased significantly, but the return on assets liquidity 2 has increased insignificantly. The cost of funds has increased liquidity 1 and decreased liquidity 2 but has an insignificant effect on liquidity. The capital adequacy ratio has decreased significantly and insignificantly effect on both liquidities. Non-performing loans have increased liquidity 1 significantly and decreased liquidity 2 insignificantly. GDP has increased liquidity 1 significantly and decreased liquidity 2 insignificantly. Inflation has increased liquidity 1 significantly and decreased liquidity 2 insignificantly.

Key Word: Banks liquidity, internal factor, external factors, random effect model

1 | INTRODUCTION

The study aims to determine how internal and external factors impact the liquidity of commercial banks. An indicator of the liquidity of commercial banks is the proportion of liquid assets to short-term borrowings and deposits by their customers. (Delechat, 2014). A bank's characteristics affect its performance according to its internal factors and bank-specific factors. Management and the board of directors decide what factors are important. Banks operate these factors as they see fit, and their functions can differ from one to another. Capital size of deposits and liabilities size and composition of credit portfolio interest rate policies labor productivity, quality of information technology management risk level, and ownership of banks are among many other factors (Dang, 2011).

Banking institutions could be insolvent and run if they face liquidity crises. Thus, minimizing liquidity risk is among the most important aspects of asset and liability management. Capital level and risk are related in a way that helps explain how bank capital acts as a buffer against bank risk. (Bhattaecharya & Thakkoer, 1993).

This study aims to assess the impact of bank internal and external factors affecting liquidity study of commercial banks in Pakistan over the time of 2011 to 2020. The study is conducted on internal factors bank size, return on asset, cost of fund, capital adequacy ratio, non-performing loan, and external factors are GDP and inflation to measure liquidity.

2 | LITERATURE REVIEW

Liquidity of banks refers to a bank's ability to meet its obligations at any moment, in particular, to repay customer deposits or to make payments on customer orders. (Vodova, 2016). Large banks hold low liquid assets due to their dependence on creditors of last resort and their access to capital markets. Smaller banks face difficulties compared to larger banks in the market for these funds (Dinger, 2009). Bank returns on assets measures how much profit is generated from an investment in an array of different activities. It is calculated by dividing net income by total assets. (Sing & Sherma 2016). Costs of funding are determined by the arrangement of liabilities and by the costs associated with raising these various liabilities. Additionally, several other factors are also considered. (Dean & Stewart 2012). The capital adequacy of a bank refers to its ability to absorb assets risks financed by its funds and other kinds of funds secured by it at all times. The capital adequacy ratio is an indication of the banks' weakness to withstand losses and this also specifies the flexibility to withstand adverse events (Ongare & Kaseu, 2013). Non-performing loans, as loans that are expected to translate into future losses for the banks. Bloem and (Gortar, 2001). GDP growth is a measure of total economic movement in an economy (Muchayi, 2013). The real gross domestic product measures the financial health of a country. Inflation leads to a rise in the price of goods and services over time (Tucker, 2007). Inflation can also influence the liquidity status of a bank, influence interest rates, and deteriorate the bank's capital, and therefore lead to an increase in non-performing loans (Sambza, 2016).

Research hypotheses:

H_1: The size of a bank has a significant impact on its liquidity.

H_2: The return on assets has a significant impact on bank liquidity.

H_3: The cost of funds has a significant impact on bank liquidity.

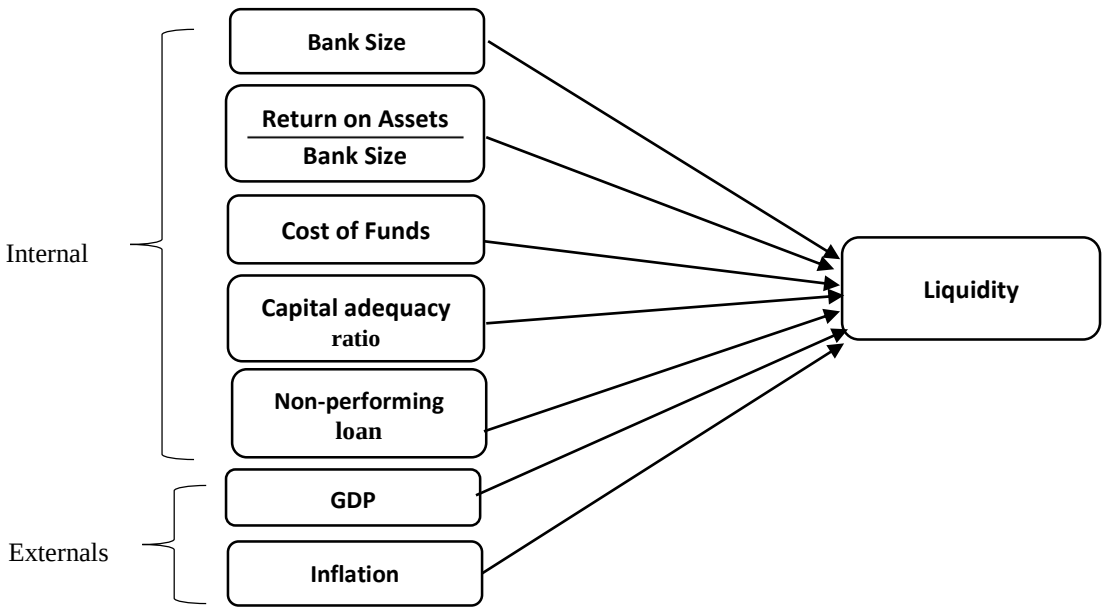
H_4: The capital adequacy ratio has a significant impact on bank liquidity.

H_5: The impact of non-performing loans on bank liquidity is significant.

H_6: The GDP has a significant impact on bank liquidity.

H_7: There is a significant impact of inflation on bank liquidity.

Conceptual framework:



3 | METHODOLOGY & DESIGN

The main goal of this study is to examine the effect of liquidity on the internal and external factors of commercial banks in Pakistan. Liquidity is a dependent variable. Liquidity is measured by the cash plus marketable securities to the total assets and advances to deposit ratio. The internal and external factors are independent variables such as bank size, return on asset, funding cost and capital adequacy ratio, non-performing loan, GDP, and inflation. This research has taken measures to assess the impact of factors on the liquidity of Pakistani commercial banks over the period of analysis.

3.1 | Equation of Model

1. $LIQ1_{it} = \beta_0 + \beta_1 BS_{it} + \beta_2 ROA_{it} + \beta_3 COF_{it} + \beta_4 CAR_{it} + \beta_5 NPL_{it} + \beta_6 GDP_{it} + \beta_7 INF_{it} + {}_t \epsilon_{it}$
2. $LIQ2_{it} = \beta_0 + \beta_1 BS_{it} + \beta_2 ROA_{it} + \beta_3 COF_{it} + \beta_4 CAR_{it} + \beta_5 NPL_{it} + \beta_6 GDP_{it} + \beta_7 INF_{it} + \epsilon_{it}$

	Sr. No	Description	Measurement	Notation	Expected Sign
Dependent variable	1	Liquidity 1	Cash + Marketable securities / Total asset	LIQ 1	
	2	Liquidity 2	Total loan / Total deposit	LIQ 2	
Independent Variables	3	Bank Size	Natural log of total asset	BS	+
	4	Return on asset	Net profit after tax/Total asset	ROA	+
	5	Cost of fund	Total interest expense / Total liabilities	COF	+
	6	Capital adequacy ratio	Tier 1 Capital / Risk Weighted Asset	CAR	+
	7	Non-performing loan	Non-performing loan/ total loans	NPL	+
	8	GDP	Gross domestic rate	GDP	+
	9	INFLATION	Inflation rate	INF	+

4 | Results and Discussion

Using both time and cross-sectional dimensions, the data used are mainly panel data. The results will focus on data from liquidity ratios got from 10 commercial banks. Data were collected for the period of 10 years from 2011 to 2020. E-views 10, IBM SPSS, Gretl software were used to analyze the research findings and data.

4.1 | Descriptive statistics:

Variable	Mean	Median	S.D.	Min	Max
LIQ1	0.108	0.0901	0.0822	0.0243	0.539
LIQ2	0.505	0.481	0.138	0.202	0.894
BS	11.6	11.8	0.989	9.06	13.4
ROA	0.0155	0.0126	0.0101	-0.00970	0.0578
COF	0.137	0.0418	0.477	0.0140	3.95
CAR	0.181	0.162	0.0665	0.0712	0.563
NPL	0.0977	0.0720	0.102	0.000	0.501
GDP	0.0375	0.0455	0.0198	-0.00390	0.0580
INF	0.0674	0.0697	0.0318	0.0253	0.119

The descriptive statistics show the mean value for the variable liquidity 1, 0.108, and a value for the variable liquidity 2, 0.505 signifying that commercial bank in Pakistan. We can say that Pakistan banks hold, on average, 10% and 50% of the liquidity buffer. Nonetheless, banks maintain maximum liquidity buffers of 53 percent and 89 percent, respectively, in Pakistan. Moreover, the minimum value that banks maintain is 0.024 and 0.202 individually. For commercial bank BS, ROA, COF, CAR, NPL, GDP, INF the mean value sustained at around which sustained as maximum and as minimum values.

4.2 | Correlation matrix:

Collinearity is the linear relationship among two independent and dependent variables. A linear connection between two variables makes two variables perfectly collinear. The value of the table shows that cash and marketable securities to total asset (LIQ, 1) are positively correlated and significant with return on asset (ROA) (r =.463, P < 0.01), capital adequacy ratio (CAR) (r=.247, P < 0.05), inflation (INF) (r= .214, P < 0.05). Bank size and GDP were negatively correlated but statistically significant over the period of analysis. The value of the table shows that LIQ 1 negatively correlated but significant with bank size (BS) (r= -.261, P < 0.01) and GDP (r=.282, P < 0.01). Liquidity 2 being statistically significant shows that bank size positively returns on asset and capital adequacy ratio negatively correlated over the period of analysis. The value of the table shows that LIQ2 positively correlated and significant with bank size (BS) (r=.534, P < 0.01) and negatively correlated (ROA) (r= -.330, P < 0.01) and (CAR) (r= -.417, P < 0.01). Cost of the fund, non-performing loan negatively and GDP, inflation positively correlated with liquidity 2 and statistically insignificant. The strong correlation is between GDP and inflation (INF) of banks, which is (-.691).

Table 3. Correlations

		LIQ 1	LIQ 2	BS	ROA	COF	CAR	NPL	GDP	INF
LIQ 1	Pearson Correlation	1	-.357**	-.261**	.463**	-.053	.247*	.135	-.282**	.214*
	Sig. (2-tailed)		.000	.009	.000	.598	.013	.179	.005	.033
	N	100	100	100	100	100	100	100	100	100
LIQ 2	Pearson Correlation	-.357**	1	.534**	-.330**	-.072	-.417**	-.158	.021	.004
	Sig. (2-tailed)	.000		.000	.001	.476	.000	.117	.838	.966
	N	100	100	100	100	100	100	100	100	100
BS	Pearson Correlation	-.261**	.534**	1	-.177	-.003	-.212*	-.036	-.039	-.066
	Sig. (2-tailed)	.009	.000		.078	.977	.034	.719	.700	.514
	N	100	100	100	100	100	100	100	100	100
ROA	Pearson Correlation	.463**	-.330**	-.177	1	.053	.505**	-.071	.017	.091
	Sig. (2-tailed)	.000	.001	.078		.601	.000	.486	.870	.368
	N	100	100	100	100	100	100	100	100	100
COF	Pearson Correlation	-.053	-.072	-.003	.053	1	.021	.006	.041	.058
	Sig. (2-tailed)	.598	.476	.977	.601		.835	.955	.682	.565
	N	100	100	100	100	100	100	100	100	100
CAR	Pearson Correlation	.247*	-.417**	-.212*	.505**	.021	1	-.193	-.094	.108
	Sig. (2-tailed)	.013	.000	.034	.000	.835		.054	.350	.283
	N	100	100	100	100	100	100	100	100	100
NPL	Pearson Correlation	.135	-.158	-.036	-.071	.006	-.193	1	-.004	.068
	Sig. (2-tailed)	.179	.117	.719	.486	.955	.054		.965	.503

	N	100	100	100	100	100	100	100	100	100
GDP	Pearson Correlation	-.282**	.021	-.039	.017	.041	-.094	-.004	1	-.691**
	Sig. (2-tailed)	.005	.838	.700	.870	.682	.350	.965		.000
	N	100	100	100	100	100	100	100	100	100
INF	Pearson Correlation	.214*	.004	-.066	.091	.058	.108	.068	-.691**	1
	Sig. (2-tailed)	.033	.966	.514	.368	.565	.283	.503	.000	
	N	100	100	100	100	100	100	100	100	100

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

4.3 | Multicollinearity:

Multicollinearity refers to a correlation between two or more independent variables during multiple linear regressions. Multicollinearity is a problem because it undermines the statistical significance of independent variables. Values are less than 5 there is no multicollinearity problem among independent variables. The tolerance value must be greater than 0.2.

Independent Variables	Model (1)		Model (2)	
	Tolerance	VIF	Tolerance	VIF
BS	.929	1.076	.929	1.076
ROA	.724	1.381	.724	1.381
COF	.982	1.018	.982	1.018
CAR	.690	1.449	.690	1.449
NPL	.947	1.056	.947	1.056
GDP	.498	2.010	.498	2.010
INF	.495	2.021	.495	2.021

4.4 | Hausman test:

Hausman's test is that the random-effects model is more appropriate than the fixed effects model. Accept the null hypothesis if the p-value is greater than 0.05 and use a random-effects model. When the p-value is less than 0.05, reject the null hypothesis and choose the fixed-effects model. On this basis, the random-effects model would be approved by the Hausman test. The Hausman test recommends using the random-effects model instead of the fixed-effects model. Therefore, both models are estimated using the random-effects model.

Test Summary Equation 1	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random L1	0.000000	7	1.0000
Test Summary Equation 2	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random L2	0.000000	7	1.0000

4.5 | Regression Analysis and Results:

The regression results investigate the impact of factors affecting the liquidity of commercial banks in Pakistan. Two models are tested. The result of the regression shows that model 1 represented liquidity 1 measured by cash and marketable securities to total asset and model 2 represented liquidity 2 measured by total loans to total deposit and independent variables are bank size, return on asset, cost of fund, capital adequacy ratio, on performing loan and GDP and inflation. Previous to conducting regression analysis, the Hausman test for random effect models was carried out to decide which random effect models are appropriate.

Dependent Variable: LIQ_1				
Method: Panel EGLS (Cross-section random effects)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.330785	0.114937	2.877965	0.0050
BS	-0.016979	0.008572	-1.980817	0.0506
ROA	3.441921	0.746807	4.608852	0.0000
COF	-0.005196	0.013725	-0.378593	0.7059
CAR	-0.085793	0.117556	-0.729802	0.4674
NPL	0.071178	0.074776	0.951889	0.3436
GDP	-1.490175	0.438643	-3.397237	0.0010
INF	-0.214720	0.274837	-0.781263	0.4367
R-squared	0.305661	Mean dependent var		0.079726
Adjusted R-squared	0.252831	S.D. dependent var		0.074726
S.E. of regression	0.064592	Sum squared resid		0.383839
F-statistic	5.785741	Durbin-Watson stat		1.341616
Prob(F-statistic)	0.000014			

Dependent Variable: LIQ_2				
Method: Panel EGLS (Cross-section random effects)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-0.311376	0.339974	-0.915883	0.3621
BS	0.072656	0.026988	2.692174	0.0084
ROA	0.772064	1.066292	0.724064	0.4709
COF	0.008720	0.018836	0.462951	0.6445
CAR	-0.463195	0.163710	-2.829367	0.0057
NPL	-0.341636	0.135590	-2.519632	0.0135
GDP	0.895659	0.585247	1.530394	0.1294
INF	0.702980	0.370772	1.895993	0.0611
R-squared	0.201065	Mean dependent var		0.141719
Adjusted R-squared	0.140277	S.D. dependent var		0.082984
S.E. of regression	0.076944	Sum squared resid		0.544672
F-statistic	3.307621	Durbin-Watson stat		1.218779
Prob(F-statistic)	0.003488			

All independent variables together can explain 30% and 20% of the variability in the dependent variables Liquidity 1 and Liquidity 2, respectively. According to F- statistical probability, both models as a whole are statistically significant and the empirical significant level is less than 1% (Pr-F < 0.01). Bank size has a model 1 negatively and model 2 has positive significant effects on banks' liquidity. If bank size increases by 1% holding other variables constant, Liquidity 1 will decrease by 0.016 which indicates that liquidity has increased. If bank size increases by 1 % holding other variables constant, liquidity 2 will increase by 0.0726 which indicates that liquidity has decreased. Return on asset model 1 has positively significant and model 2 has a positively insignificant effect on bank liquidity. If ROA increases by 1 % holding other variables constant, liquidity 1 will increase by 3.44 which indicates that liquidity has decreased. If ROA increases by 1 % holding other variables constant, liquidity 2 will increase by 0.77 which indicates that liquidity has decreased. . Cost of fund model 1 has a negative, and model 2 has a positively insignificant effect on bank liquidity. If COF increases by 1% holding other variables constant liquidity 1 will decrease by 0.005 which indicates that liquidity has increased. If COF increases by 1% holding other variables constant liquidity 2 will increase by 0.008 which indicates that liquidity

has decreased. Capital adequacy model 1 has negatively insignificant and model 2 has negatively significant effects on bank liquidity. If CAR increases by 1% holding other variables constant liquidity 1 will decrease by 0.095 which indicates liquidity has increased. If CAR increases by 1% holding other variables constant Liquidity 2 will decrease by 0.46 which indicates that liquidity has increased. The non-performing loan has model 1 positively insignificant and model 2 has negatively significant effects on bank liquidity. If NPL increases by 1%, holding other variables constant liquidity 1 will increase by 0.07 which indicates that liquidity has decreased. If NPL increases by 1% holding other variables constant liquidity 2 will decrease by 0.34 which indicates that liquidity has increased. GDP model 1 has negatively significant and model 2 has positively insignificant effects on bank liquidity. If GDP increases by 1% holding other variables constant liquidity 1 will decrease by 1.49 which indicates that liquidity has increased. If GDP increases by 1% holding other variables constant liquidity 2 will increase by 0.89 which indicates that liquidity has decreased. Inflation model 1 has negatively insignificant and model 2 has positive significant effects on bank liquidity. If INF increases by 1% holding other variables constant liquidity 1 will decrease by 0.21 which indicates that liquidity has increased. If INF increases by 1% holding other variables constant liquidity 2 will increase by 0.7 which indicates liquidity has decreased.

5 | CONCLUSION

The study aims to identify the factors that affect the liquidity of a commercial bank, including internal and external factors. This study examined 10 banks from 2011-2020, based on annual reports from Pakistani banks. Based on panel data, we examine how bank size, return on asset, cost of fund, capital adequacy ratio and non-performing loans, GDP, and inflation affect the liquidity of Pakistani commercial banks. In two models, the cash, marketable securities to total assets, and loans to deposits ratios define the dependent variables. Our study concludes that the study's findings are useful for all relevant stakeholders, including the banking sector, and which can be used to develop related banking policies. To maintain acceptable levels of liquidity in commercial banks, departments should pay attention to the economic and internal variables at the banks. Banks need to maintain higher levels of liquidity to deal with crises. The Pakistani administrations of commercial banks discuss the need for making a trade-off between lending and bankruptcy risk. Banks need to improve their deposit-taking ability, constrict their loan underwriting criteria and credit policies and implement rigorous and active collection strategies. In the future, reapply the current study with a focus on a different time period.

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