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Impact of Macroeconomic and Bank-Specific Factors on Liquidity of Commercial Banks in Pakistan

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Abstract: *Financial system stability has been gaining crucial consideration on both, national and international levels in terms of structural, institutional and macroeconomic aspects. Money as a medium of exchange and banks as an intermediary cannot be comprehended by visualizing a world without them. It can be observed that old modalities of the banking system have been replaced by many innovations in the new millennium. To evaluate the soundness and steadiness of a banking sector, it is considered imperative to associate the banking system with its liquidity position. Therefore, this research is conducted to determine the influence of bank-specific and macro environmental variables on commercial banks' liquidity in Pakistan. The data is taken from 20 commercial banks over the period 2009 to 2018. Different panel data regression models are used. The study found that leverage (LEV) and capital adequacy ratio (CAR) have a negative but significant impact on the liquidity of the banks. Moreover, the exchange rate (FER) was found to have a positive and significant effect on the liquidity of commercial banks. Furthermore, there is insignificant relation between asset size (SIZE), government deficit financing (GDF) and inflation rate (INF) with the bank's liquidity.*

Key Words: Banking Sector, Liquidity, CAR, Leverage, Bank Size, Pakistan

Introduction

Financial system stability has been gaining crucial consideration on both, national and international levels in terms of structural, institutional and macroeconomic aspects. The domestic financial system is becoming flexible for capital flow volatility because it is important for the domestic financial system to be strengthened for a large magnitude and mobility of internal capital flows towards it. Therefore, for having a national level strong macroeconomic and monetary policy performance, a sound financial system is the key part of the financial infrastructure (Javaid, Anwar, Zaman & Gafoor, 2011).

Money as a medium of exchange and banks as an intermediary cannot be comprehended by visualizing a world without them. Banks deal in money, accept deposits from customers who have surplus savings and advance loans to clients that are in need of them. The banking sector is considered to be the lifeblood of modern trade as it is a major source of finance for other sectors. The concept of efficiency is becoming more important in this increasingly growing phenomenon of globalization, both for financial and non-financial institutions, including banks. The success and growth of the banking sector mainly depend upon a sound competitive market approach.

It can be observed that old modalities of the banking system have been replaced by many innovations in the new millennium (Gul, Irshad & Zaman, 2011). Therefore, to evaluate the steadiness and soundness of a

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banking sector, it is considered imperative to associate the banking system with its liquidity position. The majority of countries have a financial system that is based on the banking system, therefore, it is important to study determinants of liquidity of the banking sector. The liquidity of banks is significantly considered at both micro and macroeconomic level. In micro and macroeconomic stability and economic growth, the function of a banking sector turns out to be very important when the banking sector share boosts in a financial system. Undoubtedly profits are an essential part of a competitive banking sector. A sound banking stream tolerates the negative financial upsets and becomes the cause of durability in the financial system, ultimately strengthening the economic system (Akhtar, Ali & Sadaqat, 2011).

Liquidity is the state of any organization to pay its short-term obligation in time. It can be the convertibility of any asset into cash or cash equivalents. Liquidity problems can be both ways i.e. excess liquidity and shortage of liquidity; both create problems for the Islamic banks, as at times their assets are not at par with the liabilities and have also different maturities. This maturity gap plays a vital role in liquidity problem to arise (Ali, 2013).

The impacts of Gross Domestic Product (GDP) on liquid asset holdings of the banks have been highlighted by many previous researchers in their studies (Calomiris and Wilson, 1998; Vodova, 2011). GDP is taken to measure the economic cycle. High GDP indicates that an economy is experiencing expansion whereas a low GDP means a recession is undergoing within the country. Vodova (2011) found that GDP is positively correlated with the bank's liquid asset holdings in commercial banks in Slovakia. On the contrary, Calomiris and Wilson's (1998) research work found that during the recession period, banks' liquid asset holdings tend to increase and then decrease when the economy starts to recover. Therefore, banks that grant more loans when the economy starts to recover will suffer a decline in banks' liquid assets (Moore, Maynard & 2005).

The empirical studies on the relationship between the bank's liquid asset holdings and inflation are negative as evident by most of the scholarly work (Bunda & Desquilbet, 2008; Vodova, 2011). Based on the empirical results of Vodova (2011), he also concluded that there is a negatively correlated relationship between the inflation rate and banks' liquid asset holdings in the Czech Republic but no relationship was found in the case of Slovakia. Quoting findings from Vodova (2011), the NPL ratio is one of the determinants that affect banks' liquid asset holdings. Based on his findings on Czech Republic's commercial banks from the period year 2001 until the year 2009, the NPL ratio and bank liquid asset holdings are positively correlated which contradicts Vodova's former expectation. This proves that banks remain prudent in their liquidity risk management to offset the high credit risk. Furthermore, this result is consistent with Ubegbunan's (1999) study which indicates that during a period of high inflation, the real value of a bank's earnings will be significantly reduced.

Rationale of the Study

Islamic banking is an emerging form of banking based on Shariah principles/guidelines and is offering various solutions as an alternative to conventional banking products. The industry is growing with the passage of time and is a very essential component of economic growth. Globally Islamic banking industry is growing in many economies, especially in Saudi Arabia, Kuwait and Bahrain with a compound annual growth rate (CAGR) of more than 48.9%, 44.6% and 27.7% respectively trend are also observed in some other emerging markets like Indonesia, Turkey and Pakistan with CAGR of 43.5% 18.7% and 22% respectively (Ernst & Young Global Limited, 2015). Presently 22 banks are offering Islamic banking services in Pakistan including 6 full-fledged Islamic banks through 1075 branches & sub-branches while 17 conventional banks through their 627 Islamic banking windows are operating in Pakistan (SBP, 2019).

Despite all the available tools for financing, investment and Interbank operations the situation is getting worse with each passing day, this has created serious

concerns for the masses and the financial institutions as the excess liquidity can be fatal for any financial institution, especially an Islamic bank. There are various concerns of the Shariah scholars for some of the contracts like Murabaha that its usage should be minimized over time and should be eliminated, (Usmani, 2012) and have also focused that the Islamic banks should avoid the usage of the agency agreement as underlying contracts for all the Islamic banking transactions and should move forwards and initiate the trading activities, the same aspect has been focused by SBP in its plan for Islamic banking for 2014-2018 (SBP, 2014).

Most of the studies related to the efficiency of Islamic banks are based on theoretical approaches having less empirical support (Akhtar, Ali & Sadaqat, 2011). In Pakistan, there is less acknowledged literature on liquidity determinants of Islamic banking and its comparison with conventional banking has been also not recognized as much. As a result, the present study help in minimizing the gap between theory and empirical approach for Islamic banking and also it discusses liquidity determinants of conventional and Islamic banking both at the internal and external level.

This study gathered the data from audited unconsolidated financial statements of banks over the period 2009 to 2018. The outcome deducted from this study would be beneficial for bank managers in identifying and liquidity position of Islamic and conventional sector banks, policy maker which enforce banks to improve their performance as per the liquidity policies they made after reviewing the liquidity of banks, individuals as it tells which sector is profitable for investing and lending purposes.

Research Questions

The research study addresses the following research questions;

- What is the effect of bank-specific factors on the bank's liquidity in Pakistan over the period 2009 to 2018?
- Does bank capital adequacy (CAR) affect the liquidity of the banks within Pakistan over the period 2009 to 2018?
- Do bank size (SIZE) affect the liquidity of the banks within Pakistan over the period 2009 to 2018?
- Does bank leverage (LEV) affect the liquidity of the banks within Pakistan over the period 2009 to 2018?
- What is the effect of macroeconomic factors on bank liquidity in Pakistan over the period 2009 to 2018?
- Does the inflation rate (INF) affect the liquidity of the banks within Pakistan over the period 2009 to 2018?
- Does the foreign exchange rate (FER) affect the liquidity of the banks within Pakistan over the period 2009 to 2018?
- Do government deficit financing (GDF) affect the liquidity of the banks within Pakistan over the period 2009 to 2018?

Literature Review

Commercial banks remain a key role in the economic development of any country. A well efficient banking system is more resilient, this is to say, it can be able to withstand various shocks and hence contribute to the stability of the banking system in the country. Empirical studies on determinants of bank liquidity were done in different countries with different social economic conditions using bank-specific, industry-specific and macro environmental factors. This empirical review takes into account both developed countries, emerging economies countries as well as developing countries. Generally, the findings from different researchers were found to contradict different factors influencing the liquidity of commercial banks, even if the same approach is used (Qasim & Ramiz-Ur-Rehman, 2011; Venkatesh & Suresh, 2014)

Bank size is represented as the natural logarithm of the total asset (Nikolaos. I. Papanikolaou, 2009; George, Carlos, & Matousek, 2011, Miller and Noulas, 1996; Favero and Palpi, 1995). The other bank-specific characteristic used for bank efficiency studies is the non-performing loan ratio, which is the ratio of loan loss provision of the total value of loans distributed. Changes in credit risk may enhance change in the efficiency of commercial banks respectively, and the best alternative is the diversification

of a portfolio, especially when the risks cannot be anticipated, Cooper et al, (2003). Various studies used this ratio to measure the efficiency of commercial banks, Pastor, 1992 (Mexico); Sufian & Habibullah, 2009 (Singapore); Sufian, 2009 (Singapore); Seelanatha, 2012 (Srilanka); Manthos, D.D, 2009 (Greece). Other bank-specific characteristics are such as capital adequacy, bank size, leverage, profitability, and noninterest expenses to total assets (Leong and Dollery, 2002; Mckillop, 2002; Casu and Molynuex, 2003; Pasiouras and Tsaklanganos, 2007; and Kosmidou, 2007).

Inflation rate and GDP were used by a good number of studies to measure the efficiency of commercial banks. Both inflation and GDP growth exert a positive and negative impact on the efficiency of commercial banks. Similarly, the GDP and Inflation rate were used in many efficiency studies such as Delis and Papanikolaou (2009) in Greece; Pasiouras (20090 within the UK; Sufian (2009) in Malaysia; Dietsch, Lozano Vivas (2000) in France and Spain. Muljawan (2005) describes in his study that the high expectation would be involved from the banking institution to perform well in the long term period so that would make a contribution to the economy through the process of intermediation.

A study was conducted by San Kablan (2010) to determine the role of bank efficiency in Sub-Saharan Africa. The primary objective of their study was to examine the level of financial development and banks efficiency in the region. The study employs stochastic frontier analysis and a generalized method of moments system to measure efficiency and financial development. The study finds that Sub-Saharan banks are cost-efficient, and the economic, as well as political environment, have held back financial development in the region.

Ismal (2010) studied Indonesian Islamic banks' liquidity risk management. The non-optimal organisational structure of Islamic banks to manage liquidity, significant demand for liquidity withdrawals from depositors, and fragility of Islamic banks to mitigate certain scenarios of liquidity withdrawals are the main causes of liquidity risk in Indonesian Islamic banks, according to the study. The paper recommends institutional deepening and rejuvenating Islamic liquid instruments to better liquidity risk management in Islamic banks. Akhtar, Ali, and Sadaqat (2011) studied conventional bank profitability. Multiple regression models are used for analysis.

Aspal and Malhotra (2012) conducted a study using the CAMEL rating system for measuring the performance appraisal of Indian Public sector banks from 2006-2011. Their study was based on the sampling of nineteen public sector banks and the variables used were also based on the CAMEL approach which was calculated by different twelve ratios. Analysis has been done by using statistical tools like taking comparing means of sampled banks, F-test, One Way ANOVA and for testing normality and homogeneity Shapiro-Walk test and Levene's test were used respectively. The findings showed that Baroda and Andhra Bank was the best performer and United Bank of India was the worst performer during the study period. Azam and Siddiqui (2012) conducted research to measure the profitability of local and foreign banks operating in Pakistan by making a comparison of performances between them. They took thirty-six commercial banks as a sample which is further divided into three (3) groups of different sector banks.

Roman and Sargu (2013) performed research to analyze the financial health of Romanian banks supported by the CAMELS framework. The sample selected was based on 15 commercial banks for the time period 2004-2011. Ongore and Kusa (2013) studied the effect on the ownership structure of bank performance to fulfil the gap in this area of study. Shah and Jan (2014) conducted a study on the comparison between Islamic banks and conventional banks to evaluate their performance.

Venkatesh and Suresh (2014) had done their work to assess the performance of selected commercial banks of the Kingdom of Bahrain. They used the CAMEL ranking system for the time period 2006-2012. Dr Ansar ul Haque (2014) conducted a study to examine the financial performance of some foreign scheduled commercial banks from 2009 - 2013. El Mehdi Ferrouhi (2014) in his research work examined the performance of

Moroccan banks by adopting the CAMEL framework. The study was based on eleven years of data from 2001 to 2011. Muhmad and Hashim (2015) also studied the performance of the 35 domestic and foreign banks in Malaysia for the period of 2008-2012 using CAMEL and analysed the CAMLE variable and bank performance relationship. The author used the POLS regression analysis and suggested that banks need to improve their Management competency which is in contradiction to Rozzani and Rahman (2013).

Kamran, Johnson, and Sammer (2016) studied macroeconomic and bank-specific factors affecting Pakistan's banking industry. The study used multiple regression analysis on 44 regular and Islamic banks in Pakistan from 2005 to 2009. The study indicated that bank-specific characteristics like growth, deposits, and loans have little impact on bank profitability in Pakistan, but macroeconomic factors do.

Yakubu (2016) looked at internal and external factors affecting Ghanaian commercial banks' performance. Internal factors positively affect commercial bank performance in Ghana, while macroeconomic issues negatively affect bank performance. Ahsan (2016) analyze the financial performance of three selected banks over a period of eight years (2007-2014) and find that the selected banks are strong in position on their composite rating system under CAMEL Rating Analysis. Through the help of different researchers' investigation, it is found that the Size of a firm can be measured through total assets and sales.

Gul et al. (2013) suggested that firm size has a positive relation to profitability. It is founded that bigger firms grow faster than smaller and younger firms grow more rapidly than older ones. Larger firms have more spirited power when contrasted with smaller firms in the field entailing competition because that firm has an opportunity to make more profit. kumar and Tamizhselvan (2010) found that there is positive a association exists between the size of a company and profitability. Papadogonas (2005) also declared the existence of a positive association between size and profitability.

Prasad and Ravinder (2012) did a study to investigate the performance of twenty nationalized banks in India from 2005-2006 to 2009-10. They also adopted the same framework as used by many researchers in the past which is the CAMEL framework. The result of their study shows that in terms of capital adequacy ratio, Canara bank shows the best performance. Bank of Baroda stood first in terms of asset quality and liquidity. As per Asset quality, Andhra Bank gets the highest position. Punjab and Sindh banks perform better in the context of management efficiency and Indian banks hold the top position in sustaining good earning quality.

Liquidity measures the corporate or company's aptitude to pay its short-term liabilities (Qasim & Ramiz-Ur-Rehman, 2011). When investors perform an essential analysis on a company then they show a keen interest in having a look at the liquidity of a company because if the company is not paying its short-term debt liabilities then a higher risk of bankruptcy (insolvency) will occur. Gill and Mathur (2011) expected that a firm that is capable to sustain a higher liquidity level will face fewer financing constraints. Different researchers consider different assets to be pertinent in computing liquidity. Working capital and liquidity could mean the same (Manyo & Ogakwu, 2013) or the same thing and relate to the management (administration) of current assets and current liabilities of an enterprise. As liquidity determines the profitability of a firm and hence management of liquidity is very important that requirement of liquidity, depends upon the nature of the company and no exact rule exists for the determination of the best possible level of liquidity that a company can sustain.

Research Gap

Liquidity risk covers excess liquidity i.e. when the banks have excessive depositor's funds (liability) in the shape of deposits of varying maturities, owners funds (equity) but don't have enough explored financing/Investing venues for profitable business i.e. financing /investment (both assets in total) are relatively less than the total deposits & equity. Banks have to pay the return to depositors for all types of deposits (except current account holders) kept by them in banks in form of saving and term deposits. When the bank has

to pay on the deposits kept with the bank but the bank has idle funds with him without any return then the bank's profitability is affected adversely and the profits decrease over time if the situation prevails.

Hypotheses of the Study

H_1: A negative significant connection exists between CAR and bank liquidity
H_2: A positive significant affiliation exists between bank size and bank liquidity
H_3: A negative significant connection exists between leverage and bank liquidity
H_4: An insignificant association exists between inflation rate and bank liquidity
H_5: A negative significant relationship exists between exchange rate and bank liquidity
H_6: A positive significant relationship exists between government deficit financing and bank liquidity

Research Framework

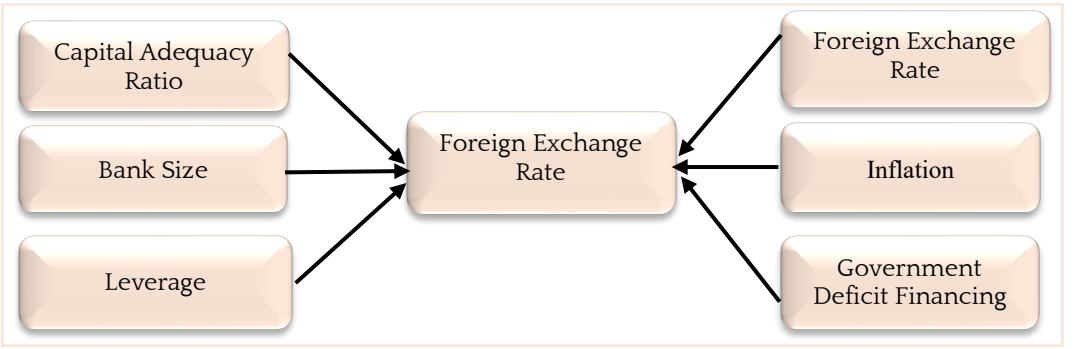

Figure 1:

Research Methodology

Population

The population of the study is the banking industry of Pakistan with all the 35 scheduled commercial banks listed on the State Bank of Pakistan as of 30th June 2019 in the Pakistan financial industry.

Sample

A sample of 4 Islamic scheduled banks is taken. One Islamic bank (MCB Islamic bank) is not being considered for study due to the non-availability of data. Along with that, a sample of 16 conventional scheduled banks (local and foreign) is considered for the study based on the availability of financial data for the understudied period. Annexure – A provides the list of all Islamic and conventional scheduled commercial banks selected for the research study.

Time Duration

The time period for the research study is from 2009 to 2018.

Research Variables

The following variables are used in this study to test the hypothesis.

Table 1. Research Variables

Variables	Proxy / Ratio	References
Liquidity	Liquid assets to Total assets	Saba, Kouser and Azeem (2012); Rudolf, D. (2009)
Capital Adequacy Ratio	(Tier 1 + Tier 2 capital) /Risk-weighted assets	Abusharba et al. (2013); Sarker, Sarker and Sidorova (2006)

Variables	Proxy / Ratio	References
Bank Size	The logarithm of total assets	Sarker, Sarker and Sidorova (2006)
Bank Leverage	Debt to Equity ratio	Sarker, Sarker and Sidorova (2006)
Inflation	Consumer price index (%)	Akhtar (2000); Hunjra et al. (2014)
Foreign Exchange Rate	Real effective exchange rate (%)	Bilawal et al. (2014); Kim, Lee and Lee (2015)
Government Deficit Financing	Deficit financing to Total GDP (%)	Habib and Nourin (2006); Lueth and Ruiz-Arranz (2007); Paranavithana (2014)

Data Collection Method

The secondary data is used for data collection and is taken from the selected banks' annual financial statements for the period 2009 to 2018 and survey reports of SBP. The macroeconomic variables data had been taken from the World Bank indicators.

Data Analysis Software

MS Excel and E-Views 9 are employed as data analysis software.

Data Analysis Techniques

Different techniques are used for data analysis, which are as followed.

1. Descriptive statistics
2. Panel regression analysis (POLS, Fixed effects, Random effects)
3. Hausman test
4. Correlation analysis

Research Equation

The model used in this analysis is as follows:

$$Liq_{it} = \alpha + \beta_1 CAR_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 INF_{it} + \beta_5 FER_{it} + \beta_6 GDF_{it} + \varepsilon_{it}$$

Where,
α = Intercept
LIQ = Bank's Liquidity
CAR = Capital Adequacy Ratio
SIZE = Bank Size
LEV = Leverage
INF = Inflation Rate
FER = Exchange Rate
GD = Government Deficit Financing
Eit = Error Term

Results And Discussion

Summary Statistics

The descriptive statistics pertaining to the variables are included in Table 4.1. It comprises a measure of the data's central tendency, as well as measurements of the data's dispersion and normalcy. The mean for the liquidity (LIQ) variable is 0.022, and the mean for the capital adequacy ratio (CAR) variable is a mean score of 1.099, bank size (SIZE) has a 17.985 mean value, leverage (LEV) has a mean value of 2.092, inflation rate (INF) with a mean value of 105.301, foreign exchange rate (FER) has 83.235 mean value and government deficit financing (GDF) makes a mean value of 4.90.

Table 2. Summary Statistics

	LIQ	CAR	Size	LEV	INF	FER	GDF
Mean	0.022	1.099	17.985	2.092	105.301	83.235	4.900
Maximum	1.646	1.440	20.091	2.583	174.973	102.654	10.216
Minimum	0.254	-6.040	14.205	1.174	84.712	59.856	1.014
Std. Dev.	0.282	0.767	1.1728	0.962	8.060	16.252	4.900
Skewness	3.555	-7.842	-0.630	2.576	3.132	-0.286	-0.175
Kurtosis	18.001	72.149	3.373	10.589	4.175	1.589	0.209
Jarque-Bera	1205.775	22205.332	7.560	364.616	201.682	9.555	170.578
Probability	0.000	0.000	0.022	0.000	0.000	0.008	0.000

The lowest possible number for LIQ is 0.254, and the highest possible value is 1.646. The CAR variable can take on any value between -1.440 and 1.440, with a minimum of -6.040. There is a minimum value of 14.205 and a maximum value of 20.091 for the Ban Size variable. The lowest possible value for LEV is 1.174, and the highest possible value is 2.583. The inflation rate might range anywhere from 84.712 to 174.97, with a minimum value of 174.12. The smallest value of FER is 59.856, and the largest value it can take is 102.654. In conclusion, the least value of GDF is 1.014, while the greatest value it can take is 10.216. Because the p-value is lower than the significance level of 0.05, the Jarque-Bera test's probability value indicates that each variable follows a normal distribution. This is because the significance level is 0.05.

Pooled Ordinary Least Squares (POLS)

The findings of the POLS regression are given in Table 4.2 below.

Table 3. Pooled Ordinary Least Square Result

Dependent Variable: LIQ
Mehtod: Least Squares:
Sample (adjusted):2009 2018
Periods included: 10
Cross-section included: 20
Included observations: 200

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	109.615	0.000	7.876	0.000***
CAR	-0.398	0.000	-2.330	0.000***
SIZE	-3.91E-06	0.370	-0.854	0.393
LEV	-1.456	0.000	3.574	0.000***
INF	2.235	0.206	0.390	0.696
FER	0.253	0.363	1.441	0.150
GDF	1.578	0.444	0.562	0.574
R-squared	0.2336	Mean dependent var		0.4307
Adjusted R- squared	0.2045	S.D. dependent var		0.1531
S.E. of regression	0.1360	Sum squared resid		1.7035
F-statistic	.9878	Prob(F-statistic)		0.0000

***p<0.01, **p<0.05, *p<1

The 2009-2018 POLS regression model uses 200 observations. R-square is 0.2336. The statistically significant variables explain 23.36 per cent of the bank's liquidity variance. The regression model demonstrates which bank-specific and macroenvironmental factors are statistically significant. A variable has a statistically significant impact on the bank's liquidity if its p-value is less than 5%. CAR and LEV have a considerable impact on liquidity, according to the table (LIQ), as their p-value is less than the 5% level of significance respectively. Furthermore, there was no effect of bank size (Size), INF, FER and GDF on the commercial bank's liquidity in Pakistan. The table also reveals F statistics value = 5.98 and F statistics (sign) = 0.000 indicating that model is a good statistical fit for the data.

Random Effect Model

The findings of the random effect regression are given in Table 4.3. A total of 200 observations are used within this random effect regression model over the period of 10 years from 2009 to 2018. The regression model explanatory power (R-square) is 0.1669. This indicates that a 16.69 per cent variance in the bank's liquidity is explained by the statistically significant explanatory variables used within this study. The regression model findings further show which internal and macroeconomic variables are statistically significant and which internal and macroeconomic factors are not statistically significant. From the table, it is found that CAR and bank's financial leverage (LEV) have a significant impact on liquidity

(LIQ) at a 5% significance level respectively. However, FER has a statistically significant impact on banks' liquidity at a 10% significance level. Moreover, CAR and LEV were found to be impacted negatively by the liquidity, whereas FER was found to have a direct positive influence on the liquidity of the banks within Pakistan. Furthermore, there was no effect of bank size (Size), INF and GDF on the commercial bank's liquidity in Pakistan. The table also reveals F statistics value = 18.85 and F statistics (sign) = 0.000 indicating that model is a good statistical fit for the data. The estimated regression model is as follows:

$$LIQ = 105.37 - 0.36CAR + 0.00SIZE - 1.12LEV + 1.91INF + 0.31FER + 1.74GDF + \varepsilon$$
(0.00) (0.59) (0.00) (0.10) (0.09) (0.20)

Table 4. Random Effect Result

Dependent Variable: LIQ
Mehtod: Panel EGLS (Cross-section random effects)
Sample (adjusted):2009 2018
Periods included: 10
Cross-section included: 20
Total Panel (unbalanced) observations: 200

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	105.378	0.000	9.409	0.000***
CAR	-0.358	0.000	-2.612	0.000***
SIZE	1.52E-06	0.598	1.087	0.874
LEV	-1.119	0.000	-3.363	0.000***
INF	1.912	0.103	0.346	0.982
FER	0.311	0.091	1.792	0.074*
GDF	1.739	0.203	1.208	0.227
Effects Specification				
			S. D	Rho
Cross-section random			0.0402	0.0945
Idiosyncratic random			0.1245	0.9055
Weight Statistics				
R-squared	0.1696	Mean dependent var		0.3719
Adjusted R- squared	0.1452	S.D. dependent var		0.1262
S.E. of regression	0.1104	Sum squared resid		1.5633
F-statistic	18.8536	Prob(F-statistic)		0.0000

***p<0.01, **p<0.05, *p<1

Fixed Effect Model

A total of 200 observations are used within this fixed effect regression model over the period of 10 years from 2009 to 2018. The regression model explanatory power (R-square) is 0.7014. This indicates that a 70.14 per cent variance in the bank's liquidity is explained by the statistically significant independent variables used within this study. The regression model findings further show which aspects of the internal and external environment hold statistical significance and which aspects of the internal and external environment do not hold statistical significance. According to the findings in the table, CAR, FER, and the financial leverage (LEV) of banks all have a substantial impact on liquidity (LIQ), as evidenced by the fact that their respective p-values fall below the 5% level of significance. respectively. Furthermore, there was no effect of bank size (Size), INF and GDF on the commercial bank's liquidity in Pakistan. The table also reveals F statistics value = 6.23 and F statistics (sign) = 0.000 indicating that model is a good statistical fit.

Table 5. Fixed Effect Results

Dependent Variable: LIQ
Mehtod: Panel Least Squares
Sample (adjusted):2009 2018
Periods included: 10
Cross-section included: 20
Total Panel (unbalanced) observations: 200

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	99.806	0.000	11.86	0.000***
CAR	-0.300	0.018	-4.488	0.030***
SIZE	3.26E-06	0.262	1.045	0.547
LEV	-0.609	0.087	-3.214	0.063***
INF	1.473	0.217	0.170	0.842
FER	0.371	0.046	0.786	0.017*
GDF	2.176	0.118	1.213	0.175
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.1696	Mean dependent var		0.3719
Adjusted R- squared	0.1452	S.D. dependent var		0.1262
S.E. of regression	0.1104	Sum squared resid		1.5633
F-statistic	18.8536	Prob(F-statistic)		0.0000

***p<0.01, **p<0.05, *p<1

The estimated regression model is as follows:

$$LIQ = 99.80 - 0.30CAR + 0.00SIZE - 0.60LEV + 1.47INF + 0.37FER + 2.17GDF + \varepsilon$$
(0.01) (0.26) (0.08) (0.21) (0.06) (0.11)

Choosing the Best Model

Breusch Pagan LM Test

The Breush Pagan LM test is used to determine if a pooled Ordinary Least Square (POLS) or random effect model is more suitable. The following is the hypothesis to be tested in the LM procedure:

We reject H0, which holds that a random effect model is preferable.

The null hypothesis is that the pooled OLS model is inferior to the random effect model.

As the p-value for the Breusch-Pagan LM test is less than 5%, the results indicate that the random effect model is preferable to the pooled OLS model. In light of this information, we have decided to go with the random effect model.

Table 6. Breusch Pagan LM Test

Test Summary	Chi-Sq Stat	Probability
Random Effect Model	292.417	0.000

Hausman Test

The Hausman test is utilised in order to make a decision between the random effect regressed model and the fixed effect regressed model. According to the Hausman test's null hypothesis, "the preferred model is the random effect," whereas the alternative hypothesis asserts that "the preferred model is the fixed effect" (Green, 2008). As a result of the fact that the p-value for the Hausman test is lower than the significance level of 0.05, which is displayed in Table 4.6, we are unable to conclude that the null hypothesis is false. It indicates that a model with random effects is being employed.

Table 7. Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	21.779	6	1.000

Diagnostics Checking

Heteroskedasticity Test

The outcomes of White's test of heteroskedasticity are presented in Table 4.7 below. "there is Heteroskedasticity among the residuals," says the test's null hypothesis, which states that "there is Heteroskedasticity among the residuals." The alternative hypothesis, on the other hand, asserts that "there is no Heteroskedasticity among the residuals." If the p-value for the significance level is less than 0.05, then it is possible that there is heteroskedasticity; on the other hand, if the p-value for the significance level is larger than 0.05, then it is possible that there is no heteroskedasticity. The results show that the p-value is lower than the 0.05 significance level; as a result, we can conclude that the alternative hypothesis is more likely to be correct than the null hypothesis. It indicates that there is no heteroskedasticity at the 0.05 level of significance.

Table 8. White's Test

Test Summary	Chi Sq. Stat	Probability
Homoscedasticity	12.73	0.208

Correlation Analysis

Table 4.8 provides the correlation analysis output for all independent variables taken for the study. From the table, it is evident that all variables have a correlation value less than the standard value of 0.70 which is mostly suggested by researchers as the maximum threshold. A value greater than 0.70 indicates the presence of correlation for each pair of variables. Therefore, no problem with correlation among the dataset.

Table 9. Multi-collinearity Analysis

	LIQ	CAR	SIZE	LEV	INF	FER	GDF
LIQ	1.0000						
CAR	-0.2386	1.0000					
SIZE	-0.1096	0.2894	1.0000				
LEV	-0.3822	-0.0527	-0.0337	1.0000			
INF	0.0428	0.0027	0.0634	0.1171	1.0000		
FER	0.1359	-0.0885	-0.0625	-0.1479	-0.2855	1.0000	
GDF	0.1445	-0.0089	0.0584	0.1083	0.3261	0.2553	1.0000

Autocorrelation Test

According to linear regression model assumptions, there should be no autocorrelation exists among disturbances. The rule of thumb indicates that if the value of probability is greater than its significance level, so we should not reject our null which states that there is no autocorrelation among residuals. The probability of the Chi-square value was 0.000 which indicates that we do not reject Ho. Hence, there exists an autocorrelation in the model. In order to overcome the autocorrelation problem, the first differences of all variables are taken. Afterwards, the Wooldridge test to test autocorrelation is again applied. As the p-value = 0.217 is greater than the 5% level of significance this time it means that there is no autocorrelation in the dataset.

Table 10. Wooldridge Test

Test Summary	F-statistics	Probability
Autocorrelation	4.757	0.000

Test Summary	F-statistics	Probability
No Autocorrelation (1st Difference)	0.354	0.217

Results Discussion

CAR and bank liquidity.

Hypothesis 1

indicates that CAR and bank liquidity are negatively correlated. CAR negatively affects bank liquidity. At 5% significance, the study hypothesis is accepted with a coefficient of -0.358 and a p-value of 0.000. CAR's influence on bank liquidity is negative; the higher the CAR, the lower the commercial banks' liquidity. The current study's findings for Pakistani commercial banks are consistent with Nuviyanti and Anggono (2014), who likewise found a negative link between CAR and bank liquidity. The negative liquidity coefficient argues against 'moral hazard.
Bank size and liquidity:

Hypothesis 2

Bank size and liquidity are statistically related. Bank size positively affects liquidity. At 5% significance, a coefficient of 1.52E-06 and a p-value of 0.000 reject the research hypothesis. The effect of bank size on liquidity is positive, therefore the larger the bank, the higher the commercial banks' liquidity. For every 1 unit rise in bank size, the loan-to-deposit ratio (or bank liquidity) increases by 1.52E-06 units or vice versa. Rauch et al. (2009) and Berger and Bouwman (2009) agree. Positive liquidity coefficients indicate 'too big to fail' hypotheses.

Hypothesis 3

Hypothesis 3 states that financial leverage and liquidity are negatively correlated. Leverage hurts banks' liquidity. At 5% significance, the study hypothesis is accepted with a coefficient of -1.119 and a p-value of 0.000. The bigger a bank's leverage, the lesser its liquidity. This indicates 1% rise in bank leverage decreases liquidity by 1.119%. The negative liquidity coefficient of banks contradicts 'poor management

Hypothesis 4

The inflation rate and bank liquidity are statistically unrelated. Inflation has little impact on bank liquidity. The study hypothesis is accepted with a coefficient () of 1.912 and a p-value (Sig) of 0.982. Belete (2015) suggested that inflation affects banks' liquidity. He contended that rising inflation lowers the real rate of return, causing credit rationing and inefficient resource allocation.

Hypothesis 5

Foreign exchange rate and bank liquidity are positively and statistically significantly correlated. FER affects bank liquidity in a beneficial way. The study hypothesis is accepted with a coefficient () of -0.311 and a p-value (Sig) of 0.074. Positive FER influence on bank liquidity indicates the higher the FER, the higher the commercial banks' liquidity. A 1% increase in the bank's foreign exchange rate increases its liquidity by 0.311%. The findings matched those of Jaffar and Manarvi (2011) and Ashraf (2013).

Hypothesis 6

Government deficit financing and bank liquidity are statistically linked. GDF affects bank liquidity in a good way. At 5% significance, a coefficient of 1.739 and a p-value of 0.227 reject the research hypothesis. GDF influences bank liquidity positively, so the larger the bank, the higher its liquidity. For every 1 unit added to the GDF, bank liquidity increases by 1.739 units or vice versa.

Conclusion

This study gathered the data from audited unconsolidated financial statements of banks for bank-specific factors and from World Bank indicators for macroeconomic factors for the period 2009 to 2018. The outcome deducted from this study would be beneficial for bank managers in identifying and liquidity position of Islamic and conventional sector banks, policy maker which enforce banks to improve their performance according to the liquidity policies they made after reviewing the liquidity of banks, individuals as it tells which sector is profitable for investing and

lending purposes. The study found that CAR and LEV have a significant impact on liquidity as their p-value at the 5% level of significance is less than 0.05 respectively. However, FER was found to be statistically significant at a 10% level of significance. Moreover, CAR and LEV were found to be impacted negatively on liquidity, whereas FER was found to have a direct positive influence on the liquidity of the banks within Pakistan.

For future investigation, the innovation in modelling techniques and inclusion of an even broader sample of economies could further help verify and improve upon the results of this research and may be able to provide a more accurate picture of the internal and external factors' impact on the bank's liquidity. The inclusion of more literature-supported macroeconomic variables along with internal variables could better forecast the movements of liquidity decisions. External environmental impact may also be taken into consideration to measure the company's liquidity structure decisions through economic, social, industry, competition and technological factors. This will lead to new and significant research that could help investors and financial analysts in decision making a timely. The properly planned and implemented financing, investment and liquidity policies will not only assist the companies in attaining their primary goal of maximizing the wealth of shareholders but may also enhance the market value of the firm and economic stability.

The research study has its limitations. To reduce the variability of the dependent variable (liquidity), scholars and academicians may classify banks on the basis of bank size, industry/sector or risk level. Time and budget constraints limited the collection of the most recent data from internet sources. The research study excluded the non-financial firms from the sample due to different regulatory frameworks and financial ratio calculations.

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