INVESTIGATING THE DRIVERS OF LIQUIDITY IN ISLAMIC AND CONVENTIONAL BANKS IN PAKISTAN

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Abstract
This study investigates the impact of bank-specific and macroeconomic factors on the liquidity of Islamic and conventional banks operating in Pakistan. The unbalanced panel data has been used from 2007 to 2020. The fixed effects model used the empirical analysis. Profitability, inflation, and market capitalization positively affects the liquidity of Islamic and conventional banks. However, efficiency and the concentration have a negative effect on the liquidity in case of full sample and Islamic banks. This empirical study offers valuable insights into the determinants of liquidity of Islamic and conventional banks in Pakistan, enabling financial regulatory institutions and the management, decision makers to adapt risk management and strengthening regulatory frameworks accordingly. Thus, encouraging Shariah-compliant liquidity instruments and improving regulatory frameworks to ensure financial soundness across the dual banking system.

INTRODUCTION

Daily operations make the bank vulnerable to a number of risks. Among those risks are credit risk, liquidity risk, interest rate risk, market risk, operational risk, etc. If there is a liquidity shortage for banks, the bank cannot run its business activities and may face bankruptcy. According to Ibe (2013), for external and internal analysis, a study of liquidity is essential due to its close connection to daily business operations. In simple terms, when the bank is incapable of fulfilling these two tasks, paying its

obligations and funding assets, it faces liquidity risk. Liquidity is critical to the successful operation of a business and can be considered essential for the stability of the financial system, mainly in the banking industry

Moreover, banks place a high priority on effective liquidity management. The shortage of liquidity appears when a customer withdraws funds when they are needed or due and the banks are unable to pay. Similarly the surplus of cash is excessive liquidity due

to the underutilization of available financial resources. In the above two situations, the first shortage of liquidity is more dangerous because it directly affects the existence of the banks and harms their survival. While the second one, excessive liquidity, seems less harmful as it affects bank profitability. Both these issues should be handled effectively to ensure banking system stability.

Islamic banks differ significantly in their business models from their conventional counterparts (Beck *et al.,* 2013). Dusuki (2007) shared the same view, pointing out that, hypothetically since Islamic banks' balance sheets are dominated by the (profit and loss) PLS on both the asset and liability side, they may be less vulnerable to liquidity risk. Any bad events on the asset side of the balance sheet of an Islamic bank are quickly absorbed since the bank depositors share the bank's risk. In practice, however, a number of critical risks remain on the asset side of the Islamic bank's balance sheet due to the preponderance of (fixed return) and (debt-based) contracts, like leasing and Murabaha. Moreover, compared with conventional banks, Islamic banks lack access to a money market or interbank market where they can resolve liquidity issues in accordance with Shariah.

In general the differences between Islamic banks and conventional banks originate based on their operations and also on the nature of the contracts, specifically liquidity instruments, which are based on debt in conventional banks, whereas Islamic banking instruments are based on equity (Hassan, 2013). According to Islamic banking principles, the sources and uses of funds are constructed on the risk-sharing between the bank and its customers (Ariffin *et al.,* 2009). The fact that Islamic banks operate under a different structure than conventional banks does not mean that they are immune to liquidity difficulties (Sukmana & Suryaningtyas, 2016). The position of liquidity in Islamic banks indicates that Islamic banks are prone to liquidity risks like conventional banks (Muttalib, 2015). In 2000-2001, the banking and financial crisis in Turkey provided a shred of evidence about bank liquidity issues that affected Islamic banks' stability.

Macroeconomic factors and conventional bank liquidity can be countercyclical and banks are more likely to hold higher liquidity shelters during the low growth of an economic period as opposed to the higher growth of an economic period (Aspachs *et al.,* 2005). Similarly, Acharya & Naqvi (2012) demonstrated the serious impact of macroeconomic (external) factors on liquidity. Macroeconomic risks can cause banks' liquidity to be high because investors tend to avoid risky investments, so they want to deposit their money in banks because they consider them safe. To the best of our knowledge, studies that investigated the effects of macroeconomic factors on both conventional banks and Islamic banks' liquidity in Pakistan are limited. During the financial crisis failure of the banking sector across the different parts of the world has been associated with liquidity. Hence, this investigation is necessary in order to determine both bank-specific and macroeconomic factors that disrupt the liquidity flow of Islamic and conventional banks in Pakistan. It is believed that external factors play an essential and significant role in explaining both conventional and Islamic banks' liquidity crises and management.

Research Gap

The purpose of this study is to determine the macroeconomic and bank-specific factors that affect the liquidity of Islamic banks as well as conventional ones in Pakistan. So far, only two studies conducted by Akhtar *et al.* (2011) and Iqbal (2012) have comparative studies of Islamic and conventional banks in Pakistan from 2006–2009 and 2007–2010, which examined the management of liquidity risk. According to Akhtar *et al.* (2011), conventional banks in Pakistan are considering long-term financing projects, and managing their liquidity risk better than Islamic banks. Iqbal (2012) argued that Islamic banks' liquidity positions are superior to conventional banks'. However, these two studies investigated the determinants of liquidity risk from a bank-specific (internal) perspective and did not explore and examine the other important potential external elements that could have some impact on the bank's liquidity.

Macroeconomic factors can influence bank liquidity. However, research examining their impact on both conventional and Islamic banks in Pakistan is scarce. This study seeks to address this gap. Our research contributes to the existing literature by analyzing key determinants of bank liquidity from both internal

(bank-specific) and external (macroeconomic) perspectives. Previous studies have primarily focused on internal factors, neglecting external influences, which may lead to missing variable bias. Critical external factors—such as inflation, GDP, monetary policy (interbank rate), market capitalization, unemployment rate, and market concentration—could also play a significant role in shaping bank liquidity. Unlike prior research, this study incorporates both internal and external factors while offering a comparative analysis of their impact on Islamic and conventional banks in Pakistan. To the best of our knowledge, no existing study has specifically examined external factors in a comparative or standalone analysis of these banking systems. Further, the data in both previous studies covered only a short period (2006–2010), during which Islamic banking was still in its early stages. This study differs by extending the time frame to ensure more robust and precise results. Specifically, we analyze a fourteen-year period (2007–2020), making it the longest study on bank liquidity in Pakistan to date. This extended period provides a more comprehensive understanding of liquidity trends and their influencing factors.

Objective of the Study
This study examines the key factors that determine the liquidity of conventional and Islamic banks in Pakistan. Specifically;

a.   To investigate whether macroeconomic factors (*unemployment rate, inflation rate, economic growth, market capitalization, concentration, and interbank rate)* affect the liquidity of Islamic and conventional banks.

b.   To investigate the impact of bank-specific factors (*profitability, bank size, efficiency, asset quality, bank capital)* on the liquidity of Islamic and conventional banks.

c.   To examine whether the effects of macroeconomic and bank-specific factors on the liquidity are different for Islamic and conventional banks.

2.   Theoretical Framework
2.1 The 'Shift Ability' Theory of Liquidity
The doctrine of anticipated income augmented the shift ability theory of liquidity, which replaced the commercial loan theory. According to the theory of shift ability, banks could best safeguard themselves against large withdrawals of deposits by holdings as a form of liquidity reserve, and there is an appropriate secondary market. However, commercial paper, prime bankers' acceptance, and, most essential, Treasury notes were all included in this liquidity reserve. In normal circumstances, all of these instruments reached the highest marketability levels and capital certainty due to their short duration to maturity.

A serious flaw in the shift ability theory has been revealed. Similarly, this rejection caused the theory of commercial loans to be rejected. Lack of market liquidity renders, secondary reserve assets ineffective as a source of liquidity during times of global crisis (Casu *et al.,* 2013). In the end, the central bank was considered the lender of last resort, so liquidity was seen as being outside the banking sector. In addition, the banking system soundness has been more closely linked to the overall health of the economy, because business conditions had a direct impact on cash flow, hence the ability of the bank borrowers to repay their loans. The shift ability hypothesis survived these realizations in an improved form this included the concept that the Federal Reserve Banks would be the ultimate source of bank loan liquidity. Banks' primary concern for liquidity was shifted back to their loan portfolios, where the preservation of high-quality assets that could pass an internal soundness test was of critical importance (Allen and Gale, 2009).

2.2   Liquidity Risks in Commercial Banks
Banks may be exposed to liquidity risk if they cannot liquidate their assets at a reasonable price and within a desirable time (Ruozi et al., 2013). This definition emphasizes two essential characteristics of liquidity risk, namely the liquidation of assets at market value when necessary and if banks fail to liquidate their assets at an average price, they are subject to liquidity risk. This could result in losses and a substantial decline in profits. Banks may face liquidity problems because of large-scale deposit withdrawals. However, this isn't usually the primary cause of liquidity risk. There are a lot of variables that are causing banks to face severe liquidity issues. As an example, long term lending and an extensive commitment base may result in major liquidity problems (Kashyap *et al.,*

2002). However, banks with a greater commitment are required to meet this when due. In addition, banks that have greater exposure to long term lending can face liquidity issues during times of immense liquidity pressures if they do not liquidate their assets at an average price. There are two fundamentals of liquidity risk, according to Goodhart (2008): Based on maturity transformations of bank assets and liabilities, it is the highest price at which an asset may be sold without experiencing a loss in value, regardless of market condition.

Consequently, the bank's liquidity is intertwined with all of its components. The maturity transformation isn't an issue for a bank with assets that can be sold off without a loss. Banks with short-term maturities, on the other hand, may not have as much of a need to keep liquid assets on hand. As a result, depositor demand rises, posing a liquidity risk. In the event of a domino effect, this could bring down an entire banking system, not just a single institution (Diamond and Rajan, 2005).

2.3   Theoretical framework
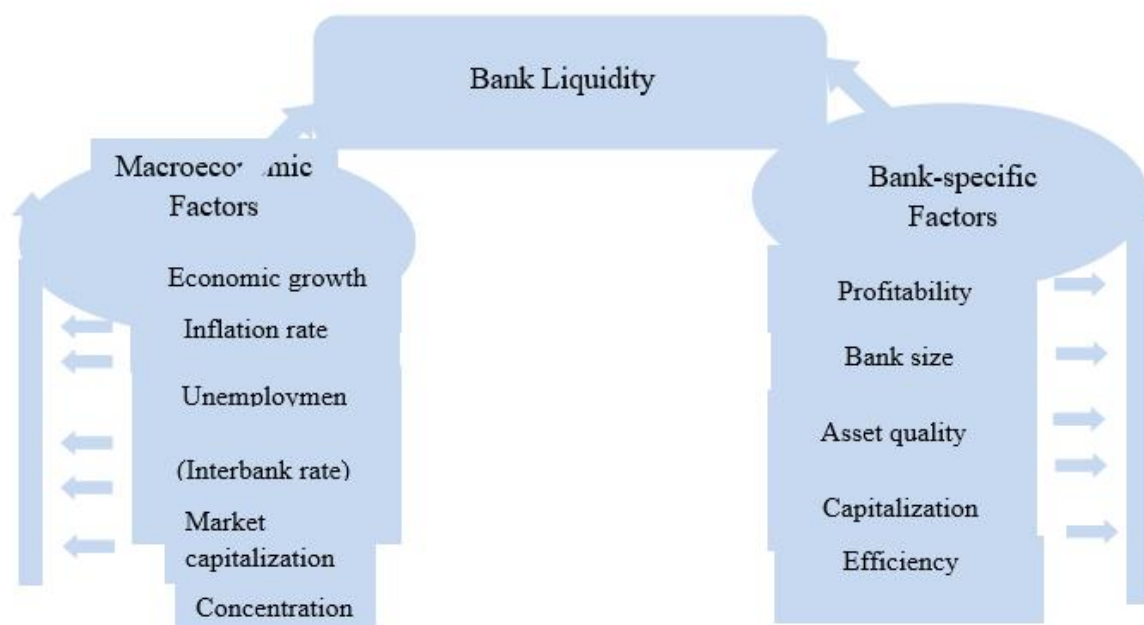
2.4   Empirical Literature

There are a number of studies that show that banks' liquidity is influenced by bank-specific and macroeconomic factors. Further macroeconomic factors cannot be influenced by the bank, likewise the unemployment rate, economic growth, inflation rate, etc. The following portion examines the empirical manifestations of the potential variables affecting banks' liquidity, particularly concentrating on those that have been carried out more recently to determine methods for liquidity risk measurement and how banks' liquidity positions could be affected by a variety of factors, identifying the statistical methods that were used in these empirical studies.

2.5   Empirical studies on Macroeconomic factors relationship with Banks Liquidity
2.5.1   Economic Growth

The theory of (financial fragility and bank liquidity) states that the growth in the GDP indicates increased business activity, which in turn lowers the liquidity of banks because they lend more and vice versa. Therefore, the bank's liquidity is seriously impacted by GDP. Trenca *et al.* (2015) conducted a study on macroeconomic factors to investigate their effects on the liquidity of banks, using a sample of forty banks that operate in Greece, Spain, Portugal, Italy, Cyprus, and Croatia. There is a negative relationship between economic growth and bank liquidity. The concept of financial fragility

and bank liquidity is also supported by Aspachs *et al.* (2005), Melese (2015) and Ferrouhi and Lehadiri (2014). Al-Harbi (2020) & Al-Harbi (2017) carried out a study in Organization of Islamic Cooperation (OIC) countries that examined Islamic banks' liquidity determinants and took into consideration all Islamic banks operating in OIC countries during the period 1989–2008and discovered that liquidity has a positive correlation with GDP growth. Ahmad and Rasool (2017) also observed a positive correlation between bank liquidity and economic growth during a period of 10 years from 2005 to 2014, when he studied 31 Pakistani banks. The studies of Pham and Pham (2021), Ahamed (2021), El-Massah *et al.* (2019), Boadi *et al.* (2016) and Bunda and Desquilbet (2008) also identified that bank liquidity is influenced by GDP in a positive way.

2.5.2   Inflation Rate
The association between inflation and bank liquidity is not well known. According to the (informational friction theory) as inflation rises, the return on total assets decreases, resulting in credit rationing and increased bank liquidity. Al-Khouri (2012), and Bunda & Desquilbet (2008) supported this theory with their research findings. Ghenimi and Omri (2015) and Pham and Pham (2021) found a positive link between inflation and bank. In addition, inflation and liquidity have a negative relationship with each other. Because higher inflation lowers consumers' purchasing power and hence reduces bank liquidity, inflation and liquidity are mutually exclusive (Trenca *et al.*, 2015). Moreover, some other studies discovered that the inflation rate has a detrimental effect on liquidity (Ahamed, 2021; Al-Harbi, 2020; Al-Harbi, 2017; Sheefeni & Nyambe 2016).

2.5.3   Unemployment Rate
Some researchers argue that when the unemployment rate rises, demand for loans decreases, thus increasing bank liquidity. For example, Trenca *et al.* (2015) discovered that the liquidity of banks is increasing as a result of an increased unemployment rate. In contrast, Munteanu (2012) concluded that the unemployment rate and bank liquidity are negatively correlated. Furthermore, the studies of Singh & Sharma (2016), and Ferrouhi and Lehadiri

(2014) examined the link between unemployment and liquidity, they found that unemployment has an insignificant relationship with bank liquidity.

2.5.4   Monetary policy (interbank rate)
It is a well-known fact that government may use an economic policy on the demand side to achieve objectives like consumption, liquidity, inflation, and growth. Furthermore, two different studies conducted by Al-Harbi (2020) and Al-Harbi (2017) examined Islamic and conventional banks' liquidity determinants, taking into consideration all Islamic banks as well as conventional ones that were operating in OIC countries for the duration of 1989 to 2008. The author found interest rate and bank liquidity have a significant negative relationship. Lucchetta (2023) argued that the monetary policy rate measures the bank's capacity to provide loans to clients. According to Berger and Bouwman (2017), Liquidity is minimally affected by monetary policy. However, small banks are significantly affected by it, while large and medium banks are least affected by it.

2.5.5   Market capitalization
Banks' liquidity is significantly affected by the stock market because of its role in stimulating economic growth by providing financing to firms. Similarly, Beck *et al.* (2004) found that firms choose equity markets over banks to obtain financing from the equity market. This shows that banks and stock markets are substitutes for each other. A study carried out by Al-Harbi (2020) in (OIC) countries examined the Islamic and conventional banks' liquidity determinants, taking into consideration all Islamic banks as well as conventional ones that were operating in OIC countries. The author found market capitalization and bank liquidity have a positive relationship.

2.5.6   Concentration
Bank liquidity and concentration are related according to two theories. The first (market power) theory indicates that a market with higher concentration makes banks act in an oligopolistic way, which makes them charge higher prices for credit. The availability of credit is reduced as a result. Therefore, the banks' liquidity is affected positively by concentration. The market power theory,

strengthened by Beck *et al.* (2004), argued that the concentration of the bank raises barriers to financing in countries in regards to the low institutional positions and economic growth. Results came in harmony with the above theory (Al-Harbi, 2020; Hainz *et al.*, 2013; Al-Khouri, 2012; Ghosh, 2016). The second hypothesis (failure information or asymmetry) indicates that banks have a powerful relationship with borrowers in the highly concentrated market, which will reduce costs linked to asymmetric information, 'moral hazard and problems of adverse selection' foremost to high credit accessibility to borrowers, therefore reducing banks' liquidity (Shao & Liu 2012).

2.6 Empirical studies on bank-specific factors relationship with banks liquidity
2.6.1 Profitability
The findings of Al-Harbi (2020), Al-Khouri (2012), and Delechat *et al.* (2012) documented that higher liquidity increases opportunity cost of a bank and ultimately reduces its profitability. In contrast, Bordeleau and Graham (2010) argued that the combined theories of (expected bankruptcy cost) and (liquid assets as a buffer) state that bank liquidity is greatly influenced by profitability, and thus holding liquid assets by banks benefits from a greater awareness of funding markets, profitability increased with lower financing costs. However, these results show profitability and liquidity have a significant positive relationship with each other. The above statement is also affirmed by Mahmood *et al.* (2014), Chowdhury *et al.*, (2019) and Berger & Bouwman (2009).

2.6.2 Bank Size
There are two opposite opinions concerning the association between liquidity and bank size. According to (too-big-to-fail) opinions, in respect of larger banks, they should hold a minimum of liquid assets as compared to small banks, since they depend upon the lender for their last resort. However, larger banks have easier access to capital market and can monitor and screen the borrowers as well. Dinger (2009) examined the liquidity risk of foreign banks in Central and Eastern Europe from 1994 to 2004. The researcher examined that bank size and liquidity have a nonlinear relationship as more liquid assets are held by smaller banks. Kashyap *et al.* (2002) supported the same argument and conducted a study on the United States banking market and reported that the size of the banks and liquidity have a strong relationship with each other, with small banks holding more liquidity since they face obstacles to access in capital markets. Furthermore, Al-Harbi (2020) and Al-Harbi (2017) conducted research on developing countries for the Islamic and conventional banks' liquidity determinants. Indeed, both banks are considered small. They found that bank size has been positively impacted by liquidity and affirmed the findings of Dinger (2009) and Kashyap *et al.* (2002). Furthermore, it is still unclear whether the size of a bank impacts its liquidity. According to Lucchetta (2023), a bank's liquidity improves dramatically as it grows in size. On the contrary, Chowdhury *et al.* (2019), El-Massah *et al.* (2019), El-badry (2018), and Bunda & Desquilb et (2008) found bank size was negatively correlated with liquidity.

2.6.3 Capitalization (CAR)
Bank capital functions as a shield to engross the unanticipated losses and provide a source of funds to handle the liquidity risks. There are two theories in the literature that investigate how bank capital and liquidity are related. According to the first (risk absorption) theory, banks with more capital can generate more liquidity. The above theory is supported by Al-Harbi (2020), Chowdhury *et al.* (2019), Al-Harbi (2017), Al-Khouri (2012), Ghosh (2016), Delechat *et al.* (2012), and Distinguin *et al.* (2013). The second (crowding out)/ (financial fragility) theory shows that greater capital holds up liquidity creation. The studies of El-Massah *et al.* (2019), Shamas *et al.* (2018), El-badry (2018), and Delechat *et al.* (2012) found that liquidity and capital have a negative association. Berger and Bouwman (2009) examined the relationship between bank capital and bank liquidity and found that banks with large capital have a substantial positive impact on bank liquidity, whereas medium-sized banks have a mixed bag of positive and negative effects on liquidity, and smaller banks have a strong negative effect on bank liquidity. Moreover, according to Cucinelli (2013), and Munteanu (2012), bank capital and liquidity have a significant positive relationship.

2.6.4   Asset Quality

Asset quality is always regarded as a bank's most essential asset, and the first internal factor, and it has the potential to have an impact on bank liquidity. According to Brown and Moles (2014), credit risk can be defined as the possibility that a contracting party fails to meet its contractual obligations according to the terms of the contract. Therefore, it is predicted that liquidity will be negatively affected by credit risk. In line with this, Al-Harbi (2020), Shamas *et al.* (2018), Al-Harbi (2017), Chowdhury *et al.* (2019), and Delechat *et al.* (2012 discovered that credit risk negatively affects bank liquidity. In contrast, Roman and Sargu (2015) investigated the factors that influenced bank liquidity in Central and Eastern Europe between 2004 and 2011. Based on nonperforming loans, they measured asset quality, and nonperforming loans were measured as a percentage of total loans. They found a significant negative correlation between bank liquidity and asset quality. Liquidity risk increases with loan default, so credit risk and liquidity should be considered negatively towards each other (Ghosh, 2016 and Acharya & Viswanathan 2011).

2.6.5   Efficiency

The bank faced two challenges when addressing the liquidity problem: optimizing liquidity and compliance with liquidity requirements. Malik & Rafique (2013) studied the liquidity determinants of commercial banks' liquidity in Pakistan for the duration of 2007 to 2011. They found that the highest liquidity level is highly dependent on the success of banking functions' efficiency. In the case of low liquidity, if the liquidity is not properly managed by the bank, then it may lead the bank to insolvency. While in the case of high liquidity, it can lead to low profitability, therefore, finally destroying the value of shareholders and might be dangerous for other banks due to the effect of contagion. However, their study on Pakistani banking indicated that the best liquidity level is very much related to competent banking operations. Al-Harbi (2020), Boadi *et al.*

(2016) and Al-Harbi (2017), found the same results. Another study, namely Sarmiento and Galan (2014), investigated that there is no relevant relationship between efficiency and liquidity, but they found that in the case of local banks, their effect is negative. Boadi *et al.* (2016) explain efficiency in terms of the bank's interest expense to their total deposits. However, there is a lack of such relations established in the Pakistani banking sector.

3   DATA DESCRIPTION AND EMPIRICAL MODEL SPECIFICATION

3.1   Data Sources

In this study, annual unbalanced panel data has been used for all conventional banks, including all foreign banks and all Islamic banks, including all Islamic banking windows, for the period of 2007 to 2020. The data was taken from the annual financial statements of the State Bank of Pakistan (SBP) and used the banks' annual financial statements as well. Furthermore, data for macroeconomic factors are gathered from the World Bank's (IBRD) and International Monetary Fund's (IMF).

Currently, more than twenty conventional banks are operating in Pakistan, along with five full-fledged Islamic banks and over eleven Islamic windows of conventional banks. Furthermore, seven foreign banks are also operating. Therefore, we have included all Islamic banks, all Islamic windows, all conventional banks, and all foreign banks in our sample selection.

3.2 Definition of the selected Variables

3.2.1   Dependent variable

In our study, we have liquidity (ratio of loans to total assets) as a dependent variable. Liquidity refers to the bank's ability to raise its assets and meet its financial commitments without incurring unfavorable losses that are due (Sheefeni & Nyambe, 2016). Liquidity is a very common measure for both conventional and Islamic banks. However, in the research literature, for measuring bank liquidity, this ratio is used by Al-Harbi (2017), Al-Harbi (2020), Bunda and Desquilbet (2008), and Roman and Sargu (2015).

Table 3.1: Information of Dependent Variable

Dependent variable	Indicator	Proxy	Source
Bank Liquidity	Liquidity (LIQ)	$\dfrac{\text{Total Loans}}{\text{Total Asset}}$	State Bank of Pakistan (SBP) Annual reports of the banks

3.2.2   Independent variable

We have chosen eleven independent variables: five bank-specific and macroeconomic variables.

Table 3.2: Information of Independent Variables

Independent variable	Indicator	Proxy	Source
Macroeconomic Variables	Economic growth	Real GDP growth	State Bank of Pakistan (SBP) World Bank (IBRD) International Monetary Fund (IMF)
	Unemploymentrate	Unemployment as % of total labor force	
	Inflation rate	Consumer price index (CPI)	
	Monetary policy	Interbank rate	
	Market capitalization	Market capitalization over GDP	
	Concentration	Total assets held by the three largest banks divided by the total assets of all banks	
Bank-specific Variables	Profitability (ROA)	Net income/ Total assets	State Bank of Pakistan Annual reports of the banks
	Asset quality	Non-performing loans/ Total loans	
	Capitalization (CAR)	Equity/ total asset	
	Bank size	Natural log of banks assets	
	Efficiency	Interest expense / total deposits	

Profitability is the capability of the business to earn a profit as well as one of the primary measurements of efficiency. Banks are facing difficulties with being profitable and having liquidity, and this has created many theories in studies to give an explanation of the profitability effect on liquidity.

$$Return\ on\ Asset = \frac{Net\ Income}{Total\ Asset}$$

According to (too-big-to-fail) opinions, in respect of larger banks, they should hold a minimum of liquid assets since they depend upon the lender for their last resource. However, larger banks have easier access to the capital market and can monitor and screen the borrowers as well.

Asset quality is always regarded as a bank's most essential asset, and the first internal factor, and it has the potential to have an impact on bank liquidity.

$$Asset\ Quality = Ln(\frac{Non-Performing\ Loan}{Total\ Loans})$$

Bank capital functions as a shield to engross the unanticipated losses and provide a source of funds to handle the liquidity risks. There are two theories in the literature that investigate how bank capital and liquidity are related. According to the first (risk absorption) theory, banks with more capital can generate more liquidity.

$$Capitalization\ (CAR) = \frac{Equity}{Total\ Assets}$$

The highest liquidity level is highly dependent on the success of banking functions' efficiency. In the case of low liquidity, if the liquidity is not properly managed by the bank, As a result, the bank may become insolvent. While in the case of high liquidity, it can lead to low profitability, therefore, finally destroying the value of shareholders and might be dangerous for other banks due to the effect of contagion (Malik and Rafique, 2013). However, in our study, efficiency is measured by interest expense divided by the total deposits. For the efficiency of the

banks in term of liquidity measurement, the same ratio is used by Al-Harbi (2020), Boadi *et al.* (2016), and Malik and Rafique (2013).Therefore, we assumed a negative relationship between the efficiency and liquidity of banks.

$$Efficiency = \frac{Interest\ Expense}{Total\ Deposits}$$

In a country, the level of economic activity is measured by its GDP. This indicator determines a country's health status. In a business cycle, this indicator is also used. The theory of (financial fragility and bank liquidity)states that the growth in the GDP indicates increased business activity, which in turn lowers the liquidity of banks because they lend more and vice versa. Therefore, the bank's liquidity is seriously impacted by GDP. Inflation measures the rate of increase in the overall general price level for services and some products. As a result, the currency's purchasing power has declined. Scientifically, the association between inflation and bank liquidity is not well known. Unemployment is defined by the Bureau of Labor Statistics as those people who have been actively looking for work for the past four weeks and have not found a job. As a result, they are more readily accessible for employment than the rest of the total labor force. Monetary policy plays an essential role in macroeconomics. Monetary policy is determined by the central bank of a country. It entails controlling the interest rate and money supply. A country's government uses an economic policy on the demand side to achieve objectives like consumption, liquidity, inflation, and growth. Monetary policy and bank liquidity have a significant relationship with each other. The Monetary policy rate measures the bank's capacity to provide loans to clients. (Lucchetta, 2023). Banks' liquidity is significantly affected by the stock market because of its role in stimulating economic growth by providing financing to firms. Firms choose equity markets over banks to obtain financing from the equity market. This shows that banks and stock markets are substitutes for each other (Beck *et al.,* (2004). There is a positive relationship exists between stock market liquidity and banking development, along with their positive influence on economic growth.

$$Market\ Capitalization = \frac{Market\ Capitalization}{GDP}$$

Bank liquidity and concentration are related according to two theories. The first (market power) theory indicates that a market with a higher concentration makes banks act in an oligopolistic way, which makes them charge higher prices for credit. The availability of credit is reduced as a result. Therefore, the bank's liquidity is affected positively by concentration. The market power theory, strengthened by Beck *et al.* (2004), argued that the concentration of the bank raises barriers to financing in countries in regards to the low institutional positions and economic growth. The second hypothesis (failure information or asymmetry) indicates that banks have a powerful relationship with borrowers in the highly concentrated market, which will reduce costs linked to asymmetric information, 'moral hazard and problems of adverse selection' foremost to high credit accessibility to borrowers, therefore reducing banks' liquidity (Shao & Liu 2012).

$$Concentration = \frac{Total\ Assets\ held\ by\ the\ three\ largest\ Banks}{the\ Total\ Assets\ of\ all\ Banks}$$

3.3   Empirical Model

The dependent variable of our model is liquidity and the right-hand variables are bank-specific variables (profitability, bank size, asset quality, efficiency, and bank capital) and macroeconomic variables (unemployment rate, inflation rate, economic growth, market capitalization, concentration, and monetary policy). We have estimated the following empirical model. The same model has been estimated by Al-Harbi (2020), Munteanu (2012), and Roman &Sargu (2015).

Model:

$$LIQ_{it} = \beta_0 + \beta_1 ROA_{it} + \beta_2 BSIZE_{it} + \beta_3 AQ_{it} \\ + \beta_4 CAR_{it} + \beta_5 EFF_{it} + \beta_6 GDP_t \\ + \beta_7 INFL_t + \beta_8 UNEM_t \\ + \beta_9 MPL_t + \beta_{10} MKTCP_t \\ + \beta_{11} CONST_t + \mu_{it}$$

LIQ denotes Liquidity, ROA is denotes profitability/return on assets, BSIZE denotes the Bank size, AQ denotes Assets quality, CAR is denotes the capital adequacy ratio, EFF denotes efficiency, GDP represents economic growth, INFL represents inflation rate, UNEM denotes unemployment rate, MPL represents the monetary policy, MKTCP represents market capitalization, CONST denotes concentration, μ_{it} denotes the error term. The same model has been applied to both Islamic and conventional banks to ensure a consistent and comparable analysis of liquidity determinants across the two banking systems.

3.4 Estimation Methods: Random Effects versus Fixed Effects

The random or fixed effect models can be used for panel data, which are both well-known methodologies. Time is invariant in the fixed effect approach, where dummy variables explicitly represent unseen factors for each observation unit, or where time degradation is used to eliminate them. On the other hand, the technique based on fixed effects is time invariant, capturing the unobserved factors for every time demeaning or observation unit by dummy variables is a way to eliminate them. Further, it is important to determine which model is going to produce the most accurate results, fixed effects or random effects. However, Husman's specification test used to which technique is appropriate.

4 RESULTS AND DISCUSSIONS
4.1 Introduction

The empirical results of estimation and their interpretations are presented in this section. However, our empirical analysis begins with estimating the model equation to examine the impact of bank-specific and macroeconomic factors on the liquidity of a bank by comparing conventional and Islamic banks in Pakistan.

4.2 Descriptive Analysis

Table 4.1 summarizes the statistics for each selected bank-specific variables for all Islamic banks, including Islamic windows, as well as for all conventional banks, including foreign banks. The standard deviation of liquidity is 0.206 percent, with a mean of 0.437 percent, indicating that the value of liquidity has less diversification. There is a 0.033 percent standard deviation in profitability, with a mean of 0.007 percent, showing that profitability has a low degree of diversification. The standard deviation of bank size is 0.802 percent, with a mean of 7.962 percent. These figures show that the bank size value is less diverse. There is a 0.111 percent standard deviation in asset quality with a mean of 0.097 percent, suggesting that the asset quality's value is diverse. The standard deviation of capitalization is 0.114 percent, with a mean of 0.115 percent, indicating that capitalization has less diversification. There is a 0.063 percent standard deviation in asset quality, with a mean of 0.053 percent, showing that the value of the liquidity has diversification.

Table 4.1: Summary Statistics for all Banks

Statistics

Variables	Mean	Std. Dev.	Min	Max
Liquidity	0.437	0.206	0.00	3.49
Profitability	0.007	0.033	-0.392	0.323
Bank size	7.962	0.802	5.087	9.562
Asset quality	0.097	0.111	0.00	0.999
Capitalization	0.115	0.114	-0.031	0.788
Efficiency	0.053	0.063	-0.184	0.602

4.2.1 Summary Statistics for Conventional Banks

The standard deviation of liquidity is 0.221 percent, with a mean of 0.425 percent, suggesting that the value of liquidity is less diverse. There is a 0.02 percent standard deviation in profitability with a mean of 0.005 percent, showing that profitability has

a wide range of values. The standard deviation of bank size is 0.678 percent, with a mean of 8.231 percent, indicating that bank size values are less diverse. The standard deviation of asset quality is 0.12 percent, with a mean of 0.114 percent, showing

the asset quality's value is diverse. There is a 0.136 percent standard deviation in capitalization, with a mean of 0.132 percent, indicating that the capitalization value is diverse.

Table 4.2: Summary Statistics for Conventional Banks

Statistics				
Variables	Mean	Std. Dev.	Min	Max
Liquidity	0.425	0.221	0.003	3.49
Profitability	0.005	0.02	-0.076	0.115
Bank size	8.231	0.678	6.43	9.562
Asset quality	0.114	0.12	0.00	0.999
Capitalization	0.132	0.136	-0.031	0.788
Efficiency	0.072	0.051	-0.058	0.602

4.2.2 Summary Statistics for Islamic Banks

There is a 0.181 percent standard deviation in liquidity with a mean of 0.456 percent, suggesting that the value of liquidity has less diversification. The standard deviation of profitability is 0.046 percent, with a mean of 0.009 percent, showing that the profitability value is diverse. There is a 0.803 percent standard deviation in bank size with a mean of 7.547 percent. These numbers show that the bank size

value has less variation. There is a 0.09 percent standard deviation in asset quality with a mean of 0.070 percent, indicating that the asset quality's value is less diverse. The standard deviation of capitalization is 0.059 percent with a mean of 0.089 percent, indicating that the bank size has less diversification. The standard deviation of efficiency is 0.069 percent with a mean of 0.025 percent, showing that efficiency values are diverse.

Table 4.3: Summary Statistics for Islamic Banks

Statistics				
Variables	Mean	Std. Dev.	Min	Max
Liquidity	0.456	0.181	0.00	0.878
Profitability	0.009	0.046	-0.392	0.323
Bank size	7.547	0.803	5.087	9.182
Asset quality	0.070	0.09	0.00	0.539
Capitalization	0.089	0.059	-0.004	0.401
Efficiency	0.025	0.069	-0.184	0.334

4.2.3 Comparative Analysis of Conventional and Islamic Banks Descriptive Data

There are 17 Islamic window banks and five full-fledged Islamic banks in Pakistan. The State Bank of Pakistan issued an Islamic banking bulletin in June 2021, which found that Islamic banks have 27.5 percent liquid assets to total assets and 34.5 percent liquid assets to total deposits. According to our descriptive statistics, Islamic banks have positive liquidity of 0.456 percent with a variance of 0.18 percent on average base over the previous fourteen years, whereas conventional banks' average liquidity is 0.425 percent with a variation of 0.221 percent, indicating positive liquidity.

4.3 Correlation
4.3.1 Correlation of all Banks Variables

Table 3.4 shows the strength and association between given variables. It is indicated that liquidity and profitability have a positive but less strong association (0.125). Similarly, Mahmood *et al.* (2014), Chowdhury *et al.* (2019) and Berger & Bouwman (2009) also found in their study that profitability and liquidity have a positive and significant relationship with each other.

However, efficiency and economic growth have negative and weak relationships with liquidity (-0.102 and -0.088) respectively. Our findings affirm the

results of Sarmiento & Galan (2014) and Trenca *et al.* (2015). There is a weak association between inflation and liquidity (0.175). Our results are consistent with the studies of and Al-Khouri (2012). Moreover, the unemployment rate has a weak negative relationship with liquidity, and monetary policy has a weak positive relationship with liquidity (-0.154) and

(0.198) respectively. Our findings are the same as the results of Munteanu (2012) and Berger and Bouwman (2017). Finally, concentration has a weak negative relationship with liquidity (-0.138). Our findings show that concentration is in line with findings of Shao and Liu (2012).

Table 4.4: Correlation Matrix of all Banks Variables

Variables	LIQ	ROA	BSIZE	AQ	CAR	EEF	GDP	INFL	UNEM	MPL	MKTC	CONS
Liquidity	1.000											
Profitability	0.125***	1.000										
	(0.003)											
Bank size	0.055	0.104**	1.000									
	(0.197)	(0.015)										
Asset quality	-0.009	-0.175***	0.072*	1.000								
	(0.832)	(0.000)	(0.092)									
Capitalization	-0.002	-0.086**	-0.386***	0.114***	1.000							
	(0.959)	(0.045)	(0.000)	(0.008)								
Efficiency	-0.102**	-0.107**	0.149***	0.200***	0.224***	1.000						
	(0.017)	(0.012)	(0.000)	(0.000)	(0.000)							
Economic growth	-0.088**	0.032	0.018	-0.056	-0.038	-0.139***	1.000					
	(0.038)	(0.447)	(0.672)	(0.191)	(0.377)	(0.001)						
Inflation	0.175***	-0.095**	-0.205***	0.006	0.168***	0.160***	-0.743***	1.000				
	(0.000)	(0.026)	(0.000)	(0.881)	(0.000)	(0.000)	(0.000)					
Unemployment rate	-0.154***	0.127***	0.361***	0.005	-0.257***	-0.126***	0.208***	-0.655***	1.000			
	(0.000)	(0.003)	(0.000)	(0.916)	(0.000)	(0.003)	(0.000)	(0.000)				
Monetary policy	0.198***	-0.091**	-0.180***	0.018	0.134***	0.154***	-0.632***	0.858***	-0.606***	1.000		
	(0.000)	(0.034)	(0.000)	(0.670)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)			
Market capitalization	0.020	0.006	-0.048	-0.121***	0.010	-0.091**	0.650***	-0.573***	0.002	-0.433***	1.000	
	(0.636)	(0.892)	(0.264)	(0.005)	(0.809)	(0.033)	(0.000)	(0.000)	(0.967)	(0.000)		
Concentration	-0.138***	0.043	0.015	-0.060	0.011	-0.057	0.539***	-0.291***	0.192***	-0.402***	0.125***	1.000
	(0.001)	(0.311)	(0.727)	(0.160)	(0.798)	(0.184)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

4.3.2 Correlation of Conventional Banks Variables

Table 3.5 also shows the strength and relationship between given variables for conventional banks. It has been shown in the table that liquidity and profitability have a weak positive association (0.098). In the same way (Berger & Bouwman, 2009; Mahmood *et al.*, 2014; Chowdhury *et al.*, 2019), they also found in their study that profitability and liquidity have a positive relationship. Bank size and liquidity shows a weak positive association with each other (0.095). Findings indicate there are weak positive relationships between asset quality and liquidity (0.050). Efficiency and economic growth have a negative and less strong relationship with liquidity (-0.125 and -0.131) respectively. Our findings affirm the results of both Sarmiento & Galan (2014) and Trenca *et al.* (2015). There is a

weak positive association between inflation and liquidity (0.235). Furthermore, the unemployment rate (monetary policy) has a weak negative (positive) association with liquidity. Our findings are the same as the results of Munteanu (2012) and Berger and Bouwman (2017).Lastly, in line with Shao and Liu (2012) concentration has a weak negative relationship with liquidity.

4.3.3 Correlation of Islamic Banks Variables

Table 4.6 indicates that liquidity and profitability have a weak positive association with each other (0.169). Mahmood *et al.* (2014), Chowdhury *et al.* (2019), and Berger & Bouwman (2009) also found similar results. However, liquidity and capitalization also have a weak positive relationship with each other. Our results are consistent with Cucinelli, (2013), and Munteanu, (2012).

Table 4.5: Correlation Matrix of Conventional Banks Variables

Variables	LIQ	ROA	BSIZE	AQ	CAR	EEF	GDP	INFL	UNEM	MPL	MKTC	CONS
Liquidity	1.000											
Profitability	0.098* (0.074)	1.000										
Bank size	0.095* (0.084)	0.324*** (0.000)	1.000									
Asset quality	0.050 (0.361)	-0.425*** (0.000)	-0.131** (0.017)	1.000								
Capitalization	-0.024 (0.656)	-0.100* (0.068)	-0.630*** (0.000)	0.129** (0.019)	1.000							
Efficiency	-0.125** (0.022)	-0.267*** (0.000)	-0.260*** (0.000)	0.286*** (0.000)	0.286*** (0.000)	1.000						
Economic growth	-0.131** (0.016)	0.119** (0.029)	0.070 (0.199)	-0.098* (0.073)	-0.045 (0.408)	-0.196*** (0.000)	1.000					
Inflation	0.235*** (0.000)	-0.195*** (0.000)	-0.279*** (0.000)	0.074 (0.177)	0.169*** (0.002)	0.170*** (0.002)	-0.745*** (0.000)	1.000				
Unemployment rate	-0.253*** (0.000)	0.136** (0.013)	0.432*** (0.000)	-0.081 (0.140)	-0.260*** (0.000)	-0.083 (0.132)	0.223*** (0.000)	-0.658*** (0.000)	1.000			
Monetary policy	0.264*** (0.000)	-0.172*** (0.002)	-0.249*** (0.000)	0.082 (0.133)	0.137** (0.012)	0.176*** (0.001)	-0.641*** (0.000)	0.863*** (0.000)	-0.619*** (0.000)	1.000		
Market capitalization	0.002 (0.975)	0.103* (0.061)	-0.008 (0.882)	-0.144*** (0.008)	-0.015 (0.782)	-0.177*** (0.001)	0.643*** (0.000)	-0.567*** (0.000)	-0.001 (0.991)	-0.427*** (0.000)	1.000	
Concentration	-0.209*** (0.000)	0.028 (0.613)	0.033 (0.549)	-0.106* (0.054)	0.004 (0.946)	-0.055 (0.320)	0.532*** (0.000)	-0.274*** (0.000)	0.195*** (0.000)	-0.402*** (0.000)	0.106* (0.052)	1.000

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 4.6: Correlation Matrix of Islamic Banks Variables

Variables	LIQ	ROA	BSIZE	AQ	CAR	EEF	GDP	INFL	UNEM	MPL	MKTC	CONS
Liquidity	1.000											
Profitability	0.169** (0.013)	1.000										
Bank size	0.100 (0.142)	0.053 (0.441)	1.000									
Asset quality	-0.107 (0.118)	0.016 (0.814)	0.200*** (0.003)	1.000								
Capitalization	0.169** (0.013)	-0.105 (0.123)	-0.374*** (0.000)	-0.133* (0.052)	1.000							
Efficiency	-0.025 (0.717)	-0.007 (0.915)	0.248*** (0.000)	-0.061 (0.376)	-0.036 (0.595)	1.000						
Economic growth	-0.020 (0.765)	-0.023 (0.739)	-0.009 (0.891)	0.041 (0.548)	0.001 (0.987)	-0.073 (0.282)	1.000					
Inflation	0.078 (0.255)	-0.033 (0.634)	-0.235*** (0.000)	-0.180*** (0.008)	0.159** (0.019)	0.121* (0.077)	-0.742*** (0.000)	1.000				
Unemployment rate	0.008 (0.902)	0.130* (0.057)	0.454*** (0.000)	0.237*** (0.000)	-0.265*** (0.000)	-0.126* (0.064)	0.181*** (0.008)	-0.644*** (0.000)	1.000			
Monetary policy	0.094 (0.167)	-0.043 (0.531)	-0.199*** (0.003)	-0.146** (0.032)	0.121* (0.076)	0.107 (0.116)	-0.617*** (0.000)	0.850*** (0.000)	-0.583*** (0.000)	1.000		
Market capitalization	0.054 (0.431)	-0.065 (0.339)	-0.095 (0.165)	-0.067 (0.326)	0.128* (0.061)	0.012 (0.858)	0.664*** (0.000)	-0.583*** (0.000)	0.001 (0.984)	-0.442*** (0.000)	1.000	
Concentration	-0.001 (0.990)	0.061 (0.376)	0.008 (0.909)	0.044 (0.519)	0.054 (0.434)	-0.060 (0.384)	0.552*** (0.000)	-0.319*** (0.000)	0.186*** (0.006)	-0.403*** (0.000)	0.158** (0.020)	1.000

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

4.4   Empirical Results of the Hausman's Test

Table 4.7 indicates that the application of Hausman's specification test, for commercial, Islamic banks and full sample (all banks). The test significantly accepts the null hypothesis (fixed effects model) in favor of the alternative hypothesis (random effects model).

Table 4.7: Results of Hausman's Test

Types of banks

Liquidity	All banks	Conventional banks	Islamic banks
Probability	0.0007	0.0000	0.0000
Conclusion	Fixed Effect, Model	Fixed Effect, Model	Fixed Effect, Model

4.5   Discussion of Empirical Results

The Table 4.8 indicates that the impact of profitability on banks' liquidity is positive for Islamic, conventional and all banks. The coefficient of profitability implies that for an average increase in bank profitability of one unit, all banks' liquidity increases by (1.097) units, Islamic banks' liquidity increases by (0.607) units, and conventional banks' liquidity increases by (2.967) units, all other factors remaining constant. Our findings are consistent with (Mahmood *et al.*, 2014; Chowdhury *et al.*, 2019; Berger & Bouwman, 2009).

The results in Table 4.8 suggest that the size of a bank has a positive impact on the liquidity of all banks and conventional banks. These results indicate that under ceteris paribus larger banks will have more liquidity. It means that for an average increase in bank size of one unit, the liquidity of all banks (conventional) increases by 0.501 (0.069) units. Our results are in line with (Al-Harbi, 2020, Lucchetta,

2023). The impact of asset quality on liquidity is negative. The result indicates that the correlation between capitalization and liquidity of all banks and conventional banks is significant and its impact on liquidity is positive. Our results are consistent with the studies of (Al-Harbi, 2020; Chowdhury *et al.*, 2019; Berger & Bouwman, 2009; Cucinelli, 2013; Munteanu, 2012).

Efficiency has a negative impact on the liquidity of Islamic and all banks. However, the liquidity is positively impacted by inflation irrespective of nature of bank. Similarly impact of unemployment on the liquidity of Islamic bank is positive. The impact of market capitalization on liquidity of all banks, Islamic and conventional banks is positive. The impact of concentration on liquidity is negative in case of all banks conventional banks.

4.8: Impact of Independent Variables on Banks Liquidity

Variables	Results for All Banks	Results for Conventional Banks	Results for Islamic Banks
Profitability	1.097***	2.967***	0.607***
	(0.000)	(0.000)	(0.003)
Bank size	0.501**	0.069*	0.035
	(0.016)	(0.055)	(0.228)
Asset quality	-0.022	0.131	-0.208*
	(0.777)	(0.222)	(0.095)
Capitalization	0.352***	0.302**	0.041
	(0.000)	(0.016)	(0.838)
Efficiency	-0.341**	-0.229	-0.423**
	(0.030)	(0.351)	(0.025)
Economic growth	0.024***	0.026**	0.019
	(0.009)	(0.042)	(0.092)
Inflation	0.018***	0.018***	0.023***
	(0.000)	(0.010)	(0.001)
Unemployment rate	0.012	-0.001	0.039***
	(0.187)	(0.898)	0.002
Monetary policy	0.006	0.008	0.004
	(0.197)	(0.284)	(0.481)
Market capitalization	0.004***	0.003*	0.007***
	(0.002)	(0.060)	(0.000)
Concentration	-1.157***	-1.497***	-0.201
	(0.001)	(0.003)	(0.680)
Constant	-0.014	-0.077	-0.313
	(0.950)	(0.832)	(0.282)
R2			
Within	0.1824	0.2263	0.2041
between	0.0084	0.0154	0.0452
overall	0.1052	0.1552	0.1251
Wald Chi2	103.95***	93.32***	47.21***
	(0.0000)	(0.0000)	(0.0000)

*$p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*

5   CONCLUSION   AND   POLICY RECOMMENDATIONS

5.1   Major findings of the study

In this study, we have examined how the liquidity of conventional and Islamic banks is affected by bank-specific and macroeconomic factors. The findings of our research show that both conventional banks and Islamic banks have experienced a substantial impact on liquidity due to profitability. As far as bank size is concerned, based on the findings of the empirical analysis, the size of conventional banks has a positive impact on their liquidity, the liquidity of Islamic banks is negatively affected by asset quality. So, it shows that Islamic banks' asset quality is notable and it indicated a high volume of defaulted loans. Therefore, Islamic banks have to put more focus on their non-performing financing to avoid liquidity issues. Our study also found an association between capitalization and liquidity of conventional banks. As for efficiency is concerned, the study results concluded that the liquidity of Islamic banks' is significantly negatively affected by their efficiency. Therefore, Islamic banks' management needs to improve their interest/return expense management.

We concluded that the liquidity of Islamic and conventional banks positively affected by inflation in the economy. Additionally, our study also recognizes the positive relationship between unemployment and liquidity of Islamic banks. Finally, this study illustrates that the liquidity of conventional banks has been significantly negatively affected by concentration.

To sum up the study improves knowledge of the drivers influencing liquidity in Islamic and conventional banks in Pakistan. In addition to that the development of Shariah-compliant liquidity tools and more focus on regulatory framework are essential going forward to enhance the financial soundness of the banking industry as a whole.

5.2   Limitation and policy implication

This research empirically investigates the drivers of the liquidity considering the bank-specific and macroeconomic factors for both Islamic and conventional banks in Pakistan. Nevertheless, it is limited in scope as it does not account for other potentially significant factors such as corruption perception, corporate governance practices, interbank market dynamics, and off-balance-sheet financing. Future research should incorporate these dimensions to provide a more comprehensive understanding. However, from a policy viewpoint, the empirical findings highlight the need for separate regulatory approaches and the development of adapted liquidity management tools for both Islamic and conventional banks to enhance sector-wide financial resilience.

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