



MANAGING LIQUIDITY AND PROFITABILITY: A STUDY OF THE IMPACT OF BASEL III REGULATIONS ON ISLAMIC BANKS IN PAKISTAN

Rafia Ayub

Institute of Business Management (IoBM)

Karachi, Pakistan

rafia.ayub@gmail.com

Syed Musa Alhabshi

Anwar Hasan Abdullah Othman

Institute of Islamic Banking and Finance (IiBF)

International Islamic University Malaysia

ABSTRACT

Basel III imposed restrictive measures on liquidity, targeting both Islamic and conventional banks equally, to strengthen the resilience of the banking industry in the aftermath of the 2008 financial crisis. This study examines the impact of Basel III liquidity regulatory variables, net stable funding ratio (NSFR), and liquidity coverage ratio (LCR) on the profitability of all four full-fledged Islamic banks in Pakistan from 2007 to 2021. Results reveal no short-term impact and a significant long-term impact of liquidity regulations on the profitability of banks by using the panel autoregressive distributed lag model. Specifically, the LCR is found to have a significant positive impact, and NSFR has a significant negative impact on the profitability of Islamic banks in Pakistan. The significance of sustained profitability planning is highlighted by the long-term effects of NSFR and LCR on profitability. Managers of banks should concentrate on tactics that strike a balance between liquidity requirements and the objective of maintaining or enhancing long-term profitability.

Keywords: Profitability, Basel III Regulations, Net Stable Funding Ratio, Liquidity Coverage Ratio, Panel ARDL

Submitted: 19/10/2023

Accepted: 19/11/2023

Published: 18/12/2023

INTRODUCTION

The global financial crisis of 2008 shook the financial industry all over the world. It has been identified that inefficient liquidity management was one of the primary reasons that led to liquidity deficiency that ultimately caused instability in the financial system (Khan et al., 2017). To prevent such a crisis, the Basel Committee for Banking Supervision (BCBS) issued Basel III liquidity regulations namely, Net Stable Funding Ratio (NSFR) (BIS 2014) and Liquidity Coverage Ratio (LCR) (BIS 2013). The LCR focuses on managing liquidity risk by requiring banks to maintain enough liquid assets over a short (thirty-day) horizon to prevent any mismatch. On the other hand, the NSFR encourages banks to shift their risk profiles from





unstable short-term funding to more stable long-term funding sources in an effort to lower funding risk. Banks that fail to meet the NSFR must decrease the assets that need stable funding and increase their sources for stable funding. According to the research, many banks have to redefine their strategies to be able to comply with these regulations which can have an impact on their profitability (DeYoung & Jang 2016; King 2013). King (2013) has highlighted the commonly acknowledged trade-offs that exist between implementing new liquidity requirements and achieving profitability in banks. Therefore, it can be said that despite the fact that these regulations are aimed at improving banking resilience, especially in periods of financial distress, there is a possibility of a negative impact on profitability.

It's also critical to recognize that, ever since the Islamic banking system was accepted and developed, there has been a combination of conventional and Islamic banking systems in use. The point of differentiation in both systems is the business model of both types of banking systems. The Islamic bank is based on risk-sharing and profit-sharing modes, while conventional banks heavily rely on interest-based financing. According to the IMF, (2017), the business model of a bank affects its stability and profitability significantly. Additionally, according to Mergaerts and Vennet (2016), the supervisory or regulatory bodies must integrate the considerations for business models while devising the regulations or practices. This research focuses on the regulatory framework given by Basel III for liquidity management in banks.

Limited empirical literature is available on studying the potential impact of these liquidity regulations on banks' profitability in general and it is even scarce for Islamic banks. Therefore, the aim of this research is to study the impact of NSFR and LCR on the performance of Islamic banks in Pakistan, a topic that is not previously explored in Pakistan. The autoregressive distributed lag (ARDL) technique has been used to for model estimation.

The structure of the article is as follows, in the next section literature review is presented followed by the research methodology and empirical findings. Lastly, the conclusion is presented.

LITERATURE REVIEW

Extensive research on bank profitability is available from various perspectives. Nonetheless, there is a dearth of research on how liquidity requirements affect the profitability of Islamic banks. This research aims to examine this relationship in Pakistan. In the coming section, a background of Basel regulations is presented followed by available literature on this area.

Basel III Regulations

A thorough framework for measuring liquidity risk was released by the Basel Committee after the 2008 financial crisis. This revised and reissued methodology is known as Basel III. According to these guidelines, NSFR and LCR must have a value of 100%. Studies suggested that adherence to Basel III regulations before global financial crisis could result in minimizing the likelihood of default (Giordana & Schumacher 2017). Kashyap et al., (2020) suggest that the LCR encourages banks to enhance their short-term liquidity, particularly when they have an elevated level of capital. Conversely, the NSFR aims to balance long-term financing with long-term assets. It has also been highlighted that banking regulations may affect the assets and liabilities of banks in various ways (Kashyap et.al., 2020), which ultimately may have an impact on banks' profitability. Therefore, it is imperative that the effect of these regulations on





profitability must be studied extensively to identify if this impact varies with the type of bank or with other factors.

Literature on Basel III and Profitability

It has been emphasized that Islamic banks may have to encounter difficulties in fulfilling the liquidity requirements of Basel III, as liquidity risk management is one of the most formidable challenges for Islamic banks. Only a robust liquidity system facilitates this implementation. Islamic banks need new instruments to implement these requirements conveniently Ahmed, (2015). Many authors are of the view that Basel III liquidity regulations should be modified to better cater to the business model of Islamic banks (Dolgun et al. 2019; Rashid et al. 2018). According to Dolgun et al., (2020), one of the key issues Islamic banks face in liquidity management is the scarcity of high-quality liquid assets (HQLA). An alternative LCR estimation method for Islamic banks has also been presented by Dolgun et al., (2019) for better liquidity risk management in Islamic banks.

Limited empirical literature is available on evaluating the effect of NSFR and LCR on the profitability of banks. Most of the available literature focused on evaluating the effect of NSFR only on the profitability of banks. Mix results have been presented in the research. As discussed, earlier King (2013) highlighted a trade-off between these regulations and profitability and suggested a negative relationship between NSFR and profitability. Conversely, some studies have also suggested a positive relationship between both variables (Le et al., 2020; Papadamou et al., 2021; Said, 2018). Le et al. (2020) also said that if banks hold too many liquid assets or if they become dependent on imprudent long-term funding, they will experience high funding costs or lower earnings. Dietrich et al., (2014) studied NSFR in Western European banks from 1996 to 2010. According to the results, banks have historically not maintained minimum NSFR requirements. Most banks began increasing their NSFR after the financial crisis of 2008. According to the authors, in the past, no significant impact of NSFR on the profitability of banks has been found, but when all banks are required to have a similar balance sheet structure, that is, after the complete implementation of Basel III, earnings scenarios for the banking industry will change. Bibi and Mazhar (2019) also found that LCR and NSFR, both have a significant positive on the profitability of banks.

Based on the information provided, it is evident that very few empirical studies presented the impact of these regulations given by Basel III on Islamic banks. Hence, a research gap is present in the literature, especially in the context of Pakistan. Therefore, this research aims to address this research gap by performing a thorough empirical analysis to examine the influence of liquidity regulations on the profitability of Islamic banks in Pakistan.

RESEARCH METHODOLOGY

Our paper aims to retrospectively examine the regulatory framework of banks in Pakistan. The NSFR and the LCR are both part of the Basel III liquidity regulations. These provisions are designed to make sure that financial institutions have adequate assets to withstand liquidity issues in both the long term and the short term. The period of analysis for our study spans from 2007 to 2021. All full-fledged Islamic commercial banks in Pakistan constitute the population. During the period 2007-2021 some banks that have merged or discontinued their operations. For this reason, Emirates Global Islamic Bank Limited and Burj Bank Limited, are excluded because they merged their operations with Albaraka Bank Pakistan Limited in the years 2010 and 2016 respectively. By the end of December 31st, 2021, the Islamic banking industry of Pakistan was comprised of five full-fledged Islamic banks (IBs). In this research banks that are





incorporated after 2007 are excluded. Therefore, MCB Islamic Bank is also excluded as it was incorporated in 2015. The final sample of the study is comprised of 4 full-fledged Islamic banks in Pakistan.

Data is presumed to be unbiased, as the data collection sources are annual reports of the respective bank, publications of the central bank that is State Bank of Pakistan, and publications of the Pakistan Bureau of Statistics.

Measure of Profitability

Return on Assets (ROA) is a profitability metric computed by dividing a firm's net income by its total assets. It shows how effectively the corporations are utilizing their resources. It is an accounting measure of profitability. It has been used as a measure of financial profitability by previous researchers as well (Le et al., 2020; Papadamou et al., 2021; Said, 2018).

Independent Variables

Banks set the Liquidity Coverage Ratio (LCR) as a measure to assess their vulnerability to potential liquidity incidents. The LCR is based on the same principles as the conventional liquidity coverage ratio. Basel III requires banks to maintain an LCR above 100%, which means that the quantity of unencumbered High-Quality Liquid Assets (HQLA) held by banks should serve as a buffer during periods of liquidity stress. Therefore, it serves as a comprehensive indicator of banks' overall exposure to systemic risk (Du, 2017). The calculation of LCR under Basel III is as follows:

$$LCR = \frac{\text{Stock of HQLA}}{\text{Total net cash outflows over 30 days}}$$

The granularity of the information is constrained since the balance sheet data required to calculate LCR is not sufficiently detailed. Because of this, the proxy given by Chiaramonte and Casu, (2017) is used to compute LCR in this study (2017). Previous literature has already acknowledged and employed this proxy (Adesina 2021; Mdaghri & Oubdi 2022). LCR is computed as follows in this study:

$$LCR = \frac{\text{Liquid assets}}{\text{Deposits} + \text{Short term funding}}$$

Past literature shows that the higher the value of LCR higher the liquidity and profitability (Bibi & Mazhar, 2019). Therefore, the positive impact of LCR on ROA was expected.

The BIS, (2014) defines NSFR as the ratio of average stable financing to required stable funding. Research by Le et al. (2020) indicates that a higher level of NSFR has a detrimental impact on the profitability of banks. They found that a commercial bank must incur high funding costs or low investment income if it holds an excessive amount of liquid assets there or relies too much on long-term financing. So, it is anticipated that NSFR will have a negative effect on ROA.

$$NSFR = \frac{\text{Available amount of stable funding (ASF)}}{\text{Required amount of stable funding (RSF)}}$$

The calculation criteria of ASF and RSF are provided in detail in the standard. The data required to calculate ASF and RSF is not publicly available. Hence, in this study, the NSFR is





calculated based on the method proposed by Vazquez and Federico (2015) and presented in Table 1.

Table 1: Factors used for the calculation of NSFR

ASSETS	Wt (%)	LIABILITIES + EQUITY	Wt (%)
1. Total Earning Assets		1 Deposits & Short-term funding	
1.A Loans	100%	1.A Customer Deposits	85%
1.A.1 Total Customer Loans		1.A.2 Customer Deposits- Current	85%
Mortgages		1.A.2 Customer Deposits-Savings	70%
Other Mortgages Loans		1.A.3 Customer Deposits-Term	70%
Other Consumer/Retail Loans		1.B Deposits from Banks	0%
Corporate & Commercial Loans		1.C Other Deposits and Short-term Borrowings	0%
Other loans		2 Other interest-bearing liabilities	
1.A.2 Reserves for Impaired Loans/NPLs		2.A Derivatives	0%
1.B Other Earning Assets	35%	2.B Trading Liabilities	0%
1.B.1 Loans and Advances to Banks		2.C Long term funding	100%
1.B.2 Derivatives		2.C.1 Total Long-Term Funding	100%
1.B.3 Other Securities		Senior Debt	
Trading securities		Subordinated Borrowing	
Investment securities		Other Funding	
1.B.4 Remaining earning assets		2.C.2 Pref. Shares and Hybrid Capital	100%
2 Fixed Assets	100%	3 Other (Non-Interest bearing)	100%
3 Non-Earning Assets		4 Loan Loss Reserves	100%
3.A Cash and due from banks	0%	5 Other Reserves	100%
3.B Goodwill	100%		
3.C Other Intangibles	100%	6 Equity	100%
3.D Other Assets	100%		

Source: Vazquez and Federico (2015)

Control Variables

Literature has described various factors that can affect the profitability of a bank. These include both internal as well as external factors. In this research following control variables have been included in the model.

Size: One significant factor influencing profitability is the bank's size, which typically reflects economies of scale (Athanasoglou et al., 2008). The size of banks is measured by taking a natural log of assets. Generally, large banks are expected to have more power or regulatory protection (too-big-to-fail), and hence, a positive relationship can be expected between profitability and bank size (Bilal et al., 2013; Said, 2018). Some researchers have argued that an increase in size can result in diseconomies of scale after a certain time, hence, negative results can also be found (Akhtar et al., 2011; Kořak & Āok, 2008).

Cost is a key variable in evaluating profitability (Ayayi & Sene, 2010; Ghosh & Sanyal, 2019). It can be proxied as a ratio of non-interest expense to total assets (Ali et al., 2021; Ghosh & Sanyal, 2019; Supiyadi, 2021). It is sometimes referred to non-interest cost to Asset ratio. The non-interest expense mainly includes operating expenses and welfare funds. It has also been defined by some researchers as an indicator of efficiency (Almaqtari et al., 2019; Bourke, 1989; Petria et al., 2015). According to the researcher, this ratio explains the efficiency of management in managing the expenses of the bank. A lower ratio means higher efficiency or management capability which will result in higher profitability. Hence, a negative relationship was found between this ratio and profitability, more specifically ROA. Nevertheless, Molyneux and Thornton, (1992), also found that efficiency and profitability might have an inverse relationship because the former can be increased by spending more on human resources, therefore, by increasing expenditure on human resources, the profitability of banks can also increase. This statement has also been endorsed by other researchers as well (Alharbi, 2017; Athanasoglou et al., 2006).





Gross Domestic Product Growth Rate (GDP): This ratio represents the economic health of a country. GDP growth represents positive economic conditions that can improve profitability. But GDP growth can reduce the ROA of banks as well because an increment in economic growth leads to an improved business environment that can result in lowering entry barriers for banks. Consequently, it can be concluded that the literature's findings on the relationship between GDP growth and ROA are contradictory (Almaqtari et al., 2019; Said, 2018; Tan & Floros, 2012).

Concentration (Conc): Five-bank asset concentration is used as a proxy of control of asset concentration in the economy over the profitability of banks. A higher ratio of concentration means low competition. Concentration in this research is calculated as a ratio of the sum of five large banks' assets to the total assets of the banking industry. The rise in concentration has resulted in lower competition and higher profitability, which is in line with the structure conduct performance paradigm. This theory suggests that greater market power, which is fuelled by growth and concentration, is the primary driver of profitability. Several studies, including those by Molyneux and Thornton, (1992), Petria et al., (2015) and Yuanita, (2019) have also demonstrated a positive correlation between concentration and profitability. Therefore, we expect the same impact on commercial banks in Pakistan as well.

Econometric models for the study of conventional banks are below:

$$ROA_{it} = \beta_0 + \beta_1 NSFR_{it} + \beta_2 LCR_{it} + \beta_3 Size_{it} + \beta_4 Cost_{it} + \beta_5 GDP_{it} + \beta_6 Conc_{it} + \varepsilon_i$$

Estimation Technique

The data for Islamic banks is macro panel data as time (T) is greater than the number of firms (N). the data is also balanced panel data because the number of observations is equal for all cross-sectional units in the data. In this research Autoregressive-distributed lag (ARDL) model is applied for analysis. The model is presented by Pesaran et al., (2001). ARDL model is preferred over other approaches because it does not require the same sequence of cointegration in all models. Hence, variation in integration levels is allowed as far as integration is either I(0) or I(1) (Pesaran et al., 2001). Given the limited sample size and various levels of integration of the research variables, the ARDL approach is suitable for this investigation. The equation of the model is as follows:

$$\begin{aligned} \Delta ROA_t = & \pi_0 + \sum_{i=1}^p \vartheta_{1i} \Delta ROA_{t-i} + \sum_{i=0}^p \vartheta_{2i} \Delta NSFR_{t-i} + \sum_{i=0}^p \vartheta_{3i} \Delta LCR_{t-i} + \\ & \sum_{i=0}^p \vartheta_{4i} \Delta Size_{t-i} + \sum_{i=0}^p \vartheta_{5i} \Delta Cost_{t-i} + \sum_{i=0}^p \vartheta_{6i} \Delta GDP_{t-i} + \sum_{i=0}^p \vartheta_{7i} \Delta Conc_{t-i} + \\ & \beta_1 ROA_{t-1} + \beta_2 NSFR_{t-1} + \beta_3 LCR_{t-1} + \beta_4 Size_{t-1} + \beta_5 Cost_{t-1} + \beta_6 GDP_{t-1} + \\ & \beta_7 Conc_{t-1} + \varepsilon_t \end{aligned}$$

Here, p_i stands for the optimal lag count for the ARDL model, ε_t stands for noise Δ represents the first difference.

There are three steps involved in implementing ARDL, as described by (Menegaki, 2019). Firstly, the stationarity of the data needs to be checked. Secondly, the existence of cointegration is determined using Kao residual test for cointegration. Lastly, the direction of causality is examined.

To examine cointegration among the variables, firstly, the order of integration is assessed using the Im Pesaran Shin (IPS) unit root test. It is important to note that mixed integrated time series must be present in to utilize ARDL. The panel cointegration test was used in the study to look at the long-term relationships between the model's variables. This test helps explain how fixed effects are heterogeneous across the different panel members and how long-run and short-run relationships exist simultaneously. Cointegration in the model is





analysed by using the Kao residual cointegration test developed by Kao, (1999). The Akaike information criterion (AIC) serves as the basis for choosing the appropriate latency (Akaike, 1974).

The null hypothesis of the Kao test for cointegration is “no cointegration” which can be statistically represented as $H_0: \beta_1=\beta_2=\beta_3=\beta_4=\beta_5=\beta_6=\beta_7=0$. When the null hypothesis is rejected, it means there is a presence of cointegration among the variables of the study. Therefore, the following long-run model will be estimated:

$$ROA_t = \pi_0 + \sum_{i=1}^{p1} \gamma_{1i} ROA_{t-i} + \sum_{i=0}^{p2} \gamma_{2i} NSFR_{t-i} + \sum_{i=0}^{p3} \gamma_{3i} LCR_{t-i} + \sum_{i=0}^{p4} \gamma_{4i} Size_{t-i} + \sum_{i=0}^{p5} \gamma_{5i} Cost_{t-i} + \sum_{i=0}^{p6} \gamma_{6i} GDP_{t-i} + \sum_{i=0}^{p7} \gamma_{7i} Conc_{t-i} +$$

where μ_t is the error term. The error correction model is used, in the manner of Engle and Granger, (1987) and Narayan, (2005), to identify the dynamic short-term relationship between dependent and independent variables. The following ECM model will be used to extract the short-term dynamics of ARDL:

$$\Delta ROA_t = \pi_0 + \sum_{i=1}^{p1} \gamma_{1i} \Delta ROA_{t-i} + \sum_{i=0}^{p2} \gamma_{2i} \Delta NSFR_{t-i} + \sum_{i=0}^{p3} \gamma_{3i} \Delta LCR_{t-i} + \sum_{i=0}^{p4} \gamma_{4i} \Delta Size_{t-i} + \sum_{i=0}^{p5} \gamma_{5i} \Delta Cost_{t-i} + \sum_{i=0}^{p6} \gamma_{6i} \Delta GDP_{t-i} + \sum_{i=0}^{p7} \gamma_{7i} \Delta Conc_{t-i} + \sigma_i ECT_{t-i} + \mu_t$$

Three different estimators were used to run the ARDL panel dynamic heterogeneous regression model that are the pooled mean group (PMG) estimators, the dynamic fixed-effects estimator (DFE), and the mean group (MG). All three estimators are derived from maximum likelihood and account for the variability of the dynamic adjustment process as well as the long-run equilibrium. (Ahmed, 2020; Samargandi et al., 2015).

In this research, the PMG model has been used. The "PMG estimator" provides more reliable estimates; assuming the homogeneity assumption is still true, PMG is better suited for consistency and effectiveness. The selection of PMG model is based on Hausman test, that is explained in the next section.

EMPIRICAL FINDINGS

Table 2 shows the distribution, central tendency, and dispersion of the variables for all banks in the sample. The data is a balanced panel data, comprised of 4 Pakistani conventional banks for the period of 15 years from 2007 to 2021 with 60 observations.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev	Min	Max
ROA	60	0.0052	0.0123	-0.0285	0.0436
NSFR	60	1.1454	0.1557	0.7737	1.6809
LCR	60	0.5390	0.1124	0.2830	0.8320
Size	60	18.6771	1.1608	16.0062	21.3667
Cost	60	0.0322	0.0118	0.0085	0.0727
GDP	60	0.0362	0.0195	-0.0133	0.0615
Conc	60	0.4668	0.0306	0.4259	0.5658





Next, the correlation among the regressors has been evaluated. LCR and NSFR exhibit a relatively strong association, as seen by the correlation matrix in Table 3. We also run the Variance Inflation Factor (VIF) test to see if multicollinearity is a problem or not. Hair et al. (2014) state that the VIF shouldn't be greater than 10, or a tolerance value of less than 0.1 (1/VIF). However, it can be seen from Table 4 that multicollinearity is not a concern in this research as the model shows a maximum VIF of 4.92 (Tolerance = 0.182).

Table 3: Correlation Matrix

	NSFR	LCR	Size	Cost	GDP	Conc
NSFR	1					
LCR	0.8650	1.0000				
Size	-0.0266	-0.0396	1.0000			
Cost	-0.1033	-0.1955	-0.6007	1		
GDP	-0.1457	-0.1996	0.1087	-0.0164	1	
Conc	0.0866	0.1749	0.1128	-0.1497	0.5143	1

Table 4: Variance Inflation Factor (VIF)

Variable	VIF	1/VIF
NSFR	4.92	0.2033
LCR	4.27	0.2340
GDP	1.75	0.5704
Conc	1.67	0.5991
Size	1.60	0.6248
Lq1t	1.58	0.6316
Mean VIF	2.63	

Testing for Cross-Sectional Dependence

The results of tests for cross-sectional dependence are shown in Table 5. To investigate contemporaneous correlation across banks, this study takes into account the results of the Breusch-Pagan LM test, Pesaran scaled LM test, bias-corrected scaled LM test, and Pesaran CD test. The null hypothesis is no cross-sectional dependence. Results show that there is no cross-sectional dependence at a 10% significance level in the model. Hence, panel ARDL is suitable for analysis.

Table 5: Tests for Cross-Sectional Dependence

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	11.14508	6	0.0840
Pesaran scaled LM	0.330557		0.7410
Pesaran CD	-1.852911		0.0639

Testing for Stationarity

Im Pesaran Shin (IPS) unit root test results are presented in Table 6. Before applying the ARDL model, it is essential to check that each variable's unit root is stationary at I(2); otherwise, the studied findings will produce unexpected conclusions. The results show that except LCR and





Size, all variables are stationary at level that is I(0) while LCR and Size are stationary at I(1). This shows that data is suitable for the application of ARDL.

Table 6: Unit Root Test

Variable	At Level	At difference
ROA	-1.8494**	
NSFR	-1.5675**	
LCR	-1.2162	-2.6853**
Size	-1.0421	-3.5060***
Cost	-1.8533**	
GDP	-2.9820**	
Conc	-1.5205*	

Testing for Cointegration

Kao residual cointegration test was performed to determine if there is a long-run relationship between two or more time series variables. Table 7 presents the results of the Kao test. The null hypothesis is there is no cointegration Results show that the t-statistic for the ADF test is -5.1079 which is statistically significant at a 1% level of significance. This suggests strong evidence of cointegration between the variables. Next, the residual variance is reported as 0.0055, which is the variance of the residuals from the cointegrating regression. This measures the degree of spread or dispersion of the residuals around the regression line. A low value suggests that the residuals are tightly clustered around the regression line, indicating a good fit for the model. Lastly, the heteroscedasticity and autocorrelation-consistent (HAC) variance estimator is given as 0.0030. When there is heteroscedasticity and autocorrelation in the residuals, this estimator is used to update the standard errors of the estimations. A low number denotes a good fit and the absence of heteroscedasticity or autocorrelation in the model.

In conclusion, the Kao residual cointegration test shows that the variables are highly correlated. There is no evidence of heteroscedasticity or autocorrelation in the residuals, and they are tightly clustered around the regression line, which demonstrates a strong fit for the model.

Table 07: Kao Residual Cointegration Test

	t-Statistic	Prob.
ADF	-5.107948	0.0000
Residual variance	0.005498	
HAC variance	0.002993	

Model Selection

The Hausman test is used to select the most preferred model for ARDL among MG, PMG or DFE. Table 8 shows the Hausman results. It is evident that the p-values for both MG or PMG and DFE or PMG are greater than 0.05, therefore PMG is the preferred model for this research.

Table 08: Hausman Test

Ho: Difference in coefficients not systematic	MG and PMG	DFE and PMG
chi2(6)	0.00	1.32
p-value	1.000	0.9708
Which model is good?	PMG	PMG





Panel ARDL-PMG Model

Panel ARDL model with PMG estimator has been applied to test the hypothesis of the research. For the selection of optimal lags in the model, Akaike information criteria (AIC) and Bayesian information criterion (BIC) have been used. Lags with the lowest values are selected. The optimal lags chosen for this study are (1 1 0 0 1 0 1). Long-run and short-run results are estimated. Table 9 presents the results of long-run and short-run models of ARDL.

Table 9: Panel ARDL Estimation Results using PMG Estimator

	Coeff.	S.E.
<i>Short-run estimates</i>		
Cons	-0.0346	0.0239
D(NSFR)	-0.3832	0.0880
D(LCR)	0.2551	0.0565
D(Size)	-0.0112	0.0028
D(Cost)	2.3846	0.9944
D(GDP)	-0.7694	0.1678
D(Conc)	1.7751	0.4281
ECT	-0.1371*	0.0793
<i>Long-run estimates</i>		
NSFR	-0.3832***	0.0880
LCR	0.2551***	0.0565
Size	-0.0112***	0.0028
Cost	2.3846**	0.9944
GDP	-0.7694***	0.1678
Conc	1.7751***	0.4281

Optimal lags (1 1 0 0 1 0 1)

Notes: This table presents ARDL-PMG estimator results with a natural log of z-score, which is a proxy for ROA (dependent variable). ROA is a percentage of net profit after tax to total assets; Size is the natural log of assets; Cost is a ratio of non-interest expense to total asset non-performing loans to gross loans; GDP is GDP growth rate; Conc is a ratio of assets of 5 large banks to total industry assets. The sample is comprised of 60 firm-year observations across 4 banks for the period 2007-2021. ***, ** and * represent significance at the 1%, 5% and 10% levels, respectively.

In the short run, none of the independent variables or control variables is found to have a significant impact on the profitability of full-fledged Islamic banks of Pakistan except size. Overall, the results suggested that in Pakistan, the liquidity ratios NSFR and LCR may not have a significant impact on the stability of the Islamic banking sector in the short run.

The error correction term (ECT) represents how fast the system returns to long-run equilibrium after short-run disequilibrium. The ECT parameter would be extremely negative, in ideal cases. In our model, the PMG estimate has a negative ECT that is statistically significant at the 10% level. According to the PMG estimate's coefficient of the ECT, or speed of adjustment towards equilibrium, which is -0.1371 for full-fledged Islamic banks in Pakistan, the deviation of variables from short-run disequilibrium to long-run equilibrium is significantly adjusted and corrected by 0.14% annually.

In practical terms, this means that if there is a shock to one or more of the independent variables (such as a change in NSFR or LCR), it may take some time for bank stability to adjust to the new equilibrium level. However, the ECT coefficient suggests that the adjustment process will eventually occur and that bank stability will return to its long-run equilibrium level. Therefore, policymakers and practitioners should consider the long-term effects of





liquidity standards and other factors on bank stability, rather than focusing solely on short-term fluctuations.

Table 9 also presents the long-run results. Results show that in the long run, NSFR and LCR both have a significant impact on ROA at a 1% significance level. NSFR has a significant negative impact on ROA and LCR has a significant positive impact on ROA. This shows that a 1% increase in NSFR will decrease ROA by 38.32% and a 1% increase in LCR will improve the ROA by 25.51%. The results cannot be refuted or supported because there is a dearth of empirical data available to assess the effect of Basel III liquidity ratios on the stability of Islamic institutions. However, in the general context of the banking industry, there is an inverse correlation between a bank's NSFR and its profitability. A higher NSFR indicates that the bank holds more low- to medium-quality assets, which in turn results in lower profits. Thus, the more a bank's NSFR increases, the more its profitability is expected to decrease (Le et al., 2020). The results for LCR are supported by the literature in which a significant positive impact of LCR has been found on the profitability of banks (Abbas et al., 2019; Bibi & Mazhar, 2019; Mashamba, 2018). Therefore, we accept our second hypothesis of a significant impact of NSFR and LCR on ROA on full-fledged Islamic banks in Pakistan.

A study of control variables in the long run shows that both bank-specific variables, Size and Cost are found significant at 1% and 5% significance levels respectively. Size has a significant negative impact on ROA and Cost has a significant positive impact. This shows that in the long run, a 1% increase in size will decrease ROA by 1.11% and a 1% increase in Cost will increase ROA by 2.380 units. This shows that although bigger banks may benefit from economies of scale, they acknowledge that larger organizations can often be rigid and slow to seize market opportunities due to bureaucratic procedures. As a result, their operational efficiency and performance may be adversely affected (Petria et al., 2015). Also, as highlighted by Molyneux and Thornton, (1992), an inverse relationship can exist between Cost and profitability because profitability can be increased by spending more on human resources, therefore, increase payroll expenses can also increase the profitability of banks. This statement has also been endorsed by other researchers as well (Al-Harbi 2019; Athanasoglou et al., 2006).

Concerning external variables GDP is found to have a significant negative impact on ROA at a 1% significance level and Conc is found to have a significant positive impact at a 1% level of significance. As found by Rehman et al., (2018), economic growth can have a negative impact on bank profitability by leading to an increase in non-performing loans. They explain that during periods of high growth, there may be a greater allocation of credit to customers who may not be qualified or have the capacity to repay the loans they have taken. These results are also supported by previous research (Rashid & Jabeen, 2016; Singh & Sharma, 2016). Also, as highlighted by Molyneux and Thornton, (1992) and Yuanita, (2019), a rise in concentration results in lower competition and higher profitability, as greater market power, which is fueled by growth and concentration, is the primary driver of profitability.

CONCLUSION

This research aimed at providing a retrospective analysis of the impact of NSFR and LCR i.e., the Basel III liquidity requirements on the profitability of Islamic banks in Pakistan from 2007 to 2021. NSFR is aimed at mitigation of the funding risk over a longer time horizon, providing stability and sustainability to banks' funding sources, while LCR improves the resilience of banks by strengthening liquidity risk management in the short term. Overall, the results show that in the context of the Islamic banking industry in Pakistan, the ARDL results suggest that both the NSFR and LCR are not relevant liquidity measures for short-term profitability but are significantly relevant for ensuring the long-term profitability of Islamic banks. One of the





possible reasons for the insignificant impact of Basel III liquidity regulations on profitability in the short run is the presence of excess liquidity (Faisal et al., 2020; Majeed & Zainab, 2021). The Islamic banks in Pakistan are not facing significant liquidity constraints in the short run, which means that changes in NSFR and LCR do not have an immediate impact on their profitability. But, if there are some significant liquidity constraints in the long run, the impact of these variables may become visible.

One possible reason for the negative impact of NSFR on ROA, in the long run, is that it urges banks to hold a liquidity buffer, that ultimately restricts banks to engage in profitable operations and to hold low-yielding assets to meet the requirement. It is evident from the literature that a trade-off is present between stability and profitability. This research also provides support for this fact.

Results show that in the long run, LCR has a positive impact on the ROA of Islamic banks in Pakistan. This may be because LCR ensures that banks hold sufficient HQLAs for any unexpected stress conditions. Decreasing the likelihood of default and boosting the confidence of investors, stakeholders, and other parties, can ultimately result in increased profitability. Meeting the LCR standards can also help the bank's reputation and position in the market, which can have a long-term positive impact on profitability. Different liquidity measures have conflicting effects on bank profitability, which emphasises the significance of carefully crafting and implementing liquidity laws to prevent unforeseen consequences. To achieve their intended goals, policymakers should take note of how these regulations are affecting bank profitability and make the necessary adjustments.

While the results provide important insights into the impact of Basel III liquidity regulations on Islamic banks in Pakistan, there may be other factors that could influence bank profitability that are not captured in this analysis. Also, cross-country comparisons could provide better understanding of the implications of Basel III liquidity regulations. Future research should consider analyzing the impact using other indicators of profitability to provide a more comprehensive understanding of the relationship between liquidity regulations and bank profitability in the context of Islamic banking in Pakistan.

Policy Implications

This study highlighted various policy implications for the bankers, regulators and policymakers in Pakistan. Firstly, regulators need to reevaluate and possibly modify existing requirements to cater the uniqueness of Islamic banking industry, given the significant long term influence of these liquidity regulations on the profitability. This entails assessing the particular difficulties Islamic banks encounter, such as the difficulty of managing liquidity risk and the dearth of high-quality liquid assets. Secondly, the highlighted trade-off between Basel III liquidity requirements and profitability should be acknowledged by the policymakers. A sophisticated regulatory strategy is needed to strike a balance between the requirement for increased stability and the necessity of sustained profitability. Furthermore, strategic planning that maximizes liquidity coverage ratios while carefully controlling net stable funding ratios to minimize potential negative effects on profitability could be beneficial for financial institutions, especially Islamic banks. In order to promote a robust and successful banking industry, the study emphasizes the significance of an adaptable regulatory framework that takes into account the long-term effects of liquidity rules on bank stability.





REFERENCES

- Abbas, F., Iqbal, S., & Aziz, B. (2019). The impact of bank capital, bank liquidity and credit risk on profitability in postcrisis period: A comparative study of US and Asia. *Cogent Economics & Finance*, 7(1), 1605683.
- Adesina, K. S. (2021). How diversification affects bank performance: The role of human capital. *Economic Modelling*, 94, 303–319.
- Ahmed, H. (2015). Basel III liquidity requirement ratios and Islamic banking. *Journal of Banking Regulation*, 16(4), 251–264.
- Ahmed, W. M. A. (2020). Stock market reactions to domestic sentiment: Panel CS-ARDL evidence. *Research in International Business and Finance*, 54, 101240.
- Akaike, H. (1974). A new look at the statistical model identification. *IEEE Transactions on Automatic Control*, 19(6), 716–723.
- Akhtar, M. F., Ali, K., & Sadaqat, S. (2011). Factors Influencing the Profitability of Islamic Banks of Pakistan. *International Research Journal of Finance and Economics*, 2(6), 235–242.
- Alaoui Mdaghri, A., & Oubdi, L. (2022). Basel III liquidity regulatory framework and bank liquidity creation in MENA countries. *Journal of Financial Regulation and Compliance*, 30(2), 129–148.
- Al-Harbi, A. (2019). The determinants of conventional banks profitability in developing and underdeveloped OIC countries. *Journal of Economics, Finance and Administrative Science*, 24(47), 4–28.
- Alharbi, A. T. (2017). Determinants of Islamic banks' profitability: international evidence. *International Journal of Islamic and Middle Eastern Finance and Management*, 10(3), 331–350.
- Ali, M. A., Shuib, M. S., & Nor, A. M. (2021). Protection of Bank's Wealth: How is Islamic Banks's Financial Performance Affected by Asset Quality and Operational Efficiency. *Accounting and Finance*, 9(4), 745–756.
- Almaqtari, F. A., Al-Homaidi, E. A., Tabash, M. I., & Farhan, N. H. (2019). The determinants of profitability of Indian commercial banks: A panel data approach. *International Journal of Finance & Economics*, 24(1), 168–185.
- Athanasoglou, P. P., Brissimis, S. N., & Delis, M. D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of International Financial Markets, Institutions and Money*, 18(2), 121–136.
- Athanasoglou, P. P., Delis, M. D., & Staikouras, C. K. (2006). *Determinants of bank profitability in the South Eastern European region* (47).
- Ayayi, A. G., & Sene, M. (2010). What drives microfinance institution's financial sustainability. *The Journal of Developing Areas*, 303–324.
- Bibi, S., & Mazhar, F. (2019). Determinants of bank's profitability & liquidity and the role of BASEL III in Islamic & conventional banking sector of Pakistan: A case study of NBP. *The Economics and Finance Letters*, 6(1).
- Bilal, M., Saeed, A., Gull, A. A., & Akram, T. (2013). Influence of Bank Specific and Macroeconomic Factors on Profitability of Commercial Banks: A Case Study of Pakistan. In *Research Journal of Finance and Accounting www.iiste.org ISSN* (Vol. 4, Issue 2). Online. www.iiste.org.
- BIS (Bank for International Settlement). (2013). Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools. In *BIS*. Basel Committee on Banking Supervision. <https://www.bis.org/publ/bcbs238.htm>.





- BIS (Bank for International Settlement). (2014). Basel III: the net stable funding ratio. In *BIS*. Basel Committee on Banking Supervision. <https://www.bis.org/bcbs/publ/d295.htm>.
- Bourke, P. (1989). Concentration and other determinants of bank profitability in Europe, North America and Australia. *Journal of Banking & Finance*, 13(1), 65–79.
- Chiaramonte, L., & Casu, B. (2017). Capital and liquidity ratios and financial distress. Evidence from the European banking industry. *British Accounting Review*, 49(2), 138–161.
- DeYoung, R., & Jang, K. Y. (2016). Do banks actively manage their liquidity? *Journal of Banking and Finance*, 66, 143–161.
- Dietrich, A., Hess, K., & Wanzenried, G. (2014). The good and bad news about the new liquidity rules of Basel III in Western European countries. *Journal of Banking and Finance*, 44(1), 13–25.
- Dolgun, M. H., Mirakhor, A., & Ng, A. (2019). A proposal designed for calibrating the liquidity coverage ratio for Islamic banks. *ISRA International Journal of Islamic Finance.*, 11(1), 82–97.
- Dolgun, M. H., Ng, A., & Mirakhor, A. (2020). Need for calibration: applying a maximum threshold to liquidity ratio for Islamic banks. *International Journal of Islamic and Middle Eastern Finance and Management*, 13(1), 56–74.
- Du, B. (2017). How Useful Is Basel III's Liquidity Coverage Ratio? Evidence From US Bank Holding Companies. *European Financial Management*, 23(5), 902–919.
- Engle, R. F., & Granger, C. W. J. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica: Journal of the Econometric Society*, 251–276.
- Faisal, M., Mubarik, M. S., & Wasim, S. M. S. (2020). Liquidity Copiousness in Pakistani Islamic Banks: What can Banks Excess Liquid Assets Tell us? *Jinnah Business & Economics Research Journal*, 1(2), 56–74.
- Ghosh, S., & Sanyal, B. (2019). Determinants of operating efficiency of commercial banks in India: Insights from panel regression model. In *The Impacts of Monetary Policy in the 21st Century: Perspectives from Emerging Economies* (pp. 253–263). Emerald Publishing Limited.
- Giordana, G. A., & Schumacher, I. (2017). An Empirical Study on the Impact of Basel III Standards on Banks' Default Risk: The Case of Luxembourg. *Journal of Risk and Financial Management 2017, Vol. 10, Page 8, 10(2)*, 8.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate Data Analysis* (new int. ed.). Harlow: Pearson Education.
- IMF- International Monetary Fund. Middle East and Central Asia Dept. (2017). *Multi-Country Report: Ensuring Financial Stability in Countries with Islamic Banking-Case Studies-Press Release; Staff Report*.
- Kao, C. (1999). Spurious regression and residual-based tests for cointegration in panel data. *Journal of Econometrics*, 90(1), 1–44.
- Kashyap Dimitrios P Tsomocos Alexandros P Vardoulakis, A. K., Barlevy, G., Bigio, S., Beom Choi, D., Corbae, D., Geanakoplos, J., Farhi, E., Keister, T., Morris, S., Perotti, E., Rochet, J.-C., Shin, H., Smets, F., Sunderam, A., Vicente, S., Wright, R., Harald Uhlig, especially, Tsomocos, D. P., Vardoulakis, A. P., & Kashyap, A. K. (2020). *Optimal Bank Regulation In the Presence of Credit and Run-Risk*.
- Khan, M. S., Scheule, H., & Wu, E. (2017). Funding liquidity and bank risk taking. *Journal of Banking & Finance*, 82, 203–216.
- King, M. R. (2013). The Basel III net stable funding ratio and bank net interest margins. *Journal of Banking & Finance*, 37(11), 4144–4156.





- Košak, M., & Čok, M. (2008). Ownership structure and profitability of the banking sector. Ownership structure and profit ability of the banking sector: The evidence from the SEE region. *Zbornik Radova Ekonomskog Fakulteta u Rijeci*, 26(1), 93–122.
- Le, M., Hoang, V.-N., Wilson, C., & Managi, S. (2020). Net stable funding ratio and profit efficiency of commercial banks in the US. *Economic Analysis and Policy*, 67, 55–66.
- Majeed, M. T., & Zainab, A. (2021). A comparative analysis of financial performance of Islamic banks vis-à-vis conventional banks: evidence from Pakistan. *ISRA International Journal of Islamic Finance*, 13(3), 331–346.
- Mashamba, T. (2018). The effects of Basel III liquidity regulations on banks' profitability. *Journal of Governance and Regulation*, 7(2), 34–48.
- Menegaki, A. N. (2019). The ARDL method in the energy-growth nexus field; best implementation strategies. *Economies*, 7(4), 105.
- Mergaerts, F., & Vander Venet, R. (2016). Business models and bank performance: A long-term perspective. *Journal of Financial Stability*, 22, 57–75.
- Molyneux, P., & Thornton, J. (1992). Determinants of European bank profitability: A note. *Journal of Banking & Finance*, 16(6), 1173–1178.
- Narayan, P. K. (2005). The saving and investment nexus for China: evidence from cointegration tests. *Applied Economics*, 37(17), 1979–1990.
- Papadamou, S., Sogiakas, D., Sogiakas, V., & Toudas, K. (2021). The prudential role of Basel III liquidity provisions towards financial stability. *Journal of Forecasting*, 40(7), 1133–1153.
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289–326.
- Petria, N., Capraru, B., & Ilnatov, I. (2015). Determinants of Banks' Profitability: Evidence from EU 27 Banking Systems. *Procedia Economics and Finance*, 20, 518–524.
- Rashid, A., & Jabeen, S. (2016). Analyzing performance determinants: Conventional versus Islamic banks in Pakistan. *Borsa Istanbul Review*, 16(2), 92–107.
- Rashid, U. S. A., Rahman, A. A., & Markom, R. (2018). The regulatory framework on liquidity risk management of Islamic banking in Malaysia. *International Journal of Business and Society*, 19(3), 332–352.
- Rehman, A. A., Benamraoui, A., & Dad, A. M. (2018). A comparative study of Islamic and conventional banks' risk management practices: empirical evidence from Pakistan. *Journal of Banking Regulation*, 19(3), 222–235.
- Said, R. M. (2018). Basel III New Liquidity Framework and Malaysian Commercial Banks Profitability. *Jurnal Pengurusan (UKM Journal of Management)*, 52(0), 111–120.
- Samargandi, N., Fidrmuc, J., & Ghosh, S. (2015). Is the relationship between financial development and economic growth monotonic? Evidence from a sample of middle-income countries. *World Development*, 68, 66–81.
- Singh, A., & Sharma, A. K. (2016). An empirical analysis of macroeconomic and bank-specific factors affecting liquidity of Indian banks. *Future Business Journal*, 2(1), 40–53.
- Supiyadi, D. (2021). The Determinant of Islamic Bank Profitability and Stability in Indonesia Periods 2010-2017. *5th Global Conference on Business, Management and Entrepreneurship (GCBME 2020)*, 16–21.
- Tan, Y., & Floros, C. (2012). Bank profitability and GDP growth in China: A note. *Journal of Chinese Economic and Business Studies*, 10(3), 267–273.
- Vazquez, F., & Federico, P. (2015). Bank funding structures and risk: Evidence from the global financial crisis. *Journal of Banking & Finance*, 61, 1–14.
- Yuanita, N. (2019). Competition and bank profitability. *Journal of Economic Structures*, 8(1), 1–15.

