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The Nexus of Capital, Risk, and Liquidity: A Comparative Study of Conventional and Islamic Banking in Pakistan

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ABSTRACT

The purpose of this study is to meticulously investigate the determinants of capital, risk, and liquidity and the joint association between them particularly in the context of conventional and Islamic banks in Pakistan. The banking and financial theory and the simultaneous equation model have been employed in this research to understand the relationships. Even though Islamic banks are growing rapidly, still research confirms the riskier character of Islamic banks. The findings of this study reveal that conventional banks outperform in asset quality. The primary concern for Islamic banks is the issue of sharing profits among depositors. Islamic banks are less capitalized in comparison with conventional ones. The resolution of such problems lies in the development of new products and initiating fresh equity. The literature lacks studies that discuss these relationships, especially in the context of the South Asian region. Hence, the present study makes a profound contribution to the extant literature and elevates further understanding.

Introduction

In any country, Economic performance is dependent on its financial sector. The banking sector is the main contributor in generating economic gain rapidly where it handles public savings and makes profitable investments (Ashraf, Tabash, & Hassan, 2022). Conventional banks are for-profit organizations that are not based on religious interest and are against religious principles such as Habib Bank and Allied Bank, etc.; whereas, Islamic banks are regulated by Shariah and thus provide non-interest financial services. They take into account the Islamic laws. These include; Meezan Bank, Dawood Islamic Banking, etc. In 2002, the first license for Islamic banking was issued followed by the commencement of the first full-fledged Islamic bank in Pakistan within two months. Currently, there are five (5) completely developed Islamic banks and seventeen (17) conventional banks.

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Many conventional banks in Pakistan are running Islamic and conventional banking windows in parallel. The market price of Islamic banking assets boosted to 14.9 percent (2019) from 13.5 percent (2018). Interest is prohibited in Islam; therefore, the Islamic banking system does not involve interest (Riba) and works according to Shariah rules and regulations. Also, it is known as interest interest-free financial system, development in this system is going on over time with the increased demand for interest-free products and services. Initiations of many commercial banks are in process.

Evaluation reveals that bank's risk and liquidity conditions are two dominant challenges for Islamic banks (IFSB Stability Report, 2013). Previous research conveys that the Islamic banking system makes a huge contribution to monitoring liquidity problems and hence to deal with risk associated with liquidity. This is a salient move for Islamic system liquidity in view of the fact, that the assets of Islamic banks in contrast with conventional banks are not so liquid. Moreover, because of the steady evolution of financial tools, the Islamic banking system has tackled many problems to lift funds rapidly from the market.

Theoretical framework

The make it clearer I elaborate some theories i-e banking theory and financial theory which assist us in understanding this interrelationship of risk, capital, and liquidity of banks.

•Banking Theories

How does the baking system work and from where whole money supply come? (Werner, 2014) demonstrate that these three theories of banking have been influenced by the twentieth century.

Rationale of Study

•This study undertakes a deep investigation into the relationship between CAP, RISK, and LIQ.

•This study takes into account both Islamic and Conventional banks in Pakistan.

Research Gap and Contribution

•As Islamic banks are very limited in number, hence very thinly explored in different aspects in Pakistan.

•The paper identified the gap aforementioned gap; thus, focuses on exploring determinants and the joint association between capital, risk, and liquidity in Islamic and conventional banks.

Research Questions and Objectives

Following is the question that this study will answer:

Q1: What is the inter-related effect of the Capital, Risk, and Liquidity Islamic banking system?
Q2: What is the inter-related effect of Capital, Risk, and Liquidity in a Conventional banking system?

This study's prime objectives are:

•To detect the factors influencing the dependent variables; CAP, RISK, and LIQ

•To test the mutual relationship between the dependent variables of both Islamic and Conventional Banks

To validate the association among the dependent variables

Literature Review

The evolution of the Islamic banking system has motivated many researchers from different regions to comparatively interpret the proficiency of Islamic and conventional banks from various aspects involving profitability achievements, risk-taking capabilities, and risk performance.

A comprehensive study was done by (Boamah, Addai, Opoku, & August 2023) by taking into consideration the emerging economies exploring the descriptive capabilities of liquidity risk, efficiency, and capital risk for the cross-sectional and time-series variations in the Bank's performance. (Kadhim, Abdulamer, & Kareem, 2023), the study was conducted by taking into consideration the Iraqi banks. The variables of the study were capital risk and credit risk including a dependent variable 'bank Liquidity'. Researchers found a significant relationship between capital risk and credit risk when bank liquidity was on the rise.(Cecchetti & G., 2023) discussed the inclusion of new financial regulations after the updated BASEL III standards and concluded that the Risk of the banking industry has been reduced over the years and the cost of Capital is smaller than it was perceived originally. Mohammad, Asutay, Dixon, and Platonova (2020) examined the liquidity risk in the banking sector. The study investigates the variables that help investigate the liquidity risk of sample banks by checking bank account specifications, governance, and macroeconomy major variables by adopting panel data regression with random effect techniques. The findings of that study indicated that Islamic banks are frequently exposed to liquidity risk as compared to conventional banks.

Naveed, Khawaja, and Maroof (2020) studied if the exposure of Islamic mutual funds is less in contrast with conventional. For data collection and risk assessment purposes, CAPM, Fama French model, and Carhart Four Factor Model were utilized. Output showcased that Islamic mutual Funds have lower risk exposure. Thus, investors with low risk-taking capabilities would like to invest in these funds.

Akram and Tahir (2020) examine that in Turkey liquidity ratio of the Islamic banking system is way better than conventional banks. Al-Sayed (2012) showcase that conventional bank stand out due to their certain advantages like interest revenue and high capital etc. This resultantly proves that the efficiency of conventional banks is better.

Alexakis, Izzeldin, Johnes, and Pappas (2019) investigated the joint relationship of Capital, Risk, and Liquidity of both Islamic and Conventional banks in 14 different countries. For liquidity, Z-cores are used as a proxy, Risk is investigated through capitalization and equity-to-asset-ratio. In research Insolvency risk, capital, and efficiency are taken as the dependent variable and findings reveal that the rise of insolvency risk is more in Islamic banks.

Furthermore, Akhtar, Ali, and Sadaqat (2011) have studied a comparative analysis of Islamic vs conventional banks. The outcomes depict that a positive relationship between liquidity and capital to assets is observed. Also, another positive relationship is seen in the ROA of Islamic banks with the capital adequacy of conventional banks.

Kochubey and Kowalczyk (2014) investigated the same but studied U.S. commercial banks from 2001-09. The simultaneous equation model with some partial adjustments developed by

Shrieves and Dahl (1992) elaborated on the link in a bank's capital, risk, and liquidity. Their outcomes predicted that banks coordinate short-term adjustments in capital, risk, and liquidity.

Paltrinieri, Dreassi, Rossi, and Khan (2020) examined the Stability along the Profitability of the banks and tested if revenue diversification matters. The study aims to identify if revenue diversity affects conventional banks in a different way than Islamic banks. It tested the impact of income diversification on the profitability and risk of banks. The result depicts that diversification gives low rewards for the Islamic banking system as compared to the conventional.

Bitar, Walker, and Pukthuanthong (2015) studied the efficiency of Islamic and conventional banks and their roles in capital and liquidity in banks. Findings show that the rules and regulations imposed by Shariah law increase the efficiency gap between these two banks. Conditional quantile regression further is used to reveal that the impact is stronger in the case of highly liquid, highly efficient, and capitalized conventional banks. The results insight into how the capital and liquidity of banks can give the edge to the efficiency of banks.

Another research conducted in Africa reveals that capital structure has a positive impact on the profitability of commercial banks Ozili (2017). Also in 2015, he demonstrated that when banks do compromise on the quality of lending, then a high loan provision may be observed, which ultimately leads to lower the bank's profitability (Ozili, 2015). Research by Islam and Nishiyama (2016) depicted that a positive impact is shown by capital structure on the profitability of South Asian commercial banks.

Abbas, Azid, and Besar (2016) reveal in their findings that in Pakistan the Islamic banks are less efficient due to low capitalization and weak loan ratio. Another study argued that there may be a misallocation of resources in the Islamic banking system which leads to low efficiency of this system (Majeed & Zanib, 2016). Tran, Lin, and Nguyen (2016) showed that a bank's performance and capital structure do not demonstrate a linear relationship, but they argue that a positive relationship exists between a bank's profitability and capital of smaller banking systems while inverse in large banks. Also, they argued in their research paper that to earn high profitability, liquidity management is required necessarily.

Research in Turkey proved that the Islamic banking system depicts higher profitability than conventional banks, still some other research reports show different views (Tran et al., 2016). For example, in Malaysia, the same research revealed that Islamic banks differ from conventional with respect to profitability because they are less profitable. The reason is that conventional banks are providing high net financing and good asset quality.

A Bangladeshi examined the Conventional and Islamic banks' performance by employing the financial ratio analysis (Tran et al. (2016). Results showed that the dimension of productivity and efficiency performance of the conventional banking system is better than in Islamic banks. Another study by Raza and Hanif (2013) depicts that the satisfaction level of customers consuming services by conventional banks is greater than Islamic banks

Chen Zheng and Cronje (2019) in the U.S., investigated the part of a bank's capital in moderating the association between the failure risk and a bank's liquidity. The result reveals that the bank's capital and liquidity are associated negatively with bank failure risk. Outcomes further show

that the solvency of banks may increase with the rise in capital, further huge capital helps to enhance liquidity. The empirical analysis indicates that the effects of bank capital were more pronounced in the financial crises of 2008-2008 and the negative effect is more highlighted for the small banking system.

Another study was conducted that examined the interrelationship between risk, liquidity, and capital of Islamic and conventional banks. They found that there exists a positive yet bidirectional relation between liquidity and risk in the context of the MENA region. Another finding of this study was that the effect of change in liquidity of both types of banks is positive (Mahdi & Abbes, 2018).

Some studies found that random shock such as COVID-19 leads to increased credit risk (Acharya & Steffen, 2020; Perotti, 2020). Another study investigated which category i.e., Islamic or convention shows more resilience towards such crisis. They found that whether the bank is Islamic or conventional, if its liquidity is higher then the effect of COVID-19 was less adverse (Ashraf, Tabash, & Hassan, 2022).

Methodology

Conceptual framework:

The explained variables of this study are Banking Capital, Risk, and Liquidity. On the other hand, the explanatory variables include the Banks' Discretionary Behavior and the Exogenous Random Shock.

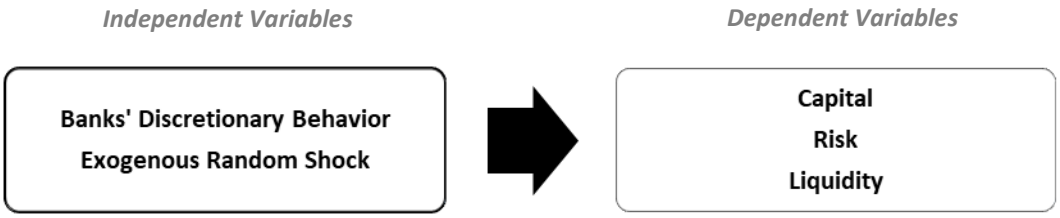

Figure 2 1 Proposed Conceptual Framework

Hypothesis specification

By keeping the research objective in mind, the following major hypotheses are made:

H_0: There exists no significant relation between Capital, Risk, and Liquidity of Islamic and Conventional banking in Pakistan.

H_1: There exists a significant relationship between Capital, Risk, and Liquidity of Islamic and Conventional banking in Pakistan.

This central hypothesis has three sub-hypotheses discussed below. The reason for these additional hypotheses is that since this study investigates the association between the dependent variables

i.e., Capital, Risk, and Liquidity, the individual effect of these variables on each other needs to be studied. The sub-hypotheses are:

H_0: Capital does not have a significant effect on risk and liquidity.

H_1: Capital has a significant effect on risk and liquidity.

H_0: Risks do not have a significant effect on capital and liquidity.

H_1: Risk has a significant effect on capital and liquidity.

H_0: Liquidity does not have a significant effect on capital and risk.

H_1: Liquidity has a significant effect on capital and liquidity.

Model specification

The finance Theory proposition along with the Simultaneous Equation Model with partial adjustment has been used in order to study the effect of dependent variables on each other. The model also includes the independent variables; bank discretionary behavior and exogenous random shock. Formally, the model is as follows:

$$\Delta CAPit = \Delta CAP_{it}^{bank} + uit \quad (1)$$

$$\Delta RISKit = \Delta RISK_{it}^{bank} + vit \quad (2)$$

$$\Delta LIQit = \Delta LIQ_{it}^{bank} + \varepsilon it \quad (3)$$

Any interchanges in Capital, Banking Liquidity, and Risk are formed in addition to bank discretionary components and random shocks. Banks are always threatened by financial disturbance and therefore, must be ready to adjust costs to make quick accommodations in Capital, Risk, and Liquidity, as stated by financial theory. Hence, accommodations are modeled as:

$$\Delta CAP_{it}^{bank} = \alpha\ (\text{CAP } it^* - CAP_{it-1}) \quad (4)$$

$$\Delta RISK_{it}^{bank} = \beta\ (RISK\ it^* - RISK_{it-1}) \quad (5)$$

$$\Delta LIQ_{it}^{bank} = \gamma\ (LIQ\ it^* - LIQ_{it-1}) \quad (6)$$

By replacing equations 4 – 6 with equations 1-3 we get the following model:

$$\Delta CAP_{it} = \alpha\ (CAP_{it}^* - CAP_{it-1}) + u_{it} \quad (7)$$

$$\Delta RISK_{it} = \beta\ (RISK_{it}^* - RISK_{it-1}) + v_{it} \quad (8)$$

$$\Delta LIQ_{it} = \gamma\ (LIQ_{it}^{*} - LIQ_{it-1}) + \varepsilon_{it} \quad (9)$$

Optimal level and random shocks are important elements that cause interchange in CAP. LIQ and RISK. With additional changes to the level of CAP. LIQ and RISK the model is completed which help to explore the simultaneity of changes in these 3 components:

$$\Delta CAP_{it} = \alpha\ (CAP_{it}^{*} - CAP_{it-1}) + \phi\ \Delta_1\ RISK_{it} + \phi_2\ \Delta LIQ_{it} + u_{it} \quad (10)$$

$$\Delta RISK_{it} = \beta\ (RISK_{it}^{*} - RISK_{it-1}) + \theta_1 \Delta CAP_{it} + \theta_2\ \Delta LIQ_{it} + v_{it} \quad (11)$$

$$\Delta LIQ_{it} = \gamma\ (LIQ_{it}^{*} - LIQ_{it-1}) + \varphi_1 \Delta CAP_{it} + \varphi_2\ \Delta RISK_{it} + \varepsilon_{it} \quad (12)$$

Now CAP, RISK, and LIQ are influenced by various individual factors or components of banks. Hence, with all those different components the following equation is:

$$\Delta CAP_{it} = +\alpha_0 + \alpha_1\ SIZE_{it} + \alpha_2\ LLP_{it} + \alpha_3\ ROA_{it} + \alpha_4\ LOAN_{it} + \alpha_5 \Delta RISK_{it} + \alpha_6 \Delta LIQ_{it} - \alpha_7 CAP_{it-1} + \alpha_8\ INF + \alpha_9\ GDP + u_{it} \quad (13)$$

$$\Delta RISK_{it} = +\beta 0 + \beta 1 SIZE_{it} + \beta_2 LLP_{it} + \beta_3 FUND_{it} + \beta_4 NII_{it} + \beta_5 LOAN_{it} + \beta_6 \Delta CAP_{it} + \beta_7 \Delta LIQ_{it} - \beta_8\ RISK_{it\ 1} + \beta\ INF_8 + \beta_9\ GDP + v_{it} \quad (14)$$

$$\Delta LIQ_{it} = +\gamma_0 + \gamma_1\ SIZE_{it} + \gamma_2\ ROA_{it} + \gamma_3\ NIMit + \gamma_4 LOAN_{it} + \gamma_5 CAP\Delta_{it} + \gamma_6\ RISKi_{t} - \gamma_7\ LIQ_{it\ -1} + \gamma_8\ INF + \gamma_9 GDP + \varepsilon_{it} \quad (15)$$

Here, ΔCAP, ΔRISK, and ΔLIQ are changes in Capital, Risk, and Liquidity respectively. The natural log of total assets provides the Size of banks. Return on Assets (ROA) is calculated through "Net income/Total assets. Net Interest Income is calculated through "non-interest income/total operating revenue" ratio. Whereas, the calculation of Net interest margin involves dividing Net interest Income by average earning assets. LLP: Loan Loss Provision, FUNDS: funding, LOANS is measured as loan growth rate. Furthermore, CAP_{it-1}, $RISK_{it-1}$, and LIQ_{it-1} are levels of Capital, Risk, and Liquidity in previous periods.

Differentiating from (Shrieves and Dahl, 1992; Jacques and Nigro, 1997), **Dynamic Panel Data** Technique has been employed. To manage the heterogeneity of banks, a Two-Step Arellano-Bind GMM estimator is used which is influenced by the presence of fixed effects in the equation making the lagged Dep variable endogenous.

Variable Description

Values for all variables are gathered through annual reports/financial statements of respected banks.

Abbreviation	Variable name	Formulas and details
ΔCAP	Change in Capital	Equity / Total Assets
ΔRISK	Change in Risk	Z score
ΔLIQ	Change in Liquidity	Liquid Assets / Total assets
SIZE	Size	Ln (Total Assets)
ROA	Return on Assets	Net Income/Total Assets
NII	Net Interest Income	Non-interest income/Total operating revenue
NIM	Net Interest Margin	Net interest Income/Average earning assets
LLL	Loan Loss Provision	Total loan loss provisions (Farook, Hassan, & Clinch, 2012)
LOAN	Loans/Borrowings	Includes customers and inter-bank loans
FUNDS	Deposits	Banks heavily depend on funding (Mahdi & Abbes, 2018)
CAP	Level of Capital in the previous period	The lagged value of ΔCAP
RISK	Level of risk in the previous period	The lagged value of ΔRISK
LIQ	Level of liquidity in the previous period	Lagg value of ΔLIQ

Table 3. 1 Variable Description

Data description:

For the purpose of investigating the link between Capital, Risk, and Liquidity. We initially used 3 regression equations. The initial model explicates the bank's capital. Then, the second equation of the regression model investigates the bank risk capabilities. Finally, the last equation of the regression model inspects the bank liquidity determinants. In all the regression equations the dependent variables are as follows: (1) ratio of equity to total assets for capital (2) z score for risk (3) ratio of liquid assets to total assets. Other than that, many other bank-related variables are also included in these 3-regression models. Like SIZE and LOAN, LLP serves as an explanatory variable, ROA which assists in checking the bank's ability to manage it efficiently. Furthermore, NIM, NPM, and NII include which explain how banks control risk. Also, GDP and INF are included in these 3 regression models. The panel data technique is a popular tool for quantitative analysis in topics related to economics and business. Two types of models are estimated with this panel data technique: Static and Dynamic panel data. we preferred to use dynamic panel data technique over static panel data because it has features to address the heterogeneity of groups/individuals. Also to use of many instrumental variables that deal with the endogeneity of variables, known as "lagged variables" gives an edge to it. (Ruiz-Porras, 2012). Also, (Mahdi & Abbes, 2018) used the same technique when investigating conventional and Islamic banks.

(Arellano & Bond, 1991), (Arellano & Bover, 1995), (Blundell & Bond, 1998), and (Roodman, 2009) have contributed a lot to provide information regarded these complex techniques. The endogeneity discussed here is defined as the presence of correlation in error terms and dependent variables. In economic terms, we can say that endogeneity can be defined as a causality relationship between explained variable and regressor along with the time. (Arellano & Bond 1991) has developed the first way which is also known as "Difference GMM", this estimator uses instruments for the lag in difference. Later (Arellano & Bover 1995) developed the second way; this estimator uses as an instrument the lags in difference and level which is also called "System GMM". After that Roodman (2006) developed the third estimator which is called "Xtabond2". This facilitates working separately on the endogeneity of dependent/ independent variables. We require different Stata commands to run these estimators.

Hence, Dynamic panel data techniques to manage bank heterogeneity and the Roodman and Arellano-bond difference GMM estimator are used.

Sample size:

The sample of our study consists of 5 full-fledged Islamic banks and 17 conventional banks in Pakistan. The time period of study comprises 12 years from 2009-2020.

Results and Discussion

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
CAP-1	201	-.03	.50	.0763	.06729	2.790	14.210
RISK-1	201	-2.32	51.21	16.7445	12.92582	.433	-.644
LIQ-1	201	.00	.98	.0808	.07576	8.548	101.015
SIZE	201	11.99	21.86	19.6934	1.14363	-1.534	9.142
LOAN	200	910691	518896397	66552362.58	90431480.043	3.016	9.735
LLP	190	-965	9853	2545.63	2978.452	.958	-.079
NIM	201	.00	.38	.0350	.03441	7.523	67.707
NII	199	3435	94625615	19036593.21	19316941.631	1.481	1.772
FUND	200	5425	2437597	446297.00	471411.795	1.903	3.778
ROA	201	-.0541	.0281	.007262	.0134647	-2.580	8.564
GDP	201	168153000000	314568000000	240638089552.24	48634278487.626	-.115	-1.219
INF	201	.4000	20.6670	8.600423	6.1221827	.789	-.418
CAP	201	-.03	.50	.0820	.06410	3.120	16.581
RISK	201	-2.32	51.21	18.1259	12.45592	.416	-.589
LIQ	201	.00	.98	.0884	.07188	9.810	120.880
Valid N (listwise)	186						

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
CAP	60	.00	.27	.0909	.04731	1.506	4.112
RISK	60	3.35	47.84	18.0393	8.57701	.759	1.218
LIQ	60	.00	.25	.1034	.04656	1.138	1.531
SIZE	60	11.53	21.14	18.8954	1.53657	-1.760	7.617
LOAN	60	0	216018886	21869413.43	38357876.014	3.126	11.630
LLP	60	-847151	3072771	345889.82	749992.743	1.677	3.232
NIM	60	.00	.05	.0339	.00973	-.597	1.196
NII	60	462314	59616214	13906553.13	16900592.109	1.269	.093
FUND	60	12487	129654288	14571933.72	32207278.904	2.195	3.729
ROA	60	-.03	.03	.0072	.01217	-.027	.815
INF	60	0	21	8.69	6.182	.777	-.421
GDP	60	16815300000	31456800000	239625750000.	49277484792.5	-.092	-1.249
		0	0	00	38		
CAP-1	60	.00	.27	.0852	.05327	.974	2.517
RISK -1	60	.00	47.84	16.8178	9.81900	.384	.522
LIQ -1	60	.00	.25	.0950	.05341	.570	.998
Valid N (listwise)	60						

Table 3. 2 Descriptive statistics of Islamic banks

Table 3.1 and 3.2 represents the summary descriptive statistics of conventional and Islamic bank variables. In the table above all the means value is calculated through several observations for all 17 conventional banks and 5 Islamic banks for all years. Standard deviation is a measure of the observation's dispersion from its mean value. Skewness and kurtosis were also added in descriptive statistics to showcase wholesome results.

From the table above superiority of NII for conventional banks over Islamic banks is observed. Also, the risk of conventional banks (18.12) is slightly higher than Islamic banks (18.03). Further, it is observed that the capital ratio of Islamic banks (9.09) is more than conventional banks (8.2) which clearly shows that Islamic banks can maintain financial strength. Table display that the liquidity ratio of Islamic banks (10.43) is higher in contrast with conventional banks' ratio (8.84) which portrays that Islamic bank is highly efficient in covering their debts.

Dynamic Panel Data Results of Conventional and Islamic Banks; (CAP)

For dynamic panel data, I preferred the two-step GMM difference over the one-step because much literature supports that it's more efficient and has a smaller asymptotic variance. Also, static tests based on a two-step estimator are more asymptotically powerful than those based on one step. In the figure below. Stata is being used to test the hypothesis, and Xtabond2 commands are used as they offer unique features of showing in automatic difference-in-Sargan/Hansen testing. Also, the use of a "collapse" instrument gives it extra power that helps to limit instrument proliferation.

"NCAP" is taken as the dependent variable. "SIZE LLP ROA LOAN RISK LIQ CAP1 INF GDP" represents independent variables. Then "iv" represents exogenous variables and "gmm" represents endogenous variables (variables that are perceived to be correlated with the dependent variable. Lag and Collapse give a very useful function to limit the number of instruments in the model. There are no clearly defined rules for lags so to what extent we can put lag value normally it is said that lag should not exceed the number of variables.

So collectively, I used the following command in Stata to get the required results.

"xtabond2 NCAP SIZE LLP ROA LOAN RISK LIQ CAP1 INF GDP, noleveleq twostep robust nomata iv (SIZE LLP ROA LOAN000 INF GDP CAP1) gmm (CAP, lag (1 3) collapse)".

Below, in Figure 3.3 1 it is seen that fortunately number of instruments is less than the number of groups which is the basic requirement and doesn't make the model questionable. Wald chi2 and prob>chi2 show the overall significance of the model and here, in the figure above prob>chi2 =0.000 which depicts that the model is statically significant. It is recommended to use the Hansen test to check overidentification, with two-step estimation, and the Arellano bond test is used to test autocorrelation.

Dynamic panel-data estimation, two-step difference GMM	
Group variable: BANKID	Number of obs = 22
Time Variable: YEAR	Number of groups = 2
Number of instruments: 11	Obs per group: min =
Wald chi2(9) = 39.82	Avg: 10.0
Prob > chi2 = 0.000	Max: 1

Arellano-Bond test for AR (1) in first differences: x = -0.61 Pr > x = 0.541 Arellano-Bond test for AR (2) in first differences: x = -0.61 Pr > x = 0.789
Sargan test of overid, restrictions: chi2(1) = 0.00 Prob > chi2 = 0.999 Hansen test of overid, restrictions: chi2(1) = 0.00 Prob > chi2 = 0.998

FIGURE 3.3 1 Dynamic Panel Results, CAP

The null hypothesis for the Hansen test and autocorrelation

H_0: All the restrictions for overidentifications are valid.

To accept the null hypothesis, it is required that the p-value must be greater than 0.05 or 5%. In the case above null hypothesis is accepted that instruments are valid as prob > 0.05 or 5%, i-e 0.998.

H_0: autocorrelation does not exist.

To accept this hypothesis, we need to consider the AR (2) value that must be > 0.05 or 5%. Here in the figure above it is observed null hypothesis is accepted that autocorrelation does not exist as prob>0.05, i-e 0.789.

As your model is statically significant (prob>chi2= 0.000). Thus, we reject H_0 for our hypothesis and conclude that Capital has a significant impact on risk and liquidity.

Dynamic Panel Data Results of Conventional and Islamic Banks; (RISK)

"NRISK" is taken as the dependent variable. "SIZE LLP FUND NII LOAN CAP LIQ RISK1 INF GDP" represents independent variables. Then "iv" represents exogenous variables and "gmm" represents endogenous variables (variables that are perceived to be correlated with the dependent variable. Lag and Collapse give a very useful function to limit the number of instruments in the model. There are no clearly defined rules for lags so to what extent we can put lag value but normally It is said that lag should not exceed the number of variables.

So collectively, I used the following command in Stata to get the required results.

"xtabond2 NRISK SIZE LLP FUND NII LOAN CAP LIQ RISK1 INF GDP, noleveleq twostep robust nomata iv (SIZE LLP FUND NII LOAN RISK1 INF GDP) gmm (RISK, lag (1 3) collapse)".

From Figure 3.3 2 below, it is seen that fortunately number of instruments is less than the number of groups which is the basic requirement and does not make the model questionable. Wald chi2 and prob>chi2 show the overall significance of the model and here, in the figure above prob>chi2 =0.000 which depicts that the model is statically significant. It is also observed that LLP and CAP RISK-1 are statically significant. It is recommended to use the Hansen test to check overidentification, with two-step estimation, and the Arellano bond test is used to test autocorrelation.

Dynamic panel-data estimation, two-step difference GMM	
Group variable: BANKID	Number of obs = 21
Time Variable: YEAR	Number of groups = 2
Number of instruments: 12	Obs per group: min =
Wald chi2(9) = 2828.71	Avg: 9.9
Prob > chi2 = 0.000	Max: 1
Arellano-Bond test for AR (1) in first differences: x = -2.37 Pr > x = 0.018 Arellano-Bond test for AR (2) in first differences: x = -0.33 Pr > x = 0.743	
Sargan test of overid, restrictions: chi2(1) = 0.02 Prob > chi2 = 0.896 Hansen test of overid, restrictions: chi2(1) = 0.06 Prob > chi2 = 0.812	

FIGURE 3.3 2 Dynamic Panel Data, RISK

The null hypothesis for the Hansen test and autocorrelation

H_0: All the restrictions for overidentifications are valid.

To accept the null hypothesis, it is required that the p-value must be greater than 0.05 or 5%. In the case above null hypothesis is accepted that instruments are valid as prob > 0.05 or 5%, i-e 0.812.

H_0: autocorrelation does not exist.

To accept this hypothesis, we need to consider the AR (2) value that must be > 0.05 or 5%. Here in the figure above it is observed null hypothesis is accepted that autocorrelation does not exist as prob>0.05, i-e 0.743.

As your model is statically significant (prob>chi2= 0.000). Thus, we reject H_0 for our hypothesis and conclude that Risk has a significant impact on Capital and Liquidity.

Dynamic Panel Data Results of Conventional and Islamic Banks; (LIQ)

"NLIQ" is taken as the dependent variable. "SIZE ROA NIM LOAN000 CAP RISK LIQ1 INF GDP" represents independent variables. Then "iv" represents exogenous variables and "gmm" represents endogenous variables (variables that are perceived to be correlated with the dependent variable. Lag and Collapse give a very useful function to limit the number of instruments in the model. There are no clearly defined rules for lags so to what extent we can put lag value but normally It is said that lag should not exceed the number of variables.

So collectively, I used the following command in Stata to get the required results.

"xtabond2 NLIQ SIZE ROA NIM LOAN CAP RISK LIQ1 INF GDP, noleveleq two-step robust nomata iv (SIZE ROA NIM LOAN LIQ1 INF GDP) gmm (LIQ, lag (1 8) collapse)"

From the output Figure 3.3 3, it is seen that fortunately number of instruments is less than the number of groups which is the basic requirement and does not make the model questionable. Wald chi2 and prob>chi2 show the overall significance of the model and here, in the figure above prob>chi2 =0.000 which depicts that the model is statically significant. It is recommended to use the Hansen test to check overidentification, with two-step estimation, and the Arellano bond test is used to test autocorrelation.

Dynamic panel-data estimation, two-step difference GMM	
Group variable: BANKID	Number of obs = 234
Time Variable: YEAR	Number of groups = 22

Number of instruments: 16	Obs per group: min = 8
Wald chi2(9) = 20.54	Avg: 10.64
Prob > chi2 = 0.008	Max: 11
Arellano-Bond test for AR (1) in first differences: x = -2.14 Pr > x = 0.033 Arellano-Bond test for AR (2) in first differences: x = -0.44 Pr > x = 0.659	
Sargan test of overid, restrictions: chi2(1) = 4.93 Prob > chi2 = 0.553 Hansen test of overid, restrictions: chi2(1) = 9.34 Prob > chi2 = 0.155	

FIGURE 3.3 3 Dynamic Panel Data, LIQ

The null hypothesis for the Hansen test and autocorrelation

H_0: All the restrictions for overidentifications are valid.

To accept the null hypothesis, it is required that the p-value must be greater than 0.05 or 5%. In the case above null hypothesis is accepted that instruments are valid as prob > 0.05 or 5%, i-e 0.155.

H_0: autocorrelation does not exist.

To accept this hypothesis, we need to consider the AR (2) value that must be > 0.05 or 5%. Here in the figure above it is observed null hypothesis is accepted that autocorrelation does not exist as prob>0.05, i-e 0.659.

As your model is statically significant (prob>chi2= 0.000). Thus, we reject H_0 for our hypothesis and conclude that Liquidity has a significant impact on Risk and Capital.

Hence collectively from all the results we can reject our major hypothesis: **H_0** "There is no significant link/relation between Capital, Risk and Liquidity in Islamic and Conventional banking of Pakistan" is not accepted, as our model is a good fit and statically significant. Thus, concluded that there is an interrelationship between CAP, RISK, and LIQ of Islamic and Conventional banks.

DISCUSSION ON DETERMINANTS OF CAP, RISK, AND LIQ:

	Islamic banks			Conventional banks		
	ΔCAP	ΔRISK	ΔLIQ	ΔCAP	ΔRISK	ΔLIQ
IND VAR						
ΔCAP		180.7142*** 0.000	.3881345 0.304		-.37643 0.924	-.1346088 0.267
ΔRISK	.005355*** 0.000		-.001204 0.391	.7429*** 0.000		.0017483 0.352
ΔLIQ	-.1305492** 0.084	32.85678 0.104		.288211 0.760	1.5781 0.193	
SIZE	.000347 0.414	-.1822082 0.138	.0016164 0.277	.91223*** 0.000	1.2012*** 0.000	.0136383*** 0.005
LLP	-1.22e-10 0.962	1.47e-06** 0.008		2.18e-09 0.978	6.80e-08** 0.024	
ROA	1.237104*** 0.004		.0389223 0.956	60.774** 0.085		.1855218 0.536
LOAN	5.07e-11 0.283	2.35e-08** 0.023	3.99e-11 0.633	8.77e-10 0.804	1.01e-09 0.810	-5.47e-12 0.912
FUND		5.32e-08*** 0.000			-2.59e-06 0.218	
NII		-1.63e-07*** 0.000			5.25e-08 0.452	
NIM			.0198622 0.965			.1608877** 0.016
INF	.0001057 0.618	-.079861 0.131	.0003309 0.427	.0023377 0.907	-.0339393 0.204	.0005181 0.318
GDP	-6.46e-14 0.299	1.42e-11 0.389	-1.11e-13* 0.065	6.82e-12 0.205	1.26e-11 0.200	-2.81e-13** 0.027
CAP-1	.0642357 0.456			4.558967 0.317		
RISK-1		-.26391*** 0.005			.90358*** 0.000	
LIQ-1			.4340606** 0.047			.796417* 0.071

NOTE: ***, **, and *, denote statistical significance at 1, 5, and 10% respectively.

Table 3. 4 Determinants of CAP, RISK and LIQ

Table 3.4 above showcases the estimation results for CAP equation (13) from the methodology chapter. Firstly, the findings depict a positive and significant impact of ΔRISK on the capital for both types of banks implying that the more the capital the higher the risk. Therefore, with the intake of higher capital, banks must take prevention strategies against high risk. Also, (Shrieves & Dahl, 1992) reports a positive correlation between capital and risk. Secondly, the results show that ΔLIQ has a negative effect on the capital of Islamic banks. The findings of (Kochubey & Kowalczyk, 2014) are consistent with our findings showing that following by drop in capital ratio, ΔLIQ increase of these banks. ROA is a profitability measure and is positively correlated with the CAP of both banks. Size is positively correlated with capital of both types of banks suggesting that small banks operate with low capital levels. This finding is only significant for conventional banks. Loans appear to be positively correlated with capital and thus banks having high loan portfolio tends to have a high capital amount in order to manage optimal leverage ratio, this justifies the results of (Miah & Uddin, 2017) who concluded that capital and profitability are positively correlated to both Islamic and conventional banks. With the positive impact of the growth rate of loans on capital for both Islamic and conventional banks, it is concluded that financial risk management is managed well by banks, as banks are advised to keep the capital ratio high to be on the safe side when a high loan ratio is observed.

Table 3.4 above showcases the results for the RISK equation (14) from the methodology chapter. Findings reveal that risk is positively influenced by loan growth rate for both bank categories. These results are significant for Islamic banks only. (Changjun Zheng, Gupta, & Moudud-Ul-Huq, 2018) and (Dang, 2019), also present the same results and conclude that banks with high loan rate growth are more hazardous. NII has a significant impact on Islamic banks' Risk suggesting that a high level of NII can make banks' structures unstable. Research suggests that banks involving high NII may be more unstable than banks that facilitate loans. This is where the theory of Islamic banking comes in, as Islamic banks prohibited loans on interest in accordance with Shariah law which make Islamic banks' product/services riskier. Change in liquidity has positively correlated to the risk of conventional and Islamic banks showing that banks having liquid assets leads to having risky portfolios. Change in banks CAP has positively influenced Islamic banks and the same findings are provided by (Shrieves & Dahl, 1992) revealing that banks raise the overall risk of asset portfolio when having low capital. Inflation is negatively correlated with the risk of banks, (Dewi, Tan Lian Soei, & Surjoko, 2019) also confirm the results that inflation impacts the value of money along with purchasing power. Also, GDP does not have a significant impact on risk for both types of banks. (Alexakis et al., 2019) findings are also aligned with our reveals that the rise of insolvency risk is more in Islamic banks.

From Table 3.4 above, the estimation results for the RISK equation (14) are shown. From the findings, it is observed that SIZE is not significant for conventional banks indicating an inefficient market evaluation of liquidity level and somehow tends to raise the banking risk. ROA has a positive relation with liquidity in Islamic banking and conventional banks; conforming to (Doan & Bui, 2021) who report that the higher the bank's liquidity, the lower its ROA. This suggests that the bank managing well and utilizes its revenue to overcome short-term liabilities. Net interest margin has a significant and positive impact on conventional banks LIQ that suggests banks who manage high liquidity ratios are more profitable. NIM in the liquidity equation of Islamic banks is non-deterministic. (Akhtar et al., 2011) reveal the same results as our study which shows a positive relationship between liquidity and capital.

CONCLUSION:

This research investigated the joint relationship between CAP, RISK, and LIQ while accounting for Islamic, as well as, conventional banks. Where equity to total assets ratio is used as a measure of banking capital, Z-score as a measure of Risk, and liquidity assets to total asset ratio is utilized as a proxy of Liquidity. Data consisted of 17 conventional and 5 full-fledged Islamic banks in Pakistan for the period 2009-2020. Different bank-specific and macroeconomic variables are used in 3 regression models. A simultaneous equation model with partial adjustments was used to examine this relationship between banks. Dynamic Panel Data technique: two-step Arellano bond difference GMM Estimator in Stata was employed. It can be concluded from the results of this study that apart from the fact that Islamic banks have been growing rapidly over the last years, still the risk is involved. Due to the limited number of Islamic banks in Pakistan, the profitability of Islamic banks is lower in comparison with the conventional banks (Ashraf, Tabash, & Hassan, 2022) and (Dang, 2019)

Results demonstrate that exposure of liquidity is higher in Islamic banks and these results are parallel with the Islamic banking theory, due to unique features of their financing activity; Islamic banks create complexity in managing assets and liabilities position, which ultimately causes financing gap and leads to increased liquidity risk. The results of this study reveal that conventional banks are better off in asset quality which is attributed to their diverse product range. The primary area of concern that must not be neglected by Islamic banks is the issue of share distribution of profits to their depositors as the profit share provided to depositors is lower in comparison to conventional banks. Furthermore, the findings disclosed that Islamic banks depict lower capitalization relative to conventional banks. It is worth noting that such differences can be mitigated by the introduction of new financial products and additional equity. This output is consistent with (Al-Sayed, 2012) who showcased that conventional banks stand due to their certain advantages like interest revenue and high capital, etc. Thus, the author concluded efficiency of conventional banks is better (Dewi, Tan Lian Soei, & Surjoko, 2019).

Recommendations:

- The time of study can be increased by collecting data for the past ten to fifteen years or by adding the latest years to check the pre- & and COVID impact.

- In the future researchers can check the performance of both banks by analyzing ROE, net loans to asset ratio, short-term fund ratio, and total impaired loans to cross loan ratio.

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