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# **Panel Data Estimation of Liquidity Risk Determinants in Islamic Banks: A Case Study of Pakistan**

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# Panel Data Estimation of Liquidity Risk Determinants in Islamic Banks: A Case Study of Pakistan

Salman Ahmed Shaikh<sup>1</sup>

## Abstract

*The two most important problems identified in a post-financial crisis look back are perverse incentives and de-linking of financial sector growth and activities with the real sector of the economy. These problems are inherently avoided by Islamic banks. In this study, we take 7 year data from 2007 to 2013 for all 5 full-fledged Islamic banks. We attempt to empirically explore the determinants of liquidity risk in Islamic banks. As per the findings, deposits to total capital ratio increases the liquidity risk. It is plausible since greater deposit mobilization implies greater liabilities of banks. The increase in this ratio implies that a greater portion of funds with banks are in the form of deposit liabilities as compared to own capital. We also find that increase in capital to financing ratio decreases the liquidity risk which is again consistent with apriori expectations. The results further highlight that improvement in efficiency also reduces the liquidity risk by freeing tied up resources. Finally, the increase in spread increases liquidity risk since there is a tradeoff between increasing spread and credit risk. Higher spreads improve profitability, but they narrow the scale of operations due to which finance to deposit ratio decreases. For Islamic banks, it is true that finance to deposit ratio and spread move in opposite directions.*

**Keywords:** Islamic Banking, Islamic Finance, Interest Free Banking, Risk Management, Credit Risk, Liquidity Risk

**JEL Codes** G32, G21

## 1. Introduction

The financial crisis of 2007-2009 and ongoing sovereign debt crisis in Europe has challenged the conventional wisdom. Massive levels of debt and consumption beyond means and speedy financial innovation with lax regulation has put major economies in a deep crisis.

According to *The Economist*, in the US, the share of total corporate profits generated in the financial sector grew from 10% in the early 1980s to 40% in 2006. These earnings are transaction costs for the production sector. Financial institutions that were just supposed to be playing a supportive role to the production economy grew much bigger and unregulated through the shadow banking practices.

Recently, Piketty (2014) explains that the tendency of returns on capital to exceed the rate of economic growth today threatens to generate extreme inequalities. Nevertheless, financial intermediation has a useful function to facilitate intertemporal consumption decisions by households and investment decisions by firms to encourage capital formation. It is well established in literature that financial development compliments economic growth. Levine (2002) using cross country data argues that overall financial development is robustly linked with economic growth. North (1990) and Neal (1990) have also concluded that regions that developed the relatively more sophisticated and well-functioning financial systems were the ones that were the subsequent leaders in economic development of their times. Odedokun (1998) also concludes that the growth of financial aggregates in real terms has positive impacts on economic growth of developing countries, irrespective of the level of economic development attained.

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What is needed is a new paradigm that can put the focus back on productive enterprise, brings recovery with job creation, limit and regulate speculative financial instruments and improve corporate governance by influencing the incentives more deeply and proactively.

During the last decade and half, the Islamic financial industry has seen tremendous growth even when the conventional financial institutions went into a deep crisis. Islamic finance is a fast growing industry all across the globe with an asset base touching \$1.5 trillion in a small amount of time. Islamic finance products are not only interest free alternatives for the financial needs of the contemporary Muslim communities wanting to avoid interest, but the products are generating increased appeal primarily because of their financial and economic merits. Islamic finance principles by basing all financial products with real assets provide an inherent risk management tool inbuilt into the system.

The paper proceeds as follows:

In section 2, we discuss the operational underpinnings of risk management in Islamic banking. In section 3, we give an overview of Islamic banking in Pakistan and document the performance using various descriptive statistics and present our analysis. In section 4, we give a brief account of empirical literature focused on risk determinants in Islamic banking. In section 5, we explain our research methodology, results and findings.

## **2. Risk management in Islamic Banking**

The basic structure of Islamic banking can be explained as follows. First, an Islamic bank creates an asset pool which consists of bank's equity and deposits. Deposits include two further classifications, i.e. remunerative deposits and non-remunerative deposits. Remunerative deposits are mobilized using partnership mode 'Mudarabah' with bank's shareholders and depositors as partners. Profit sharing ratio is agreed at the start of this partnership. Non-remunerative deposits are mobilized using Qarz (non-compensatory loan).

This pool of assets is used to provide asset backed financing. These financing assets are based on different underlying financing contracts, i.e. Ijarah, Diminishing Musharakah, Murabaha, Istisna etc. Islamic bank does not lend money. It provides asset backed financing in which the asset is owned by the bank. These financing modes can be categorized as lease based financing or credit sale based financing. Income stream is generated either through profit on credit sale or rent for the use of asset.

Income from the sale or lease of real assets is distributed among the contributors in asset pool, including bank's shareholders and depositors. To achieve spreads for financial intermediation function, profit sharing is done between bank and depositors as per the pre-agreed profit sharing ratio.

In this section, we discuss the major risks that Islamic banks face in their commercial operations and the tools with which they mitigate these risks.

### **2.1. Credit Risk**

Credit risk is generally defined as the potential that the counterparty fails to meet its obligations in accordance with agreed terms. Credit risk includes the risk arising in the settlement and clearing of transactions.

But, since clean borrowing is not possible in Islamic banking, Islamic financing is asset backed and adequately collateralized. Furthermore, the title of ownership rests with the bank in Ijarah and Murabaha

until the actual sale transaction is made. Therefore, an Islamic bank can foreclose the asset in the case of default.

### **2.1.1. Tools to Manage Credit Risks**

- Pledge of Assets as Collateral

Any asset owned by the client could be taken as collateral. The client may not be able to sell that asset without bank's permission. However, the ownership of the asset will remain with the client.

- Third Party Guarantee

If the client's own guarantee is not completely reliable, then the bank can ask for third party guarantee, especially when the client is an associated company or a subsidiary company or when the majority owner is a conglomerate.

- First and Second Charge on Assets

First and second charge on the asset rank the order in which the proceeds of the liquidated asset are used to pay off liabilities. If a financier has a secondary charge, then his turn to be paid back from the client's liquidation of asset will come second. All else equal, the financiers will prefer to have first charge.

- Takaful

Takaful can be used to insure a tangible movable or immovable asset. The insurance cost can also be added back in the sale price or rentals.

- Hamish Jiddiyah

As an alternative to down payment or security deposit, some advance rental could be taken which may be adjusted in the payment schedule. It could also be used as partial settlement price for the sale of asset. However, any amount received in this case at the beginning of the contract cannot be taken as income for that period.

## **2.2. Market Risk**

It refers to the risk arising from adverse movements in interest rates, commodity prices and FX rates. Commodity risk is also present in Murabaha, Ijarah and Salam.

### **2.2.1. Tools to Manage Market Risks**

- Parallel Contract (if permissible)

To mitigate the storage risk and avoid inventory cost, parallel contract can be done for the same date in the case of Salam.

- Binding Promise

Binding promise which is unilateral (one-sided) can be taken to ensure contract enforcement and to guarantee seriousness of purpose on client's end before the bank invests depositors' funds to provide financing to the clients.

- Takaful for Asset Risk

Takaful can be used to insure a tangible movable or immovable asset. The insurance cost can also be added back in the sale price or rentals.

### **2.3. Equity Risk**

It refers to adverse changes in market value (and liquidity) of equity held for investment purposes. It covers all equity instruments including Mudarabah and Musharakah.

#### **2.3.1. Tools to Manage Equity Risks**

- Seek diversification of capital contribution.
- Using restricted Mudarabah.
- Using Musharakah than Mudarabah where possible.
- Limiting period of contract.
- Plan exit strategies.

### **2.4. Liquidity Risk**

Liquidity risk is the potential loss to the Islamic banks arising from their inability to meet their obligations as they fall due without incurring unacceptable costs or losses.

#### **2.4.1. Tools to Manage Liquidity Risks**

- Diversify Sources of Funds

Increase in non-remunerative deposits can reduce the cost of raising funds from the public. Reliance on few big deposits is risky. It is better to have a widespread deposit base.

- Reduce Concentration of Funding Base

It is better to have efficient liability mix with adequate availability of short term and long term deposits. Maturity matching on both sides of the balance sheet can solve much of the problem systematically.

- Rely on Marketable Assets

It is better to finance those assets on priority basis that have secondary market and that are somewhat standardized and widely used in the real sector of the economy.

### **2.5. Legal Risk**

It refers to inadequate legal framework, conflict of conventional and Islamic laws and conflict between Shariah rulings and legal decisions.

#### **2.5.1. Tools to Manage Legal Risks**

- Taking prior approval from Shari'ah advisor.
- Documenting agreements to make them enforceable.
- Binding undertakings.

- Covering contingencies in design of agreements.
- Documenting the details of rights/duties in agreements.
- Strong internal compliance, due diligence and audit.

## **2.6. Displaced Commercial Risk**

It refers to the risk that the Islamic bank may confront commercial pressure to pay returns that exceed the rate that has been earned on its assets.

### **2.6.1. Tools to Manage Legal Risks**

- Floating rentals so that increase in benchmark rate is absorbed effectively on both sides of the balance sheet.
- Using profit equalization reserves.
- Using Hibah.

Hence, it can be seen that asset backed financing feature in Islamic banking ensures sound credit risk management. The different modes of Islamic financing cater to different needs of the client and help the Islamic bank to ensure effective risk management. The use of floating rentals helps the Islamic bank to mitigate benchmark rate risk. We also discussed that Islamic banks use profit equalization reserves to remain competitive and reduce the commercial displacement risk.

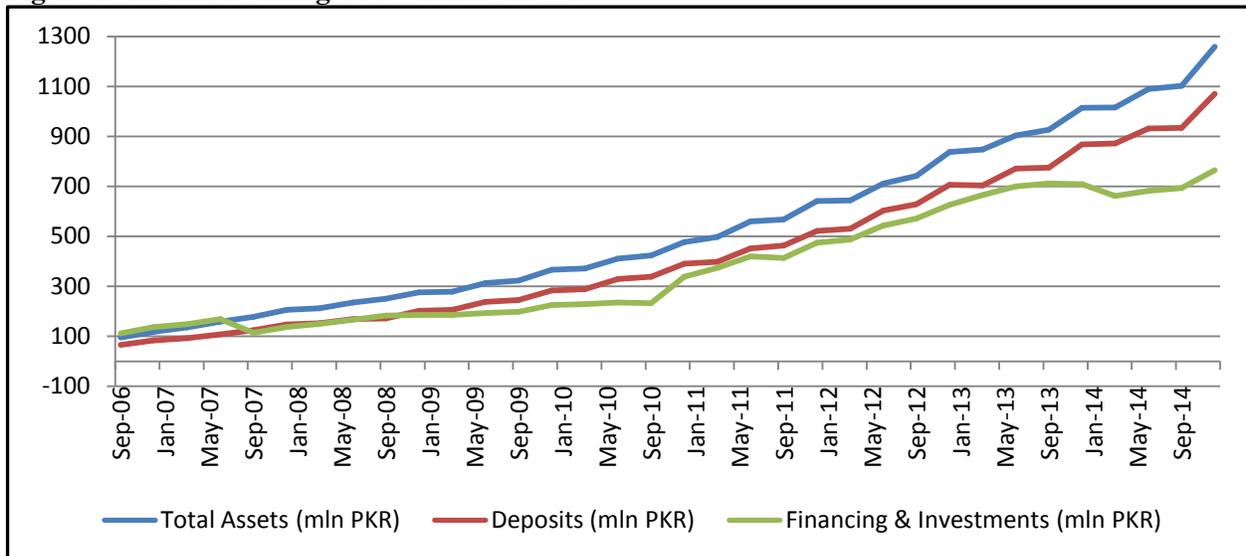
## **3. Islamic Banking in Pakistan**

In Pakistan, the second phase of Islamic banking got started in 2002 with the launch of first full-fledged Islamic bank in Pakistan, i.e. Meezan Bank. The first phase of Islamic banking during the 1980s under the patronage of Zia-ul-Haq was not successful. However, with increased participation of Shari'ah scholars in the policy making, product design, audit and supervision, the second phase has seen impressive and consistent growth.

Now, Islamic banking in Pakistan is an established industry with 10% market share achieved in just over a decade. There are 5 full-fledged Islamic banks and 18 other commercial banks that operate Islamic banking windows alongside conventional banking operations in Pakistan.

Figure 1 below shows the growth in assets, deposits and advances in Islamic banking industry in Pakistan for the period 2006-14. The exponential and uninterrupted growth is evident from this graph.

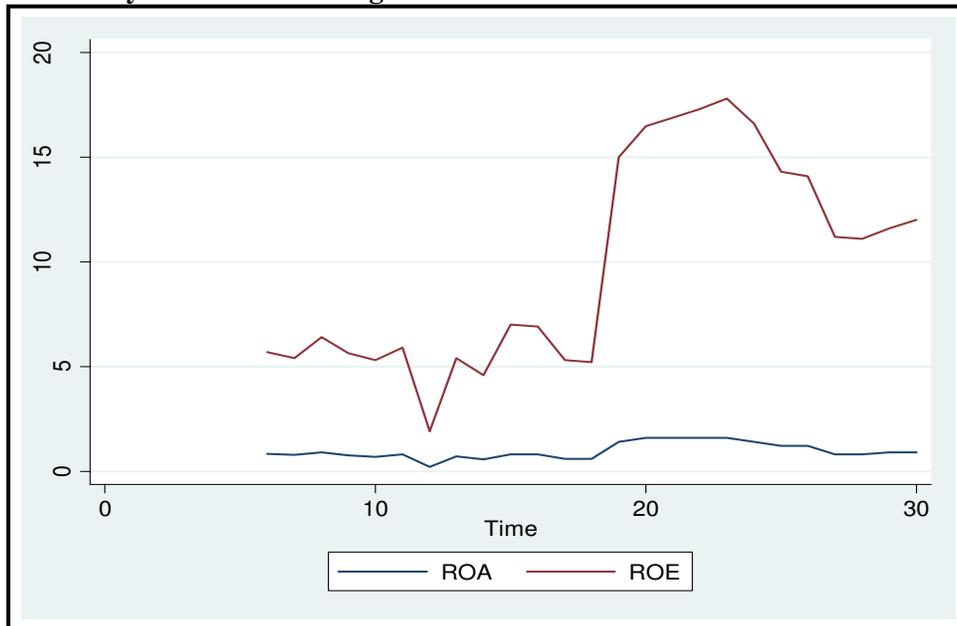
**Figure 1: Islamic Banking Growth in Pakistan**



**Source: SBP Islamic Banking Bulletin**

Figure 2 below shows the profitability in Islamic banking during the period 2006-14 in Pakistan as measured by the accounting ratio, Return on Equity (ROE) and Return on Assets (ROA). It can be seen that initially some banks took time to consolidate and reach breakeven; but in later periods, they have registered strong growth with ROE reaching even 18% and sustaining to be in double digits despite the security, energy and fiscal crisis in the country.

**Figure 2: Profitability in Islamic Banking in Pakistan**

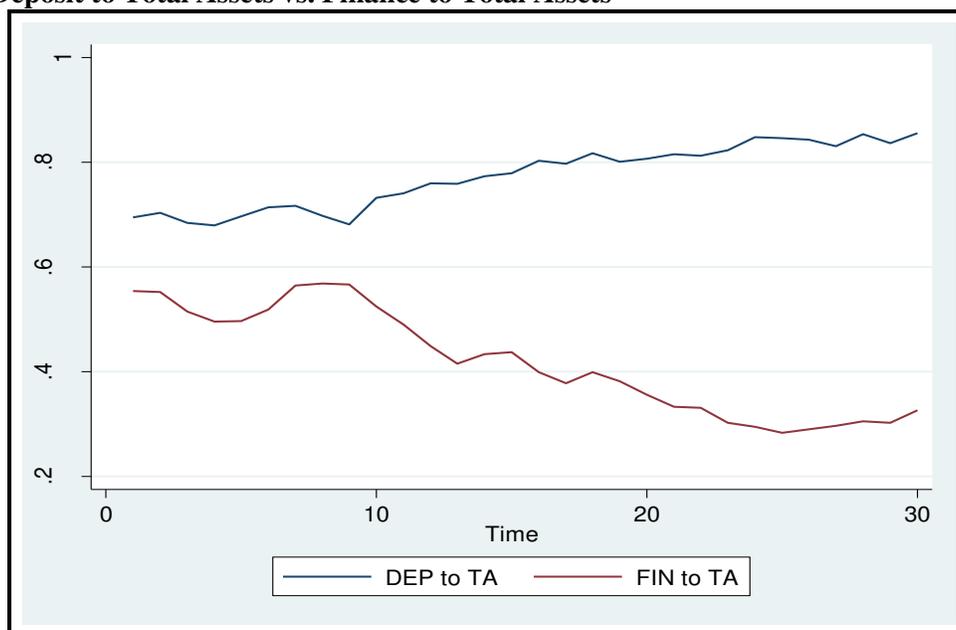


**Source: SBP Islamic Banking Bulletin**

However, the challenge for Islamic banks in Pakistan is to effectively use the deposits in generating income earning assets. It can be seen in Figure 3 below that the gap between Deposits to Total Assets (DEP to TA) and Financing to Total Assets (FIN to TA) had swelled in recent quarters in Pakistan. It

shows that deposit mobilization had been much easier in Islamic banking as compared to using the deposits to provide finance. This widening gap is after the consumer financing credit crunch and can partly be explained by increased intensity of energy crisis which hit the manufacturing sector the most in Pakistan. Islamic banks with assets backed financial products rely much more on formal documented manufacturing based industries where finance is required for plant and machinery, raw material and industrial equipment.

**Figure 3: Deposit to Total Assets vs. Finance to Total Assets**



Source: SBP Islamic Banking Bulletin

#### 4. Brief Review of Empirical Literature on Risk Determinants in Islamic Banks

In this section, we give a brief account of empirical literature on risk determinants in Islamic banking. In early literature, How et al (2004) using Malaysian data find that Islamic banks have significantly lower credit and liquidity risks but significantly higher interest-rate risk than conventional banks. They also find that bank size is significantly related to credit risk. Their results show that loan volatility, bank capital, and bank size are statistically significantly related to liquidity risk.

Conducting a study in Malaysia, Noraini (2012) finds that the financial crisis has little impact on the extent of liquidity risk in the Islamic banks. The study also suggests that there is a general decline in the ROE of the Islamic banks from 2006 to 2008, indicating that the crisis has had an adverse effect on the Islamic banks' profitability. Conducting a study for Islamic banks in Malaysia, Misman et al (2013) show that financing quality, capital buffer and Islamic financing type have a positive and significant effect on credit risk of Islamic banks in Malaysia while capital ratio and financing expansion are negatively related to their credit risk level.

For a study on credit risk determinants in GCC Islamic banks, Al-Wesabi & Ahmad (2013) find that the credit risk is largely determined by liquidity, management quality, risky assets in portfolios and GDP.

Conducting a study for Pakistan, Ahmed et al (2011) use credit, operational and liquidity risks as dependent variables while size, leverage, NPL ratio, capital adequacy and asset management are used as explanatory variables. The results indicate that the size of Islamic banks have a positive and statistically

significant relationship with financial risks (credit and liquidity risk), whereas its relation with operational risk is found to be negative and insignificant. The asset management establishes a positive and significant relationship with liquidity and operational risk. The debt equity ratio and NPL ratio have a negative and significant relationship with liquidity and operational risk. In addition, capital adequacy has a negative and significant relationship with credit and operational risk.

In another study for Pakistan, Iqbal (2012) reports significant and positive relation of CAR, ROA, ROE and size of the bank with the liquidity risk, whereas NPL is negatively related with liquidity risk. In a cross country study of 99 full-fledged Islamic banks from top 14 Islamic banking countries, Alam (2012) uses 10 year data for the period 2000-10. According to the empirical findings, Islamic banks are more profit efficient compared to the cost efficiency scores. Inefficient Islamic banks still maintain lower risk level due to cost constraints which restricts the ability of inefficient Islamic banks to take on more risks.

## 5. Research Methodology

### 5.1. Data

We have selected five full-fledged Islamic banks in the sample. Annual data for the period 2007-13 on various internal financial factors is taken from the balance sheets and income statements. We have also created variables from the reported data which are important financial ratios used commonly for the analysis of banks. In total, there are 35 observations ( $N = i \times t$ ), i.e. 7 year data (t) for 5 banks (i) and thus we have a balanced panel. Islamic banks included in the sample are Meezan Bank Limited (MBL), Bank Islami (BI), Dubai Islamic Bank (DIB), Bank Al-Barakah (BA) and Burj Islamic Bank (BIB). Variables are taken from the annual reported financial statements. Some variables are constructed as ratios of reported variables. Table 1 lists variables and defines their mathematical definition.

**Table 1: List of Variables with Labels and Mathematical Definition**

Variable	Label	Formula
dep	Total deposits	dep
fin	Total financings	fin
cash_t	Cash at treasury	cash_t
cash_b	Cash at bank	cash_b
totcash	Total cash as sum of cash in treasury and cash with banks	cash_t + cash_b
liquidity	Ratio of total cash to total deposits	totcash/dep
findep	Ratio of finance to deposits	fin/dep
spread_r	Ratio of gross return to gross expense	ret_g/exp_g
efficiency	Ratio of gross return to administrative expense	ret_g/admin_e
nplfin	Ratio of NPL to total finance	npl/fin
depcap	Ratio of deposits to total capital	dep/cap
lnassets	Natural log of assets	ln(assets)
spread	Difference of gross return to finance and gross expense to	(ret_g/fin)-(exp_g/dep)

### 5.2. Methods of Analysis

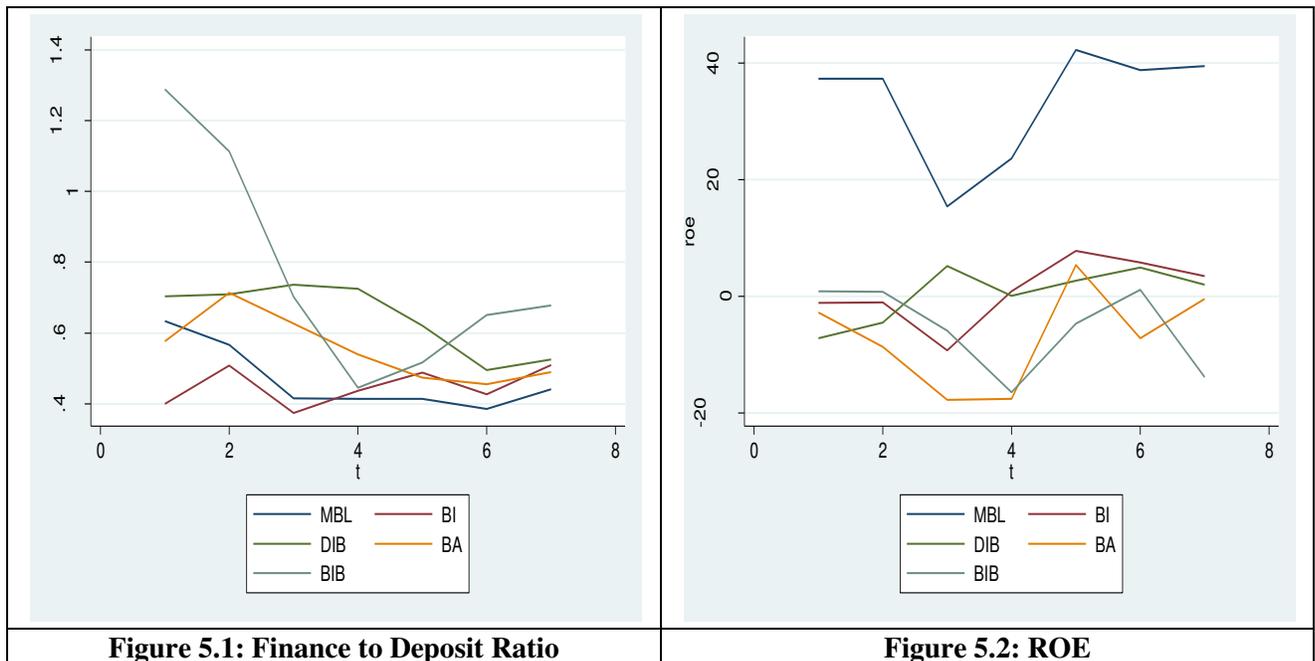
We use balanced panel data and estimate the model using fixed effects and random effects. We also apply several diagnostic tests to check for heteroskedasticity and serial correlation. We use Hausman test to decide between choosing fixed effects and random effects model. We also give illustrations of important

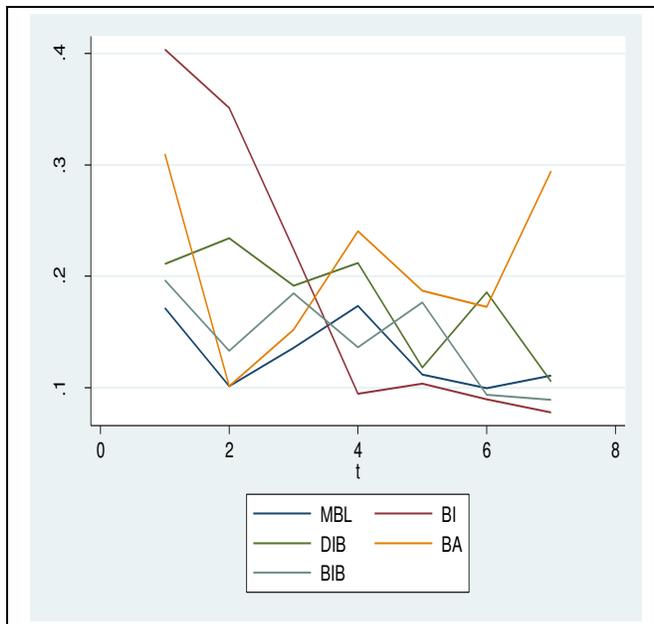
ratios of individual banks.

### 5.3. Descriptive Statistics

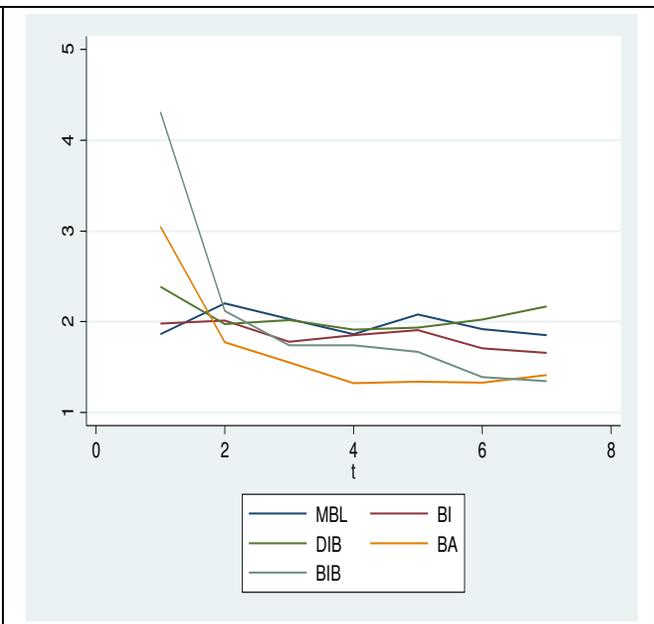
It can be seen that finance to deposit ratio is on the lower side for most Islamic banks. Most Islamic banks have also reached breakeven and have positive ROE in recent years. Apart from Bank Al-Barakah, most Islamic banks have seen decline in liquidity recently. The spread calculated as the ratio of gross returns to gross expense is fairly steady across all banks. It implies that size has limited influence on profit potential. Efficiency as measured by the ratio of gross returns to administration expense of most Islamic banks was higher during the credit crunch, but lately, there is a decline in the ratio. Lastly, NPLs rose during the credit crisis, but have stabilized since 2009.

**Figure 5: Key Ratios for Islamic Banks**

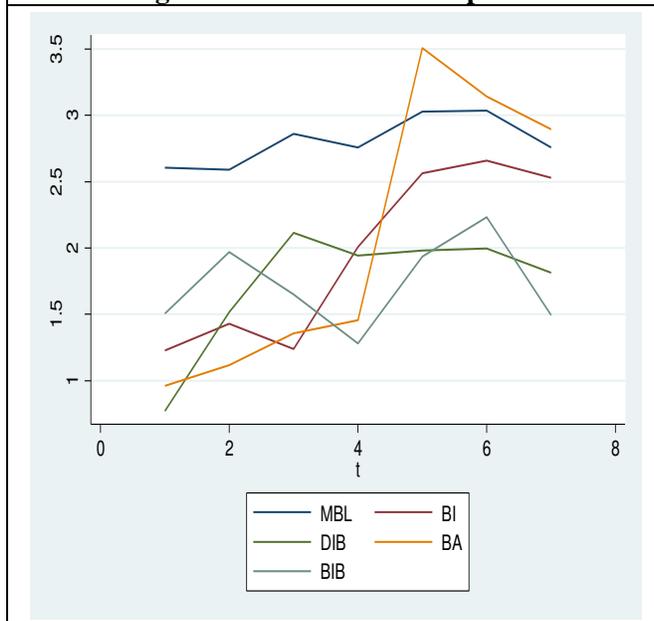




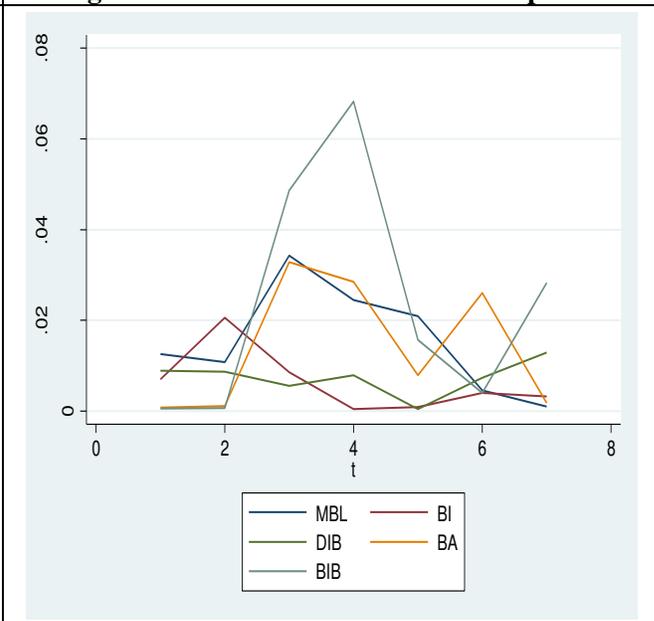
**Figure 5.3: Total Cash / Deposits**



**Figure 5.4: Gross Return to Gross Expense**



**Figure 5.5: Gross Return to Admin Expense**



**Figure 5.6: NPL to Finance**

#### 5.4. Empirical Determinants of Liquidity Risks

Next, we describe our model to study the determinants of liquidity risks.

$$\text{illiquidity}_{it} = \beta_0 + \beta_1 \text{depcap} + \beta_2 \text{cfr} + \beta_3 \text{efficiency} + \beta_4 \text{lnassets} + \beta_5 \text{spread} + e_{it} \quad \dots \dots \dots (i)$$

Where

- illiquidity = Ratio of total deposits to total cash.
- depcap = Ratio of total deposits to total capital
- cfr = Ratio of capital to total financing.

efficiency = Ratio of gross return to administrative expense  
 lnassets = Natural log of total assets.  
 spread = Ratio of NPL to total financing  
 $e_{it}$  = Random error term.

'i' is cross sectional unit identifier and 't' is time identifier.

We run the model using fixed effects and random effects estimation framework. As per Hausman test, we find that fixed effects model is more efficient. The dependent variable 'illiquidity' is defined as ratio of deposits to total cash. Increase in this ratio implies greater liquidity risks since each unit of cash at bank has greater deposits as liabilities with a higher value of this ratio. As per the empirical findings, deposits to total capital ratio increases the liquidity risks. It is plausible since greater deposit mobilization implies greater liabilities for banks. The increase in this ratio implies that a greater portion of funds with banks are in the form of deposit liabilities as compared to own capital. We also find that increase in capital to financing ratio decreases the liquidity risk which is again consistent with apriori expectations. The results further highlight that improvement in efficiency also reduces the liquidity risk by freeing tied up resources. Finally, the increase in spread increases liquidity risk since there is a tradeoff between increasing spread and credit risk. Higher spreads improve profitability, but they narrow the scale of operations due to which finance to deposit ratio decreases. For Islamic banks, it is true that finance to deposit ratio and spread move in opposite directions during the period of this study.

**Table 2: Model Estimation for Islamic Banks**

Fixed-effects (within) regression		Number of obs.	=	35	
Group variable: id		Number of groups	=	5	
R-sq: within = 0.6014		Obs per group: min	=	7	
between = 0.2272		avg	=	7.0	
overall = 0.2755		max	=	7	
corr(u_i, Xb) = -0.8136		F(5, 25)	=	7.54	
		Prob > F	=	0.0002	
illiquidity	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
depcap	.5202289	.1683519	3.09	0.005	.1735016 .8669561
cfr	-.1505614	.0369948	-4.07	0.000	-.2267536 -.0743691
efficiency	-1.698225	.8541761	-1.99	0.058	-3.457433 .060984
lnassets	-3.778785	1.470403	-2.57	0.017	-6.807138 -.7504326
spread	30.05068	14.22963	2.11	0.045	.7442127 59.35714
_cons	48.89428	15.24207	3.21	0.004	17.50265 80.28591
sigma_u	3.2640507				
sigma_e	1.9008651				
rho	.74674365	(fraction of variance due to u_i)			
F test that all u_i=0:		F(4, 25) =	6.55	Prob > F = 0.0009	

## Conclusion

In this study, we discussed that asset backed financing in Islamic banking ensures sound credit risk management. The different modes of Islamic financing cater to different needs of the client and help the Islamic bank to ensure effective risk management. The use of floating rentals helps the Islamic bank to mitigate benchmark rate risk. We also discussed that Islamic banks use profit equalization reserves to remain competitive and reduce the commercial displacement risk. In the empirical part of the study, we

find that deposits to total capital ratio increases the liquidity risk since greater deposit mobilization implies greater liabilities of banks. We also find that increase in capital to financing ratio decreases the liquidity risk which is again consistent with apriori expectations. The results further highlight that improvement in efficiency also reduces the liquidity risk by freeing tied up resources. Finally, the increase in spread increases liquidity risk since there is a tradeoff between increasing spread and credit risk. Higher spreads improve profitability, but they narrow the scale of operations due to which finance to deposit ratio decreases. For Islamic banks, it is true that finance to deposit ratio and spread move in opposite directions.

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