

## Analysis of Asset Model for Liquidity Risk Management in Islamic Banks of Pakistan

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### **Abstract**

*Liquidity risk is the potential loss that can arise due to maturity and asset liability mismatch. The purpose of the study is to determine different factors that influence the maturity and asset liability mismatch. For examining such factors, the asset model is adopted. The variables of the asset model are return income from operational financial, sharing paid to depositors, cost of banking operation and profit from non-operational financing. The secondary data is collected from the annual income statements and balance sheets of Islamic banks from the year 2006-2015. Secondary data was used and different statistical tests were applied for examining the results. These were the descriptive i.e. S. deviation, Mode, Median, skewness and mean. In addition to that Fixed effect and Random effect was used for calculations of simple and multiple regressions. Diagnostic tests: Durbin- Watson Statistics, Hausman test, and cross dependence test are also used for ensuring accuracy of results. The findings indicate that the variables cost of banking operations, return sharing paid to depositors and profit from non-operational finances has positive and significant impact on investments in operational financing. Islamic banks can have made investments when more deposits will be deposited by the depositors therefore if return sharing to depositors will increase then deposits will also be increased then Islamic bank will be able to invest in the operational financing. Secondly if the non-operational profits increase then more investment will be likely in operational financing. Similarly, higher cost of banking operations will lead to the better management of liquidity in the Islamic banks.*

**Keywords:** Islamic Banking, Liquidity Risk, Liquidity Reserves, Shariah Principles, Financial markets.

### **Introduction**

In the recent decades capital and money markets have made tremendous progress towards financial stability that ultimately lead to the economic growth. The financial markets, banks and stock exchanges usually an indicator of economic development which can be helpful for the government, academicians and society (Onder & Ozyildirim, 2013). It can be perceived that the

finance constitutes the financial markets and management of financial markets leads to economic development. Therefore, the economic development can be aggravated through effective money markets of the country (Salamon, 2015) and it leads to increase in national income of the country (Levine, 1993). Schumpeter theory's findings were further confirmed by Bittencourt in 2012 i.e. in four Latin American nations economic development was resulted due to the progressive financial function of nation between 1980 and 2007 (Bittencourt, 2012).

The financial facilitator and supporter can be considered as Islamic, commercial and state banks that play a vital role in the financial economic system improvement. This support ultimately provides benefits for the depositors and lenders. The economic factors of production can be improved if liquidity be improved with the help of more investments and deposits by businesses and individuals in Islamic as well as to commercial banks because financial institutions create credit from those deposits and investments. Therefore, for increase in national income the Islamic banks play a vital role by managing credit creation. Although Islamic banks create credit but the proportionate growth of Islamic banks are less than commercial banks (SBP report, 2014) therefore Islamic banks need adjustments in liquidity management so there become a risk of short fall of funds. This probable short fall is called liquidity risk. Therefore, it is indispensable that Islamic banks should have strong check on the liquidity risk. To overcome the liquidity, risk the Islamic banks must convert its financial assets into liquid asset so that the depositors' liquidation needs can be fulfilled on timely manner. Therefore, the liquidity risk and mismatch is considered as main problem to be addressed and it is vital to determine that what the different factors are that influences liquidity mismatch so that mitigation of such risk can be made applicable.

The asset model (Ismal, 2010) is adopted to determine different factors are that influences liquidity mismatch so that mitigation of such risk can be made. The variables of the asset model are return income from operational financial, sharing paid to depositors, cost of banking operation and profit from non-operational financing.

### **Literature Review**

#### **Banks & Financial Institutions Liquidity risk and its Mitigation**

The money circulation and trading are facilitated by the banks and financial institutions and such facilitation is due to the money savers and different businesses. The strategic implications for the banks generally cover two competitive factors for sustainability in the financial market i.e. customer oriented financial services and liquidity management. According to Akkizidis and Khandelwal (2007), liquidity management can be defined as attract money from the depositors and balancing demand with the borrowers and depositors' money back. The depositors deposit money and bankers issue money to lenders, but the banks must secure some money for the depositors' money back, therefore banks manage current accounts form depositors and invest in long term securities and deposits that leads to liquidity risk. If investment in long term advances and deposits is controlled or curtailed then the same effect will be made on the profitability of the banks therefore to check on liquidity risk the banks must set balance between investments and deposits. If the money is required to arrange in less time than the banks can invest funds in liquid financial instruments so that the demand for the depositor's payback can be easily meet with (Fiedler, 2000).

Liquidity risk management is based on four rudiments namely the policies and initiatives of the board of directors, secondly asset liability committee roles and responsibilities, thirdly for monitoring the risk an effective information management system is also required and lastly role

of internal control system. The banks should have to monitor and control the liquidity risk by reviewing these rudiments (BIS, 2008a).

There are different risks including liquidity that effect the banking operations and performance. These are reputational risk, insolvency risk and government risk of takeovers. When the bank has liquidity constraints and cannot be able to meet its financial obligations than insolvency risk arises (Greenbaum & Thakor, 2015). The net worth of the bank becomes negative because financially assets become fewer as compared to liabilities (Greenbaum & Thakor, 2015). If the liquidity mismatch occurs and financial needs are not fulfilled then stakeholders i.e. depositors trust will be shaken so the reputational risk will occur (Heffernan, 2005). When the bank has liquidity distress then the lender of the last resort will be the country government, therefore government bailout packages for banks to manage liquidity distress (Ibrahim and Vijay Kumar, 2004).

Gap analysis can be made for comparing assets and liabilities side of balance sheet of bank to analyze the liquidity position. After such analysis the risk mitigation can be relating to liquidity can be planned and established (Heffernan, 2001). Normally the banks invest in assets for higher returns and plan to reduce cost to minimum. The ratio of liability side, total returns to deposit side, total cost of interest. This ratio should be positive to mitigate the liquidity risk (Heffernan, 2001).

### **Liquidity Management Issues on Asset Side**

The central bank has necessary condition to maintain liquidity reserve that normally shown on the assets side of balance sheet. These reserves are of two types: cash reserve and requirement of statutory reserve. The cash reserve is retained by the bank for the day to day payments and transactions. Statutory reserves on the other hand rest with the central bank for guaranteed repayments of requirements of cash (Ibrahim and Vijay Kumar, 2004). Islamic bank maintains these funds i.e. statutory reserve and cash reserve but this retention of funds is considered as idle funds. Therefore, these idle funds can be invested in money market (Mudarabah interbank funds and Mudarabah interbank) after analysis of liquidity demand and liquidity reserves (Ismail, 2010).

There are two types of financing of idle reserves i.e. equity based financing and debt based financing. The debt based financing is considered interest based short term financing and in contrast equity based financing is profit oriented and is considered as long-term financing. Therefore, Islamic banks use equity based long term financing so such banks need to identify their liquidity needs and risks (El-Din, 2008). Another liquidity issue is the default of entrepreneurs. In such a default trade based contracts and obligations are not met by the entrepreneurs. This is usually occurred because the Islamic banks do not charge interest and penalties thereon the entrepreneurs. Therefore, it is needed that banks should take careful selection of the depositors & investors. Secondly the investment should be made in diverse portfolio (Ismail, 2010).

Another asset side based issue is that the Islamic financial markets are fewer as compared to the commercial banks. They have less portfolio investment alternatives. Funds can only be invested in equity based and services based financing contracts. Therefore, the liquidity risk should have to be identified for smooth and effective working (Antonio, 1999). The Islamic banks might face difficulty for meeting daily liquidity requirements therefore it is needed to invite and attract more new depositors to arrange fresh liquidity. This extra liquidity will enhance

investments and profitability of the banks. So, the viable strategy is required for attracting new investors and depositors.

**Asset management (Sharia-based)**

Islam allows exchange business and restricts Riba (Quran, 2:275). This origination fabricates the establishment stone of Islamic managing an account. Islamic banks choose three methods of ventures: benevolent loans and services, debt-based advances and equity-based advances. Cases of value-based advances incorporate Mudarabah, Musharakah, Musaqah and Muzara'ah" (Antonio, 1999). "Cases identified with obligation based advances are Qard, Istisna, Salam, Ijarah and Murabahah, while cases of altruistic advances and administrations are Kafalah, Wakalah and Hiwalah" (Obaidullah, 2005).

Following are different recommendation for asset side management regarding investing in projects:

- Estimation of project nature and funds necessities.
- Management and matching of cash flows of project and balance sheet liability side.
- Care and due diligence is required for the selection of entrepreneurs.

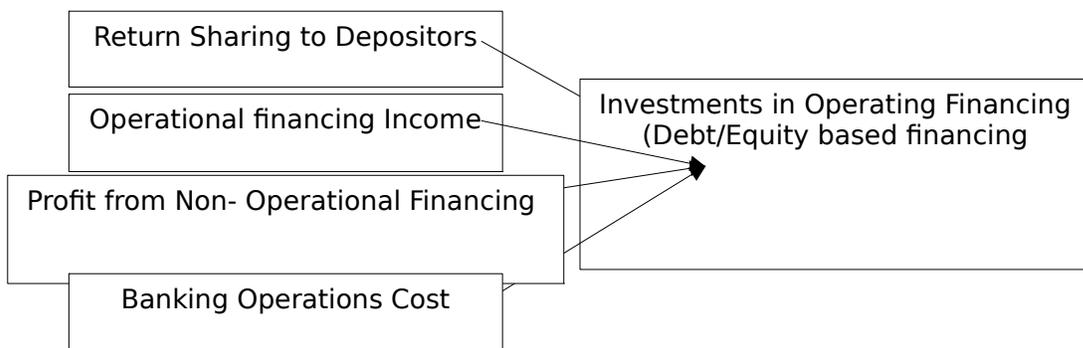


Figure 1. Conceptualization of Variables: Asset Model

The variables of the asset model are operational financial income; return sharing to depositors, profit from non-operational financing and banking operation cost.

**Data and Methodology**

The liquidity asset model was estimated through E-Views and panel estimation technique. Furthermore, the quantitative data were also testified using random and fixed effect.

Table 1: Methodology of Research Studies

Research Method	Quantitative Data Analysis (Positivistic Paradigm)
Research Data	Financial Statements
Methods of Analysis	Fixed and Random Effect Model by Panel Data Econometrics

For the most part, "quantitative research stresses on ordinal measures and numbers" (Gray et al., 2007). In particular, "quantitative research approach endeavors to set up formal connections between related factors. It is for the most part guided by positivist philosophy"

(Asutay, 2008). The worldview utilized is positivistic: "quantitative scientists by and large acknowledge the objective of building up an understanding that accurately reflects what is really occurring, some quantitative specialists rather underline the objective of building up a credible comprehension of a social procedure or social setting" (Gubrium and Holstein, 1997). The panel data econometrics is used. The panel data can be related to countries, company's individuals etc. over time. Panel data analysis leads to the data that change over time but this data does not provide cultural changes and different policies of business across companies. According to Gujarati (2009) the panel data provide less multicollinearity, data will be more variable and informative and degree of freedom will be additional. Furthermore, according to Moulton (1986) to alleviate heterogeneity, instead of time series and cross-sectional data, panel data is best suited. For the panel data analysis, it is vital to choose suitable regression model. Therefore, for this study the fixed and random effects model of regression is applied.

### Fixed Effects Model

The following equation represents the fixed effects model;

$$Y_{it} = \beta_i X_{it} + \alpha_i + u_{it}$$

Dependent variable is represented by  $Y_{it}$  whereas  $t$  is representing time and  $i$  signify entity. Dependent variable is represented by  $X_{it}$  and coefficient of independent variable is shown as  $\beta_i$ . The unknown intercept in the analysis is represented by  $\alpha_i$ . The error term in the above equation is shown by  $u_{it}$ .

### Random Effects Model

The following equation represents the random effects model;

$$Y_{it} = \beta X_{it} + \omega_i + v_{it}, \quad \omega_i = \epsilon_i + v_i$$

Explanatory variables vector is represented by  $X_{it}$ .  $\epsilon_i$  is representing the heterogeneity that occur among the cross-sectional dimensions in random effect model.  $t$  representing the time,  $v_i$  is the error term,  $\beta X_{it}$  is showing independent variable and  $\sigma_e^2$  is representing constant variance according to Brooks (2014). If there are influencing factors on across entities on dependent variable then the random effect model is used.

### Random effects VS fixed effects Model

According to Brooks (2014); Gujarati (2009); Hausman (1978); and Moulton (1987) the random effect model is used when time is small and cross-sections are large secondly if population is selected randomly from cross sections. The fixed effect model is considered as suitable if independent variables and  $\epsilon_i$  error terms are correlated with each other secondly entire population is selected for analysis.

### Model specification: Asset Model

$$PDF = f(RPA, DFR, NOP, CO)$$

$$PDF_{it} = \beta_0 + \beta_1 RPA_{it} + \beta_2 DFR_{it} + \beta_3 NOP_{it} + \beta_4 CO_{it} + u_{it}$$

Whereas:

PDF= Operational financing Investments  
DFR= Operational financing Income  
profits

RPA= Depositors return sharing paid  
NOP= Non-operational financing

CO= Banking operations cost

$0 = \text{Constant}$

Slop of coefficients =  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_i$

$\mu = \text{error term}$

ln = Natural logarithmic

### Hausman Test

In 1978 Hausman built up a test which is known as Hausman test, the prime goal of this test was to choose between random effects or fixed effects model. Hausman test have null hypothesis which is random effects model is suitable. On the off chance that likelihood esteem comes over 5% for this situation we apply random effects demonstrate. On the opposite side if likelihood esteem comes under 5% we apply fixed effects model ([Hausman, 1978](#)).

### Diagnostic Tests

**Durbin- Watson Statistics.** According to [Gujarati \(2009\)](#) “Durbin-Watson esteem is utilized to check serial autocorrelation in errors from regression analysis. Durbin-Watson Statistics has invalid theory no serial relationship. The estimation of D-W fall in scope of 0-4, if values exist close to 2, this show that there is no autocorrelation, while values almost 0 speak to positive autocorrelation”.

**Correlation and Cross Dependence Test.** If the multicollinearity is present then the results can be considered as biased therefore the multicollinearity is detrimental. Multicollinearity can be defined as a state where the variable correlate with each other. The cross-dependence test is also used in this study. According to Phillips and Sul (2003) like multicollinearity, the cross-sectional dependence is also detrimental.

### Empirical Results and Analysis

The asset liquidity model has been econometrically analyzed and results are calculated. The descriptive analysis of the variables is made for asset model. Furthermore, Hausmen test is used for selection of fixed and random effect model and panel data estimation is used by random and fixed effect model. The asset side represent asset model of liquidity management. The independent variables of the asset model are operational financial income; return sharing to depositors, profit from non-operational financing and banking operation cost and dependent variable is Investments in Operating Financing.

### Asset Model: Descriptive

Table 2: Descriptive Statistics: Asset Model

	lnPDF	lnRPA	lnDFR	lnNO P	lnCO
Mean	16.482	13.673	14.436	9.441	13.854
Median	16.827	14.139	14.613	10.34 5	14.043
Maximum	18.994	17.033	17.725	13.76 3	16.193
Minimum	12.086	9.044	11.162	0.001	11.641
Std. Dev.	1.420	1.880	1.754	3.636	1.241
Skewness	-2.937	-0.763	-0.074	-1.525	-0.182
Kurtosis	4.266	3.337	2.073	4.456	2.099
Jarque-Bera	7.752	3.672	1.373	17.38	1.470

				9	
Probability	0.022	0.150	0.516	0.001	0.487

The table of descriptive statistics is 2 showing five variable descriptive. The variable PDF is showing 16.482, 1.420, -2.937, 0.022 mean, std. deviation, skewness, and probability respectively. The second variable RPA is showing 13.673, 1.880, -0.763, 0.150 mean, std. deviation, skewness, and probability respectively. The third variable DFR is showing 14.463, 1.754, -0.074, 0.516 mean, std. deviation, skewness, and probability respectively. The fourth variable NOP is showing 9.441, 3.636, -1.525, 0.001 mean, std. deviation, skewness, and probability respectively. The fifth variable CO is showing 13.854, 1.241, -0.182, 0.487 mean, std. deviation, skewness, and probability respectively. The variables are all skewed left as the above data is reflecting. lnDFR and lnCO variables are platykurtic and leptokurtic are lnPDF, lnRPA and lnNOP as shown by Kurtosis statistic.

**Asset Model: Fixed and Random Effect Model**

The fixed effect model is quite good because adjusted R square is 0.62 that is representing 62% of the variation in variable of PDF. Furthermore, the model is good fit at significance level of 1% because the F-statistics is 8.3334.

*Table 3: Fixed effects and random effects model estimation: Asset Model*

Variable	Fixed effects model	Random effects model
	8.6726	7.8415
Constant	[1.8882] (0.001)	[1.5227] (0.0000)
lnRPA	0.5092 [0.1520] (0.0023)	0.3914 [0.1432] (0.0101)
lnDFR	0.2621 [0.1639] (0.1328)	0.2524 [0.1687] (0.1446)
lnNOP	0.0668 [0.0718] (0.3604)	0.0863 [0.0519] (0.1060)
lnCO	-0.2572 [0.1993] (0.2076)	-0.08310 [0.0198] (0.6761)
<i>R-squared</i>	0.7042	0.5936
<i>Adjusted R-squared</i>	0.6222	0.5427
<i>F-statistic</i>	8.3334	11.6829
<i>Prob. (F-statistic)</i>	0.0000	0.0000

Note: Standard errors in [ ] & probability in ( )

The table 3 is showing different statistics. In the first-place independent variable of the model was return sharing paid to investor (RPA), which yielded beta co-effective of 0.5092 likelihood esteem is 0.0023, which demonstrates the positive effect of RPA on interest in operational financing is noteworthy. Second independent variable of wage from operational financing yielded a positive beta coefficient of 0.2621 alongside a likelihood estimation of 0.1328 suggesting that this relationship is likewise inconsequential. Third variable of the model i.e. benefit from non-operational financing (NOP) gave a beta coefficient of 0.0668 and likelihood estimation of variable is 0.3604, suggesting that the effect of benefit from non-

operational financing is likewise unimportant. In conclusion, variable of cost of saving money activities (CO) yielded a beta coefficient of - 0.2572 alongside a likelihood estimation of 0.2076, inferring that effect of cost of tasks on interests in operational financing is immaterial at 5% level of importance.

The model is very great because balanced R square is 0.54 that is speaking to 54% of the variety in irregular impact demonstrate. Moreover, the model is solid match at hugeness level of 1% because the F-measurements is 11.6829.

In the first-place independent variable of the model is return sharing paid to investors (RPA), which yielded a positive effect on the interest in operational financing. The relationship is portrayed by beta coefficient of 0.3914. Likelihood estimation of the relationship is 0.0101, which shows that effect of return sharing paid to contributors has a positive and noteworthy effect on interest in operational financing. The coefficient esteem demonstrating that due to 1% expansion in lnRPA leads over increment 39% in interest in operational financing. Second variable independent is salary from operational financing (DFR), which yielded a beta coefficient of 0.2524 alongside likelihood estimation of 0.1446 inferring that the effect of benefit from operational, financing on interest in operational financing, is immaterial. Third independent variable of the model is benefit from non-operational financing (NOP) furnished beta coefficient of 0.0863 alongside a likelihood of .1060 which suggests that effect of benefit from non-operational financing insignificantly affects interest in working financing. In conclusion, cost of keeping money activities (CO) additionally demonstrated a positive beta of -0.0831 alongside likelihood estimation of 0.6761 inferring that effect of cost of managing an account tasks on interest in operational funds is irrelevant".

Table 4: Hausman Specification Test: Asset Model

Test Summary	Chi-Sq. Statistic	Chi-Sq. d. f	Probability.	Decision
Cross-section random	1.798858	4	0.7727	Random effects model

Table 4 indicating Hausman Test specifying that which model we must choose i.e. fixed or random effect model. The probability value of 0.7727 specifying beta coefficient difference and indicating that random effect model is more appropriate.

### Diagnostic tests

Table 5: Pearson’s correlation coefficient matrix

Correlation (Probability)	lnPDF	lnRPA	lnDFR	lnNOP	lnCO
lnPDF	1.000000				
lnRPA	0.674386*	1.000000			
lnDFR	0.706189*	0.712953*	1.000000		
lnNOP	0.278786**	-0.062793	0.315054**	1.000000	
lnCO	0.548788*	0.748502*	0.650300*	0.131631	1.000000

Note: \* indicates significance at 5% level of significance

\*\* indicates significance at 10% level of significance

Table 5 is showing the values of correlation coefficients. If the values in the matrix are more than 0.800 then multicollinearity exist in model. But in this matrix, all the values are less than 0.800 hence multicollinearity problem does not exist in the asset model

Table 6: Serial correlation

Test	Fixed effects Model	Random effects Model
Durbin-Watson Statistics	2.25	2.20

Table 6 is showing Durbin-Watson Statistics. The rule indicate that negative serial correlation exists if Durbin-Watson value is 2 and if the value is near 0 then there will be positive correlation. For this model the values are 2.25 and 2.20 for fixed and random model respectively so serial correlation is negative hence we can rely on asset model findings.

Cross-Section Test	Table 7: Residual Dependence			
	Test	Statistic	d.f.	Prob.
Lagrange Multiplier (LM)		-0.2692	4	0.7877

Null hypothesis: No cross-section dependence (correlation) in residuals. Table 7 is showing that the probability value is 0.7877 that is greater than 0.05 hence there is no cross-sectional dependence that was enviable for acceptance of results of Asset model.

### Conclusion

Overall, the findings indicate that the variables cost of banking operations, return sharing paid to depositors and profit from non-operational finances has positive and significant impact on investments in operational financing. Islamic banks can have made investments when more deposits will be deposited by the depositors therefore if return sharing to depositors will increase then deposits will also be increased then Islamic bank will be able to invest in the operational financing. Secondly if the non-operational profits increase then more investment will be likely in operational financing. Similarly, higher cost of banking operations will lead to the better management of liquidity in the Islamic banks. However, following are some recommendations for bankers of Islamic banks:

- The conceptual issue exists in the minds of depositors. Bankers should have to clarify these issues with the help of Shariah guidelines. These clarifications will attract depositors to deposit in banks and liquidity will enhance.
- In the Islamic bank an Alam should be available with sound knowledge who gives clarifications to the potential depositors.
- At this point of time trust on Islamic banks that they are really doing Islamic practices is doubtful. This clarity is very necessary for improvement of image of banks.
- Liquidity management process should be formalized and cash requirements should be estimated beforehand.
- It's better to have separate liquidity offices at regional basis for application of liquidity policy.

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