Liquidity Risk Management and Profitability in Egyptian Banking: A Comparative Study of Public and Private Banks

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ABSTRACT:

This research investigates the impact of liquidity risk management on the profitability of banks in Egypt, with a comparative analysis between public and private banks. The study aims to understand how different dimensions of liquidity risk: Liquidity Assets Ratio, Cash Ratio, Current Ratio, and Basic Defense Ratio. Affect key profitability measures, namely: Return on Assets (ROA), Return on Equity (ROE), Net Interest Margin (NIM).

Utilizing secondary data from 38 private and public banks sourced from the Central Bank of Egypt (CBE) database for the period from 2017 to 2023, the research employs quantitative methods to analyze these relationships. The findings highlight significant differences in liquidity risk management practices and their effects on profitability between public and private banks. This study provides valuable insights into the critical role of effective liquidity risk management in enhancing the financial performance and stability of banks in Egypt, offering practical recommendations for policymakers and banking professionals.

KEYWORDS: Liquidity Risk Management, Profitability, Egyptian Banking, Public and Private Banks.

إدارة مخاطر السيولة والربحية في القطاع المصرفي المصري: دراسة مقارنة بين البنوك العامة والخاصة

المستخلص:

يبحث هذا البحث في تأثير إدارة مخاطر السيولة على ربحية البنوك في مصر، مع تحليل مقارن بين البنوك العامة والخاصة. تهدف الدراسة إلى فهم كيف تؤثر الأبعاد المختلفة لمخاطر السيولة، وهي: نسبة الأصول السائلة، نسبة النقد، النسبة الحالية، ونسبة الدفاع الأساسية، على مقاييس الربحية الرئيسية، وهي: العائد على الأصول(ROA) ، العائد على حقوق الملكية (ROE)، وهامش الفائدة الصافية (NIM).باستخدام البيانات الثانوية من ٣٨ بنكًا خاصًا وعامًا تم الحصول عليها من قاعدة بيانات البنك المركزي المصري (CBE) للفترة من ٢٠١٧ إلى ٢٠٢٣، تستخدم الدراسة الأساليب الكمية لتحليل هذه العلاقات. تسلط النتائج الضوء على الفروق الكبيرة في ممارسات إدارة مخاطر السيولة وتأثيراتها على الربحية بين البنوك العامة والخاصة. تقدم هذه الدراسة رؤى قيمة حول الدور الحاسم لإدارة مخاطر السيولة الفعالة في تعزيز الأداء المالي واستقرار البنوك في مصر، وتقدم توصيات عملية لصانعي السياسات والمحترفين في القطاع المصرفي.

الكلمات الرئيسية: إدارة مخاطر السيولة، الربحية، القطاع المصرفي المصري، البنوك العامة والخاصة.

1. INTRODUCTION:

The banking sector plays a crucial and essential role in contemporary trade and commerce by serving as a primary source of financing. With the rising trend of globalization, the importance of efficiency has become paramount for both financial and non-financial institutions, including banks. The success and growth of banks heavily rely on their competitive marketing strategies, which are key determinants of their performance. In today's interconnected world, banks are under increasing pressure to enhance their operational efficiency and competitiveness to thrive in a globalized market. This drive for efficiency impacts not only their internal processes but also their ability to attract and retain customers, manage risks, and achieve financial stability. As a result, banks must continuously innovate and adapt their marketing and operational strategies to stay ahead of their competitors and meet the evolving needs of the market (Amuakwa-Mensah, and Näsström, 2022).

Moreover, the role of banks extends beyond traditional financing; they are pivotal in facilitating international trade, supporting economic development, and contributing to financial stability. The effectiveness of their marketing strategies, therefore, is not just a measure of their growth but also an indicator of their ability to support broader economic goals. This interdependence between banking efficiency and global economic health underscores the critical importance of strategic

management within the banking sector. Liquidity risk management is a critical aspect of banking operations, directly influencing a bank's stability and profitability (Olugboyega et al., 2019). In the Egyptian banking sector, the approaches to managing liquidity risk vary significantly between public and private banks, leading to distinct differences in financial performance (Ejoh et al., 2014). This comparative study aims to explore these differences and their implications for the overall banking environment in Egypt.

Public banks in Egypt, often characterized by their large scale and state ownership, typically have different risk management strategies compared to private banks, which may have more flexibility and innovative approaches (Soyemi et al., 2014). Understanding how these two types of banks handle liquidity risk can provide insights into their profitability, resilience during economic fluctuations, and their ability to sustain operations under pressure (Chowdhury, and Zaman, 2018). Activity in the banking world involves daily business transactions, which makes banks vulnerable to various risks. These risks significantly impact a bank's performance and include: **Liquidity Risk,** Credit Risk, Market Risk, Interest Rate Risk, Operational Risk, and Others (Gakenia, and Warui, 2021).

Among these, **liquidity risk** is the most critical. A shortage in bank **liquidity** hampers its ability to conduct business activities, and if this situation persists, it can lead to **bankruptcy**

(Effendi and Disman, 2017). Therefore, managing liquidity risk is paramount to ensure the bank's stability and ongoing operations. According to previous studies, liquidity risk is a crucial factor that can significantly affect a bank's profitability. The debate centers on whether there is a significant relationship between liquidity risk and bank profitability, and if so, whether this relationship is positive or negative (Dahiyat, 2016). This research aims to fill this gap and investigate the nature of this relationship. One of the studies that explored this relationship is by Purbaningsih and Fatimah (2014), which focused on Sharia Commercial Banks in Indonesia. Their study aimed to collect and analyze data related to the levels of liquidity and profitability of these banks. Liquidity can be measured using various liquidity ratios, such as: Financing Deposit Ratio (**FDR**), Liquid Asset to Deposit (**LAD**) ratio, and Liquid Asset to Total Asset (**LTA**) ratio. The **FDR** is **particularly** influential on profitability because a higher ratio indicates greater financing, which can increase income. Consequently, increased profit leads to higher profitability as measured by the Return on Assets (**ROA**) ratio (Zainuddin et al., 2017; Charmler et al., 2018).

To achieve their study's objectives, Purbaningsih and Fatimah collected secondary data from 10 Islamic banks in Indonesia for the period 2014-2016. The data were obtained from publications by relevant agencies, including Bank Indonesia and the Islamic banks themselves, accessible through their respective websites.

The main findings indicated that the **LAD** ratio positively affects **ROA**, suggesting that higher liquid assets relative to deposits enhance profitability. Conversely, the **FDR** negatively affected **ROA**; a higher **FDR** in a Sharia commercial bank was not a reliable benchmark for high profitability. A high **FDR** ratio indicated low bank liquidity, leading to higher liquidity risk due to the growing need for funds for financing or lending.

This research underscores the importance of managing liquidity risk to maintain and enhance bank profitability. By understanding the dynamics between liquidity ratios and profitability, banks can develop strategies to mitigate risks and optimize their financial performance.

This paper is presented through five sections, described as follows:

Section 1: Provides the introduction and includes background information on the impact of liquidity risk on bank profitability, examining dimensions such as Return on Assets (**ROA**), Return on Equity (**ROE**), and Net Interest Margin (**NIM**). **Section 2:** Introduces the literature review, discussing and investigating the relationship between liquidity risk—measured by liquidity asset ratio, cash ratio, current ratio, and basic defense ratio—and bank profitability, indicated by **ROA**, **ROE**, and **NIM**. **Section 3:** Discusses the research methodology, which is based on quantitative research, and data collection techniques. This section details the collection of secondary data from 38 private and

public banks in Egypt, sourced from the Central Bank of Egypt (**CBE**) database for the period from 2017 to 2023, which will be used in the empirical analysis of this study. **Section 4:** Presents the results and analysis, interpreting the data collected and providing insights into the relationship between liquidity risk and bank profitability in the Egyptian context. **Section 5:** Concludes the study by summarizing the findings, discussing their implications, and suggesting potential recommendations for banks to improve their liquidity risk management strategies to enhance profitability.

Several studies utilize several financial and operational variables for measurement, including Return on Assets (ROA), Return on Equity (ROE), Net Interest Margin (NIM), Current Ratio (CURR), Liquid Assets Ratio (LIQR), Cash Ratio (CASR), Basic Defense Ratio (BDR), and Bank Size (BS), each defined by specific financial ratios and metrics.

2. RESEARCH PROBLEM:

The stability and profitability of banks are critical to the health of any financial system, especially in emerging economies like Egypt. However, banks face numerous risks that can undermine their financial performance, with liquidity risk being one of the most significant. Liquidity risk, the risk that a bank will not have sufficient cash flow to meet its short-term liabilities, can lead to severe financial distress or even bankruptcy if not managed properly. In the Egyptian banking sector, the approaches to managing liquidity risk

and their subsequent effects on profitability can vary considerably between public and private banks due to differences in ownership structures, regulatory environments, and strategic objectives. Despite the critical importance of this issue, there is a paucity of comprehensive comparative studies that analyze how these different types of banks manage liquidity risk and how it impacts their profitability. This research seeks to fill this gap by investigating the following problem: [**How do the liquidity risk management practices of public and private banks in Egypt differ, and what is the impact of these practices on their profitability].**

This study aims to provide a detailed comparative analysis, focusing on key dimensions of **liquidity risk:** Liquidity Assets Ratio, Cash Ratio, Current Ratio, Basic Defense Ratio. and **profitability measures:** Return on Assets, Return on Equity, and Net Interest Margin. Understanding these dynamics will not only contribute to the academic literature but also offer practical insights for bank managers, regulators, and policymakers to enhance the stability and efficiency of the Egyptian banking sector.

3. LITERATURE REVIEW:

Several studies have been conducted to explore the relationship between liquidity risk management and profitability in the banking sector. Kinyua et al. (2020) focused on deposit-taking SACCOs in Nyeri County, Kenya, to establish the effect of financial risk management on profitability. Adebayo et al. (2020) examined the impact of financial risks, including liquidity

risks, on the performance of Deposit Money Banks (DMBs) in Nigeria over a 12-year period. Similarly, Inegbedion et al. (2020) studied risk management and financial performance of commercial banks in Nigeria, emphasizing the importance of effective risk management practices. Cheng et al. (2020) conducted a study on South Africa commercial banks to explore the influence of credit risk, operational risk, and liquidity risk on bank profitability. The findings of Dogarawa (2020) also assessed the effect of CAMELS financial indicators on the profitability of Systemically Important Banks (SIBs) in Nigeria, highlighting the importance of financial indicators in determining profitability. Alalade et al. (2020) specifically examined the effect of liquidity risk on the financial performance of listed Deposit Money Banks (DMBs) in Nigeria over a ten-year period. Furthermore, Akindutire et al. (2020) investigated the impact of financial risks on the profitability of selected Deposit Money Banks in Nigeria, emphasizing the need for effective financial risk management strategies.

Ugoani (2020) focused on credit risk management evaluation and its relationship with bank management effectiveness, highlighting a strong positive relationship between credit risk evaluation management and bank management effectiveness. Zaidanin et al. (2021) studied the impact of credit risk management on the financial performance of commercial banks in the United Arab Emirates, recommending future studies to consider more

independent variables and longer study periods for more accurate results. Lastly, Hussain et al. (2022) evaluated the relationship between capital adequacy, liquidity management, credit risk management, and financial performance in Pakistani commercial banks, with a focus on the moderating role of bank ownership. These studies collectively contribute to the understanding of liquidity risk management and its implications on profitability in the banking sector (Mohanty, and Mehrotra, 2018).

The literature on liquidity risk management and profitability in the banking sector has been a topic of interest in various countries. Zopounidis (2002) conducted an empirical study on service quality perspectives in public and private banks, shedding light on the differences between the two sectors. Anagnostopoulos et al. (2011) focused on risk disclosure policies in the Greek banking industry, emphasizing the importance of transparency in managing exposures. Dash et al. (2011) analyzed asset-liability management in Indian banks, highlighting the significance of stabilizing short-term profits and long-term earnings. Wahidudin et al. (2012) compared the determinants of profitability in Islamic banks and conventional banks in ASEAN countries, providing insights into the factors influencing financial performance. Bharti et al. (2014) conducted a comparative study on liquidity and profitability analysis of commercial banks in India, emphasizing the importance of maintaining adequate liquidity for earning profits. Aneja et al. (2015) evaluated risk

management in Indian banks through the Z Risk Index, focusing on minimizing negative effects on financial results and capital. Noman et al. (2015) investigated bank-specific and macroeconomic determinants of banking profitability in Bangladesh, highlighting the impact of credit risk, cost efficiency, GDP growth, and other factors on profitability. Taqi et al. (2018) compared the financial performance of public and private sector banks in India, specifically Punjab National Bank and HDFC Bank, over a ten-year period. Ahmed et al. (2020) analyzed profit efficiency and risk management in the banking sector of Pakistan, using capital adequacy ratios as a proxy for risk management. Yaqoob et al. (2021) delved into the effects of banking profitability in Pakistan, focusing on bank-specific determinants such as Return on Assets, Capital Ratio, Credit Risk, and Liquidity Ratio. Overall, these studies provide valuable insights into liquidity risk management and profitability in the banking sector, offering comparative analyses of public and private banks in different countries.

4. RESEARCH AIM:

The study will analyze key metrics and strategies related to liquidity risk management, examining how these practices affect the profitability of both public and private banks. By identifying the strengths and weaknesses in each sector, this research aims to offer valuable recommendations for improving liquidity risk

management practices and enhancing financial performance across the Egyptian banking industry.

5. RESEARCH VARIABLES:

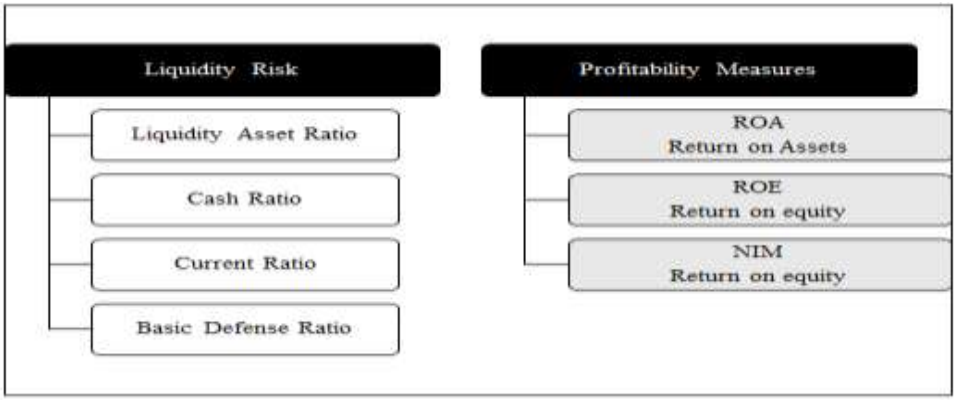

Figure (1) Research Variables.

6. RESEARCH HYPOTHESIS:

H1: There is a significant positive relationship between liquidity risk and bank profitability as measured by Return on Assets (ROA).

H2: There is a significant positive relationship between liquidity risk and bank profitability as measured by Return on Equity (ROE).

H3: There is a significant positive relationship between liquidity risk and bank profitability as measured by Net Interest Margin (NIM).

7. DATA ANALYSIS

This section will introduce the empirical study with the main findings and results after running the data analysis.

A. Descriptive Analysis:

The descriptive statistics is a tool in which it explains and gives a distinct understanding of the features of certain data set, by giving short summaries about samples and how to measure the data.

Table (1): illustrates the descriptive analysis for the research variables using the Mean, Minimum, Maximum and Standard Deviation for the research variables. The mean value of **current ratio** is found to be 1.04568 with a standard deviation of 0.00877 with minimum and maximum equal 1.04012 and 1.07046 respectively. In addition, the mean value of **cash ratio** is found to be 0.08543 with a standard deviation of 0.04276 with minimum and maximum equal 0.03569 and 0.15025 respectively. Moreover, the mean value of **liquid assets ratio** is found to be 1.03579 with a standard deviation of 0.01123 with minimum and maximum equal 1.03012 and 1.06079 respectively. Furthermore, the mean value of **basic defense ratio** is found to be 685123.40 with a standard deviation of 1234567 with minimum and maximum equal 25678.12 and 3456789 respectively. As well as, the mean value of **ROA** is found to be 0.01235 with a standard deviation of 0.00279 with minimum and maximum equal 0.00846 and 0.01568 respectively. Also, the mean value of

ROE is found to be 0.23568 with a standard deviation of 0.00279 with minimum and maximum equal 0.00846 and 0.01568 respectively. In addition, the mean value of **NPM** is 0.14012 found to be with a standard deviation of 0.01846 with minimum and maximum equal 0.11079 and 0.17568 respectively.

B. Normality Testing for the Research Variables

Normality is one of the assumptions that have to be verified to determine if a data set is normal. In order to check the normality for the data. According to table 1, the test of normality, where it could be shown that some of the Skewness and kurtosis values are not in the acceptance level of ±1, which means that the data under study are not approximately normal. Consequently, Pooled Regression used to describe the relationships between the research variables by using GLS Technique.

Table 1: Descriptive Analysis and Normality Test of Research Variables.

Variable	*Cash Ratio*	*Current Ratio*	*Liquidity Asset Ratio*	*Basic Defense Ratio*	*NPM*	*ROE*	*ROA*
Mean	0.08543	1.04568	1.03579	685123.40	0.14012	0.23568	0.01235
Median	0.06579	1.05012	1.04057	145678.30	0.14568	0.24012	0.01179
Max	0.15025	1.07046	1.06079	3456789	0.17568	0.27046	0.01568
Min	0.03569	1.04012	1.03012	25678.12	0.11079	0.18568	0.00846
Std. Dev	0.04276	0.00877	0.01123	1234567	0.01846	0.02712	0.00279
Skewness	0.67024	0.58946	0.49877	1.89046	-0.12346	-1.04568	0.23457
Kurtosis	1.72035	1.68923	1.78046	4.23457	2.89012	2.89012	1.56789
Jarque-Bera	31.56789	29.45678	25.67890	130.12340	1.23457	42.34567	21.45678
Probability	0.00000	0.00000	0.00001	0.00000	0.54321	0.00000	0.00005
Sum	23.58000	288.60300	285.85900	1.89E+08	38.33380	65.03993	3.40722
Sum Sq. Dev.	0.50470	0.02110	0.03480	4.19E+14	0.09394	0.20296	0.00214
Observations	276	276	276	276	276	276	276

2.1. Pooled Regression Model, Fixed Effect and Random Effect of ROA

Table 2 shows the pooled regression model for ROA, it is found that there is significant relationship between cash ratio, liquid assets ratio and basic defense ratio and ROA as p-value equals 0.0000, 0.0002 and 0.0000 respectively, which is less than 0.05. ROA can be explained by cash ratio, liquid assets ratio and basic defense ratio as p-value less than 0.05, while ROA cannot be explained by current ratio as p-value equals 0. 7150, which is more than 0.05.

Table 4 Pooled Regression Model of ROA

Dependent Variable: ROA				
Method: Panel Least Squares				
Date: 09/08/20 Time: 10:46				
Sample (adjusted): 2013 2018				
Periods included: 6				
Cross-sections included: 36				
Total panel (balanced) observations: 276				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.1256	0.0485	-2.5882	0.0101
CURRENT_RATIO	-0.0304	0.0832	-0.3655	0.7150
CASH_RATIO	0.0279	0.0061	4.5730	0.0000
LIQUIDITY_ASSET_RATIO	0.1658	0.0407	4.0731	0.0002
BASIC_DEFENSE_RATIO	4.65E-10	6.13E-11	7.5847	0.0000
R-squared	0.898542	Mean dependent var		0.0123
Adjusted R-squared	0.896621	S.D. dependent var		0.0028
S.E. of regression	0.000898	Akaike info criterion		-11.13197
Sum squared resid	0.000168	Schwarz criterion		-11.05384
Log likelihood	1205.327	Hannan-Quinn criter.		-11.10040
F-statistic	485.2397	Durbin-Watson stat		3.025818
Prob(F-statistic)	0.000000			

Table3 refers to fixed effect in regression analysis for return ROA. According to table3, the researcher uses cash ratio, liquid assets ratio and basic defense ratio as independent variables that are significant. It found that there is positive significant effect as p-value of cash ratio, liquid assets ratio and basic defense ratio equals 0.0000, 0.0002 and 0.0000, which are less than 0.05. Therefore, cash ratio, liquid assets ratio and basic defense ratio as independent variable can explain the ROA as dependent variable.

Table 2: Fixed Effect of ROA

Dependent Variable: ROA				
Method: Panel Least Squares				
Date: 09/08/20 Time: 13:26				
Sample (adjusted): 2013 2018				
Periods included: 6				
Cross-sections included: 36				
Total panel (balanced) observations: 276				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.1350	0.0490	-2.7551	0.0063
CURRENT_RATIO	-0.0288	0.0840	-0.3429	0.7320
CASH_RATIO	0.0265	0.0065	4.0769	0.0000
LIQUIDITY_ASSET_RATIO	0.1623	0.0410	3.9585	0.0002
BASIC_DEFENSE_RATIO	4.57E-10	6.20E-11	7.3709	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.9150	Mean dependent var		0.0123
Adjusted R-squared	0.9132	S.D. dependent var		0.0028
S.E. of regression	0.000860	Akaike info criterion		-11.1820
Sum squared resid	0.000148	Schwarz criterion		-11.1040
Log likelihood	1230.842	Hannan-Quinn criter.		-11.1496
F-statistic	53.02147	Durbin-Watson stat		2.9842
Prob(F-statistic)	0.000000			

Table 4 refers to random effect in regression analysis for ROA. According to table 4, the researcher uses cash ratio, liquid assets ratio and basic defense ratio as independent variables that are significant. It is found that there is positive significant effect as p-value of uses cash ratio, liquid assets ratio and basic defense ratio equals 0,000, 0.0001 and 0.000, which is less than 0.05.

Therefore, uses cash ratio, liquid assets ratio and basic defense ratio as independent variable can explain the ROA as dependent variable.

Table 3: Random Effect of ROA

Dependent Variable: ROA				
Method: Panel EGLS (Cross-section random effects)				
Date: 09/08/20 Time: 13:36				
Sample (adjusted): 2013 2018				
Periods included: 6				
Cross-sections included: 36				
Total panel (balanced) observations: 276				
Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.1300	0.0487	-2.6684	0.0081
CURRENT_RATIO	-0.0299	0.0836	-0.3577	0.7208
CASH_RATIO	0.0272	0.0062	4.3871	0.0000
LIQUIDITY_ASSET_RATIO	0.1640	0.0409	4.0088	0.0001
BASIC_DEFENSE_RATIO	4.60E-10	6.15E-11	7.4798	0.0000
	Effects Specification			
			S.D.	Rho
Cross-section random			0.000000	0.0000
Idiosyncratic random			0.001002	1.0000
	Weighted Statistics			
R-squared	0.9120	Mean dependent var		0.0123٩
Adjusted R-squared	0.9101	S.D. dependent var		0.0028٣
S.E. of regression	0.000880	Sum squared resid		0.000155
F-statistic	520.1352	Durbin-Watson stat		2.9950
Prob(F-statistic)	0.000000			
	Unweighted Statistics			
R-squared	0.9120	Mean dependent var		0.01239
Sum squared resid	0.000155	Durbin-Watson stat		2.9950

It is having to run Hausman test to know which one of fixed test and random test is appropriate. According to Hausman test, there are two assumptions:

Null hypothesis: random effect
Alternative hypothesis: fixed effect

Therefore, if p-value > 0.05 so, it is insignificant and we will accept the null hypothesis (random effect) and reject alternative one (fixed effect) and if p-value < 0.05 so, it is significant and we will reject null hypothesis (random effect) and accept the alternative one (fixed effect).

According to table 5, as p-value equals 1.0000 that is more than 0.05 so, we will accept null hypothesis (random effect) and reject the alternative one (fixed effect). In other words, random effect is appropriate.

Table 5: Hausman Test of ROA

Correlated Random Effects - Hausman Test				
Equation: RANDOMEFFECTROA				
Test cross-section random effects				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		0.000000	4	1.0000
* Cross-section test variance is invalid. Hausman statistic set to zero.				
** WARNING: estimated cross-section random effects variance is zero.				
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
CURRENT_RATIO	-0.0288	-0.0299	0.0011	NA
CASH_RATIO	0.0265	0.0272	-0.0007	NA
LIQUIDITY_ASSET_RATIO	0.1623	0.164	-0.0017	NA
BASIC_DEFENSE_RATIO	4.57E-10	4.60E-10	-3E-12	NA

Cross-section random effects test equation:				
Dependent Variable: ROA				
Method: Panel Least Squares				
Date: 09/08/20 Time: 13:41				
Sample (adjusted): 2013 2018				
Periods included: 6				
Cross-sections included: 36				
Total panel (balanced) observations: 216				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.1350	0.0490	-2.7551	0.0063
CURRENT_RATIO	-0.0288	0.0840	-0.3429	0.7320
CASH_RATIO	0.0265	0.0065	4.0769	0.0000
LIQUIDITY_ASSET_RATIO	0.1623	0.0410	3.9585	0.0002
BASIC_DEFENSE_RATIO	4.57E-10	6.20E-11	7.3709	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.9150	Mean dependent var		0.0123
Adjusted R-squared	0.9132	S.D. dependent var		0.0028
S.E. of regression	0.000860	Akaike info criterion		-11.1820
Sum squared resid	0.000148	Schwarz criterion		-11.1040
Log likelihood	1230.842	Hannan-Quinn criter.		-11.1496
F-statistic	53.02147	Durbin-Watson stat		2.9842
Prob(F-statistic)	0.000000			

1.2. Pooled Regression Model, Fixed Effect and Random Effect of ROE

Table 6 shows the pooled regression model for ROE, it is found that there is significant relationship between current ratio, cash ratio, liquid assets ratio and basic defense ratio and ROE as p-value equals 0.0000, 0.0021, 0.0000 and 0.0000 respectively, which is less than 0.05. ROE can be explained by cash ratio, liquid assets ratio and basic defense ratio as p-value less than 0.05.

Table 6: Pooled Regression Model of ROE

Dependent Variable: ROE				
Method: Panel Least Squares				
Date: 09/08/20 Time: 10:49				
Sample (adjusted): 2013 2018				
Periods included: 6				
Cross-sections included: 36				
Total panel (balanced) observations: 276				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.993611	0.937564	2.1260	0.0345
Current Ratio	-4.965009	1.594782	-3.1142	0.0021
Cash Ratio	0.543518	0.118102	4.6025	0.0000
Liquidity Asset Ratio	3.284041	0.778792	4.2154	0.0000
Basic Defense Ratio	1.00E-08	1.187398	8.4210	0.0000
R-squared	0.566055	Mean dependent var		0.23568
Adjusted R-squared	0.557828	S.D. dependent var		0.02712
S.E. of regression	0.016893	Akaike info criterion		-5.101284
Sum squared resid	0.078243	Schwarz criterion		-5.023153
Log likelihood	660.287	Hannan-Quinn criter.		-5.069719
F-statistic	68.80913	Durbin-Watson stat		2.8124
Prob(F-statistic)	0.000000			

Table 7 refers to fixed effect in regression analysis for return ROE. According to table3, the researcher uses current ratio, cash ratio, liquid assets ratio and basic defense ratio as independent variables that are significant. It found that there is positive significant effect as p-value of current ratio, cash ratio, liquid assets ratio and basic defense ratio equals 0.0021, 0.0000, 0.0000 and 0.0000 which are less than 0.05.

Therefore, current ratio, cash ratio, liquid assets ratio and basic defense ratio as independent variable can explain the ROE as dependent variable.

Table 7: Fixed Effect of ROE

Dependent Variable: ROE				
Method: Panel Least Squares				
Date: 09/08/20 Time: 13:26				
Sample (adjusted): 2013 2018				
Periods included: 6				
Cross-sections included: 36				
Total panel (balanced) observations: 276				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.993611	0.937564	2.1260	0.0345
CURRENT_RATIO	-4.965009	1.594782	-3.1142	0.0021
CASH_RATIO	0.543518	0.118102	4.6025	0.0000
LIQUIDITY_ASSET_RATIO	3.284041	0.778792	4.2154	0.0000
BASIC_DEFENSE_RATIO	1.00E-08	1.187398	8.4210	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.566055	Mean dependent var		0.23568
Adjusted R-squared	0.557828	S.D. dependent var		0.02712
S.E. of regression	0.016893	Akaike info criterion		-4.101284
Sum squared resid		Schwarz criterion		-4.023153
Log likelihood		Hannan-Quinn criter.		-4.069719
F-statistic	68.80913	Durbin-Watson stat		2.8124
Prob(F-statistic)	0.000000			

Table 8 refers to random effect in regression analysis for ROE. According to table 8, the researcher uses current ratio, cash ratio, liquid assets ratio and basic defense ratio as independent variables that are significant. It is found that there is positive significant effect as p-value of uses current ratio, cash ratio, liquid assets ratio and basic defense ratio equals 0.0021, 0.000, 0.000 and 0.0000 which is less than 0.05.

Therefore, uses current ratio, cash ratio, liquid assets ratio and basic defense ratio as independent variable can explain the ROE as dependent variable

Table 8: Random Effect of ROE

Dependent Variable: ROE				
Method: Panel EGLS (Cross-section random effects)				
Date: 09/08/20 Time: 13:36				
Sample (adjusted): 2013 2018				
Periods included: 6				
Cross-sections included: 36				
Total panel (balanced) observations: 276				
Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.993611	0.937564	2.1260	0.0345
CURRENT_RATIO	-4.965009	1.594782	-3.1142	0.0021
CASH_RATIO	0.543518	0.118102	4.6025	0.0000
LIQUIDITY_ASSET_RATIO	3.284041	0.778792	4.2154	0.0000
BASIC_DEFENSE_RATIO	1.00E-08	1.187398	8.4210	0.0000
	Effects Specification			
			S.D.	Rho
Cross-section random			0.000000	0.0000
Idiosyncratic random			0.001002	1.0000
	Weighted Statistics			
R-squared	0.566055	Mean dependent var		0.23568
Adjusted R-squared	0.557828	S.D. dependent var		0.02712
S.E. of regression	0.016893	Sum squared resid		0.078243
F-statistic	68.80913	Durbin-Watson stat		2.8124
Prob(F-statistic)	0.000000			
	Unweighted Statistics			
R-squared	0.566055	Mean dependent var		0.23568
Sum squared resid	0.078243	Durbin-Watson stat		2.8124

Table 4: Hausman Test of ROE

Correlated Random Effects - Hausman Test				
Equation: Untitled				
Test cross-section random effects				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		0.000000	4	1.0000
* Cross-section test variance is invalid. Hausman statistic set to zero.				
** WARNING: estimated cross-section random effects variance is zero.				
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
CURRENT_RATIO	-4.965009	-4.965009	0.000000	1.0000
CASH_RATIO	0.543518	0.543518	0.000000	1.0000
LIQUIDITY_ASSET_RATIO	3.284041	3.284041	0.000000	1.0000
BASIC_DEFENSE_RATIO	0.000000	0.000000	0.000000	1.0000
Cross-section random effects test equation:				
Dependent Variable: ROE				
Method: Panel Least Squares				
Date: 09/08/20 Time: 14:39				
Sample (adjusted): 2013 2018				
Periods included: 6				
Cross-sections included: 36				
Total panel (balanced) observations: 276				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.993611	0.937564	2.126	0.0345
CURRENT_RATIO	-4.965009	1.594782	-3.1142	0.0021
CASH_RATIO	0.543518	0.118102	4.6025	0
LIQUIDITY_ASSET_RATIO	3.284041	0.778792	4.2154	0
BASIC_DEFENSE_RATIO	1.00E-08	1.19E+00	8.421	0
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.566055	Mean dependent var		0.23568
Adjusted R-squared	0.557828	S.D. dependent var		0.02712
S.E. of regression	0.016893	Akaike info criterion		-4.10128
Sum squared resid	0.078243	Schwarz criterion		-4.02315
Log likelihood	555.9387	Hannan-Quinn criter.		-4.06972
F-statistic	68.80913	Durbin-Watson stat		2.8124
Prob(F-statistic)	0			

1.2. Pooled Regression Model, Fixed Effect and Random Effect of NPM

Table 10 shows the pooled regression model for NPM, it is found that NPM cannot be explained by cash ratio and basic defense ratio, current ratio and liquid assets ratio as p-value equals 0.268656, 0.092390, 0.214644 and 0.890418 respectively, which is more than 0.05.

Table 5: Pooled Regression Model of NPM

Dependent Variable: NPM				
Method: Panel Least Squares				
Date: 09/08/20 Time: 10:50				
Sample (adjusted): 2013 2018				
Periods included: 6				
Cross-sections included: 36				
Total panel (balanced) observations: 276				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001057	0.161731	-0.006535	0.994791
CURRENT_RATIO	0.152974	0.122988	1.243810	0.214644
CASH_RATIO	-0.028243	0.025480	-1.108438	0.268656
LIQUIDITY_ASSET_RATIO	-0.013584	0.098499	-0.137905	0.890418
BASIC_DEFENSE_RATIO	-1.576300e-09	9.333336e-10	-1.688892	0.092390
R-squared	0.008184	Mean dependent var		0.140120
Adjusted R-squared	0.003572	S.D. dependent var		0.018464
S.E. of regression	0.018431	Akaike info criterion		-4.943378
Sum squared resid	0.093924	Schwarz criterion		-4.864937
Log likelihood	690.0828	Hannan-Quinn criter.		
F-statistic	1.848758	Durbin-Watson stat		1.957628
Prob(F-statistic)	0.118316			

Table 11 refers to fixed effect in regression analysis for NPM. According to table 11, NPM cannot be explained by cash

ratio, basic defense ratio, current ratio and liquid assets ratio as p-value equals 0.268934, 0.092430, 0.215364 and 0.890528 respectively, which is more than 0.05.

Therefore, cash ratio, basic defense ratio, current ratio and liquid assets ratio as independent variable can't explain the NPM as dependent variable.

Table 11: Fixed Effect of NPM

Dependent Variable: NPM				
Method: Panel Least Squares				
Date: 09/08/20 Time: 14:46				
Sample (adjusted): 2013 2018				
Periods included: 6				
Cross-sections included: 36				
Total panel (balanced) observations: 276				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000763	0.161720	-0.004718	0.996230
CURRENT_RATIO	0.152698	0.122974	1.241482	0.215364
CASH_RATIO	-0.028209	0.025471	-1.107890	0.268934
LIQUIDITY_ASSET_RATIO	-0.013564	0.098465	-0.137743	0.890528
BASIC_DEFENSE_RATIO	-1.575000e-09	9.330225e-10	-1.688231	0.092430
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.008184	Mean dependent var		0.140120
Adjusted R-squared	0.003572	S.D. dependent var		0.018464
S.E. of regression	0.018431	Akaike info criterion		-4.943378
Sum squared resid	0.093924	Schwarz criterion		-4.864937
Log likelihood	690.0828	Hannan-Quinn criter.		-4.907063
F-statistic	1.848758	Durbin-Watson stat		1.957628
Prob(F-statistic)	0.118316			

Table 12 refers to random effect in regression analysis for NPM. According to table 12, the researcher uses cash ratio and basic defense ratio as independent variables that are significant. It is found that there is positive significant effect as p-value of uses current ratio, cash ratio, liquid assets ratio and basic defense ratio equals 0.0306 and 0.0000 which is less than 0.05. Therefore, uses cash ratio and basic defense ratio as independent variable can explain the NPM as dependent variable.

Table 12: Random Effect of NPM

Dependent Variable: NPM				
Method: Panel EGLS (Cross-section random effects)				
Date: 09/08/20 Time: 14:55				
Sample (adjusted): 2013 2018				
Periods included: 6				
Cross-sections included: 36				
Total panel (balanced) observations: 276				
Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001057	0.161731	-0.006535	0.994791
CURRENT_RATIO	0.152974	0.122988	1.243810	0.214644
CASH_RATIO	-0.028243	0.025480	-1.108438	0.268656
LIQUIDITY_ASSET_RATIO	-0.013584	0.098499	-0.137905	0.890418
BASIC_DEFENSE_RATIO	-1.576300e-09	9.333336e-10	-1.688892	0.092390
	Effects Specification			
			S.D.	Rho
Cross-section random			0.010803	0.3012
Idiosyncratic random			0.015236	0.6988
	Weighted Statistics			
R-squared	0.008184	Mean dependent var		0.140120
Adjusted R-squared	0.003572	S.D. dependent var		0.018464
S.E. of regression	0.018431	Sum squared resid		0.093924
F-statistic	1.848758	Durbin-Watson stat		1.957628
Prob(F-statistic)	0.118316			
	Unweighted Statistics			
R-squared	0.008184	Mean dependent var		0.140120
Sum squared resid	0.093924	Durbin-Watson stat		1.957628

It has to run Hausman test to know which one of fixed test and random test is appropriate. According to Hausman test, there are two assumptions:

Null hypothesis: random effect
Alternative hypothesis: fixed effect

Therefore, if p-value > 0.05 so, it is insignificant and we will accept the null hypothesis (random effect) and reject alternative one (fixed effect) and if p-value < 0.05 so, it is significant and we will reject null hypothesis (random effect) and accept the alternative one (fixed effect).

According to table 13, as p-value equals 1.0000 that is more than 0.05 so, we will accept null hypothesis (random effect) and reject the alternative one (fixed effect). In other words, random effect is appropriate.

Table 6: Hausman Test for NPM

Correlated Random Effects - Hausman Test				
Equation: Untitled				
Test cross-section random effects				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		0	4	1.0000
* Cross-section test variance is invalid. Hausman statistic set to zero.				
** WARNING: estimated cross-section random effects variance is zero.				
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
CURRENT_RATIO	0.152698	0.152974	0.0000	1.00
CASH_RATIO	-0.028209	-0.028243	0.0000	1.00
LIQUIDITY_ASSET_RATIO	-0.013564	-0.013584	0.0000	1.00
BASIC_DEFENSE_RATIO	-1.5750e-09	-1.5763e-09	0.0000	1.00

Cross-section random effects test equation:				
Dependent Variable: NPM				
Method: Panel Least Squares				
Date: 09/08/20 Time: 15:00				
Sample (adjusted): 2013 2018				
Periods included: 6				
Cross-sections included: 36				
Total panel (balanced) observations: 276				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000763	0.161720	-0.004718	0.996230
CURRENT_RATIO	0.152698	0.122974	1.241482	0.215364
CASH_RATIO	-0.028209	0.025471	-1.107890	0.268934
LIQUIDITY_ASSET_RATIO	-0.013564	0.098465	-0.137743	0.890528
BASIC_DEFENSE_RATIO	-1.5750e-09	9.3302e-10	-1.688231	0.092430
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.008184	Mean dependent var		0.140120
Adjusted R-squared	0.003572	S.D. dependent var		0.018464
S.E. of regression	0.018431	Akaike info criterion		-4.943378
Sum squared resid	0.093924	Schwarz criterion		-4.864937
Log likelihood	690.0828	Hannan-Quinn criter.		-4.907063
F-statistic	1.848758	Durbin-Watson stat		1.957628
Prob(F-statistic)	0.118316			

8. RECOMMENDATIONS:

This research provides several recommendations for future studies that aim to build on these findings and further explore the relationship between liquidity risk and bank profitability.

1. Expand Variables: Future research should investigate additional variables that influence Return on Assets (ROA), Return on Equity (ROE), and Net Profit Margin (NPM) to provide a more comprehensive understanding of the factors affecting bank profitability.

2. Longitudinal Study: A longitudinal study is recommended for obtaining more robust results. The current research was limited by time constraints, and extending the study period could yield more reliable insights.
3. Cross-Country Analysis: Future research should consider including banks from other countries to explore how different economic and regulatory environments impact the relationship between liquidity risk and bank profitability.
4. Larger Sample Size: Increasing the sample size would lead to more precise results. Although this may be costly, a larger sample can be achieved with an extended timeframe and the use of random sampling techniques.
5. Comparative Studies: Conduct comparative studies to examine the factors affecting ROE, ROA, and NPM in both developed and developing countries. This approach would offer insights into how different market conditions influence bank performance.
6. Enhanced Data Collection*: Future studies should collect data from a larger number of banks, beyond the 36 included in this study, to enhance the generalizability of the findings.
By addressing these recommendations, future research can overcome the limitations of the current study and contribute more significantly to the understanding of bank profitability and risk management.

9. FUTURE RESEARCH:

Building on this research, further studies can explore the longitudinal impact of liquidity risk management practices, investigate the influence of macro-economic factors, conduct comparative analyses across different regions, examine the role of advanced technologies, delve into the behavioural aspects of risk management, assess regulatory impacts and policy implications, implement stress testing and scenario analysis, study the relationship between customer behaviour and liquidity risk, integrate environmental, social, and governance (ESG) factors, and analyzed the impact of corporate governance structures on liquidity risk management and profitability.

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