
**THE IMPACT OF LIQUIDITY RISK ON PROFITABILITY IN THE
EGYPTIAN-BANKING SECTOR**

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Abstract

This paper investigates the relationship between liquidity risk (liquidity asset ratio-LIQR, cash ratio-CASR, current ratio-CURR and basic defense ratio-BDR) and bank profitability (Return on assets-ROA, return on equity-ROE and Net interest margin-NIM) for the banking sector in Egypt including public and private banks. Data was collected from the official website of the banks and the annual reports during the period from 2013 to 2019. The research methodology was built upon quantitative approach by collecting panel data (secondary data) for the assigned period to examine the research hypotheses. Pooled regression, as well as the fixed effect and random effect analyses were used as the statistical tools to analyze the collected data. Results revealed that there was a significant relationship between liquidity risk and bank profitability in the period 2013 to 2019 in the Egyptian banking sector. But the relationship varied between being positive and negative according to the indicator used for measuring liquidity and banks profitability.

Keywords: liquidity risk, bank profitability, Net interest margin, return on assets, Return of equity, liquidity asset ratio, cash ratio, current ratio and basic defense ratio

INTRODUCTION

The banking sector has a vital role in modern trade as it has an important effect on any country economy (Akhtar et al., 2011; Iqbal, 2012). Globalization has led to attract the attention to the importance of financial and non-financial institutions. Considering the financial institutions, achievement of success and growth for most of banks in based on strategies of competitive marketing (Abugamea, 2018; Irshad et al., 2011). Such strategies are structured in the form of the activities done by the banking sector, which are included in the daily business transactions carried out by the banks. Such activities make banks subject to risk, represented in credit risk,

liquidity risk, interest rate risk, market risk, operational risk, and others, which in turn affects banks' profitability (Arif and Anees, 2012; Chen et al., 2018).

banks, liquidity risk is one of the most important risks affecting their activity, as evidenced by their inability to manage their commercial activities when there is a shortage in their liquidity, and they reach the point of bankruptcy when this shortage continues (Effendi and Disman, 2017). According to previous studies (Khursheed et al., 2016; Purbaningsih and Fatimah, 2014; Rasul, 2013), The bank's profitability is greatly affected by the liquidity risk that exists in any bank. A gap is found in the debate that is exist in the previous studies regarding whether there is a positive or negative effect of liquidity risk on bank profitability. Therefore, this research comes to fill such gap in literature and investigates the impact of liquidity risk of banks on profitability in the Egyptian context. Liquidity risk is measured by cash Ratio-CASR, current ratio-CURR, liquidity assets ratio-LAR and basic defense ratio-BDR (Anbar and Alper, 2011; Khursheed et al., 2016), while bank profitability dimensions are measured by Return on Assets (ROA), Return on Equity (ROE) and Net Interest Margin (NIM) (Anbar and Alper, 2011).

This paper is presented in seven sections, described as follows: section (1) provides the introduction and include a background information on the effect of liquidity risk on profitability of banks. Section (2) Clarifies the paper problem. Section (3) introduces the literature review, which discusses and investigates the relationship between liquidity risk and Bank Profitability. Section (4) discusses the research methodology (quantitative research based) and data collection technique from the annual reports and websites of the banks during the period from 2013 to 2019. Section (5) introduces data analysis and findings. Section (6) includes discussion and comparative studies between private and public banking sectors in the Egyptian context. The last section includes recommendations and research limitations.

PROBLEM STATEMENT

Egypt witnessed several revolutions since the year 2011, followed by another revolution in the year 2013. These revolutions cause a negative and significant impact on the Egyptian economy. One of the major issues that was considered as a significant challenge faced by the Egyptian economy was the floating of the Egyptian currency in 2016.

Attention had been made to the banking sector because of the need to improve the economy and achieve an economic growth, because banks are considered the most important institutions in the country that are concerned with economic growth and improvement, especially after the crisis of floating of the Egyptian pound. Considering such great challenge of the floating, this research considers the period 2013 to 2019 to include an equal period before and after the floating. Such a challenge may vary in its implications between the private and public sector.

Therefore, this research clarifies liquidity risk influence on profitability for the banking sector in Egypt and examines the difference between public banks and private banks.

LITERATURE REVIEW

In this section, literature is reviewed to develop hypotheses of the research for the relationship between liquidity risk and banks profitability. Such relationship is investigated through three subsections. The first investigates the relationship between liquidity risk and ROA. The second investigates the relationship between liquidity risk and ROE. The third investigates the relationship between liquidity risk and NIM.

Relationship between Liquidity Risk and Bank Profitability Measured by Return on Assets (ROA)

ROA is calculated by dividing income over total asset. It expresses the bank's capacity to manage its income generated by utilizing the bank assets. Several studies investigated the effect of liquidity risk on ROA and different results were obtained. Some of these studies found a positive significant effect of liquidity risk on ROA, while others found a negative significant effect. Few studies found an insignificant impact of liquidity risk on ROA. This section discusses these studies in details.

Toutou and Xiaodong (2011) explained the power of liquidity risk on ROA in the Eurozone area. Secondary data was collected from financial reports during the period 2005 to 2010 for 12 banks and data was analyzed using regression analysis. Finding proved a positive effect of liquidity risk on ROA in the Eurozone area.

The same result was obtained by Ruziqa (2013), who examined liquidity risk influence on ROA in Indonesia through collecting secondary data for 23 traditional banks for the period of 2007 to 2011. A positive and significant effect between liquidity risk and ROA was obtained by analyzing panel data using regression analysis. The result slightly changed in Indonesia when data was collected from 10 Islamic Banks in the period 2014 to 2016. Different liquidity risk indicators were used, where Liquid Asset to Deposit (LAD) showed a positive effect on ROA, while Financing deposit ratio (FDR) showed a negative effect on ROA (Purbaningsih and Fatimah, 2014). This could be related by the fact that a high FDR ratio indicated a low bank liquidity and led to high liquidity risk, as the amount of funds needed for financing or lending is growing.

Moreover, Rahman et al. (2015) collected secondary data from 6 banks (three were conventional banks and three were Islamic banks) in Bangladesh during the period from 2007 to 2011. Samples were analyzed using correlation and multiple regression analyses. The finding investigated that there is a positive impact of liquidity risk on ROA in Bangladesh.

Furthermore, Saeed (2015) proved that there is a positive significant effect of liquidity risk management on ROA in Malaysia banks. The result was obtained by collecting secondary data from 27 conventional banks during the period from 2005 to 2013. Data was analyzed using regression analysis with GLS estimation.

Also, a positive relationship was obtained between liquidity risk and ROA in Jordan by Dahiyat (2016) through collecting secondary data from financial statement of 15 banks listed in stock

exchange of Amman in 2012 till 2014. After collection of the data, the researcher analyzed it using simple regression analysis. Similarly, Sukmana and Suryaningtyas (2016) clarified the liquidity risk management impact on ROA of Islamic and other banks in Indonesia. Secondary data was collected for 13 banks (8 Islamic banks, 5 Conventional banks) in Indonesia during 2010-2014 and data was analyzed using panel regression analysis. The results placed the significant and positive relationship between liquidity risk management and ROA of Islamic and Conventional banks in Indonesia.

In addition, Salim and Bilal (2016) investigated the relationship between ROA and liquidity risk in Oman. Data was collected from banks annual reports of 4 commercial banks in Oman, targeted period from 2010 to 2014 and analysis of the paper was done by multiple regression analysis. The analysis showed the significant impact of liquidity risk on ROA in Oman.

In Pakistan, Khursheed et al. (2016) examined the relationship between liquidity risk through liquid assets ratio, cash ratio and current ratio and bank profitability measured by return on assets (ROA). Data was collected from financial institutions in the private sector during the period 2009 to 2013 and was analyzed using Ordinary Least Square (OLS) technique. Results revealed that there was a positive significant relationship between liquidity risk through liquid assets ratio, cash ratio and current ratio and bank profitability measured by return on assets (ROA) in Pakistan.

In the same way, Zainuddin et al. (2017) investigated the relationship between liquidity risk through cash ratio and bank profitability measured by return on assets (ROA) of banks in Indonesia. The study methodology built upon collecting panel data (secondary data) from financial reports of 10 banks in Indonesia listed in Indonesian Stock Exchange among the period 2011 to 2015 and was analyzed using multiple regression analysis with the least squares' equation (Ordinary Least Square). Analysis found that the liquidity risk through cash ratio had a positive significant influence on bank profitability measured by return on assets (ROA) in Indonesia. Moreover, Charmler et al. (2018) clarified the relationship between liquidity risk through liquid assets and bank profitability measured by return on assets (ROA) in Ghana. Secondary data was collected from 21 commercial banks in Ghana from 2007-2016 and data was analyzed using regression and correlation analyses. The conclusion referred to the fact that liquid assets was needed to improve and enhance bank profitability measured by return on assets (ROA) in Ghana.

Alalade et al. (2020) investigated the impact of management of liquidity risk on bank profitability measured by return on assets (ROA) in Nigeria banks. Secondary data was collected from financial statements of 14 banks in Nigeria during the period 2009 to 2018 and data was analyzed using pooled, fixed and random effect models. Results revealed that there was a positive significant influence of liquidity risk management on bank profitability measured by return on assets (ROA) in Nigeria.

After displaying several recent researches which found a positive significant effect of liquidity risk on ROA, the research presents other studies which found a negative significant effect of

liquidity risk on ROA to be able to recognize the debate in literature in the relationship investigated in this research. Mwangi (2014) purpose was to determine the effect of liquidity risk management on ROA in commercial banks of Kenya. In order to achieve such purpose, secondary data was obtained for 43 listed commercial banks in Kenya and data was analyzed for the period 2010 to 2013. Results revealed that liquidity risk management has a significant negative relationship with ROA. The negative relationship between liquidity risk and ROA was also observed by Chowdhury and Zaman (2018) in Bangladesh by collecting data for six Islamic banks in the period 2012 to 2016. Liquid risky asset to total asset, Loan to deposit ratio, Capital to total asset ratio were used as liquidity indicators. The correlation and regression analyses were done to find the effect of liquidity risk on ROA.

However, some recent researches found neither a positive nor a negative relationship, instead, they found an insignificant link between liquidity risk and ROA. One of these researches was the one done by Rasul (2013), who investigated the relationship between liquidity risk through current ratio and ROA in Bangladesh. Secondary data was gathered from five Islamic banks for the years 2001 till 2011 and results revealed that there was an insignificant relationship between current ratio and ROA in Bangladesh. Another research that observed an insignificant relationship between liquidity risk and ROA was the one done by Mohanty and Mehrotra (2018), who examined such relationship in India. Secondary data was collected from Reserve Bank of India (RBI) website for 93 commercial banks in the years from 2011 to 2015. Multiple regression was used to data analysis.

Based on the previous studies that were illustrated, the researcher can develop the first hypothesis of the current research, as follows:

H₁: There is a positive significant relationship between liquidity risk and bank profitability measured by ROA.

Relationship between Liquidity Risk and Bank Profitability Measured by Return on Equity (ROE)

Return on equity (ROE) is a financial ratio that refers to how much profit a company earned compared to the total amount of shareholder equity invested or found on the balance sheet. ROE is what the shareholder looks in return for their investment (Mwangi, 2014). Several studies examined the effect of liquidity risk on ROE and different results were obtained. Some of these studies found a positive significant effect of liquidity risk on ROE, while others found a negative significant effect. Few studies found an insignificant impact of liquidity risk on ROE. This section discusses these studies in details.

Toutou and Xiaodong (2011) explained the influence of liquidity risk on profitability of the banks measured by return on equity (ROE) in the Eurozone area. Secondary data was collected from financial reports during the period from 2005 to 2010 for 12 banks in the Eurozone area and was analyzed using the regression analysis. The results revealed the positive impact of liquidity risk on ROE in the Eurozone area. Similarly, a positive significant relationship was

observed by Ruziqa (2013), who conducted a research to investigate such relationship Indonesia using secondary data collected from 23 traditional banks during the period 2007 to 2011.

Moreover, Rahman et al. (2015) found the same result when analyzed the relationship between liquidity risk and bank profitability measured by return on equity (ROE) in Bangladesh. The result was achieved by analyzing secondary data collected from 6 banks (three were conventional banks and three were Islamic banks) during the period 2007 to 2011. Furthermore, Saeed (2015) found a significant positive relationship between liquidity risk management and ROE in Malaysia through analyzing secondary data gathered from 27 conventional banks during the period 2005 to 2013. In addition, Salim and Bilal (2016) investigated the impact of liquidity risk on ROE in Oman and found a significant positive impact of liquidity risk ROE through analyzing secondary data collected from 4 commercial banks during the period 2010 to 2014. The same result was obtained by several researches done in other countries, like Pakistan (Pasha et al., 2016), Ghana (Charmier et al., 2018), Nigeria (Alalade et al., 2020).

However, a different result was obtained by some other researches, one of which is that conducted by Mwangi (2014), who aimed to explain the relation between ROE and liquidity risk management in Kenya. A number of 43 listed commercial banks in Kenya were analyzed for a period 2010 to 2013. Results revealed that liquidity risk management has a significant and negative link with ROE. In the same way, Muriithi and Waweru (2017) aimed to examine the effect of liquidity risk on ROE in Kenya. Liquidity risk was measured by liquidity coverage ratio (LCR) and net stable funding ratio (NSFR). Panel data techniques of random effects estimation were used to analyze the data obtained for the period between year 2005 and 2014 for 43 registered commercial banks in Kenya. The results found that net stable funding ratio (NSFR) was negatively associated with bank profitability in both long run and short run, while liquidity coverage ratio (LCR) did not significantly influence ROE in both the long run and short run. However, the overall effect was that liquidity risk had a negative effect on ROE.

Also, Chowdhury and Zaman (2018) aimed to clarify the effect of liquidity risk on ROE, as liquidity crisis was affecting the banking industry in Bangladesh. Data was collected for six Islamic banks for the period 2012 to 2016. Liquid risky asset to total asset, Capital to total asset ratio were used as liquidity indicators and results revealed that there was a negative relation between liquidity indicators and ROE. However, Rasul (2013) did not find such relationship when analyzing data collected for five Islamic banks in Bangladesh on 2001-2011. This might be because of the difference in the period assigned for the research in both cases.

Malik et al. (2016) also found an insignificant relationship between liquidity risk through liquid assets ratio, cash ratio and current ratio and bank profitability measured by return on equity (ROE) in Pakistan private sector. Secondary data was obtained for the private sector in Pakistan during the period 2009 to 2013 and data was analyzed using technique of Ordinary Least Square (OLS). Similarly, an insignificant relationship was observed by Mohanty and Mehrotra (2018), when examining such relationship in India for 93 commercial banks during the period 2011 to 2015.

Based on the previous studies that were illustrated, the researcher can develop the second hypothesis of the current research, as follows:

H₂: There is a positive significant relationship between liquidity risk and bank profitability measured by ROE.

Relationship between Liquidity Risk and Bank Profitability Measured by Net Interest Margin (NIM)

Net interest margin (NIM) is one of the measurements used to indicate and measure the profitability of banks. NIM is calculated by difference between the interest income generated by banks and the amount of interest paid out to their lenders (deposits), relative to the amount of their (interest earning) assets. Also, it is usually expressed as a percentage of what the financial institution earns on loans in a specific time period and other assets minus the interest paid on borrowed funds divided by the average amount of the assets on which it earned income in that time period (the average earning assets) (Mwangi, 2014).

Few researches were conducted to test the relationship between liquidity risk and NIM. Chowdhury et al. (2016) aimed to determine the effect of liquidity risk on the profitability of banks measured by net interest margin (NIM) of the conventional banks in Bangladesh. As Net Interest Margin (NIM) of a bank depends on several firm-specific factors. The main earning source of conventional banks is net interest income. The profitability of the banks depends much on this net interest income. Liquidity risk was measured by cash to asset ratio (CA), loan to deposit ratio (LD) and loan to asset ratio (LA). Data obtained for seven banks was analyzed for the period 2011 to 2015 using correlation and regression analyses and results revealed that cash to asset (CA) ratio had a negative relationship with net interest margin (NIM) but a loan to asset (LA) ratio had a positive effect on the net interest margin (NIM). There was also a significant positive relationship between net interest margin (NIM) and loan to deposit (LD) ratio. From the regression analysis, it was clear that the loan to deposit (LD), cash to asset (CA) and loan to asset (LA) were able to explain the changes of net interest margin (NIM) of the banks.

Moreover, Fungáčová and Poghosyan (2011) examined the relationship between liquidity risk and bank profitability measured by net interest margin in Russia on 1999 till 2007. A significant positive effect was found between liquidity risk and bank profitability measured by net interest margin in Russia. Similarly, a positive significant relationship was observed between liquidity risk (measured by liquidity ratio) and NIM (Ruziqa, 2013) in Indonesia, where secondary data was collected from financial statements of 23 conventional banks during the period 2007 to 2011.

On the other hand, Mwangi (2014) aimed to determine the relation an impact of liquidity risk management on the financial performance of commercial banks in Kenya. Data was selected from 43 listed commercial banks in Kenya, which analyzed for a period 2010 to 2013. Results revealed that liquidity risk management has a significant negative relationship with NIM. The same result of having a negative significant relationship between liquidity risk (measured by

cash ratio and liquidity assets ratio) and bank profitability (measured by net interest margin) was observed by Marozva (2015) in South Africa during the period from 1998 to 2014.

However, Hamadi and Awdeh (2012) examined the relationship between liquidity risk and bank profitability measured by net interest margin of 53 commercial banks in Lebanese during the period 1996 to 2009 and results indicated that there was an insignificant relationship between liquidity risk and bank profitability measured by net interest margin in Lebanese commercial banks.

Based on the previous studies that were illustrated, the researcher can develop the third hypothesis of the current research, as follows:

H₃: There is a positive significant relationship between liquidity risk and bank profitability measured by NIM.

Many studies have found an effect of the size of the bank on profitability, but this effect varied from study to another. Some studies found no relationship (Trujillo-Ponce, 2013). other studies found that size has a negative effect on bank profitability (Nguyen et al. ,2017; Chen et al.,2018). On the other hand, some studies detected a positive effect of the bank size on its profitability (Chowdhury and Zaman, 2018).

RESEARCH METHODOLOGY

This research depends on quantitative design using the deductive approach. Secondary data was gathered in the form of panel data for 38 banks, including the private and public banks in Egypt. Data was collected form the official website of the banks and the annual reports during the period from 2013 to 2019. The research framework is illustrated in Figure 1, where the independent variable considered in this research is Liquidity risk, which includes four dimensions, namely; LIQR, CASR, CURR and BDR (Khursheed et al., 2016). The dependent variable considered in this research is Bank Profitability, which includes three dimensions, namely; ROE, ROA and NIM (Anbar and Alper, 2011). The size of the bank-BS is used as a control variable when examining the relationship between Liquidity risk and profitability (Trujillo-Ponce, 2013; Nguyen et al. ,2017; Chen et al.,2018; Chowdhury and Zaman,2018).

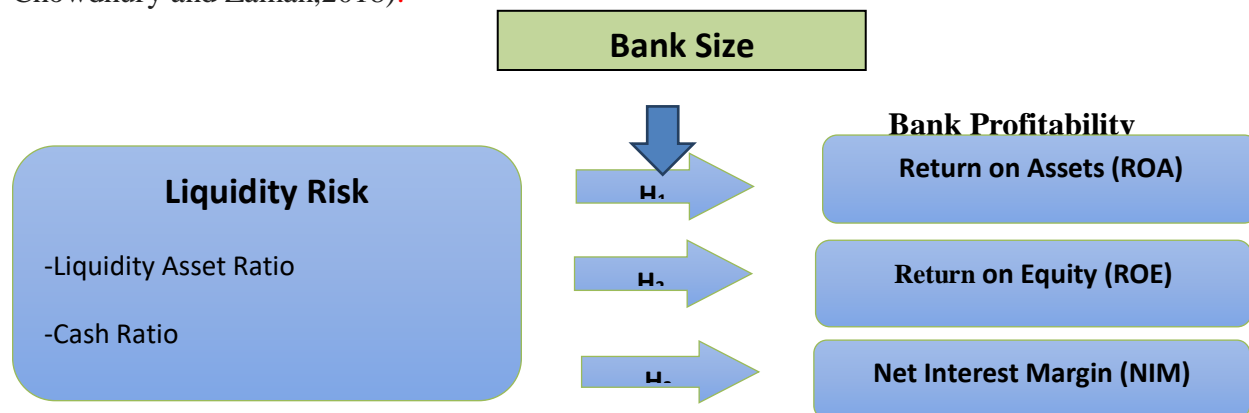


Figure 1: Proposed Research Framework

Table 1 shows the research variables and their measurements according to the income statements and balance sheets of the banks under study.

Variables	Measurement	References
Return on Assets (ROA)	Net profit / Total Assets	Anbar and Alper (2011)
Return on Equity (ROE)	Net profit / Total Equity	Anbar and Alper (2011)
Net Interest Margin (NIM)	Net Interest Income / Total Assets	Anbar and Alper (2011)
Current Ratio (CURR)	Short term assets / Short term liabilities	Khursheed et al. (2016)
Liquid Assets Ratio(LIQR)	Liquid Assets / Short term liabilities	Khursheed et al. (2016)
Cash Ratio(CASR)	Cash and equivalent / Short term liabilities	Khursheed et al. (2016)
Basic Defense Ratio (BDR)	Short term assets / Daily Operational Expenses	Anbar and Alper (2011)
Bank size (BS)	Log of total assets	Chen et al. (2018)

Table 1: Research Variable Measurements

After collecting data from the annual reports of the public and private banks, data was analyzed using Generalized Least Squares method of regression (GLS), where fixed and random effects are tested using Hausman test. Fixed effects regression is an estimation technique employed in a panel data setting that allows one to control for time-invariant unobserved individual characteristics that can be correlated with the observed independent variables, while Random effects model estimates the effects of time-invariant variables, but the estimates may be biased because omitted variables are not controlled. The Hausman test is used to be able to determine which effect of the fixed versus random effects is dominant in the data under study. The detailed analysis as well as discussion of the main findings are shown in the following section.

RESULTS AND FINDINGS

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

Descriptive Analysis and Normality Testing for the Research Variables

The descriptive statistics, which give short summaries about samples and how to measure the data, is a tool gives explanation and distinct understanding of the features of certain data set. Table 2 illustrates the descriptive analysis for the research variables using the Standard Deviation, maximum, minimum and mean. The mean value of CURR is found to be 1.056 with a standard deviation of 0.007 with minimum and maximum values of 1.048 and 1.068 respectively. In addition, the mean value of CASR is 0.096 with a standard deviation of 0.046 and minimum and maximum values of 0.045 and 0.169 respectively. Moreover, the mean value of LIQR is 1.047 with a standard deviation of 0.010 with minimum and maximum values

of 1.034 and 1.063 respectively. Furthermore, the mean value of BDR ratio is 725827.6 with a standard deviation of 1323030 and minimum and maximum values of 30766.88 and 3669924 respectively. The mean value of ROA is 0.013 with a standard deviation of 0.002 and minimum and maximum values of 0.009 and 0.017 respectively. The mean value of ROE is 0.246 with a standard deviation of 0.028 and minimum and maximum values of 0.190 and 0.275 respectively. In addition, the mean value of NIM is 0.148 with a standard deviation of 0.019261 and minimum and maximum values of 0.114 and 0.180 respectively. And finally, the mean value of BS is 10.758 with a standard deviation of 1.161 and minimum and maximum values of 1.169 and 13.533 respectively.

Regarding normality, it is one of the assumptions that have to be verified to be able to use ordinary least squares method for regression analysis. Table 2 clarifies the skewness and kurtosis values for the research variables, where it could be observed 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 normally distributed. Consequently, Pooled Regression used to describe the relationships between the research variables by using GLS Technique.

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
CASR	0.096	0.074	0.169	0.045	0.046	0.590	1.610
CURR	1.056	1.052	1.068	1.048	0.007	0.607	1.598
LIQR	1.047	1.042	1.063	1.034	0.010	0.509	1.714
BDR	725827.6	155609.9	3669924	30766.88	1323030	1.768	4.163
NPM	0.148	0.149	0.180	0.114	0.019	-0.173	2.956
ROE	0.246	0.254	0.275	0.190	0.028	-1.06	2.907
ROA	0.013	0.012	0.017	0.009	0.002	0.186	1.570
BS	10.758	9.522	13.533	1.169	1.161	-5.069	44.123

Table 2: Descriptive Analysis and Normality Test of Research Variables

After showing the descriptive analysis for the research variables, it was observed that the data is not normally distributed, which leads to the use of GLS method for regression analysis. The following sections use the GLS method to respond to the research hypotheses.

Testing the First Research Hypothesis: Effect of Liquidity Risk on ROA

Applying pooled regression model for the effect of Liquidity Risk on ROA, Table 3 shows that there is a positive significant effect of CASR, LIQR and BDR on ROA, as the corresponding P-values are less than 0.05 (P-values = 0.0000, 0.0001 and 0.0000 respectively) and the corresponding coefficients are all greater than zero ($\beta > 0$). On the other hand, there is an insignificant effect of CURR on ROA, as the corresponding P-value is greater than 0.05 (P-value = 0.7005). Moreover, the R2 is 0.904, which means that 90.4% of the variation in ROA can be explained by Liquidity Risk.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.133871	0.050081	-2.673102	0.0081
CURR	-0.032761	0.085046	-0.385212	0.7005
CASR	0.029501	0.006293	4.687552	0.0000
LIQR	0.170540	0.041518	4.107632	0.0001
BDR	4.91E-10	6.34E-11	7.751706	0.0000
BS	-0.928	0.005	-23.880	0.0000
R-squared	0.904142	Mean dependent var		0.013294
Adjusted R-squared	0.902324	S.D. dependent var		0.002928
F-statistic	497.5411	Durbin-Watson stat		3.035717
Prob(F-statistic)	0.000000			

Table 3: Pooled Regression of Liquidity Risk Effect on ROA

Therefore, the regression equation could be written as follows:

$$ROA = -0.133871 - 0.032761 * CURR + 0.029501 * CASR + 0.170540 * LIQR + 4.91E-10 * BDR - 0.928 * BS$$

Table 4 refers to the fixed versus random effect in regression analysis for ROA. It could be observed that there is a positive significant effect of cash ratio, liquid assets ratio and basic defense ratio (P-value < 0.05, $\beta > 0$) in both fixed and random effects. Applying Hausman test to know which one of fixed test and random test is appropriate, it was found that the p-value of Hausman test is 0.999 (P-value > 0.05), which means that the fixed effect is not supported in favor of the random effect.

Variable	Fixed Effect		Random Effect		Hausman Test
	Coefficient	Prob.	Coefficient	Prob.	
C	-0.133871	0.0156	-0.133871	0.0155	0.999
CURR	-0.032761	0.7254	-0.032761	0.7253	
CASR	0.029501	0.0000	0.029501	0.0000	
LIQR	0.170540	0.0002	0.170540	0.0002	
BDR	4.91E-10	0.0000	4.91E-10	0.0000	

Table 4: Fixed Versus Random Effect of Liquidity Risk on ROA

Therefore, the first hypothesis claiming that there is a significant relationship between liquidity risk and ROA is partially supported.

Testing the Second Research Hypothesis: Effect of Liquidity Risk on ROE

Applying pooled regression model for the effect of Liquidity Risk on ROA, Table 5 shows that there is a positive significant effect of CASR, LIQR and BDR on ROE, as the corresponding P-

values are all less than 0.05 (P-value = 0.0000, 0.0001 and 0.0000 respectively), and the corresponding coefficients are all greater than zero ($\beta > 0$). On the other hand, there is a negative significant effect of CURR on ROE, as the corresponding P-value is 0.0046 (P-value < 0.05), and the corresponding coefficient is -4.965 ($\beta < 0$). Moreover, the R2 is 0.566, which means that 56.6% of the variation in ROE can be explained by Liquidity risk.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.993611	1.021454	1.951738	0.0523
CURR	-4.965009	1.734612	-2.862317	0.0046
CASR	0.543518	0.128361	4.234279	0.0000
LIQR	3.284041	0.846802	3.878170	0.0001
BDR	1.00E-08	1.29E-09	7.745749	0.0000
BS	10.197	7.283	1.40000	0.163
R-squared	0.566055	Mean dependent var		0.246751
Adjusted R-squared	0.557828	S.D. dependent var		0.028072
F-statistic	68.80913	Durbin-Watson stat		3.035717
Prob(F-statistic)	0.000000			

Table 5: Pooled Regression of Liquidity Risk Effect on ROE

Therefore, the regression equation could be written as follows:

$$ROE = 1.993611 - 4.965009 * CURR + 0.543518 * CASR + 3.284041 * LIQR + 1.00E-08 * BDR + 10.197 * BS$$

Table 6 refers to the fixed versus random effect in regression analysis for ROE. It could be observed that there is a significant effect of current ratio, cash ratio, liquid assets ratio and basic defense ratio (P-value < 0.05) in both fixed and random effects. Applying Hausman test, it was found that the p-value of Hausman test is 0.999 (P-value > 0.05), which means that the fixed effect is not supported in favor of the random effect.

Variable	Fixed Effect		Random Effect		Hausman Test
	Coefficient	Prob.	Coefficient	Prob.	
C	1.993611	0.0764	1.993611	0.0761	0.999
CURR	-4.965009	0.0097	-4.965009	0.0096	
CASR	0.543518	0.0002	0.543518	0.0001	
LIQR	3.284041	0.0005	3.284041	0.0005	
BDR	1.00E-08	0.0000	1.00E-08	0.0000	

Table 6: Fixed Versus Random Effect of Liquidity Risk on ROE

Therefore, the second hypothesis showing that there is a significant relationship between liquidity risk and ROE is fully supported.

Testing the Third Research Hypothesis: Effect of Liquidity Risk on NIM

Applying pooled regression model for the effect of Liquidity Risk on NIM, Table 7 shows that there is a positive significant effect of CASR and BDR on NIM, as the corresponding P-values are less than 0.05 (P-value = 0.0181 and 0.0000 respectively), and the corresponding coefficients are greater than zero ($\beta > 0$). On the other hand, there is an insignificant effect of CURR and LIQR on ROA, as the corresponding P-value is greater than 0.05 (P-value = 0.8202 and 0.7965 respectively). Moreover, the R2 is 0.664, which means that 66.4% of the variation in NIM can be explained by Liquidity risk.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.512504	0.616560	0.831231	0.4068
CURR	-0.238290	1.047029	-0.227587	0.8202
CASR	0.184650	0.077480	2.383188	0.0181
LIQR	-0.131967	0.511138	-0.258184	0.7965
BDR	1.17E-08	7.80E-10	14.98350	0.0000
BS	0.017000	0.057000	0.305000	0.7610
R-squared	0.664164	Mean dependent var		0.148962
Adjusted R-squared	0.657797	S.D. dependent var		0.019261
F-statistic	104.3206	Durbin-Watson stat		3.035717
Prob(F-statistic)	0.000000			

Table 7: Pooled Regression of Liquidity Risk Effect on NIM

Therefore, the regression equation could be written as follows:

$$NIM = 0.512504 - 0.238290 * CURR + 0.184650 * CASR - 0.131967 * LIQR + 1.17E-08 * BDR + 0.170 * BS$$

Table 8 refers to the fixed versus random effect in regression analysis for NIM. It could be observed that there is a significant effect of cash ratio and basic defense ratio (P-value < 0.05) in both random and fixed effects. Applying Hausman test, it was found that the p-value of Hausman test is 0.999 (P-value > 0.05), which means that the fixed effect is not supported in favor of the random effect.

Variable	Fixed Effect		Random Effect		Hausman Test
	Coefficient	Prob.	Coefficient	Prob.	
C	0.512504	0.4488	0.512504	0.4486	0.999
CURR	-0.238290	0.8356	-0.238290	0.8355	
CASR	0.184650	0.0308	0.184650	0.0306	
LIQR	-0.131967	0.8139	-0.131967	0.8138	
BDR	1.17E-08	0.0000	1.17E-08	0.0000	

Table 8: Fixed Versus Random Effect of Liquidity Risk on NIM

Therefore, the third hypothesis claiming that there is a significant relationship between liquidity risk and NIM is partially supported.

A Comparative Study between Public and Private Banks in the Egyptian Context

In this section, the effect of liquidity risk on profitability of Banks is tested for the public versus private banks to be able to compare between both types. Considering the effect of Liquidity Risk on ROA in Public and Private Banks, Table 9 shows the pooled regression model for ROA of public and private banks in the Egyptian context. It is reached that there is a positive significant effect of LIQR and BDR on ROA in public banks (P-value < 0.05, $\beta > 0$). On the other hand, it is found that there is a negative significant effect of CURR on ROA in public banks (P-value < 0.05, $\beta < 0$). Regarding Private banks, it is reached that there is significant effect of CASR, LIQR and BDR on ROA in private banks (P-value < 0.05, $\beta > 0$). Similar to the public banks, it is found that there is a negative significant effect of CURR on ROA in private banks (P-value < 0.05, $\beta < 0$). Therefore, the impact of Liquidity risk on ROA is almost the same in both; public and private banks, with one difference in the effect of cash ratio, which only appears in private banks.

Variable	Public Banks		Private Banks	
	Coefficient	Prob.	Coefficient	Prob.
C	0.515774	0.0000	0.562782	0.0000
CURR	-13.18141	0.0000	-0.251297	0.0000
CASR	0.009437	0.0837	0.045703	0.0000
LIQR	12.73596	0.0000	0.261614	0.0000
BDR	1.38E-09	0.0008	5.93E-10	0.0000
R-squared for Public Banks	0.904596		R-squared for Private Banks	0.900895

Table 9: Pooled Regression of Liquidity Risk Effect on ROA in Public versus Private Banks

Therefore, the regression equation for the public banks could be written as follows:

$$ROA \text{ of Public Banks} = 0.515774 - 13.18141 * CURR + 0.009437 * CASR + 12.73596 * LIQR + 1.38E-09 * BDR$$

In addition, the regression equation for the private banks could be written as follows:

$$ROA \text{ of Private Banks} = 0.562782 - 0.251297 * CURR + 0.045703 * CASR + 0.261614 * LIQR + 5.93E-10 * BDR$$

In addition, it could be claimed that 90.4% of the variation in ROA of public banks can be explained by current ratio, liquid assets ratio and basic defense ratio, while 90% of the variation in ROA of private banks can be explained by cash ratio, current ratio, liquid assets ratio and basic defense ratio.

Considering the effect of Liquidity Risk on ROE in Public and Private Banks, Table 10 shows the pooled regression model for ROE of public and private banks in the Egyptian context. It is

found that there is a positive and significant effect of LIQR and BDR on ROE in public banks (P-value < 0.05, $\beta > 0$). On the other hand, it is found that there is a negative significant effect of CURR on ROE in public banks (P-value < 0.05, $\beta < 0$). Regarding Private banks, it is found that there is a positive significant effect of CASR, LIQR and BDR on ROE in private banks (P-value < 0.05, $\beta > 0$). Similar to the public banks, it is found that there is a negative significant effect of CURR on ROE in private banks (P-value < 0.05, $\beta < 0$).

Therefore, the effect of Liquidity risk on ROE is almost the same in both; public and private banks, with one difference in the effect of cash ratio, which only appears in private banks. It could also be claimed that 89.3% of the variation in ROE of public banks can be explained by CURR, LIQR and BDR, while 56.6% of the variation in ROE of private banks can be explained by CASR, CURR, LIQR and BDR.

Variable	Public Banks		Private Banks	
	Coefficient	Prob.	Coefficient	Prob.
C	9.933975	0.0000	1.993611	0.0723
CURR	-196.8058	0.0000	-4.965009	0.0087
CASR	0.176365	0.0552	0.543518	0.0001
LIQR	188.0642	0.0000	3.284041	0.0004
BDR	2.02E-08	0.0021	1.00E-08	0.0000
R-squared for Public Banks	0.893942		R-squared for Private Banks	0.566055

Table 10: Pooled Regression of Liquidity Risk Effect on ROE in Public versus Private Banks

Therefore, the regression equation for the public banks could be written as follows:

$$ROE \text{ of Public Banks} = 9.933975 - 196.8058 * CURR + 0.176365 * CASR + 188.0642 * LIQR + 2.02E-08 * BDR$$

In addition, the regression equation for the private banks could be written as follows:

$$ROE \text{ of Private Banks} = 1.993611 - 4.965009 * CURR + 0.543518 * CASR + 3.284041 * LIQR + 1.00E-08 * BDR$$

Considering the effect of Liquidity Risk on NIM in Public and Private Banks, Table 11 shows the pooled regression model for NIM of public and private banks in the Egyptian context. It is showed that there is a positive significant effect of LIQR and BDR on NIM in public banks (P-value < 0.05, $\beta > 0$). On the other hand, it is found that there is a negative significant effect of CURR on NIM in public banks (P-value < 0.05, $\beta < 0$). Regarding Private banks, it is found that there is a positive significant effect of CASR and BDR on NIM in private banks (P-value < 0.05, $\beta > 0$). Therefore, the effect of Liquidity risk on NIM is differs between public and private banks, where the effect of CURR and LIQR appears only in public banks, while the effect of CASR appears only in private banks. It could also be claimed that 78.18% of the variation in

NIM of public banks can be explained by CURR, LIQR assets ratio and BDR, while 66.42% of the variation in NIM of private banks can be explained by CASR and BDR.

Variable	Public Banks		Private Banks	
	Coefficient	Prob.	Coefficient	Prob.
C	5.572649	0.0039	0.512504	0.4424
CURR	-116.5730	0.0008	-0.238290	0.8333
CASR	0.026059	0.7893	0.184650	0.0286
LIQR	111.7337	0.0008	-0.131967	0.8113
BDR	1.82E-08	0.0097	1.17E-08	0.0000
R-squared for Public Banks	0.781845		R-squared for Private Banks	0.664164

Table 11: Pooled Regression of Liquidity Risk Effect on NIM in Public versus Private Banks

Therefore, the regression equation for the public banks could be written as follows:

$$NIM \text{ of Public Banks} = 5.572649 - 116.5730 * CURR + 0.026059 * CASR + 111.7337 * LIQR + 1.82E-08 * BDR$$

In addition, the regression equation for the private banks could be written as follows:

$$NIM \text{ of Private Banks} = 0.512504 - 0.238290 * CURR + 0.184650 * CASR - 0.131967 * LIQR + 1.17E-08 * BDR$$

The results shown above for the Egyptian banks as well as the public versus private banks are discussed in the following section.

DISCUSSION AND CONCLUSION

The data is analyzed empirically to test the research hypotheses by measuring the variables concluded from the literature review through a descriptive and regression analysis using E-views – version 10. Testing the first research hypothesis for the relationship between liquidity risk measures and ROA, it was found that there is a significant effect of CASR, LIQR and BDR on ROA. This is consistent with Ruziqa (2013), who claimed that the relationship between liquidity risk through LIQR and ROA in Indonesia was positive significant. Similarly, the result obtained with Khursheed et al. (2016) who examined the relationship between liquidity risk through LIQR, CASR and BDR and bank profitability measured by (ROA) in Pakistan.

Testing the second research hypothesis for the relationship between liquidity risk and ROE, it was found that there is a significant effect of CASR, LIQR and BDR. The result observed was proved by several studies (Rahman et al., 2015; Malik et al., 2016; Pasha et al., 2016; Charmler et al., 2018; Alalade et al., 2020).

Testing the third research hypothesis for the relationship between liquidity risk (and NIM, it was found that there is a significant effect of cash ratio and basic defense ratio. This result is consistent with Marozva (2015), who found a relationship between liquidity risk through CASR and BDR and bank profitability measured by NIM in South Africa. Table 12 showed a summary for the conducted analysis.

Hypothesis	Description	Results
H1	There is a significant relation between liquidity risk and bank profitability (Return on assets)	Partially Supported
H2	There is a significant relation between liquidity risk and bank profitability (Return on equity)	Fully Supported
H3	There is a significant relation between liquidity risk and bank profitability (Net Interest Margin)	Partially Supported

Table 12: Summary of Research Hypotheses

Comparing the relationship between liquidity Risk and (ROA) in Public and Private Banks, it is found that ROA of public banks can be explained by CURR, LIQR and BDR, while ROA of private banks can be explained by CASR, CURR, LIQR and BDR. Investigating ROE in public and private banks, it was observed that ROE can be explained by CURR, LIQR and BDR in the public banks, while ROE of private banks can be explained by CASR, CURR, LIQR and BDR. Moreover, observing the effect of liquidity Risk on (NIM) in Public Banks and Private Banks, it is found that NIM of public banks similar to that of private banks can be explained by CASR and BSR.

RECOMMENDATIONS AND RESEARCH LIMITATIONS

This research investigates the relationship between liquidity risk and banks profitability, however, there might be other variables that may affect banks profitability which are not discussed in this research. Therefore, future research could study the effect of other variables on banks profitability, such as disclosure index, quality control, corporate governance and several other factors.

The data was collected for a total number of 38 banks using their financial reports, forming a panel data covering the period 2013 to 2019. Therefore, this research has several limitations through the study handled. First, despite the fact that data was collected from one country Egypt, but the research was limited to take into consideration more countries rather than one country. another limitation for this research is that it focused only on the banking sector which make it impossible to generalize the results. Moreover, future research could also consider studying the relationship between liquidity risk and banks profitability in the developing versus developed

countries. In addition, the relationship between liquidity risk and banks profitability could be also be considered Islamic versus conventional banks.

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