

DETERMINANTS OF LIQUIDITY RISK: DO CORPORATE GOVERNANCE PRACTICES HAVE AN IMPACT? AN EMPIRICAL STUDY OF EMERGING MARKETS

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Abstract

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Most banks are concerned about how liquidity risk affects their performance. Managing liquidity risk is critical since failing to do so will result in a bank's insolvency. This study aims to investigate systematic and unsystematic factors that affect the liquidity risk of Egyptian banks during the period 2000–2022. A dynamic panel data and generalized method of moments (GMM) estimator is used. Results revealed that systematic factors have no impact on the liquidity risk of Islamic banks and are more exposed to unsystematic factors. Since corporate governance practices have an impact on banks performance we assume corporate governance practices have an impact on liquidity risk determinants as well. Therefore, applying good corporate governance practices will mitigate the liquidity risk of Egyptian banks. The second part of this study examines which banking system applies corporate governance practices more effectively, and if it has an impact on factors that most affect liquidity risk. Traditional banks and traditional banks with Islamic windows have governance practices more effectively to mitigate the impact of systemic and unsystematic risks on a bank's liquidity risk. Islamic banks apply governance practices less effectively. This is attributed to the presence of a Sharia Committee as an alternative to applying governance practices.

Keywords: Liquidity Risk, Emerging Markets, Corporate Governance, Traditional Banks and Islamic Banks

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1. INTRODUCTION

The importance of this research emerges in an unprecedented way after announcing the bankruptcy of a number of American banks

during the beginning of March, and the fear that a number of other banks will follow them. The spread of a state of panic at the level of depositors in those banks, as well as at the level of international financial markets due to the sharp

decline in many shares of other American banks, prompted the supervisory authorities in the financial markets to suspend trading in the shares of these banks. The collapse of Silicon Valley Bank highlights the impact of the followed monetary policy and deficiencies in banking supervision in the United States. The main reason behind this failure and collapse goes back to the rapid increase in interest rates at unprecedented rates that exceeded the rate of increase in interest rates over the past 40 years, which affected the adverse movements in the prices of financial assets causing some negative effects on the international financial system.

The bankruptcy of the bank in the first place resulted from a liquidity crisis (liquidity shock) and not as a result of unexpected losses in the loan portfolio, which confirms the importance of this research to investigate determinants of liquidity risk of Egyptian banks.

Liquidity risk determinants have been a major concern recently since they shape and control the financial performance of Egyptian banks. Liquidity risk is concerned with loans because that is the biggest asset that the banks have, it is the probability that the bank will or will not have sufficient cash to meet the sudden deposit withdrawals. Islamic and traditional banks have different approaches to managing their liquidity. Islamic banks use the non-interest system compared to traditional banks. For instance, traditional banks invest their money in treasury bills since it is one of the highly liquid forms of asset, easily tradable, and the second reserve in the balance sheet. So, it is important to study the liquidity risk of banks since it is not only concerned about the liquid assets and meeting up with short-term obligations but also related to the stability and efficiency of banks without facing any difficulties that could threaten the banks' status. Because of the current economic condition affected by COVID-19, people became afraid of the current situation and the deteriorating economy they started to invest less of their money in banks or withdraw money from deposit accounts. It has become a vital concern to maintain operational efficiency in banks.

Basel III aims to strengthen global capital and liquidity regulations in order to reach a more resilient banking sector. Liquidity coverage ratio (LCR) is used to ensure that a bank maintains an adequate level of high-quality liquid assets that can be converted into cash to meet liquidity needs for a 30 calendar day time horizon under a liquidity stress scenario. At a minimum, the stock of liquid assets should enable the bank to survive until day 30 of the stress scenario, by which time it is assumed that appropriate corrective actions can be taken by management and resolved in an orderly way. The LCR builds on traditional liquidity "coverage ratio" methodologies used internally by banks to assess exposure to contingent liquidity events. The standard requires that the value of the ratio be no lower than 100% (i.e., the stock of high-quality liquid assets should at least equal to total net cash outflows). Banks are expected to meet this requirement continuously and hold a stock of unencumbered, high-quality liquid assets as a defense against the potential onset of severe liquidity stress. Banks are also expected to be aware

of any potential mismatches within the 30-day period and ensure that sufficient liquid assets are available to meet any cash flow gaps throughout the period. The LCR refers to the proportion of highly liquid assets to ensure their ongoing ability to meet short-term obligations. This ratio is a generic stress test that aims to anticipate market-wide shocks and make sure that financial institutions possess suitable capital preservation.

The net stable funding ratio (NSFR) represents the relationship between available stable funding (ASF) and required stable funding (RSF), where the ratio works to counter the incompatibility of the long-term financing structure by urging banks to use long-term stable sources of funds for a period of at least one year to cover investments in assets and any financing claims resulting from off-balance sheet obligations, which helps the bank to structure its sources of funds, and this ratio must not be less than 100% permanently. The LCR and NSFR standards provide the cornerstone of information that aids supervisors in assessing the liquidity risk of a bank. These tools that can be used in the short term can be represented as follows:

- Contractual maturity mismatch, which identifies the gaps between the contractual inflows and outflows of liquidity for defined time bands, and these gaps indicate how much liquidity a bank would potentially need to raise in each of these time bands if all outflows occurred at the earliest possible date.

- Funding concentration identifies those sources of wholesale funding that are of such significance that withdrawal of this funding could trigger liquidity problems.

- Available unencumbered assets (AUA) provides supervisors with data on the quantity and key characteristics, including currency denomination and location, of banks' available unencumbered assets. It is used as collateral to raise additional high-quality liquid assets or secured funding in secondary markets.

- LCR by currency, in order to better capture potential currency mismatches, banks and supervisors should also monitor the LCR in significant currencies not only for the local currency.

For the purpose of monitoring intraday liquidity positions and risks and, according to Pillar 8, for sound liquidity risk management and supervision, "A bank should actively manage its intraday liquidity positions and risks to meet payment and settlement obligations on a timely basis under both normal and stressed conditions and thus contribute to the smooth functioning of payment and settlement systems" (Basel Committee on Banking Supervision, 2013, p. 1). According to the availability and accuracy of data we used the LCR to measure liquidity risk of Egyptian banks. Egyptian banks apply major principles of corporate governance of the Basel Committee, namely:

- transparent governance;
- identify the operational structure of the bank;
- internal control functions and internal auditors;
- board of directors and their key executive compensation;
- ensuring oversight by senior management;
- accountability and lines of responsibility;

- board role regarding strategic the bank's corporate values and strategic objectives;
- boards responsibilities, capabilities and qualifications.

Corporate governance in banking is getting higher attention because of various components, including the level and nature of bank regulation and supervision, the hazy nature of banks assets, and the condition of market improvement. The Central Bank of Egypt issued rules and guidance to apply corporate governance across all Egyptian banks as follows:

Pillar 1: Board of directors' qualifications, responsibilities, and capabilities.

Pillar 2: Board's role regarding the bank's corporate values and strategic objectives.

Pillar 3: Lines of accountability and responsibility.

Pillar 4: Ensuring oversight by top management.

Pillar 5: Auditors and internal control systems.

Pillar 6: Board and key executive compensation.

Pillar 7: Transparent governance.

Pillar 8: Identify the operation structure of the company.

Basel Committee requires the application of appropriate corporate governance practices since banks cannot work successfully without good practices of corporate governance. Good corporate governance practices would mitigate bank failures and enhance the bank's revenues and financial performance. Corporate governance is a method to manage the overlapping role between a bank's owners, directors, shareholders, and stakeholders. A lot of research has proven a positive relationship between corporate governance and a bank's financial performance (Hafez, 2015). On that basis, we expect to see an impact of corporate governance practices on liquidity risk determinants of Egyptian banks. Effective implementation of corporate governance mitigates liquidity risk and leads to the effective performance of banks, increases the bank value, and develops banking systems. It will enhance the Egyptian economy in an indirect way. Corporate governance enhances the liquidity positions of banks as well. We would expect that there is an impact of corporate governance practices on liquidity risk determinants of Egyptian banks.

This study opens the door for researchers and academics to study the variables that affect liquidity levels in Egyptian banks. Whether they are traditional commercial banks or Islamic banks. Especially in light of the international crises that cast a shadow on the global economic climate and the extent of its impact on the activity and work of Egyptian banks.

The importance of this study is highlighted at the present time with the bankruptcy of a number of American banks. It was necessary to study the variables that determine liquidity in Egyptian banks. And to study whether the application of governance standards within Egyptian banks affects liquidity levels and contributes to reducing the risk of bankruptcy of those banks in the future. Therefore, this study could help financial decision-makers in Egypt manage the monetary policy file more effectively, helping to support and stabilize the Egyptian economy, especially during periods of financial crises. It supports the efficient operation of Egyptian banks and contributes to advancing the

economy. This research was conducted in two basic stages. The first stage is to identify the variables that determine liquidity levels in Egyptian banks with their different systems (traditional or Islamic commercial). The other part is selecting some governance variables and studying their impact on the determinants of liquidity variables.

The study attempts to find the most important determinants of liquidity between regular variables associated with the macroeconomic variables and irregular variables associated with the characteristics of banks. The study also found the importance of following governance practices in affecting the determinants and levels of liquidity within Egyptian banks, which ultimately works to reduce the possibility of banks being exposed to any financial shocks or bankruptcy.

We used the dynamic data approach to conduct the research analysis, the same approach was used by Ghenimi et al. (2020).

This paper is structured as follows. Section 1 presents the introduction, the importance, and the contribution of the research. Section 2 presents a literature review and hypotheses development. Section 3 presents the research methodology. Data analysis is presented in Section 4. Lastly, Section 5 presents the research conclusion and research limitations.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. Systematic factors

2.1.1. Inflation rate

The literature review has mixed results. Vodova (2011) found that the inflation rate has a positive impact on liquidity risk. On the contrary, Horvath et al. (2014) found that the inflation rate has an insignificant impact on the liquid assets of banks. Ben Moussa (2015) concluded that the fluctuation in inflation rates is inversely related to liquidity risk. Sukri and Waemustafa (2015) concluded that the relationship between inflation rate and liquidity risk in Islamic banks is positive, however, this relationship is not valid for traditional banks in Malaysia. We conclude that the effect of the inflation rate on liquidity risk is positive since liquidity levels of Egyptian banks fluctuate as inflation rates fluctuate. The increase in inflation rates can deteriorate the capacity of Egyptian borrowers to pay debt installments and interest expenses since this reduces the real income for Egyptians and leads to an increase in non-performing loans. In this instance, credit and liquidity risk are correlated. If banks cannot meet the demand of depositors because of the failure of some projects which impacts the value of these assets, this will lead to an increase in credit and liquidity risk, consequently, and will decrease the loan repayment value. Therefore, we can formulate this hypothesis as follows:

H1: There is a significant positive relationship between inflation rate and liquidity risk.

2.1.2. Gross domestic product (GDP)

The growth in GDP refers to the acceleration of business cycle of the country's economy where investments and the country's economic growth are heavily affected by banks' liquidity position. Many studies examined the relationship between the growth in gross domestic product and liquidity risk across traditional banks. Ben Moussa (2015) proved the positive relationship between the growth in gross domestic product and liquidity holdings. On the contrary, Dinger (2009) proved that this relationship is negative in the Central and Eastern European emerging economies. The growth in gross domestic product is negatively related to the liquidity of banks operating in the core economy. This means the growth change in the gross domestic product is related to the bank's liquidity. An expanding economy provides an efficient financial environment for banks to generate more income, consequently reducing liquidity risk. On the other hand, only a few studies examined the determinants of liquid risk of Islamic banks. Abdul-Rahman et al. (2018) proved the negative relationship between the growth in gross domestic product and liquidity risk in Islamic and traditional banks emphasizing the fact that when both types of banks have limited access to capital markets, the higher the possibility that bank liquidity holdings is related to the economic cycle. Therefore, most banks maintain sufficient liquidity to reduce external debt during different economic statuses: recession or expansion. During this period, the level of investment increases and facilitates economic growth. Accordingly, those banks are more willing to lend money. The growth in gross domestic product is an indicator to measure the demand for banking services. The higher the growth in gross domestic product, the higher the increases in bank liquidity as more money flows into financial markets to citizens. As a result, this reduces liquidity risk. During recession periods corporate borrowers and individuals need more funds to pay off their debts and this leads to an increase of the liquidity risk. We can formulate the second hypothesis as follows:

H2: There is a negative significant relationship between growth in gross domestic product and liquidity risk.

2.1.3. Financial crisis

Liquidity is a major component of financial stability. Previous studies showed that there is a positive significant relationship between financial crisis and liquid risk. Mahdi and Abbes (2018) proved that there is a significant negative relationship between the financial crisis and liquidity risk of traditional and Islamic banks operating in the MENA region. In the meantime, Vadova (2011) supported the results of this study since the author proved the significant negative relationship between financial crisis and banks' liquidity risk. A financial crisis may be a consequence of poor bank liquidity but the reverse relationship could be also true. The existence of a financial crisis leads to weak bank liquidity causing the instability of macroeconomic factors. This generates an unfavorable business environment for banks and worsens the business environment. Accordingly, corporate borrowers and

individuals will not have the capacity to pay outstanding debt. This leads to reducing the bank's liquidity and increasing credit and liquidity risk. We can formulate the third hypothesis as follows:

H3: There is a positive relationship between financial crisis and liquidity risk.

2.2. Unsystematic factors (Bank-specific factors)

2.2.1. Bank size

Large banks with economies of scale provide services more efficiently and lower the costs of acquiring and processing data than small banks, large banks have a more diverse loan portfolio than small banks and can access markets. Empirical studies are not consistent. During the period from 2007 to 2014, Alzoubi (2017) examined 42 Islamic banks in 15 countries stating that bank size is negatively related to liquidity risk. On the other side, Vadova (2011) provided an analysis of Czech commercial banks between 2001 and 2009 and concluded that large banks have less liquidity. This result confirms the "too big to fail" assumption. Large banks tend to maintain lower levels of liquid funds because in the case of failure they depend on government intervention. As long as the size of banks reduces liquidity risk which can give these banks more confidence in their customers. We can formulate the fourth hypothesis as follows:

H4: There is a positive relationship between bank size and liquidity risk.

2.2.2. Credit risk

Credit risk is the probability of loss resulting from a borrower's failure to repay the loan or meet contractual commitments. This process leads to disruption in cash flow and higher collection costs. Excess cash flows can be written to provide extra credit risk protection when a lender is faced with increased credit risk. Sukri and Waemustafa (2015) used data from 2000 to 2010 from 15 traditional and 13 Islamic banks in Malaysia, they found a positive and significant relationship between credit risk and liquidity risks in traditional banks compared to Islamic banks. Credit risk leads to some of the bank's assets declining in value and is calculated by using the provision of loan and lease, which is how much a bank expects to uncover from loans, allowance for loan and leasing, total liabilities, and equity. Traditional banks are considered risk-takers compared to Islamic banks. Traditional banks have a variety of ways to finance their money and apparently are going to end up with high credit risk because they are exposed to bad debts. The study found that traditional banks have an inverse relationship between liquidity risk and credit risk. Furthermore, since they are exposed to higher credit risk, their liquidity will decrease because they have to make up for the bad uncovered debts leaving insufficient cash to meet other demands of short-term obligations and sudden withdrawals. According to Fatimah Yaacob et al. (2016), many recent studies supported the inverse relationship between liquidity risk and credit risk. Islamic banks, on the contrary, are not exposed to higher risk. Iqbal (2012) proved

the significant negative relationship between liquidity risk and credit risk within both types of banks. The increase in credit risk means that banks have huge amounts of bad debts which, in turn, reduce liquidity positions; this leads to lower cash inflows of banks. Accordingly, we can formulate the following hypothesis:

H5: There is a negative relationship between credit risk and liquidity risk.

2.2.3. Capital adequacy ratio (CAR)

According to a recent study by El-Ansary et al. (2019), the higher the increase in bankruptcy risk due to a lack of existing liquid assets by increasing the capital adequacy ratio, the higher the liquidity risk. The higher capital adequacy ratio means that there are not enough liquid assets to meet obligations. This happens because banks who maintain a higher capital adequacy ratio finance funds in tier 1 and tier 2. Tier 1 is the stockholders/bank's owners' equity and retained earnings. Tier 2 is the capital instruments and debts to protect a bank from credit risk. This will force banks to spend more money to expand their capital and finance, their funding leading to liquidity risk. Islamic bank does have a significant positive relationship between capital adequacy ratio and liquidity risk. Liquidity risk leads to capitalization. Banks with a large capital face fewer problems or risk situations. Iqbal (2012) proved that the capital adequacy ratio has a positive and significant impact on both types of banks. The higher the capital adequacy ratio, the higher the capital. This means that capital can be used to meet its maturity date obligations and, therefore, it will have less difficulty in risky situations. The sixth hypothesis can be formulated as follows:

H6: A significant negative relationship exists between the capital adequacy ratio and liquidity risk.

2.2.4. Liquidity gap

A liquidity gap is a method of evaluating a bank's financial risk to measure financial health. It can be measured as the difference between a bank's total liquid assets and total liabilities. The bank can measure the liquidity gap once, twice, or three times and compare changes in the liquidity gap. Most of the assets with a liquidity gap are financed by deposits, most of which currently can be called at any time. Choudhry (2011) clearly stated that traditional banks must achieve a certain grade of mismatch between assets and liabilities to improve operation efficiency and increase generated profit. Excessive maturity mismatch causes a higher liquidity risk. The liquidity gap is expected to have a strong relationship with liquidity risk. We can formulate this hypothesis as follows:

H7: A significant positive relationship exists between liquidity gap and liquidity risk.

2.2.5. Return on assets (ROA)

Noraini (2012) stated that traditional banks are much more flexible in investing and financing since they have a lot of investing options in the market. They use the interest rate system. On the other side,

Islamic banks have strict rules; they follow Sharia to avoid anything that's *haram*. Because of this, Islamic banks have somehow a closed scope of investing money. They would not have high returns form financing compared to traditional banks. They share profits and losses to cover it. Consequently, Islamic banks more exposed to liquidity risk compared to traditional banks because of the limited sources of cash inflows. For Islamic banks to solve this issue they use different types of liquidity managing for example having accounts that contain liquidity cushion to cover sudden demands on paying debt. Muharam and Kurnia (2012) proved the significant negative relationship between liquidity risk and returns on assets in Islamic banks. Islamic banks use all of the money generated form the assets to cover their liabilities so the higher return on assets, the lower the liquidity risk. In terms of traditional banks, there is a positive relationship between return on assets and liquidity risk because they use capital to cover their debts (long and short). There will be the money that comes from the use of assets. The increase in return on assets means that the bank generates higher profits and enough cash from the use of its assets. Banks can generate return from giving loans with higher interest rates or investing in short-term governmental securities. Traditional banks use the interest system to generate income. Islamic banks do not use the interest rate system, the main source of generating profit, but they still can generate profits from using their assets and cover their short-term debts. As a result, Islamic banks do not have enough liquidity to cover long-term liabilities. We can formulate this hypothesis as follows:

H8: There is a significant positive relationship between return on assets and liquidity risk.

2.2.6. Return on equity (ROE)

It is used to evaluate the performance of banks to demonstrate how well the bank's management is converting shareholders' capital into net profits and distributing them to shareholders. According to Alzoubi (2017), the increase in return on equity makes liquidity risk decrease since equity is considered much more stable and does not involve high risk compared to debts. Traditional banks have a high return on equity compared to Islamic banks because most of the retained earnings of traditional banks go back to the shareholders compared to the amount that was distributed to the market since Islamic banks want to gain awareness in the market and expand so it has a lower return on equity. According to Iqbal (2012), traditional banks hold the distribution of dividends to the public as they retain this money to the shareholders which leads to higher return on equity compared to Islamic banks. Therefore, we can formulate the following hypothesis:

H9: A significant negative relationship exists between return on equity and liquidity risk.

2.2.7. Loans to total assets

The higher the loans to assets ratio is, the more a bank's loan book is depleted, its liquidity is low and the riskier a bank is to default. A significant

negative relationship is expected between the loans to total assets ratio and liquidity risk for both Islamic and traditional banks. The increase in the loans to assets ratio indicates that the bank is levered by many loans and has low liquidity meaning that it has an exposure to higher liquidity risk. This means that banks will increase liquidity when their lending opportunities decrease. This means that existing funds are widely used for credit allocation and less for short-term liabilities. It has a negative effect on liquidity risk, we can formulate this hypothesis as follows:

H10: A significant negative relationship is expected between loan to total assets ratio and liquidity risk.

2.2.8. Non-performing loans (NPL)

A non-performing loan is a loan in which the borrower has defaulted because they have failed to make scheduled payments (principal or interest) depending on the sector and the type of loan. Non-performing loan status can vary based on the conditions of the loan. Sukmana and Suryaningtyas (2016) studied eight Islamic and five traditional banks and proved that there is a direct relationship between non-performing loans and liquidity risk. For traditional banks, the higher the non-performing loans ratio, the higher the liquidity risk. Banks will not be able to cover the borrowed money by customers so that will lead to low liquid assets available in the bank. Whilst, in Islamic banks, non-performing loans do not affect it that much since it does not mainly rely on loans compared to a traditional bank. Non-performing loans exist in the calculation of credit risk. Because there is an inverse relationship between credit risk and liquidity. The higher the credit risk, the higher the face of uncovering worthless loans, which leads to a liquidity crisis in banks. There are a lot of things that can trigger non-performing loans such as for instance high rate of inflation. A higher interest rate, in a bad-performing economy (low GDP) leads to poverty and increases the level of unemployment, so with these types of conditions, it can increase the non-performing loans ratio. Since individuals and corporations are not doing well in a poor economy, non-performing loans mainly come with interest rates. Islamic banks are not that affected by the non-performing loans compared to the traditional bank. The following hypothesis can be formulated:

H11: A significant negative relationship is expected to exist between non-performing loans and liquidity risk.

2.2.9. Operational efficiency

Operational efficiency shows a bank's ability to generate revenue and manage expenses. It is a metric that evaluates the profitability of a bank as a function of its operational costs. The more profitable a bank

is, the more efficient its operations are. This is because the entity may generate more income or returns for the same or less money than a competitor. Al-Homaidi et al. (2019) investigated liquidity risk determinants of Indian traditional banks listed on the Bombay Stock Exchange and found that operation efficiency had a positive effect on liquidity. This study is in line with Sadaqat et al.'s (2011) study on Islamic banks. The higher the operational efficiency the lower the liquidity risk. We can write the following hypothesis:

H12: A negative significant relationship is expected to exist between operational efficiency and liquidity risk.

2.2.10. Asset quality

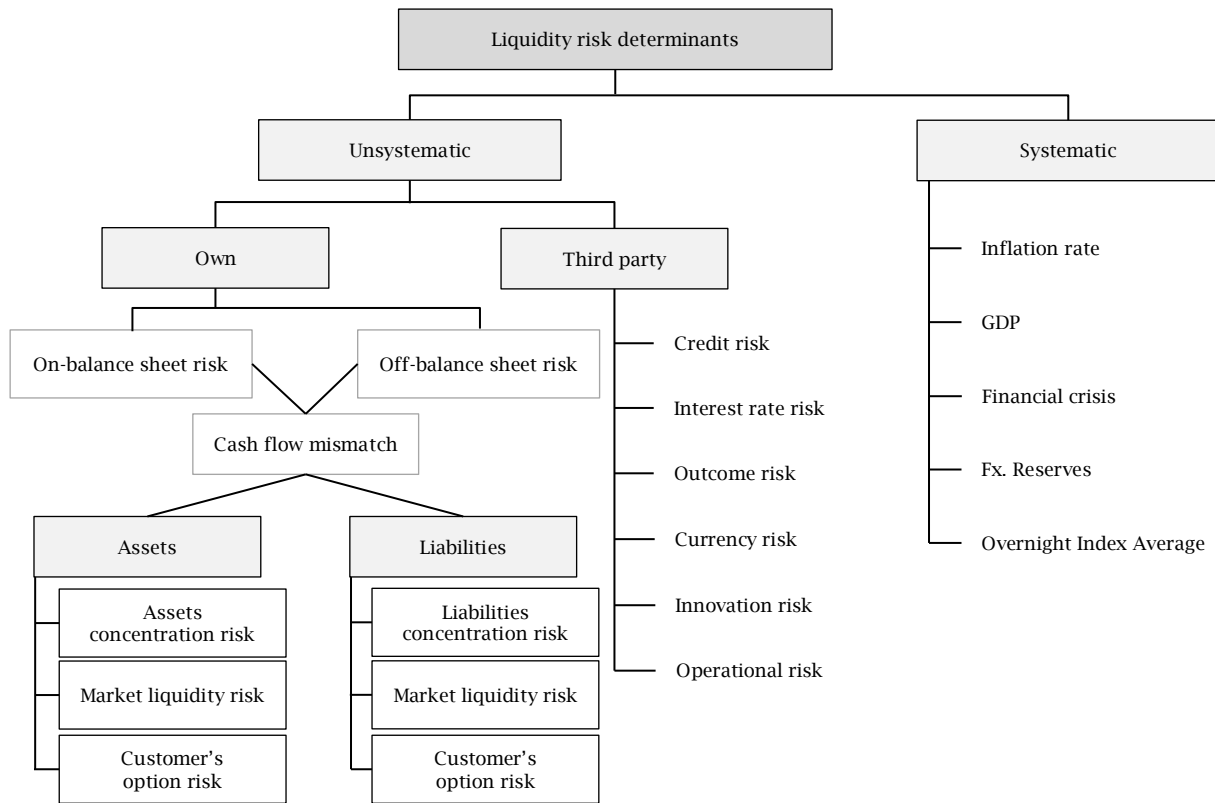
It refers to the estimation of the quality of a bank's assets, such as loans, as assessed by the loan loss reserve to gross loan ratio. According to Irawati and Puspitasari (2018), the higher the asset quality, the lower the liquidity risk which means Islamic banks were managing their assets well. Asset quality measures the price at which the bank can value or sell its assets like loans in the market. So, it is more likely that any more would like to increase its asset value in the market to gain more approval from the customers. Therefore, the more recognition the bank gets the more it is able to make loans to the public since it has a higher asset quality ratio which leads to an increase in assets. Thus, we can formulate the following hypothesis:

H13: There is a negative significant relationship between asset quality and liquidity risk.

Bhati et al. (2015) examined the long-term effect of various regulatory, bank-specific, and macroeconomic factors on the determination of liquidity in Indian banks. Results were mixed. Indian banks rely more on asset-based liquidity and less on liability-based liquidity. Liquidity ratios showed a significant relationship with macroeconomic variables. Also, liquidity ratios showed a significant relationship with bank-specific variables. The regulatory factors of cash reserve ratio, profitability, and non-performing assets were not found to have any effect on the liquidity of Indian banks. Ghenimi et al. (2020) examined the similarities of liquidity risk determinants within conventional and Islamic banks by selecting 27 Islamic banks and 49 conventional ones operating in the MENA region from year 2005 to 2015. Results concluded that the set of bank-specific variables influences the liquidity risk of both banking systems, while macroeconomic factors determine the liquidity risk of conventional banks. Islamic banks are not affected by macroeconomic determinants

Figure 1 presents a summary of all variables that affect liquidity risk determinants.

Figure 1. Liquidity risk determinants



Source: Author's elaboration.

3. RESEARCH METHODOLOGY

3.1. Data collection

Traditional banks in Egypt are well-developed, unlike Islamic banks. A basic quantitative research technique was employed and primary panel data were taken from 5 Islamic banks, 21 traditional banks, and 4 mixed banks with Islamic windows using time series analysis from 2000 to 2022. Data are gathered from the audited financial statements of each bank, which are taken from Bankscope (unsystematic factors). Data on systematic factors are obtained from annual reports of the Central Bank of Egypt. As a result of the presence of many cases of bank mergers in Egypt and the tendency of

other European banks to withdraw from the banking market in Egypt to support their financial centers in the home country. We believe that this period, which represents 12 years, is considered an appropriate period for conducting statistical analysis, by relying on periodic quarterly data.

3.2. Statistical model

We adopted a generalized method of moments approach (GMM) to consider the time persistence in the equation for the structure of liquidity risk and due to the short period of collecting data. GMM was developed by Arellano and Bond (1991). The following regression model is used:

$$LR_{i,t} = C + \delta LR_{i,t-1} + \sum_{j=1}^J \beta_j Bank_{i,t}^j + \sum_{l=1}^L \beta_l Systematic_{i,t} + \varepsilon_{i,t} \quad (1)$$

where,

i = refers to bank;

t = refers to the time;

$LR_{i,t}$ = liquidity risk for a specific bank;

$LR_{i,t-1}$ = the first lagged dependent variable which captures the continuity in the liquidity risk;

$Bank_{i,t}^j$ = refers to bank-specific variables: unsystematic factors: Bank size, credit risk, capital adequacy ratio, liquidity gap, return on assets, return on equity, loan to assets, non-performing loans, operational efficiency, asset quality;

$Systematic$ = macro factors.

This research used three macroeconomic variables: Inflation rate, the GDP growth, and the financial crisis as a dummy variable (0 or 1).

GMM regression analysis technique solves the issue of bias and inconsistency due to the existence of lagged liquidity risk (the endogeneity caused by explanatory variables). Second, it provides more unbiased, realistic and efficient estimates if there is an autocorrelation and heteroskedasticity within explanatory variables when they are not strictly exogenous. Third, it combines regressions of levels and first differences and uses more instruments. GMM estimation gives more efficient results than any other technique since the data is unbalanced, and GMM magnifies the gaps. We used the Hansen test to examine the over-identifying restrictions to detect if the model is well-specified or not. We cannot reject the null

hypothesis (H_0) proving that instruments used are valid. The test of first-order and second-order serial correlation were conducted. Accordingly, we should reject the null hypothesis; there is no first-order

serial correlation. Therefore, the instruments validity of autocorrelation cannot be rejected. Table 1 presents a measurement of all variables: dependent and independent.

Table 1. Variables measurement

Variable	Measure
	Dependent factor
Liquidity coverage ratio (LCR)	$L_1 = \frac{\text{High quality liquid assets amount (HQLA)}}{\text{Total net cash flow amount}}$ Over a 30 - day stress period
	Unsystematic factors
Bank size (Total assets)	Natural log of total assets
Credit risk	$= \frac{\text{Loan provision}}{\text{Total loans}} \times 100$ $= \frac{\text{Loan loss reserves}}{\text{Total loans}} \times 100$
Capital adequacy ratio (CAR)	$CAR = \frac{\text{Primary capital} + \text{Submintary capital}}{\text{Risk weighted assets}} \times 100$ $(\text{Tier 1} + \text{Tier 2})/\text{Risky weighted assets}$
Profitability ratio	$ROA = \frac{\text{Net income after tax}}{\text{Total assets}} \times 100$ $ROE = \frac{\text{Net income after tax}}{\text{Total assets}} \times 100$
Operational efficiency	The Index of Data Envelopment Analysis
Liquidity gap	$\text{Log}(\text{Assets} - \text{Liabilities})$
Non-performing loans (NPL)	$NPL = \frac{\text{Non-performing loans}}{\text{Total assets}} \times 100$
Loans to assets	$\text{Total loans}/\text{Total assets}$
Asset quality (AMQ)	$AMQ = \frac{\text{Earning assets}}{\text{Total assets}} \times 100$
	Systematic/Macrofactors
Inflation rate	Consumer price index
The growth in gross domestic product	Real rate of gross domestic product growth
Financial crisis	Financial crisis = 0 in 2005, 2006, and 2009 to 2015 and = 1 for the 2007 to 2008 period

3.3. Empirical results of generalized method of moment model

3.3.1. Ramsey equation specification error test (RESET)

The Ramsey test is conducted to show the relationship between dependent and explanatory variables and if it is linear or non-linear. The restricted and unrestricted model assumption for linearity and non-linearity is used in Table 2. We used the sum of squared residuals (SSR) for restricted and unrestricted models to perform the F-test since the F-statistic is bigger than right critical values resulting in accepting the H_0 , which means that it is a linear relationship.

3.3.2. Outlier test of the significance of variables

In order to examine the significance of selected variables, some variables may include values that have more than three standard deviations.

Therefore, a limit of three is set for all variables as any variable that exceeds this limit is considered an outlier and will be removed from collected data. This test is constructed by an ordinary least square regression. Results revealed that the data did not exceed the standard deviation of three and there are no variables that have any double effects on the dependent variable.

We will start our analysis by introducing descriptive analysis of both dependent and independent variables namely the standard deviation and mean of three categories of banks operating in Egypt: traditional banks, Islamic banks, and traditional banks with Islamic windows.

Table 2 presents a descriptive analysis of the three categories of banks operating in Egypt as follows:

Table 2. Descriptive statistics of systematic and unsystematic factors

Factors	Traditional banks		Islamic banks		Traditional banks with Islamic windows	
	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean
Dependent factor (<i>LR</i>)	0.031	10.234	0.351	0.347	0.102	3.652
Inflation rate (<i>IR</i>)	0.209	7.101	0.255	7.311	0.203	8.001
Gross domestic product (<i>GDP</i>)	0.737	5.445	0.758	6.446	0.435	6.416
International financial crisis (<i>IFC</i>)	0.554	0.192	0.462	0.195	0.314	0.196
Size of the bank (<i>LogAssets</i>)	0.691	4.031	0.913	4.656	0.622	5.192
Credit risk (<i>CR</i>)	0.031	0.857	0.123	0.767	0.192	0.779
Capital adequacy ratio (<i>CAR</i>)	0.413	16.645	0.203	14.795	0.845	13.112
Liquidity gap (<i>LG</i>)	0.491	5.435	0.794	4.631	0.618	4.977
Return on assets (<i>ROA</i>)	0.308	5.2173	0.405	4.101	0.305	4.356
Return on equity (<i>ROE</i>)	0.311	13.256	0.31	6.433	0.315	8.827
Loans to total assets (<i>LTA</i>)	0.215	2.434	0.239	1.103	0.24	1.872
Non-performing loans (<i>NPL</i>)	0.427	0.679	0.439	0.724	0.49	0.606
Technical efficiency (<i>TE</i>)	0.774	0.638	2.001	0.629	0.711	0.774
Asset quality (<i>AQ</i>)	0.689	0.749	1.322	0.885	0.714	0.872

3.3.3. Testing multicollinearity using SPSS

The problem of multicollinearity exists when more predictor variables are highly correlated to each other. If the degree of correlation is high it can cause problems when fitting and interpreting the regression model. We use the matrix of variance inflation factor (VIF) in order to detect the problem of multicollinearity between independent variables. Table 3 has been generated through the application of Statistical Package for the Social Sciences (SPSS). The value for VIF starts at 1 and has no upper limit. A general rule of thumb for interpreting VIFs is as follows:

- A value of 1 indicates there is no correlation between a given predictor variable and any other predictor variables in the model.

- A value between 1 and 5 indicates a moderate correlation between a given predictor variable and other predictor variables in the model, but this is often not enough to require attention.

- A value greater than 5 indicates a potentially severe correlation between a given predictor variable and other predictor variables in the model. In this case, the coefficient estimates and p-values in the regression output are likely unreliable.

Tables 3, 4, and 5 prove that the issue of multicollinearity does not exist across three categories of banks.

Table 3. Collinearity statistics: Traditional banks

Model 1	Tolerance	VIF
Inflation rate	0.567	1.23
GDP growth	0.982	1.789
Financial crisis	0.801	1.456
Bank size	0.561	1.413
Credit risk	0.678	1.892
Capital adequacy ratio	0.603	1.457
Liquidity gap	0.791	1.042
Return on assets	0.631	2.903
Return on equity	0.773	2.032
Loans to total assets	0.878	1.403
Non-performing loans	0.614	1.872
Operational efficiency	0.744	1.045
Asset quality	0.497	1.623

Table 4. Collinearity statistics: Islamic banks

Model 2	Tolerance	VIF
Inflation rate	0.607	1.415
GDP growth	0.726	1.213
Financial crisis	0.693	1.609
Bank size	0.877	1.378
Credit risk	0.789	1.702
Capital adequacy ratio	0.502	1.519
Liquidity gap	0.605	1.444
Return on assets	0.745	1.905
Return on equity	0.884	1.874
Loans to total assets	0.989	1.305
Non-performing loans	0.416	1.702
Operational efficiency	0.633	1.54
Asset quality	0.515	1.816

Table 5. Collinearity statistics: Traditional banks with Islamic windows

<i>Model 3</i>	<i>Tolerance</i>	<i>VIF</i>
Inflation rate	0.567	1.414
GDP growth	0.982	1.809
Financial crisis	0.801	1.567
Bank size	0.561	1.506
Credit risk	0.678	1.913
Capital adequacy ratio	0.603	1.569
Liquidity gap	0.791	1.154
Return on assets	0.631	1.205
Return on equity	0.773	1.112
Loans to total assets	0.878	1.523
Non-performing loans	0.614	1.762
Operational efficiency	0.744	1.006
Asset quality	0.497	1.417

Table 6. Correlation matrix: Traditional banks

	<i>LR</i>	<i>IR</i>	<i>GDP</i>	<i>FC</i>	<i>SIZE</i>	<i>CR</i>	<i>CAR</i>	<i>LG</i>	<i>ROA</i>	<i>ROE</i>	<i>LTA</i>	<i>NPL</i>	<i>OE</i>	<i>AQ</i>
<i>LR</i>	1.00													
<i>IR</i>	-0.16*	1.00												
<i>GDP</i>	0.07*	-0.12*	1.00											
<i>FC</i>	0.03	0.03	0.02	1.00										
<i>SIZE</i>	0.07	-0.05	0.05	-0.08	1.00									
<i>CR</i>	0.06	-0.07	-0.25*	-0.72	-0.12	1.00								
<i>CAR</i>	0.07	-0.36	-0.56	-0.69	-0.04	0.69*	1.00							
<i>LG</i>	0.08	-0.08	0.06	-0.02	0.48*	0.12	-0.15	1.00						
<i>ROA</i>	0.03	-0.09	-0.04	-0.27	0.14	-0.08*	0.06*	0.02	1.00					
<i>ROE</i>	0.05	-0.31	-0.03	-0.72	0.27	-0.62	0.43*	0.04	0.31*	1.00				
<i>LTA</i>	-0.06	-0.25	0.08*	-0.07	0.05	0.26	0.18	-0.07	0.23*	0.14*	1.00			
<i>NPL</i>	0.07*	0.29*	0.03*	-0.25*	0.26	0.34*	0.05*	-0.22*	0.15	0.16	0.05	1.00		
<i>OE</i>	-0.06*	-0.77	0.70	-0.15	0.04	-0.16	-0.16	-0.40	0.34*	0.32*	0.24	-0.35	1.00	
<i>AQ</i>	0.09*	-0.28	-0.32	-0.28	0.45*	-0.47*	-0.13	-0.06	0.10*	0.037*	-0.30	-0.14	-0.44	1.00

Note: * Level of significance at 5%.

Table 7. Correlation matrix: Islamic banks

	<i>LR</i>	<i>IR</i>	<i>GDP</i>	<i>FC</i>	<i>SIZE</i>	<i>CR</i>	<i>CAR</i>	<i>LG</i>	<i>ROA</i>	<i>ROE</i>	<i>LTA</i>	<i>NPL</i>	<i>OE</i>	<i>AQ</i>
<i>LR</i>	1.00													
<i>IR</i>	-0.16	1.00												
<i>GDP</i>	-0.16*	0.18	1.00											
<i>FC</i>	0.05	-0.19*	0.05	1.00										
<i>SIZE</i>	-0.17	0.33	-0.17	-0.04	1.00									
<i>CR</i>	-0.03	0.21	0.32	-0.25	-0.15	1.00								
<i>CAR</i>	-0.22	0.35	0.46*	-0.47	-0.37	0.50*	1.00							
<i>LG</i>	-0.14	-0.12	0.19	-0.09	0.53*	0.32*	0.14*	1.00						
<i>ROA</i>	-0.11	-0.04*	0.09	0.25*	0.17	-0.24	-0.27	-0.73*	1.00					
<i>ROE</i>	-0.20	-0.45*	0.27	0.34*	0.32	-0.39	-0.29	-0.25*	0.21*	1.00				
<i>LTA</i>	-0.60	0.43	0.14	-0.41	0.18	-0.21	-0.23	-0.36	0.08*	0.22*	1.00			
<i>NPL</i>	-0.17	0.13	0.26	-0.32	0.09	0.30*	-0.18	0.02*	-0.01*	-0.45	0.05*	1.00		
<i>OE</i>	-0.07	0.18	0.65	-0.23	0.29	-0.15	-0.69	0.16	0.28*	0.23*	-0.07	-0.26	1.00	
<i>AQ</i>	-0.36	0.54	0.43	-0.81	0.21	-0.24*	-0.35	0.02	0.43*	0.03*	-0.34*	-0.40*	-0.32*	1.00

Note: * Level of significance at 5%.

Table 8. Correlation matrix: Traditional banks with Islamic windows

	<i>LR</i>	<i>IR</i>	<i>GDP</i>	<i>FC</i>	<i>SIZE</i>	<i>CR</i>	<i>CAR</i>	<i>LG</i>	<i>ROA</i>	<i>ROE</i>	<i>LTA</i>	<i>NPL</i>	<i>OE</i>	<i>AQ</i>
<i>LR</i>	1.00													
<i>IR</i>	-0.04	1.00												
<i>GDP</i>	-0.08*	0.24	1.00											
<i>FC</i>	0.18	-0.16*	0.20	1.00										
<i>SIZE</i>	-0.24	0.13	-0.27	-0.32	1.00									
<i>CR</i>	-0.14	0.23	0.49	-0.31	-0.24	1.00								
<i>CAR</i>	-0.28	0.09	0.42*	-0.28	-0.51	0.43*	1.00							
<i>LG</i>	-0.33	-0.05	0.32	-0.19	0.32*	0.31*	0.02*	1.00						
<i>ROA</i>	-0.11	-0.12*	0.17	0.23*	0.19	-0.38	-0.86	-0.20*	1.00					
<i>ROE</i>	-0.38	-0.46*	0.38	0.45*	0.44	-0.41	-0.30	-0.49*	0.22*	1.00				
<i>LTA</i>	-0.39	0.21	0.18	-0.24	0.22	-0.16	-0.77	-0.25	0.18*	0.21*	1.00			
<i>NPL</i>	-0.11	0.17	0.22	-0.39	0.42	0.17*	-0.31	0.16*	-0.13*	-0.41	0.08*	1.00		
<i>OE</i>	-0.06	0.293	0.42	-0.08	0.81	-0.05	-0.74	0.06	0.57*	0.14*	-0.05	-0.43	1.00	
<i>AQ</i>	-0.21	0.45	0.33	-0.57	0.40	-0.06*	-0.55	0.09	0.49*	0.15*	-0.41*	-0.54*	-0.45*	1.00

Note: * Level of significance at 5%.

3.3.4. Empirical results

Since there is no autocorrelation in the transformed residuals the hypothesis stating the absence of second order is valid. As a result, the used model in

empirical analysis is specified correctly. The model of dynamic character used as results proved that the lagged liquidity risk is significant and positive across all types of banks (Daher et al., 2015).

Table 9. Results using the generalized methods of moments

Variable	Dependent variable: Liquidity risk					
	Islamic banks		Traditional banks		Traditional banks with Islamic window	
	(1)	(2)	(1)	(2)	(1)	(2)
Dependent factor (LCR)	0.76***	0.75***	0.51***	0.64***	0.81**	0.68**
Inflation rate (IR)	-0.54	-0.46	-0.41***	-0.56***	-0.29***	-0.42***
Gross domestic product (GDP)	-0.645	-0.32	-0.17***	-0.25***	-0.23***	-0.25***
International financial crisis (IFC)		5.41	4.12***	3.89***	4.11***	2.56***
Size of the bank (LogAssets)	-0.05***	-0.19***	0.60***	0.74***	0.52***	0.41***
Credit risk (CR)	4.22***	3.41***	2.72***	1.56***	2.28***	0.89***
Capital adequacy ratio (CAR)	3.11***	1.92***	2.02***	5.457***	2.12***	4.30***
Liquidity gap (LG)	4.09***	-	16.17***	-	9.32***	-
Return on assets (ROA)	10.15***	15.15***	0.24***	0.13***	9.45***	6.29***
Return on equity (ROE)	13.19***	13.00	0.19***	0.24***	9.416***	5.51***
Loans to total assets (LTA)	2.52***	5.09***	4.88***	7.09***	4.32***	2.87***
Non-performing loans (NPL)	0.64	0.42	0.32***	0.11***	0.48***	0.42***
Technical efficiency (TE)	-1.62	-3.08	-4.34	-4.29	-5.40	-4.17
Asset quality (AQ)	0.74***	0.49***	0.62***	0.53***	0.72***	0.72***
AR(2)	1.78	2.09	0.67	0.44	1.18	1.44
P-value	0.021**	0.030**	0.049***	0.056**	0.028**	0.0325**
Hansen test	0.740	0.31	0.21	0.29	0.36	0.24

Note: *** level of significance at 1%. AR(2) denotes test of second-order serial correlation and the null hypothesis is there is no serial correlation.

3.3.5. Results related to systematic factors

There is a common consensus across previous studies and this study that the inflation rate is found to have a significant negative relationship with liquidity risk for all different types of Egyptian banks. In this case, we have to reject $H1$ stating that there is a significant positive relationship between the inflation rate and liquidity risk. The growth in gross domestic product is found in this study and Ben Moussa's (2015) and Abdul-Rahman et al.'s (2018) research to have a significant negative relationship with liquidity risk, so we will accept our hypothesis $H2$ stating that there is a significant negative relationship between growth in GDP and liquidity risk.

In terms of the financial crisis, our findings showed mixed results. The financial crisis has no relationship with liquidity risk in Islamic banks but has a significant impact across traditional and traditional banks with Islamic windows. In this context this supports the idea of the support of Islamic banking in Egypt. Bank size has a significant negative effect on liquidity risk. Our results support the findings of Alzoubi (2017) and Vadova (2011). So, we will reject our hypothesis $H4$ stating that there is a positive relationship between bank size and liquidity risk.

3.3.6. Results related to unsystematic factors

Credit risk and capital adequacy ratio have a positive impact on the liquidity risk. This does not support both hypotheses $H5$ and $H6$ stating that there is a significant negative relationship between credit risk and capital adequacy ratio with the liquidity risk. Sukri and Waemustafa (2015) supported our findings that there is a positive and significant relationship between credit risk and liquidity risk in Islamic banks whilst a significant negative to credit risk and liquidity in traditional banks. The liquidity

gap has a significant negative relationship with the three types of banks contrary to the research of Choudhry (2011). So we rejected $H7$ stating that there is a significant positive relationship between liquidity gap and liquidity risk.

Return on assets across all types of banks has a significant positive relationship with liquidity risk. The findings of this study support $H8$ that there is a significant positive relationship between return on assets and liquidity risk. Whilst not supporting $H9$ stating that there is a significant negative relationship between return on equity and liquidity risk. Whereas, in Alzoubi's (2017) and Iqbal's (2012) studies, return on equity shows a positive significant relationship with liquidity risk but a negative with return on assets. Return on assets has an insignificant negative relation with liquidity risk but a study by Muharam and Kurnia (2012) assured the opposite that return on assets has positive insignificant relation. Return on equity has a negative insignificant effect on liquidity risk.

The loans to total assets ratio has a positive relationship with liquidity risk when the ratio gets higher, the lower the liquidity, therefore, the higher the liquidity risk. We reject $H10$ stating that there is a significant negative relationship between loans to assets ratio and liquidity risk. NPL has a positive significant relationship with liquidity risk, consistent with Sukmana and Suryaningtyas's (2016) research findings that NPL has a significant positive effect on the liquidity risk of traditional banks and does not have a significant effect on the liquidity risk of Islamic banks. Islamic banks support $H11$ stating that there is a significant negative relationship between non-performing loans and liquidity risk versus conventional and conventional banks with Islamic windows. Operational efficiency has a negative relationship with liquidity risk but is not significant, also based on Al-Homaidi et al. (2019), it has a significant negative impact. In general, this

supports our hypothesis *H12* that there is a negative relationship between operational efficiency and liquidity risk. Asset quality has a positive insignificant relationship with liquidity risk. This result does not support *H13* that there is a significant negative

relationship between asset quality and liquidity risk. However, Irawati and Puspitasari (2018) found that asset quality has a negative significant effect on liquidity risk.

Table 10. Results summary

Hypothesis	Traditional banks	Islamic banks	Traditional banks with Islamic windows
Systematic factors			
<i>H1: There is a significant positive relationship between inflation rate and liquidity risk.</i>	Refused since there is a significant negative relationship.		
<i>H2: There is a negative significant relationship between the growth in gross demotic product and liquidity risk.</i>	Accepted		
<i>H3: There is a positive relationship between financial crisis and liquidity risk.</i>	Mixed results, no relation with Islamic banks but significant with traditional and traditional with Islamic windows		
<i>H4: There is a positive relationship between bank size and liquidity risk.</i>	Rejected, there is a negative relationship		
Unsystematic factors			
<i>H5: There is a negative relationship between credit risk and liquidity risk.</i>	Rejected, there is a positive relationship		
<i>H6: A significant negative relationship exist between capital adequacy ratio and liquidity risk.</i>	Rejected, there is a positive relationship		
<i>H7: A significant positive relationship exist between liquidity gap and liquidity risk.</i>	Rejected, there is a negative relationship		
<i>H8: There is a significant positive relationship between return on assets and liquidity risk.</i>	Accepted		
<i>H9: A significant negative relationship exist between return on equity and liquidity risk.</i>	Rejected there is a positive relationship		
<i>H10: A significant negative relationship is expected between loan to total assets ratio and liquidity risk.</i>	Rejected, there is a positive relationship.		
<i>H11: A significant negative relationship is expected to exist between non-performing loans and liquidity risk.</i>	Accepted for Islamic banks only but not supported for traditional and traditional banks with Islamic windows		
<i>H12: A negative significant relationship is expected to exist between operational efficiency and liquidity risk.</i>	Accepted		
<i>H13: There is a negative significant relationship between asset quality and liquidity risk.</i>	Rejected		

4. RESULTS AND DISCUSSION

All banks in Egypt operate according to a number of criteria approved by the Basel Committee, which are: board capabilities, responsibilities, and qualifications, regarding the bank’s corporate values and strategic objectives, to ensure oversight by senior management, lines of accountability and responsibility, auditing and internal control functions, board and key executive compensation, transparent governance and identify the bank operational structure. There are two main mechanisms of corporate governance: internal mechanisms and external mechanisms.

4.1. Internal factors

Internal factors represent many factors but the focus will be on the board of directors and ownership.

4.1.1. Factors related to the board of directors

The board of directors is responsible for the success and failure of the bank. Previous research assured that there is a solid connection between the independence of the board and corporate governance practices. High independence will prevent shareholders from interfering in the decision-making process, whilst low independence will hinder performance. On that basis, the high degree of independence increases the degree of effectiveness of governance practices within Egyptian banks, which are implemented on a daily basis.

Board composition: Most previous research assured that the greater number of non-official executives on the board serves to decrease the agency’s cost. Coles et al. (2008) and Weir et al. (2001) concluded that there is no relationship between non-official executives and representation. Little board has a higher business market valuation.

Kamaly et al. (2015) demonstrated that board size and the existence of an audit committee have a negative impact on a bank’s performance. The size of the board has a positive impact on conventional banks’ performance. The larger the board size, the larger the bank resources and opportunities to make a better performance. The board size increases corporate governance practices, profitability, and efficiency. The absence of corporate governance practices affects banks’ performance negatively. Other researchers have mixed results and proved the opposite since board size has a significant negative effect on bank performance. However, on a different scale as the size of the board increases banks would make outstanding performance and implement good corporate governance practices (Jensen, 1993; Yermack, 1996).

Board independence: Previous studies concluded that boards with a higher percentage of outside directors are positively related to a bank’s performance since they are expected to have effective supervisors of the executive members and are highly independent in the decision-making process. This will lead to high performance, reduce cost, and increase efficiency. On the other hand, other studies showed mixed results (Coles et al., 2008).

4.1.2. Ownership

The ownership structure is key to management’s level of dependency and degree of control. Lefort (2005) proved that ownership structure assists in implementing efficient corporate governance practices. The viability of corporate governance practices is generally controlled by ownership structure and affects performance. Hutchinson (2003) showed that ownership structure debilitates the negative relationship between the company’s performance and the company’s opportunities. Moreover, higher ownership concentration has a positive impact on a bank’s performance as it

expands the capacity of shareholders to appropriately monitor administrators (Coles et al., 2008). Ownership and board-related variables have a positive significant effect on banks’ profitability using the size of the board, and the percentage of the shares owned by shareholders as a proxy of corporate governance variables.

In order to investigate the impact of applying corporate governance standards on liquidity risk determinants of Egyptian banks, and according to the availability of data, Table 11 presents factors used as a proxy of corporate governance practices as shown below:

Table 11. Corporate governance factors

Corporate governance factors	Independent factors	Measurment	Dependent factor
Board related factors	Size of the board (SZ)	Number of board of directors.	Liquidity risk
	Hierarchy of the board (HB)	Non-executive number of the board.	
	Duality of the CEO (DCEO)	Dummy variables; the CEO takes the role of the chairman of the board during the period of study: takes 1 while if not takes zero.	
	Qualification of the board (QBM)	The number of members with higher education of qualifications and experience in the field.	
Ownership concentration related factors	Internal ownership (IO)	Calculating the percentage of the bank largest shareholders': banks that totally owned by the Egyptian government or the central bank of Egypt took 0%.	
	Family ownership (FAO)	Takes one if family owns more than 50%, is expressed as zero if not owned by family.	
	Foreign ownership (FEO)	Takes one if the bank has an Arab or foreign ownership. Is expressed by zero it is nationally owned.	

4.2. Testing multicollinearity

Table 12 shows that the problem of multicollinearity between independent corporate governance

variables — it does not exist as shown in the analysis below.

Table 12. Multicollinearity

Variable	Islamic banks	Traditional banks	Mixed banks
	VIF	VIF	VIF
Size of the board (SZ)	1.892	1.542	1.765
Hierarchy of the board (HB)	1.749	1.462	1.643
Duality of the CEO (DCEO)	1.928	1.709	1.901
Qualification of the board (QB)	1.875	1.514	1.705
Internal ownership (IO)	1.773	1.583	1.692
Family ownership (FAO)	1.698	1.495	1.543
Foreign ownership (FEO)	1.894	1.611	1.797
Bank size (BZ)	1.816	1.463	1.754
Bank age (BA)	1.909	1.378	1.894

4.3. Statistical model used

The following regression model is used for Islamic banks, traditional banks, and traditional banks with Islamic windows:

Table 13 shows the statistical results analysis of the impact of corporate governance factors on

liquidity risk determinants. Statistical results proved that corporate governance practices have an impact on liquidity risk determinants of traditional banks and traditional banks with Islamic windows (mixed). However, this is not the case for Islamic banks. Since the transactions and operations of Islamic banks abide by Sharia compliance.

$$LR_1 = \beta_0 + \beta_1(SZ_{i,t}) + \beta_2(HB_{i,t}) + \beta_3(DCEO_{i,t}) + \beta_4(QBM_{i,t}) + \beta_5(IO_{i,t}) + \beta_6(FAO_{i,t}) + \beta_7(FEO_{i,t}) + \beta_8(BZ_{i,t}) + \beta_9(BA_{i,t}) + \varepsilon_{i,t} \tag{2}$$

$$i = 1, \dots, 8; t = 1, \dots, 9$$

Table 13. Corporate governance and liquidity risk

Variable	Dependent variable: Liquidity risk					
	Islamic banks		Traditional banks		Mixed banks	
	Coefficient	STD	Coefficient	STD	Coefficient	STD
Size of the board (SZ)	0.18	0.41	0.42*	0.24	0.18*	0.42
Hierarchy of the board (HB)	0.2	1.51	0.39*	1.29	0.23*	0.78
Duality of the CEO (DCEO)	-0.59	6.32	-0.32*	1.62	-0.47	0.34
Qualification of the board (QB)	-0.02	4.06	-0.29**	2.12	-0.310	2.115
Internal ownership (IO)	0.13	4.15	0.45	0.25	0.402	0.95
Family ownership (FAO)	0.79	8.42	-0.32	0.66	0.359	3.31
Foreign ownership (FEO)	0.77	4.57	0.23*	0.43	0.211	5.29
Bank size (BZ)	0.45	0.21**	0.17*	0.245	0.164*	4.02
Bank age (BA)	0.39	0.12**	0.34*	0.16	0.48*	3.02
R	0.486		0.782		0.530	
R ²	0.57		0.693		0.559	
Adjusted R ²	0.468		0.682		0.582	
F	3.016		2.052		4.807	
P-value	0.032**		0.021**		0.091	

Note: ** level of significance at 0.05%.

It is clear from the results of the analysis that corporate governance had an impact on both traditional banks and traditional banks with Islamic windows, but it had no effect on Islamic banks, which explains the severity of the impact of Islamic banks on unsystematic risks, depending on the fact that Islamic banks monitor sources of financing and investment through the existence of an Islamic Sharia committee that complies with the provisions of Islamic Sharia. Which could be a replacement for applying corporate governance practices within Islamic banks.

In this research, Egyptian banks are classified into three categories: traditional banks, Islamic banks, and traditional banks with Islamic windows. There are only five Islamic banks operating in Egypt (see Appendix).

5. CONCLUSION

The purpose of this study was to investigate factors that have an impact on the liquidity risk of different types of banks operating in Egypt. Liquidity risk has fluctuated in traditional banks during the study period, as it is known that the liquidity risk is the coverage of the short-term obligation, which is an indication of how much liquid asset is in banks. In terms of Islamic banks, liquidity risk has deteriorated, indicating that they have had difficulty controlling liquidity risk, whilst in traditional banks with an Islamic window, it has been declining for the previous four years and has been the year 2021. Islamic banks will outnumber mixed banks for the first time to rise from 2017 to 2022. In comparison to Islamic banks, mixed banks have more liquid assets.

In terms of investigating unsystematic factors: all unsystematic have an impact on liquidity risk within both banking systems Islamic, traditional, and traditional banks with Islamic windows. On the macroeconomic level (systematic factors), results indicate that financial crisis, inflation rate, and economic growth are indicators that determine the liquidity risk of traditional banks and traditional banks with Islamic windows. However, Islamic banks are more sensitive to unsystematic factors than systematic factors. The inefficiency of Islamic money markets (lack of liquidity), and the absence of diversification can all be justified by these findings. As a result, despite complying with Islamic Sharia, Islamic banks should manage this risk differently

than traditional banks and traditional banks with Islamic windows. We can attribute this result to the lack of applying corporate governance practices within Islamic banks.

Loan to asset is the most significant factor that has an impact on Egyptian banks. The increase in this ratio means that banks using it to finance their assets. It is so high in some traditional banks and so low in others. During the period from 2000 to 2022, the loan-to-asset ratio fluctuated in Islamic banks and was high in mixed banks but it eventually decreased.

In the previous nine years, growth in GDP has been shifting; GDP is more comparable to the country's economic cycle. Therefore, high growth in GDP indicates a good economy that banks have a good chance of growing in a better way, which means lower unemployment, and higher output such as investments, savings, and consumption, which means banks' liquidity will function better and increase in a good wealthy economy. The financial deposits ratio is used to finance the money that comes from deposits and converts it to loans, therefore, the higher the ratio, the lower the liquidity. Operational efficiency is a measure of expenses in financial operations; the lower the costs, the greater the operational efficiency, which implies more profitability and leads to increased liquidity in banks. When compared to traditional banks, the majority of banks have inferior operating efficiency. While Islamic have almost the same fluctuations. While in the traditional banks with Islamic window was high. This explains the negative relationship between operational efficiency and liquidity risk. In traditional banks and traditional banks with Islamic window was positive whilst in Islamic banks were negative. Asset quality refers to the market value of a bank's assets, the greater this ratio, the better. Liquidity was usually poor, except in 2013, while in Islamic banks and mixed banks, it fluctuated. The return on asset ratio fluctuated in each of the traditional banks. Because of the limited availability of financing, the majority of the income generated by assets is utilized to service obligations in Islamic banks, resulting in an inverse relationship between return on assets and liquidity risk. From 2016 to 2019, the ROA increased, while liquidity decreased and the same goes for the traditional banks with Islamic windows. Return on equity fluctuates in the three types of banks. Sure, results revealed that Islamic banks were much affected by

the lack of applying good corporate governance practices. This research opens the door for Islamic banks to better develop very comprehensive governance merged with a good practice of Sharia compliance committee according to the nature, business model, and scope of work of Islamic banks. The increased number of Islamic banks in Egypt has a positive impact on the absorption of the Egyptian economy by the global and regional financial crises such as COVID-19 and the war between Russia and Ukraine.

The importance of this study is that it is the first study in Egypt that focused on studying the determinants of liquidity in Egyptian banks. The global financial crisis has cast its shadow on the bankruptcy of some banks at the international level due to the lack of liquidity standards in those banks and exposure to credit risks or the poor credit portfolios of those banks. This attracted attention to the liquidity standard in international banks, as well as Egyptian banks as an important standard that could have a strong impact on the bankruptcy of some banks.

The liquidity criterion has become increasingly important at the present time and the extent of its impact on the bankruptcy of a number of banks.

It is important to study the control and supervision standards practiced by Egyptian banks and the extent of the impact of these practices on maintaining reasonable levels of liquidity by banks. Therefore, the importance of studying the impact of the use of government practices and their impact on the determinants of liquidity for those banks has emerged. Therefore, this study opens the door for other studies in the future to study other variables of governance practices to examine the degree of their impact on liquidity determinants. It also opens the door to increasing the research sample and the time periods of the study.

This novel study shed light on different variables that have an impact on liquidity risk. The study also investigated the effectiveness of corporate governance practices on liquidity risk determinants of Egyptian banks. It is better for Egypt to adopt the Islamic banks, as it is more stable in absorbing the consequences of international financial crises such as the coronavirus pandemic and the war between Russia and Ukraine.

REFERENCES

1. Abdul-Rahman, A., Sulaiman, A. A., & Mohd Said, N. L. H. (2018). Does financing structure affects bank liquidity risk? *Pacific-Basin Finance Journal*, 52, 26–39. <https://doi.org/10.1016/j.pacfin.2017.04.004>
2. Al Kharusi, S., Murthy, Y. S. R., & Al Foori, A. (2022). Performance and profitability of local banks: The case of the emerging market. *Corporate & Business Strategy Review*, 3(1), 55–63. <https://doi.org/10.22495/cbsrv3i1art6>
3. Al-Homaidi, E. A., Tabash, M. I., Farhan, N. H., & Almaqtari, F. A. (2019). The determinants of liquidity of Indian listed commercial banks: A panel data approach. *Cogent Economics and Finance*, 7(1), Article 1616521. <https://doi.org/10.1080/23322039.2019.1616521>
4. Alrawashdeh, B. (2012). The impact of the application of corporate governance in the banking sector. *British Journal of Economics, Finance and Management Sciences*, 6(2), 23–33. [https://www.ajournal.co.uk/EFpdfs/EFvolume6\(2\)/EFVol.6%20\(2\)%20Article%202.pdf](https://www.ajournal.co.uk/EFpdfs/EFvolume6(2)/EFVol.6%20(2)%20Article%202.pdf)
5. Al-Sharkas, A. A., & Al-Sharkas, T. A. (2022). The impact on bank profitability: Testing for capital adequacy ratio, cost-income ratio and non-performing loans in emerging markets [Special issue]. *Journal of Governance & Regulation*, 11(1), 231–243. <https://doi.org/10.22495/jgrv11i1siart4>
6. Alzoubi, T. (2017). Determinants of liquidity risk in Islamic banks. *Banks and Bank Systems*, 12(3), 142–148. [https://doi.org/10.21511/bbs.12\(3\).2017.10](https://doi.org/10.21511/bbs.12(3).2017.10)
7. Ansari, S., & Siddique, M. (2013). Comparative corporate governance practices by Islamic and conventional banks in Pakistan. In M. T. Semmelrock-Picej & A. Novak (Eds.), *Proceedings of the 9th European Conference on Management, Leadership & Governance* (p. 493). Academic Conferences International Limited.
8. Arellano, M., & Bond, S. (1991). Some tests of specifications for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, 58(2), 277–297. <https://doi.org/10.2307/2297968>
9. Arellano, M., & Bover, O. (1995). Another look at the instruments variable estimation of error component models. *Journal of Econometrics*, 68(1), 29–51. [https://doi.org/10.1016/0304-4076\(94\)01642-D](https://doi.org/10.1016/0304-4076(94)01642-D)
10. Ariffin, N., & Kassim, S. (2013). *Liquidity risk management and financial performance in Malaysia: Empirical evidence from Islamic banks*. <https://doi.org/10.3366/edinburgh/9780748647613.003.0007>
11. Arjoon, S. (2005). Corporate governance: An ethical prospective. *Journal of Business Ethics*, 61, 343–352. <https://doi.org/10.1007/s10551-005-7888-5>
12. As Sahara, M., & Setiawan, D. (2022). The effect of ethical values on Islamic banking performance. *Corporate & Business Strategy Review*, 3(2), 34–42. <https://doi.org/10.22495/cbsrv3i2art3>
13. Avogouleas, S. (2009). Corporate governance and the global performance of Islamic banks. *Journal of Corporate Law Studies*, 1–58.
14. Basel Committee on Banking Supervision. (2013). *Monitoring tools for intraday liquidity management*. Bank for International Settlements. <https://www.bis.org/publ/bcbs248.pdf>
15. Bassen, A. (2004). The implementation of good corporate governance by institutional investors: The scorecard for German corporate governance. *International Journal of Disclosure and Governance*, 2, 244–263. <https://doi.org/10.1057/palgrave.jdg.2040056>
16. Ben Moussa, M. A. (2015). The determinants of bank liquidity: Case of Tunisia. *International Journal of Economics and Financial Issues*, 5(1), 249–259. <https://www.econjournals.com/index.php/ijefi/article/view/1036>
17. Bhati, S., DeZoysa, A. D., & Jitree, W. (2015). Determinants of liquidity in nationalized banks of India. In *World Finance & Banking Symposium* (p. 1–11). World Finance Conference. <http://ro.uow.edu.au/buspapers/837>
18. Chalhoub, M. (2009). Relations between dimensions of corporate governance and corporate performance: An empirical study among banks in the Lebanon. *International Journal of Management*, 26(3), 476–486. <https://www.proquest.com/openview/9bd8149059d00c806bed1ca1c2d159c9/1?pq-origsite=gscholar&cbl=5703>

19. Choudhry, M. (2011). *An introduction to banking: Liquidity risk and asset-liability management*. John Wiley & Sons. <https://doi.org/10.1002/9781119206941>
20. Chung, K. H., Wright, P., & Kedia, B. (2003). Corporate governance and market valuation of capital and R&D investments. *Review of Financial Economics*, 12(2), 161-172. [https://doi.org/10.1016/S1058-3300\(02\)00063-0](https://doi.org/10.1016/S1058-3300(02)00063-0)
21. Coles, J. L., Daniel, N. D., & Naveen, L. (2008). Boards: Does one size fit all? *Journal of Financial Economics*, 87(2), 329-356. <https://doi.org/10.1016/j.jfineco.2006.08.008>
22. Daher, H., Masih, M., & Ibrahim, M. (2015). The unique risk exposures of Islamic banks' capital buffers: A dynamic panel data analysis. *Journal of International Financial Markets, Institutions and Money*, 36, 36-52. <https://doi.org/10.1016/j.intfin.2015.02.012>
23. Dinger, V. (2009). Do foreign-owned banks affect banking system liquidity risk? *Journal of Comparative Economics*, 37(4), 647-657. <https://doi.org/10.1016/j.jce.2009.04.003>
24. El-Ansary, O., El-Masry, A., & Yousry, Z. (2019). Determinants of capital adequacy ratio (CAR) in MENA region: Islamic vs. conventional banks. *International Journal of Accounting and Financial Reporting*, 9(2), 287-313. <https://doi.org/10.5296/ijaf.v9i2.14696>
25. Fatimah Yaacob, S., Abdul Rahman, A., & Abdul Karim, Z. (2016). The determinants of liquidity risk: A panel study of Islamic banks in Malaysia. *Journal of Contemporary Issues and Thought*, 6, 73-82. <https://ejournal.upsi.edu.my/index.php/JCIT/article/view/1073>
26. Ghenimi, A., Chaibi, H., & Omri, M. (2020). Liquidity risk determinants: Islamic vs conventional banks. *International Journal of Law and Management*, 63(1), 65-95. <https://doi.org/10.1108/IJLMA-03-2018-0060>
27. Hafez, M. H. (2015). Corporate governance and financial performance: An empirical study on Egyptian banks. *Corporate Ownership and Control*, 13(1-11), 1359-1374. <https://doi.org/10.22495/cocv13i1c1p8>
28. Horvath, R., Seidler, J., & Weill, L. (2014). Bank capital and liquidity creation: Granger-causality evidence. *Journal of Financial Services Research*, 45(3), 341-361. <https://doi.org/10.1007/s10693-013-0164-4>
29. Hutchinson, M. A. (2003). Corporate governance practices and firm performance. *Journal of Corporate Finance*, 18(2), Article 120.
30. Iqbal, A. (2012). Liquidity risk management: A comparative study between conventional and Islamic banks of Pakistan. *Global Journal of Management and Business Research*, 12(5), 54-64. https://globaljournals.org/GJMRR_Volume12/6-Liquidity-Risk-Management.pdf
31. Irawati, D., & Puspitasari, I. (2018). Liquidity risk of Islamic banks in Indonesia. In *Proceedings of the 2nd International Conference on Banking, Accounting, Management and Economics (ICOBAME 2018)* (Advances in Economics, Business and Management Research, Vol. 86, pp. 34-37). Atlantis Press. <https://www.atlantispress.com/article/125911532.pdf>
32. Jensen, M. C. (1993). The modern industrial revolution, exit, and the failure of internal control systems. *The Journal of Finance*, 48, 831-880. <https://doi.org/10.1111/j.1540-6261.1993.tb04022.x>
33. Kamaly, A., El-Ezaby, S., & El-Hinawy, M. (2015). *Does privatization enhance the performance of banks? Evidence from Egypt* [Paper presentation]. 2015 Applied Social Science Association (ASSA) Conference. American Economic Association. <https://www.aeaweb.org/conference/2015/retrieve.php?pdfid=3639&tk=7ZhdEbfQ>
34. Lefort, F. (2005). Ownership structure and corporate governance in Latin America. *ABANTE*, 8(1), 55-84. https://www.researchgate.net/publication/5224169_Ownership_Structure_and_Corporate_Governance_in_Latin_America
35. Mahdi, I. B. S., & Abbes, M. B. (2018). Relationship between capital, risk and liquidity: A comparative study between Islamic and conventional banks in MENA region. *Research in International Business and Finance*, 45, 588-596. <https://doi.org/10.1016/j.ribaf.2017.07.113>
36. Marashdeh, Z., Omet, G., & Haddad, F. (2021). Country or bank-specific factors: A study to explain bank performance. *Corporate Governance and Organizational Behavior Review*, 5(2), 66-71. <https://doi.org/10.22495/cgobrv5i2p6>
37. Mashamba, T. (2021). Liquidity regulations and bank behavior: An emerging markets perspective [Special issue]. *Journal of Governance & Regulation*, 10(4), 194-211. <https://doi.org/10.22495/jgrv10i4siart1>
38. Muharam, H., & Kurnia, H. (2012). The influence of fundamental factors to liquidity risk on banking industry: Comparative study between Islamic bank and conventional bank in Indonesia. *Conference in Business, Accounting and Management (CBAM)*, 1(2), 359-368. <https://doi.org/10.2139/ssrn.2339598>
39. Obeten, O., Ocheni, S., & John, S. (2014). The effects of corporate governance on the performance of commercial banks in Nigeria. *International Journal of Public Administration and Management Research*, 2(2), 219-234.
40. Sadaqat, S., Ali, K., & Farhan, M. (2011). Liquidity risk management: A comparative study between conventional and Islamic banks of Pakistan. *Interdisciplinary Journal of Research in Business*, 1(1), 35-44.
41. Sukmana, R., & Kholid, M. (2012). An assessment of liquidity policies with respect to Islamic and conventional banks. *Qualitative Research in Financial Markets*, 5(2), 126-138. <https://doi.org/10.1108/QRFM-09-2011-0023>
42. Sukmana, R., & Suryaningtyas, S. (2016). Determinants of liquidity risk in Indonesian Islamic banks and conventional banks. *Journal of Islamic Economics*, 8(2), 187-200. <https://doi.org/10.15408/aiq.v8i2.2871>
43. Sukri, S., & Waemustafa, W. (2015). Bank specific and macroeconomics dynamic determinants of credit risk in Islamic banks and conventional banks. *International Journal of Economics and Financial Issues*, 5(2), 476-481. https://www.academia.edu/15785021/Bank-Specific_and_Macroeconomics_Dynamic_Determinants_of_Credit_Risk_in_Islamic_Banks_and_Conventional_Banks
44. Vodova, P. (2011). Liquidity of Czech commercial banks and its determinants. *International Journal of Mathematical Models and Methods in Applied Sciences*, 5(6), 1060-1067.
45. Weir, C., Laing, D., & McKnight, P. J. (2001). An empirical analysis of the impact of corporate governance mechanisms on the performance of the UK firms. <https://doi.org/10.2139/ssrn.286440>
46. Yermack, D. (1996). High market valuation of companies with a small board of directors. *Journal of Financial Economics*, 40(2), 185-211. [https://doi.org/10.1016/0304-405X\(95\)00844-5](https://doi.org/10.1016/0304-405X(95)00844-5)

APPENDIX

Table A.1. The sample

<i>No.</i>	<i>Name of the bank</i>	<i>Type of the bank</i>
1	Commercial International Bank	TB
2	United Bank — Egypt	IB
3	Societe Arab International De Banque (SAIB)	TB
4	Suez Canal Bank	TB
5	Arab African International Bank	TB
6	Principal Bank for Development and Agricultural Credit	TB
7	Arab International Bank	TB
8	Export Development Bank of Egypt	TB
9	Union National Bank Egypt (UNB - E)	IB
10	Housing and Development Bank	TB
11	Industrial Development and Workers Bank of Egypt	TB
12	Arab Investment Bank	TB
13	Arab Bank Corporation (ABC)	TB
14	Bank Audi	TB
15	Bloom Bank Egypt	TB
16	Egyptian and Arab Land Bank	TB
17	Credit Agricola Egypt	TB
18	HSBC Bank	TB
19	African Export and Import Bank	TB
20	Bank of Alexandria and San Polo	TB
21	Banque Misr	TB
22	National Bank of Egypt	TB
23	Mashreq Bank — Egypt	TB
24	Banque du Caire	TBWIW
25	Egyptian Gulf Bank (EG Bank)	TBWIW
26	Misr Iran Development Bank	TBWIW
27	Qatar National Bank Al Ahly (QNB ALAhli)	TBWIW
28	Faisal Islamic Bank	IB
29	Al Baraka Bank, Egypt	IB
30	Federal Arab Bank for Investment and Development	IB