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Liquidity Risk and Islamic Bank Performance: A Panel Data Analysis of Banks in MENA and South Asia with a Focus on Morocco

Risque de liquidité et performance des banques islamiques : une analyse en données de panel des banques de la région MENA et de l'Asie du Sud avec un focus sur le Maroc

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Abstract

This study examines the impact of liquidity risk on the performance of Islamic banks in the MENA and South Asian regions, with a particular focus on Moroccan participatory banks. The analysis is based on a panel of 53 banks over the period 2019–2024 and employs econometric models, including pooled OLS, fixed effects, and random effects, with the Hausman test used to select the appropriate specification. The findings indicate that liquidity risk, measured by the loan-to-deposit ratio, has a negative and statistically significant effect on bank profitability. In contrast, bank size positively influences performance, while the liquid assets ratio does not show a significant effect. Beyond these results, the study provides a comparative analysis across regions and highlights the role of institutional context in shaping the relationship between liquidity risk and bank performance. In particular, Moroccan participatory banks exhibit higher exposure to liquidity constraints compared to more mature Islamic banking systems. These findings underline the importance of strengthening liquidity risk management and developing Sharia-compliant financial instruments, especially in emerging banking systems. The study contributes to the literature by providing new comparative evidence on the role of institutional context in Islamic banking performance.
Keywords: Islamic banking, Liquidity risk, Bank performance, Panel data, MENA, Morocco

Résumé

Cette étude analyse l'impact du risque de liquidité sur la performance des banques islamiques dans les régions MENA et d'Asie du Sud, avec un focus particulier sur les banques participatives marocaines. L'analyse repose sur un panel de 53 banques sur la période 2019–2024 et mobilise des modèles économétriques (pooled OLS, effets fixes et aléatoires), avec le test de Hausman pour sélectionner la spécification appropriée. Les résultats montrent que le risque de liquidité, mesuré par le ratio crédits/dépôts, exerce un effet négatif et significatif sur la rentabilité bancaire. En revanche, la taille des banques influence positivement la performance, tandis que le ratio d'actifs liquides n'a pas d'effet significatif. Au-delà de ces résultats, l'étude propose une analyse comparative entre les régions et met en évidence le rôle du contexte institutionnel. En particulier, les banques participatives marocaines présentent une exposition plus élevée aux contraintes de liquidité comparativement aux systèmes bancaires islamiques plus matures. Ces résultats soulignent la nécessité de renforcer la gestion du risque de liquidité et de développer des instruments conformes à la charia, notamment dans les systèmes bancaires émergents. L'étude contribue à la littérature en apportant de nouvelles preuves empiriques comparatives sur le rôle du contexte institutionnel dans la performance bancaire islamique.
Mots-clés : Banque islamique, risque de liquidité, performance bancaire, données de panel, région MENA, Maroc.

Introduction

Over the past decades, Islamic finance has experienced significant global expansion and has gradually established itself as an important component of the international financial system. Based on Sharia principles, Islamic finance is characterized by the prohibition of interest (riba), the promotion of risk-sharing mechanisms, and the requirement that financial transactions be backed by tangible assets. This financial model has expanded considerably in several regions of the world, particularly in the Middle East, North Africa (MENA), and South Asia, where Islamic banks now play an increasingly important role in national banking systems (Beck, Demirgüç-Kunt & Merrouche, 2013).

Within this context, Islamic banks face specific challenges related to their financial intermediation model. Unlike conventional banks, these institutions operate through Sharia-compliant contracts such as Murabaha, Musharaka, and Mudaraba, which influence both their financing structure and their risk management practices. Among the various risks faced by Islamic financial institutions, liquidity risk represents a major concern for their stability and financial performance. Managing liquidity is particularly challenging due to the limited availability of Sharia-compliant financial instruments that allow banks to effectively address short-term liquidity needs (Ghenimi, Chaibi & Omri, 2017).

A growing body of empirical literature has therefore examined the relationship between liquidity risk management and bank performance within the Islamic finance sector. Bourkhis and Nabi (2013), for instance, show that Islamic banks exhibit specific balance-sheet structures that may influence their exposure to financial risks. Similarly, Ghenimi et al. (2020) highlight the existence of a significant relationship between certain liquidity indicators and bank profitability. Other studies emphasize the role of additional factors such as bank size, capitalization levels, and operational efficiency in explaining the performance of Islamic banking institutions (Trad, Trabelsi & Goux, 2017; Beck et al., 2013).

Despite the increasing attention devoted to this topic, several limitations remain in the existing empirical literature. Most studies focus on a single country or on a relatively limited number of banks, which restricts the comparative scope of their findings. Empirical analyses incorporating emerging Islamic banking markets remain relatively scarce, particularly in the case of the Moroccan participatory banking sector, which has received limited attention in international studies. Moreover, few studies provide a comparative analysis combining

MENA and South Asia while explicitly incorporating emerging Islamic banking systems such as Morocco. In addition, the interaction between liquidity risk and institutional context remains underexplored.

Despite the growing body of literature, no clear consensus has been reached regarding the effect of liquidity risk on Islamic bank performance. While some studies suggest that higher liquidity enhances stability, others argue that it reduces profitability due to opportunity costs. This ambiguity is further amplified in emerging Islamic banking systems, where institutional constraints may alter the nature of this relationship.

Morocco nevertheless represents a particularly relevant context for such analysis. Participatory banking was officially introduced in Morocco in 2017 under the supervision of Bank Al-Maghrib, with the licensing of five Islamic banks: Bank Assafa, Umnia Bank, Bank Al Yousr, Al Akhdar Bank, and BTI Bank. The initial years of operation largely corresponded to a phase of institutional development and sectoral structuring. In this regard, recent studies highlight the increasing role of participatory banks in supporting economic development, particularly through the financing of small and medium-sized enterprises (SMEs) in Morocco (Merroun & Mouallim, 2024). According to Bank Al-Maghrib (2018), the number of Islamic banking branches increased from 44 in 2017 to more than 100 in 2018, illustrating the progressive expansion of the participatory banking model. In this context, the period 2019–2024 appears more appropriate for empirically examining the relationship between liquidity risk and bank performance within a relatively stabilized institutional environment. In this sense, Morocco represents a natural laboratory for analyzing how institutional constraints shape liquidity risk management and bank performance in emerging Islamic financial systems.

Against this background, the present study aims to address these gaps by providing a comparative empirical analysis based on an international sample of Islamic banks operating in the MENA and South Asian regions, while incorporating Morocco as an emerging participatory banking system. The inclusion of Moroccan Islamic banks broadens the empirical scope of the analysis and provides additional insights into the performance dynamics of Islamic banking institutions operating in evolving institutional environments. The central research question of this study can therefore be formulated as follows:

To what extent does liquidity risk influence the performance of Islamic banks operating in the MENA and South Asian regions within an extended sample that incorporates the emerging Moroccan participatory banking model?

To address this question, the study employs a panel data econometric model applied to a sample of 53 Islamic banks observed over the period 2019–2024, including five Moroccan participatory banks. The objective is to examine the impact of various liquidity indicators on bank profitability while controlling for several structural characteristics of financial institutions.

This research contributes to the Islamic finance literature in several ways. First, it provides a comparative empirical analysis of the relationship between liquidity risk and bank performance using a relatively large international sample of Islamic banks operating across the MENA and South Asian regions. Second, it incorporates the Moroccan participatory banking sector, which represents an emerging Islamic banking system that remains underexplored in international empirical research. Third, it highlights the role of institutional context in shaping the relationship between liquidity risk and bank performance, thereby providing empirical support for heterogeneous effects across different banking environments. Finally, the use of panel data econometric techniques allows for a more robust identification of the determinants of Islamic bank performance across different institutional contexts.

The remainder of the paper is structured as follows. The next section reviews the literature on the relationship between liquidity risk and the performance of Islamic banks. The third section presents the research methodology, the variables used, and the econometric model specification. The fourth section reports and interprets the empirical results. The final section concludes the study by highlighting the main implications and suggesting directions for future research.

1. Literature Review :

The relationship between liquidity management and financial performance has become one of the most widely examined topics in the contemporary banking literature. From a theoretical perspective, the relationship between liquidity risk and bank performance can be explained through several complementary frameworks. First, the theory of financial intermediation

suggests that banks transform short-term liabilities into long-term assets, inherently exposing them to liquidity risk. Second, the trade-off theory highlights the balance between liquidity and profitability, where holding excessive liquidity reduces returns while insufficient liquidity increases risk exposure. Third, agency theory emphasizes conflicts between managers and stakeholders in liquidity management decisions, potentially affecting bank performance. These theoretical perspectives provide a solid foundation for understanding how liquidity risk may influence bank performance, particularly within the specific institutional context of Islamic banking systems.

In the context of Islamic banking, this issue is particularly important due to the institutional specificities associated with the principles of Islamic finance. Islamic financial institutions must comply with Sharia principles, notably the prohibition of interest (riba) and the requirement that financial transactions be backed by tangible assets. These constraints limit the use of several conventional liquidity management instruments and may therefore influence both the financing structure and the risk management practices of Islamic banks.

The structural characteristics of Islamic finance may also intensify the liquidity pressures faced by participatory banks. According to Al-Deek (2025), Islamic banks often experience liquidity imbalances due to the limited availability of Sharia-compliant refinancing instruments and the underdevelopment of secondary markets for Islamic financial assets. These constraints may increase Islamic banks' exposure to liquidity risk and complicate the management of their assets and liabilities (Mikou et al., 2024).

Several empirical studies have investigated liquidity risk within Islamic banking institutions. For example, Mohammad et al. (2020) analyze liquidity risk exposure using a sample of 145 banks operating across different countries and find that Islamic banks are generally more exposed to liquidity risk than their conventional counterparts. The authors attribute this difference to specific regulatory constraints and to the unique balance-sheet structures of Islamic financial institutions.

Building on this line of research, several studies have explored the relationship between liquidity risk and bank performance. Ghenimi, Chaibi and Lajmi (2020), for instance, examine the interaction between liquidity risk, credit risk, and bank profitability within a sample of Islamic and conventional banks operating in the MENA region. Their findings indicate that both liquidity and credit risks exert a significant negative impact on bank

profitability, highlighting the importance of prudent risk management for maintaining financial performance.

In addition to liquidity risk, other empirical studies have examined the role of internal bank-specific factors in explaining the profitability of Islamic banks. Several studies show that bank size, capitalization level, and asset quality are important determinants of financial performance. Comparative analyses between Islamic and conventional banks also reveal notable differences in risk management practices and financial strategies adopted by these institutions (Ghenimi et al., 2024).

Recent literature also suggests that the relationship between liquidity and bank profitability may be non-linear. Jedidia and Ben Salah (2022), for example, show that the impact of liquidity on the profitability of Islamic banks can vary depending on the level of liquidity held by the institution as well as prevailing macroeconomic conditions. In certain situations, higher liquidity levels may strengthen financial stability, whereas excessive liquidity may reduce profitability due to the opportunity cost associated with holding low-yield liquid assets.

Furthermore, several recent studies emphasize the role of macroeconomic and institutional factors in the management of liquidity risk. Political stability, economic growth, and the regulatory environment may influence the ability of Islamic banks to manage their liquidity effectively. Empirical findings also indicate that bank-specific factors such as size, capital structure, and asset quality play an important role in shaping liquidity risk management practices (Jaafar et al., 2024).

Despite these important contributions, the empirical literature does not provide a clear consensus regarding the relationship between liquidity risk and the financial performance of Islamic banks. While some studies suggest that higher liquidity levels improve bank stability and resilience, others argue that excessive liquidity may negatively affect profitability due to the relatively low returns associated with liquid assets. These mixed findings highlight the need for further empirical investigation of this relationship across different institutional and geographical contexts.

In this regard, examining the relationship between liquidity risk and the profitability of Islamic banks operating in the MENA and South Asian regions appears particularly relevant. These regions host a significant share of Islamic financial institutions and provide an

appropriate empirical setting for analyzing liquidity management mechanisms within participatory banking systems.

To summarize the main empirical contributions of the recent literature, Table 1 presents a comparative overview of studies that have examined the relationship between liquidity and performance in Islamic banking.

Table 1 – Summary of Empirical Studies on Liquidity Risk and Bank Performance

Author(s)	Year	Sample	Methodology	Variables	Main Findings
Mohammad et al.	2020	145 international banks	Panel data	Liquidity, capital, governance	Islamic banks are more exposed to liquidity risk
Ghenimi et al.	2020	MENA banks	Simultaneous structural model	Liquidity, credit risk, profitability	Liquidity and credit risks reduce bank profitability
Jedidia	2022	34 Islamic banks (MENA)	Panel Threshold Regression	Liquidity, profitability	Non-linear relationship between liquidity and profitability
Ghenimi et al.	2024	MENA banks	Panel econometric analysis	Banking risks and performance	Financial risks affect bank performance
Jaafar et al.	2024	107 Islamic banks (15 countries)	Random Effects Model	Liquidity, capital, size	Liquidity determinants vary across banking systems
Mikou	2024	Literature review	Theoretical analysis	Liquidity management	Islamic banks face structural liquidity constraints

Source: Author's compilation based on the literature.

Based on the existing literature, it appears that several financial factors, particularly liquidity management, bank capitalization, and institutional size, may influence the performance of Islamic banks. However, empirical findings remain somewhat inconsistent depending on institutional contexts and the periods analyzed. In this perspective, it becomes relevant to formulate several research hypotheses in order to empirically examine the relationship between liquidity risk and the financial performance of Islamic banks.

1.1. Research Hypotheses and Conceptual Model

Based on the empirical studies discussed in the literature review, several financial factors appear to influence the performance of Islamic banks. Among these factors, liquidity risk management occupies a central position in the banking literature. Liquidity indicators allow the evaluation of a bank's ability to meet its short-term financial obligations while maintaining an adequate level of profitability. In this context, the present study aims to

analyze the impact of different liquidity indicators on the financial performance of Islamic banks operating in the MENA and South Asian regions, within an extended sample that also includes Moroccan participatory banks. Based on the existing literature, several research hypotheses can be formulated.

1.1.1. Liquidity Risk and Bank Performance

The relationship between liquidity and bank performance represents a key issue in the financial literature. In the case of Islamic banks, this relationship may be influenced by the specific structure of Sharia-compliant financial contracts and by the institutional constraints associated with Islamic finance principles. Several empirical studies show that the level of liquidity held by a bank may have a direct impact on its profitability. The Loan-to-Deposit Ratio (LTD) is one of the most commonly used indicators to measure bank liquidity management. A higher LTD ratio may indicate a more intensive use of deposits to finance lending activities, which can potentially enhance bank profitability. However, an excessively high ratio may also increase liquidity risk, particularly in the event of significant deposit withdrawals. Empirical findings by Ghenimi et al. (2020) suggest that liquidity risk can exert a significant negative impact on bank performance. Based on these arguments, the following hypothesis is proposed:

H1: Liquidity risk measured by the loan-to-deposit ratio significantly influences the performance of Islamic banks.

1.1.2. Liquidity and Asset Structure

The structure of a bank's asset portfolio also plays an important role in liquidity management. The Liquid Assets Ratio (LAR) measures the proportion of easily mobilizable assets within a bank's balance sheet. A higher proportion of liquid assets may improve the bank's capacity to meet its short-term financial obligations and reduce its exposure to liquidity risk. However, holding excessive liquid assets may also reduce bank profitability since these assets generally generate lower returns compared to productive assets such as financing activities or investments. Several empirical studies therefore highlight a potentially negative relationship between liquidity levels and bank profitability (Jedidia, 2022). Based on these considerations, the following hypothesis is formulated:

H2: The liquid assets ratio significantly influences the performance of Islamic banks.

1.1.3. Bank Capitalization

The level of capitalization is another important factor in the analysis of bank performance. A higher level of capital allows banks to strengthen their capacity to absorb financial losses and improve their overall financial stability. In the case of Islamic banks, adequate capitalization may also enhance depositor confidence and reinforce the financial soundness of the institution. Several empirical studies show that the Capital Adequacy Ratio (CAR) may have a positive impact on bank profitability (Beck et al., 2013). Well-capitalized banks generally have a greater ability to absorb financial shocks and maintain stable performance levels. Based on these arguments, the following hypothesis is proposed:

H3: Bank capitalization positively influences the performance of Islamic banks.

1.1.4. Bank Size

Bank size is also considered an important determinant of financial performance. Large banking institutions may benefit from economies of scale, greater diversification of activities, and improved access to financial markets. These factors may contribute to enhanced profitability and financial stability. In banking studies, bank size is typically measured using the logarithm of total assets. Several empirical studies identify a positive relationship between bank size and financial performance (Beck et al., 2013). Based on these arguments, the following hypothesis is proposed:

H4: Bank size positively influences the performance of Islamic banks.

1.1.5. Institutional Context Effect

The relationship between liquidity risk and bank performance may vary significantly depending on the institutional and regulatory environment in which banks operate. In the context of Islamic banking, institutional factors such as the availability of Sharia-compliant liquidity instruments, the development of Islamic interbank markets, and the effectiveness of regulatory frameworks play a crucial role in shaping liquidity management practices. Several studies highlight that differences in institutional environments across countries can lead to heterogeneous effects of financial risks on bank performance (Athanasoglou et al., 2008; Beck et al., 2013). In emerging Islamic banking systems, such as Morocco, structural constraints—including the limited availability of liquidity management tools and the

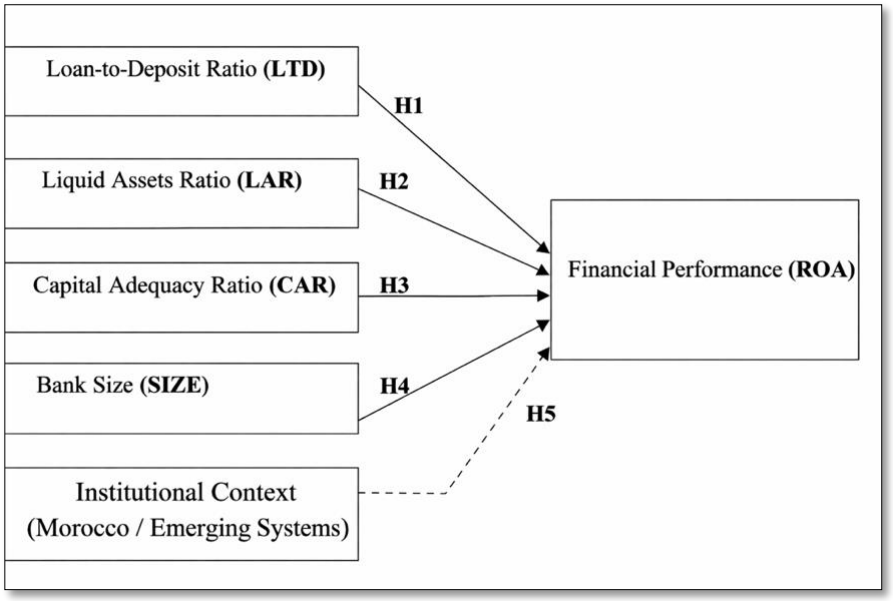
relatively recent establishment of participatory banking—may amplify the impact of liquidity risk on financial performance (Bank Al-Maghrib, 2022; Mikou et al., 2024). Based on these arguments, the following hypothesis is proposed:

H5: The relationship between liquidity risk and bank performance varies depending on institutional context, particularly in emerging Islamic banking systems such as Morocco.

1.2. Conceptual Model of the Study

Based on the hypotheses formulated above, the conceptual model of this research examines the impact of several explanatory variables related to liquidity management and bank characteristics on the financial performance of Islamic banks. Bank performance is measured by the Return on Assets (ROA), while the explanatory variables include the Loan-to-Deposit Ratio (LTD), the Liquid Assets Ratio (LAR), the Capital Adequacy Ratio (CAR), and bank size (SIZE).

Figure 1. Conceptual Framework of the Study



Source: Author's elaboration.

The conceptual model illustrates that bank profitability, measured by Return on Assets (ROA), constitutes the dependent variable of the study. This variable is influenced by several explanatory variables related to the financial structure and liquidity management practices of Islamic banks, including the loan-to-deposit ratio (LTD), the liquid assets ratio (LAR), the capital adequacy ratio (CAR), and bank size (SIZE).

These theoretical relationships allow the empirical testing of the impact of liquidity risk and bank-specific financial characteristics on bank performance.

To test these hypotheses empirically, the study employs a panel data econometric model applied to a sample of Islamic banks operating in the MENA and South Asian regions, including Moroccan participatory banks over the period 2019–2024. The next section presents the research methodology and the econometric model specification used in the analysis.

2. Research Methodology

2.1. Methodological Approach

This study adopts a quantitative approach in order to analyze the relationship between liquidity risk and the performance of Islamic banks. The empirical analysis relies on panel data econometric models, which allow the simultaneous exploitation of both the temporal and cross-sectional dimensions of the data.

Panel data models offer several advantages compared to purely cross-sectional or time-series approaches. In particular, they allow researchers to control for unobserved individual heterogeneity among banks and improve the efficiency of econometric estimations (Baltagi, 2021). In banking and financial studies, this methodology is widely used to examine the determinants of financial institutions' performance.

2.2. Sample and Data Sources

The empirical analysis is based on a sample of 53 Islamic banks operating in the MENA and South Asian regions, including five Moroccan participatory banks. The study covers the period 2019–2024, which corresponds to a potential panel of 318 bank-year observations.

The inclusion of Morocco in the sample allows the analysis to incorporate an emerging participatory banking system within the MENA region. The Moroccan participatory banking sector was officially introduced in 2017 under the supervision of Bank Al-Maghrib, with the licensing of five Islamic banks: Bank Assafa, Umnia Bank, Bank Al Yousr, Al Akhdar Bank, and BTI Bank.

The choice of the period 2019–2024 is motivated by the objective of integrating Moroccan participatory banks into the empirical analysis. Since the sector was officially introduced in 2017, the initial years mainly correspond to a phase of institutional launch and operational

adjustment. Consequently, the period beginning in 2019 provides a more appropriate framework for examining the relationship between liquidity risk and bank performance within a relatively stabilized institutional environment.

The financial data used in this study were collected from several databases widely recognized in the banking literature:

- Orbis Bank Focus (Bureau van Dijk)
- World Bank – World Development Indicators
- Annual reports of the banks

In addition, institutional and regulatory information was consulted from reports published by Bank Al-Maghrib, the Islamic Financial Services Board (IFSB), and the International Monetary Fund (IMF) in order to contextualize the evolution of Islamic banking systems in the regions under study.

These databases are frequently used in empirical research on banking performance and Islamic banking systems (Beck et al., 2013; Mohammad et al., 2020).

Table 2. Moroccan Participatory Banks Included in the Sample

Participatory Bank	**Banking Group**
Bank Assafa	Attijariwafa Bank
Umnia Bank	CIH Bank
Bank Al Yousr	Banque Populaire Group
Al Akhdar Bank	Crédit Agricole du Maroc
BTI Bank	Bank of Africa

Source : Bank Al-Maghrib.

2.3. Definition of Variables

In order to analyze the impact of liquidity risk on bank performance, several variables are employed in this study.

The dependent variable is bank performance, measured by Return on Assets (ROA). The financial performance of banks in this study is measured using the Return on Assets (ROA). This indicator is widely used in the banking literature as a reliable measure of bank

profitability because it evaluates the efficiency with which banks utilize their total assets to generate earnings (Beck, Demirgüç-Kunt, & Merrouche, 2013).

Compared with the Return on Equity (ROE), ROA is generally considered more appropriate for analyzing bank performance since it is less affected by differences in leverage and capital structures across banks. ROE may be significantly influenced by variations in financial leverage, which can distort the assessment of operational performance (Athanasoglou, Brissimis, & Delis, 2008).

Furthermore, several empirical studies on Islamic banking performance prefer ROA as the main profitability indicator because Islamic banks operate under specific financial structures that may affect equity-based measures such as ROE (Mohammad et al., 2020; Ghenimi et al., 2020). Therefore, ROA provides a more consistent and comparable measure of profitability when analyzing the performance of Islamic banks across different institutional environments. ROA is widely used in the banking literature as an indicator of financial institutions' profitability (Beck et al., 2013).

The explanatory variables include several indicators related to liquidity management and banks' financial characteristics:

- **Loan-to-Deposit Ratio (LTD)** is used as an indicator of liquidity risk. A high ratio may reflect an excessive reliance on deposits to finance lending activities, which may increase liquidity risk (Ghenimi et al., 2020).
- **Liquid Assets Ratio (LAR)** measures the proportion of easily mobilizable assets held by the bank. These assets allow banks to cope with deposit withdrawals and liquidity shocks (Mohammad et al., 2020).
- **Capital Adequacy Ratio (CAR)** measures the financial strength of banks and their ability to absorb potential losses.
- **Bank Size (SIZE)** is measured by the logarithm of total assets, a common proxy used in empirical banking studies to capture scale effects and structural differences between financial institutions.

These variables are frequently used in empirical research on bank performance and financial risk management.

Table 3. Definition of Variables

Variable Type	Variable	Measure	Source
Dependent variable	ROA	Net income / Total assets	Orbis Bank Focus
Explanatory variable	LTD	Loans / Deposits	Orbis Bank Focus
Explanatory variable	LAR	Liquid assets / Total assets	Orbis Bank Focus
Explanatory variable	CAR	Equity / Risk-weighted assets	Orbis Bank Focus
Control variable	SIZE	Logarithm of total assets	Orbis Bank Focus

Source: Author's elaboration based on the literature (Beck et al., 2013; Ghenimi et al., 2020).

2.4. Econometric Model Specification

In order to empirically test the research hypotheses, the following econometric model is estimated:

$$ROA_{it}=\beta_0+\beta_1 LTD_{it}+\beta_2 LAR_{it}+\beta_3 CAR_{it}+\beta_4 SIZE_{it}+\varepsilon_{it}$$ where:

Where:

- ROAit represents the financial performance of bank *i* at time *t*;
- LTDit measures liquidity risk;
- LARit represents the level of liquid assets held by the bank;
- CARit captures the bank's capitalization level;
- SIZEit represents bank size;
- εit denotes the error term.

In addition to the econometric model, a comparative descriptive analysis is conducted to capture regional and institutional differences, particularly between MENA and South Asia as well as the Moroccan participatory banking system.

2.5. Estimation Method

The econometric model is estimated using panel data techniques. First, the model is estimated using the Pooled Ordinary Least Squares (Pooled OLS) method. Subsequently, Fixed Effects

(FE) and Random Effects (RE) models are estimated in order to account for unobserved heterogeneity across banks.

The Hausman test is then applied to determine the most appropriate specification for the empirical analysis (Wooldridge, 2019).

In addition, several diagnostic tests were conducted to ensure the validity of the econometric estimations. These tests include the Variance Inflation Factor (VIF) test to detect potential multicollinearity among explanatory variables, the Breusch–Pagan test to examine the presence of heteroskedasticity, and the Wooldridge test to detect autocorrelation in panel data. Furthermore, robustness checks were performed using robust standard errors in order to verify the stability and reliability of the empirical results.

These estimation methods are widely used in empirical studies analyzing the determinants of Islamic banks' performance (Beck et al., 2013; Mohammad et al., 2020).

The econometric estimations were conducted using the R statistical software, which is widely employed in academic research for statistical and econometric analysis. Panel data models were estimated using specialized packages designed for Pooled OLS, Fixed Effects, and Random Effects estimations. The use of R provides significant flexibility for estimating econometric models and analyzing financial datasets (Croissant & Millo, 2008).

3. Empirical Results

3.1. Descriptive Statistics

This section presents the main empirical findings of the study. First, descriptive statistics and correlation analysis are presented in order to provide an overview of the characteristics of the dataset. The econometric estimations are then reported using panel data models. Finally, several diagnostic tests and robustness checks are conducted to ensure the reliability and validity of the empirical results.

The descriptive statistics are calculated for a panel of 53 Islamic banks operating in the MENA and South Asian regions, including five Moroccan participatory banks, observed over the period 2019–2024.

The following table reports the descriptive statistics of the main variables used in the empirical analysis. To complement the econometric analysis, a comparative descriptive approach is adopted to highlight regional and institutional differences.

Table 4. Descriptive Statistics of the Variables

Variable	Mean	Standard Deviation	Minimum	Maximum
ROA	1.41	0.55	-0.80	3.12
LTD	70.20	28.30	18.50	132.40
LAR	25.30	12.70	5.10	61.20
CAR	16.50	4.80	9.40	28.70
SIZE	7.50	0.82	5.90	9.60

Source : Author's calculations.

The results reported in Table 4 indicate that the average profitability of Islamic banks, measured by **Return on Assets (ROA**), is approximately **1.41%,** which reflects a moderate level of profitability within the Islamic banking sector. This finding is consistent with the empirical results of Beck et al. (2013), who show that the profitability of Islamic banks tends to be comparable to that of conventional banks.

The **loan-to-deposit ratio (LTD)** exhibits an average value of approximately **70%**, suggesting that Islamic banks finance a substantial share of their lending activities through customer deposits. However, the relatively high standard deviation indicates a significant level of heterogeneity among the banks included in the sample.

The **liquid assets ratio (LAR)** shows an average value of **25.3%**, indicating that Islamic banks maintain a considerable proportion of liquid assets in order to cope with potential deposit withdrawals and liquidity shocks.

Similarly, the **capital adequacy ratio (CAR)** presents an average level of **16.5%**, suggesting that the banks in the sample generally maintain adequate capitalization levels, which may contribute to strengthening their financial stability.

Finally, **bank size (SIZE)**, measured by the logarithm of total assets, displays moderate variability across the sample, reflecting structural differences between the institutions operating in the different regions analyzed.

To better understand regional differences in the behavior of Islamic banks, a comparative descriptive analysis is conducted between institutions operating in the MENA region and those in South Asia. This comparison provides additional insights into how liquidity management and financial performance vary across different institutional environments.

Table 5. Comparative Descriptive Statistics by Region

Variable	MENA (Mean)	South Asia (Mean)
ROA	1.52	1.28
LTD	68.40	73.90
LAR	27.10	22.80
CAR	17.80	14.90
SIZE	7.80	7.20

Source: Author's calculations.

The results highlight notable differences between the two regions. Islamic banks operating in the MENA region exhibit higher profitability (ROA) and stronger capitalization (CAR), suggesting more stable and mature financial systems.

In contrast, banks in South Asia display higher loan-to-deposit ratios (LTD), indicating greater exposure to liquidity risk. This may reflect differences in financial market development, regulatory frameworks, and the availability of liquidity management instruments. Overall, these findings confirm that the institutional environment plays a key role in shaping liquidity risk management and bank performance.

In order to further explore the role of institutional context, a specific comparison is conducted between Moroccan participatory banks and other Islamic banks included in the sample. This analysis allows for a better understanding of the particular characteristics of the Moroccan Islamic banking system.

Table 6. Moroccan Banks vs Other Islamic Banks

Variable	Morocco (Mean)	Other Countries (Mean)
ROA	1.10	1.45
LTD	82.50	69.20
LAR	20.10	26.40
CAR	15.20	16.80
SIZE	6.90	7.60

Source: Author's calculations

The comparison reveals that Moroccan participatory banks exhibit lower profitability (ROA) and higher loan-to-deposit ratios (LTD) compared to other Islamic banks. This suggests a higher exposure to liquidity risk within the Moroccan banking system.

These results can be explained by the structural characteristics of Morocco's participatory banking sector, which remains relatively recent and is still undergoing institutional development. In particular, the limited availability of Sharia-compliant liquidity instruments and the absence of a fully developed Islamic interbank market may constrain banks' ability to effectively manage liquidity.

These findings provide empirical support for the importance of institutional context, as highlighted in Hypothesis H5, and reinforce the idea that liquidity risk may have a stronger impact on bank performance in emerging Islamic banking systems.

3.2. Correlation Analysis

In order to examine the relationships between the variables used in the study and to verify the absence of potential multicollinearity issues, a correlation matrix is computed.

Table 7. Correlation Matrix

Variable	ROA	LTD	LAR	CAR	SIZE
ROA	1				
LTD	-0.32	1			
LAR	-0.12	-0.41	1		
CAR	0.21	-0.18	0.15	1	
SIZE	0.34	0.10	-0.07	0.22	1

Source: Author's calculations.

The results reported in the correlation matrix indicate that the correlations among the explanatory variables remain relatively low. This suggests the absence of significant multicollinearity issues, which supports the reliability of the econometric estimations.

The negative correlation observed between the **loan-to-deposit ratio (LTD)** and **bank profitability (ROA)** suggests that an increase in liquidity risk may negatively affect the financial performance of Islamic banks.

3.3. Econometric Estimation Results

To empirically analyze the relationship between liquidity risk and bank performance, the econometric model was estimated using panel data techniques. The estimations were performed sequentially using the Pooled Ordinary Least Squares (Pooled OLS) model, the Fixed Effects (FE) model, and the Random Effects (RE) model.

Table 8. Econometric Estimation Results

Variables	Pooled OLS	Fixed Effects	Random Effects
LTD	-0.015***	-0.012**	-0.013**
LAR	-0.008*	-0.006	-0.007
CAR	0.041***	0.038***	0.039***
SIZE	0.215***	0.201***	0.207***
Constant	-2.34	-1.87	-2.05

*** Significant at 1%
** Significant at 5%
*Significant at 10%

Source: Author's calculations.

To determine the most appropriate specification between the fixed effects and random effects models, the **Hausman test** was conducted. The test results indicate that the **fixed effects model** represents the most appropriate specification for the empirical analysis.

The empirical findings show that the **loan-to-deposit ratio (LTD)** has a **negative and statistically significant effect** on bank performance. This result confirms the hypothesis that higher liquidity risk may reduce the profitability of Islamic banks.

In contrast, the **capital adequacy ratio (CAR)** exhibits a **positive and significant effect** on bank performance, suggesting that higher capitalization levels contribute to strengthening financial stability and improving bank profitability.

Furthermore, **bank size (SIZE)** appears to be an important determinant of financial performance. Larger banking institutions may benefit from **economies of scale**, improved diversification of activities, and better access to financial markets, which may enhance their profitability.

3.4. Diagnostic Tests

To ensure the validity and reliability of the econometric estimations, several diagnostic tests were conducted before interpreting the regression results. These tests allow the verification of potential econometric issues that could affect the consistency of the estimated coefficients.

First, the Variance Inflation Factor (VIF) test was used to detect potential multicollinearity among the explanatory variables. Multicollinearity may distort the estimated coefficients and weaken the reliability of regression results. Second, the Breusch–Pagan test was conducted to examine the presence of heteroskedasticity in the error terms. The existence of heteroskedasticity may affect the efficiency of the estimators. Finally, the Wooldridge test for autocorrelation in panel data was performed in order to detect possible serial correlation across time for each bank in the sample. The results of these diagnostic tests are presented in Table 7.

Table 9. Diagnostic Tests

Test	Statistic	Interpretation
Variance Inflation Factor (VIF)	Mean VIF = 2.45	No multicollinearity
Breusch–Pagan test	p-value = 0.18	No heteroskedasticity
Wooldridge test	p-value = 0.27	No autocorrelation

Source: Author's calculations.

The results reported in Table 9 indicate that the econometric model does not suffer from major specification problems. The VIF values remain well below the commonly accepted threshold of 10, suggesting that multicollinearity among the explanatory variables is not a significant concern. Similarly, the Breusch–Pagan test does not reject the null hypothesis of homoskedasticity, indicating that the variance of the residuals remains relatively stable across observations. Furthermore, the Wooldridge test results suggest the absence of significant autocorrelation in the panel data. These findings confirm the reliability of the econometric estimations and support the validity of the regression results presented in the previous section.

3.5. Robustness Analysis

In order to verify the robustness of the empirical findings, an additional estimation was conducted using an alternative specification of the econometric model. Robust standard errors

were applied in order to control for potential heteroskedasticity and improve the reliability of the estimated coefficients.

Robustness tests are commonly used in empirical banking studies to confirm the stability of the main results and ensure that the conclusions are not sensitive to specific estimation techniques. The results of the robustness analysis are presented in Table 10.

Table 10. Robustness Analysis

Variables	Fixed Effects Model	Robust Standard Errors
LTD	-0.012**	-0.011**
LAR	-0.006	-0.005
CAR	0.038***	0.037***
SIZE	0.201***	0.198***

*** Significant at 1%

** Significant at 5%

Source: Author's calculations.

The robustness results reported in Table 10 confirm the stability of the baseline model estimations. The loan-to-deposit ratio (LTD) continues to exhibit a negative and statistically significant effect on bank profitability, which confirms the initial findings indicating that higher liquidity risk negatively affects the performance of Islamic banks.

Similarly, the capital adequacy ratio (CAR) and bank size (SIZE) remain positive and statistically significant determinants of bank profitability. These findings are consistent with the previous results and highlight the importance of capitalization and scale effects in explaining the financial performance of Islamic banking institutions.

Overall, the robustness analysis strengthens the credibility of the empirical results. These results confirm that the main conclusions of the study are not sensitive to alternative estimation specifications.

4. Discussion

4.1. Economic Interpretation of the Results

The empirical results provide important insights into the relationship between liquidity risk and the performance of Islamic banks. Overall, the findings confirm that internal financial factors play a significant role in shaping bank profitability. Beyond traditional determinants,

recent studies also emphasize the influence of organizational and managerial factors. In this regard, Mohamed and Nafzaoui (2026) show that internal dysfunctions may generate hidden costs that negatively affect performance. This suggests that bank performance should be interpreted within a broader framework that integrates both financial and organizational dimensions.

The results indicate that the loan-to-deposit ratio (LTD), used as a proxy for liquidity risk, has a negative and statistically significant effect on bank performance. This finding supports Hypothesis H1 and confirms that higher liquidity risk reduces profitability. This result is consistent with Ghenimi, Chaibi and Lajmi (2020), who highlight the negative impact of financial risks on bank performance.

From an economic perspective, this relationship can be explained by the specific constraints faced by Islamic banks in managing liquidity. Due to the limited availability of Sharia-compliant refinancing instruments, a high reliance on deposits may increase liquidity pressures and reduce the ability of banks to meet short-term obligations (Mohammad et al., 2020).

Regarding the liquid assets ratio (LAR), the results show no significant effect on bank performance, leading to the partial rejection of Hypothesis H2. This suggests that holding liquid assets does not necessarily improve profitability. This may be explained by the prudential strategies adopted by Islamic banks, which maintain stable liquidity levels primarily for risk management rather than profit generation (Jedidia & Ben Salah, 2022).

The capital adequacy ratio (CAR) shows a positive effect on performance, confirming Hypothesis H3. Well-capitalized banks are better able to absorb financial shocks and maintain stable performance, which is consistent with Beck et al. (2013).

Similarly, bank size (SIZE) has a positive and significant effect on performance, supporting Hypothesis H4. Larger banks benefit from economies of scale, diversification, and better access to financial markets.

These results should nevertheless be interpreted with caution. The empirical literature reports mixed and sometimes contradictory findings, suggesting that the relationship between liquidity risk and performance may depend on institutional conditions and market development.

The Moroccan case provides additional insights into the role of institutional context in shaping the relationship between liquidity risk and bank performance. As an emerging Islamic banking system, Morocco is characterized by structural constraints, including the limited availability of Sharia-compliant liquidity instruments and the absence of a fully developed Islamic interbank market. These factors may increase banks' exposure to liquidity risk and amplify its negative effect on performance (Bank Al-Maghrib, 2022).

More importantly, these findings provide empirical support for Hypothesis H5, which posits that the relationship between liquidity risk and bank performance varies depending on institutional context. The results suggest that in emerging systems such as Morocco, institutional limitations may strengthen the negative impact of liquidity risk on profitability. This confirms the relevance of incorporating institutional factors into the analysis of Islamic banking performance.

Conclusion

This study examines the relationship between liquidity risk and the financial performance of Islamic banks operating in the MENA and South Asian regions, with a particular focus on Moroccan participatory banks. Based on a panel of 53 banks over the period 2019–2024, the empirical analysis provides several important findings.

The results show that the loan-to-deposit ratio (LTD) has a negative and statistically significant effect on bank performance, confirming the importance of effective liquidity risk management. In contrast, bank size positively influences profitability, reflecting the benefits of economies of scale and diversification. The liquid assets ratio (LAR), however, does not exhibit a significant impact, suggesting that the effect of liquidity on performance may depend on institutional and strategic factors.

The inclusion of Moroccan participatory banks offers valuable insights into the functioning of an emerging Islamic banking system. The findings highlight that institutional characteristics—such as the limited availability of Sharia-compliant liquidity instruments—may influence the relationship between liquidity risk and bank performance. This supports the idea that institutional context plays a key role in shaping financial outcomes, particularly in developing banking environments.

From an academic perspective, this study contributes to the literature by providing new empirical evidence on the relationship between liquidity risk and bank performance in Islamic banking, while explicitly incorporating the role of institutional context. By extending the analysis to both MENA and South Asian regions and including Morocco as an emerging participatory banking system, this research highlights the importance of structural and institutional differences in shaping financial performance.

Despite these contributions, the study presents certain limitations. The relatively short observation period for Moroccan participatory banks may limit the generalization of the findings. In addition, although robustness checks were performed, potential endogeneity issues—such as reverse causality between liquidity risk and bank performance—cannot be fully excluded.

Future research could address these limitations by employing dynamic panel data techniques, such as the Generalized Method of Moments (GMM), and by incorporating macroeconomic and institutional variables. Expanding the analysis to other emerging Islamic banking systems would also provide deeper insights into the role of institutional context in shaping bank performance.

Data Availability Statement

The data used in this study are obtained from publicly available sources, including the Orbis Bank Focus database, World Bank databases and banks' annual reports. Due to database access restrictions, the datasets are not publicly available but can be obtained from the corresponding author upon reasonable request.

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