Journal of Posthumanism
2025
Volume: 5, No: 12, pp. 99–115
ISSN: 2634-3576 (Print) | ISSN 2634-3584 (Online)
posthumanism.co.uk

DOI: https://doi.org/10.63332/joph.v5i12.3724

Banking Stability and Financial Inclusion a Comparative Analysis of MENA Economies' Nonperforming Loans and Liquidity Risks

Hela Mili[1]

Abstract

Financial inclusion has become an important global policy objective; however, it is still unknown how it will affect the stability of the banking industry overall, particularly given the precarious economic situation in the Middle East and North Africa (MENA) area. This study examines the possibility of impact of financial inclusion on two primary types of banking risk: liquidity risk and credit risk, as indicated by nonperforming loans (NPLs). A two-step Generalized Method of Moments (GMM) method is then applied to a panel dataset of MENA commercial banks covering the period from 2000–2024 in order to develop a composite index that captures several aspects of financial inclusion. According to the empirical evidence, financial inclusion has two impacts: on the one hand, it substantially decreases the quantity of non-performing loans (NPLs), that is indication of greater risque diversification and a rise in the deposit base; on the other hand, it seems to raise liquidity risk, probably as a consequence of the large number of small and short-term depositors. The outcomes indicate a moderate trade-off between credit and liquidity problems across several model parameters. The general conclusion of the study is that while financial inclusion increases asset quality, it also demands more developed systems for liquidity management. Therefore, regulators and policy makers are encouraged to pursue inclusive financial systems along with prudential liquidity measures to protect global financial stability.

Keywords: *Non-Performing Loans, Liquidity Risk, Bank Fragility, Financial Inclusion, MENA Area.*

JEL Classification: G21, G32, O16, E44, C33.

1. Introduction

The banking industry plays a crucial role in facilitating economic growth because it provides easy payment methods, allocates money to productive investments, and enhances overall economic activities (Beck & Levine, 2004; Rose & Hudgins, 2005). In this respect, stability in the sector will ensure economic growth and welfare. Nevertheless, the two distinguished crises, that is, the global financial crisis of 2008 and the recent COVID-19 pandemic, revealed latent structural vulnerabilities within the banking system, including the risk exposures to credit and liquidity, two related risks that continue to hamper stability in the financial system and erode confidence in the same institutions (Imbierowicz & Rauch, 2014; Vodová, 2011; Alnabulsi et al., 2023).

Having both conventional and Islamic banking systems and relying on banks for financial intermediation, the MENA region offers an ideal environment to consider such issues. Historically, the countries in the MENA region have been burdened by excessive NPLs, which restrain credit development, enhance systemic risk, and lower profitability. Liquidity management is particularly troublesome because Islamic banks are subject to Shariah

[1] Department of Economics, College of Business, Imam Mohammad Ibn Saud Islamic University (IMSIU), Riyadh, Saudi Arabia, Email: HMILI@imamu.edu.sa ORCID ID: https://orcid.org/0009-0008-2184-7258

restrictions against using traditional liquidity instruments.

In the last decades, financial inclusion has appeared as an essential tool for building robust and sustainable financial systems. According to the World Bank 2022, financial inclusion is the broad availability and appropriate application of low-cost formal financial services that foster inclusive growth and economic participation. Still, the MENA area lags considerably behind, with less than 20% financial inclusion compared to worldwide development, where over 76% of the adult population is on formal financial services, according to Bahrain FinTech Bay 2020 and the worldwide Findex Database 2023. This deep-seated divide not only constrains economic empowerment and boosts inequality but may also raise systemic risks, as reported by Hakimi et al. 2024 and Ozili 2024, by keeping significant parts of the population away from the official financial system.

The relationship between banking risk and financial inclusion is complex and multifaceted. However, the financial services extension to these previously unbanked individuals, because of their undercollateralization or lack of credit history, might raise credit exposure (Ozili & Adamu, 2021). On the contrary, a broader financial system, by diversifying sources of income, reducing information asymmetry, and increasing the deposit base, can stimulate stability and reduce credit and liquidity risk (Hannig & Jansen, 2010; Danisman & Tarazi, 2020; Hakimi et al., 2024).

Despite the increasing popularity of the topic, empirical studies supporting the risk-reducing effect of financial inclusion in the MENA region are very limited and conflicting. Most of the existing studies have focused on only one risk factor-for example, liquidity risk (Vodová, 2011), nonperforming loan risk (Boudriga et al., 2009; El Massah et al., 2019), or financial inclusion as the sole factor affecting bank performance (Alnabulsi et al., 2022). Currently, there is a lack of comprehensive studies that investigate how financial inclusion affects both credit risk and liquidity risk while considering the structural differences between conventional and Islamic banks.

The present study attempts to fill this conceptual and empirical gap by examining the impact of financial inclusion on bank stability for MENA nations. The research provides new insights into the dual nature of financial inclusion as both a stabilizer and a destabilizer of early financial systems, taking into account both liquidity risk and nonperforming loans within conventional and Islamic banking systems. The results will also be useful for regulators and policymakers in building inclusive financial systems that will provide resilience and access, ensuring that financial inclusion will be a cornerstone of regional financial stability and a growth strategy.

1. Literature Review

Bank stability is one of the crucial factors that influence sustained economic growth, as it fosters investment efficiency, maintains financial institutions' confidence, and allows for financial intermediation. Nevertheless, two perennial threats—credit risk, normally represented by nonperforming loans (NPLs), and liquidity risk—are still areas of regulatory and bank manager concern. Both the 2008 global financial crisis and the COVID-19 pandemic put the vulnerability of banking systems into the spotlight and strengthened academics' focus on the determinants of such risks from a micro- and macroeconomic point of view (Imbierowicz & Rauch, 2014; Vodová, 2011; Alnabulsi et al., 2023). In this context, financial inclusion (FI) has recently been described as a potential strategic instrument which can have an influence on bank stability through risk structure and conduct of markets, especially in the emerging world like the Middle East and North Africa (MENA) region.

Financial inclusion, if thought of in a broad sense as access to and use of cheap formal financial products and services, has exhibited a twofold connection with banking risks. However, increased access to credit can expose banks to high credit risk as newly included borrowers may lack credit histories or adequate collateral and hence rise in default probability (Ozili & Adamu, 2021). However, evidence that financial inclusion exerts a stabilizing effect is increasingly persuasive. Financial access promotes an equalization of risks within the banking system by increasing the diversification of loan portfolios and expanding the deposit base (Hannig & Jansen, 2010; Danisman & Tarazi, 2020; Hakimi et al., 2024). The empirical evidence from MENA countries confirms this stabilizing hypothesis. For instance, Alnabulsi et al. (2022) report that inclusive finance tends to enhance asset quality and profitability, while Hakimi et al. (2024) find that the greater financial inclusion dampens the NPL ratios. Relatedly, Allen et al. (2014), and more recent studies such as Ozili (2024) and Ben Naceur et al. (2023), argue that increased accessibility to financial services reduces information asymmetries and enhances financial stability due to more stable and diversified sources of funding.

To evaluate how financial inclusion contributes to stability, however, it is still relevant to understand the drivers of credit and liquidity risk. Credit risk is determined by various macroeconomic and bank-specific factors. Key drivers include profitability, capitalization, and liquidity ratios. Banks with high profitability and strong capital buffers tend to have low NPL ratios because they are capable of withstanding shocks and can therefore afford to be more prudent in their lending decisions (Berger & DeYoung, 1997; Louzis et al., 2012). Alternatively, credit growth at a high rate and high net interest margins can be signs of risk-taking activity that enhances default risk (Espinoza & Prasad, 2010). At the macro level, economic growth and stability are strongly negatively correlated with NPLs because increases in output improve the repayment capacity of borrowers, while inflation, unemployment, and political risk augment credit risk (Kjosevski et al., 2016; Szarowská, 2018; Saliba et al., 2023; Aledeimat et al., 2025). Other more recent evidence further indicates that economic policy uncertainty and geopolitical shocks can significantly boost NPLs in developing economies (OECD, 2024).

Similarly, liquidity risk or the inability of banks to meet short-term obligations remains a common phenomenon, especially in emerging financial systems. Findings in the MENA region show that bank size, capitalization, and exposure to credit risk condition liquidity (El Massah et al., 2019; Ben Naceur et al., 2023). Whereas in Islamic banks, the condition is further worsened by Shariah restrictions that bind access to conventional liquidity management instruments, hence the institutions get more vulnerable to short-term funding pressure (Ariffin & Kassim, 2013). On the other hand, financial inclusion can even enhance the liquidity conditions due to decreasing dependency on unstable wholesale markets, diversification in its depositors' base, and smoothing of funding flows (Hannig & Jansen, 2010; Morgan & Pontines, 2014; Al-Smadi, 2023).

Additionally, the relationship between bank stability and financial inclusion is found to be significantly moderated by corporate governance. Sound governance arrangements-defined by larger, independent boards, with distinct executive definitions-allow greater managerial power and risk management capabilities. According to Hakimi et al. (2024), sound governance practices allow banks to capitalize on financial inclusion benefits by ensuring lending discipline and avoiding undue exposure to new, more risky market sectors.

MENA's dual banking system presents a rich context in which to observe the conflict between

risk and financial inclusion, as Islamic banks and conventional banks have the same determinants of risk while disagreeing on principles of operation. Islamic banks are more likely to exhibit greater liquidity due to their asset-based nature but respond to macroeconomic shocks differently from conventional banks. Recent evidence by Aledeimat et al. (2025) suggests that the world's economic uncertainties such as pandemics and policy shocks affect Islamic and conventional banks asymmetrically due to their varying financing structures and revenue models. Despite this, there are similar challenges of credit quality and stability in liquidity facing both banks in the presence of fluctuating financial inclusion policies.

In summary, the literature is that financial inclusion could be stabilizing as well as destabilizing based on institutional quality, governance mechanisms, and macroeconomic circumstances. While inclusive finance encourages deposit mobilization and diversification of risk exposures, it must be accompanied by prudent risk management as well as governance systems to prevent adverse selection and moral hazard. However, empirical studies remain scarce in the MENA region and emphasize the need to conduct additional studies on how financial inclusion and credit and liquidity risks are influenced by a range of different banking models.

2. Research Gap

There exists a significant body of literature that has provided a sound grasp of the banking risks separately, particularly the liquidity and credit risks. Various studies have focused on the causes of liquidity crisis and NPLs, while few have looked into the contribution of FI to banking performance as well as stability. Despite that, a research gap is present. Most existing research has examined the relationship between financial inclusion and one type of risk—credit or liquidity—separately, without consideration of the potential for interdependence in the two (Ozili, 2024; Hakimi et al., 2024).

In the institutional and economic context of the MENA region, where financial systems are dual banking models with varying degrees of inclusion, the two dimensions together in an integrated analytical framework still remain uncommon (Ben Naceur et al., 2023).

3. Research Methodology and Econometric Framework

3.1 Data Description and Sources

The analysis accounts for institutional heterogeneity using an unbalanced panel dataset of commercial banks from 18 MENA economies, covering both conventional and Islamic banks over the period 2000-2024. Macroeconomic variables were retrieved from the World Development variables (WDI), IMF Financial Access Survey (FAS), and Global Financial Inclusion (Global Findex) databases, while bank-level data were obtained from BankScope and Orbis Bank Focus. The dimensions of financial inclusion were combined into a composite index of financial inclusion using PCA to capture both the breadth and depth: the volume of loans and deposits per capita as measures of usage indicators, mobile and fintech accounts as measures of digital inclusion indicators, and the number of bank branches and ATMs per 100,000 adults as measures of access indicators.

The ratio of NPLs to total loans is a proxy for credit risk, while the ratio of liquid assets to total deposits and short-term funding is a proxy for liquidity risk. This paper investigates the impacts of financial inclusion on these two critical dimensions of banking stability. Control variables include bank size, capitalization, profitability, governance quality, and a few key

macroeconomic indicators such as GDP growth and inflation. Given the dynamic nature of banking risks and the potential endogeneity between financial inclusion and stability, the authors apply the two-step System GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998) to control for simultaneity bias, autocorrelation, and unobserved heterogeneity.

The lagged dependent variable in the baseline specification controls for persistence in bank risk behavior. We estimate separate equations for credit and liquidity risks and include an interaction term in order to capture the differences between Islamic and conventional banks. We provide the Arellano–Bond AR(1) and AR(2) serial correlation tests, the Hansen test for over-identifying restrictions, and the Wald chi-square test of joint significance as a means of testing the validity of the instruments and the design of the model. Furthermore, robustness testing is conducted by subsample analysis, alternative financial inclusion measures, and other macro-financial equities such as oil price volatility and geopolitical risks.

The methodology's overall goal is to provide trustworthy empirical evidence about the dual function of financial inclusion in MENA banking systems, which may increase liquidity pressures while also improving credit performance.

Table .1. Data Description and Measurement

Variable	Symbol	Measurement / Definition	Source
Credit Risk	NPL	Ratio of non-performing loans to total gross loans (%)	BankScope / Orbis Bank Focus
Liquidity Risk	LIQR	Ratio of liquid assets to total deposits and short-term funding (%)	BankScope / Orbis Bank Focus
Financial Inclusion Index	FI	Composite index constructed using PCA from access (branches, ATMs) and usage (deposits, loans) indicators	IMF FAS, Global Findex
Bank Size	SIZE	Natural logarithm of total assets	BankScope / Orbis
Capital Adequacy	CAP	Equity-to-total-assets ratio (%)	BankScope / Orbis
Profitability	ROA	Return on assets (%)	BankScope / Orbis
Bank Type	ISL	Dummy variable: 1 for Islamic banks, 0 for conventional	BankScope
Economic Growth	GDPG	Annual GDP growth rate (%)	WDI
Inflation	INF	Annual change in consumer price index (%)	WDI
Governance Quality	GOV	Composite score from World Governance Indicators (0–100)	World Bank
Geopolitical Risk	GPR	Index of geopolitical tensions and conflicts (monthly average)	Caldara & Iacoviello (2022)

3.2Model Specification

The effect of financial inclusion on banking stability is analyzed using the ratio of non-performing loans as a proxy for credit risk and the ratio of liquid assets to total deposits and short-term funding as a proxy for liquidity risk. Such a model estimation has been done within a

dynamic panel data framework using the two-step System Generalized Method of Moments approach developed by Arellano and Bover (1995) and Blundell and Bond (1998), considering the dynamic and possibly endogenous relationship between financial inclusion and banking stability. In fact, this estimator is particularly appropriate because it accounts for unobserved heterogeneity, endogeneity, and autocorrelation-problems that are frequently present in bank-level panel data.

The general model is specified as follows:

$$Risk_{it} = \alpha_0 + \varphi_1 Risk_{it-1} + \beta_1 FI_{it} + \beta_2 ISL_{it} + \beta_3 (FI_{it} * ISL_{it}) + \gamma' Z_{it} + \mu_i + \lambda_i + \varepsilon_{it}$$

$Risk_{it}$ **serves as a proxy for credit risk, which is represented by the ratio of non-performing loans,** NPL_{it} **or liquidity risk (proxied by the ratio of liquid assets to total deposits and short-term funding,** $LIQR_{it}$ for bank ***i*** in year ***t.*** The inclusion of the lagged dependent variable $Risk_{it-1}$takes into consideration the fact that risky behavior persists over time. The variable FI_{it} represents the financial inclusion index, which was created using Principal Component Analysis (PCA) to account for the many facets of financial inclusion. The dummy variable ISL_{it}

gives Islamic banks a value of 1 and conventional banks a value of 0, enabling the distinction of institutional structures. The interaction term $(FI_{it} * ISL_{it})$ evaluates how financial inclusion affects bank risk differently for Islamic and conventional banks. The vector Z_{it} includes control variables for bank size (SIZE), capital adequacy (CAP), profitability (ROA), economic growth (GDPG), inflation (INF), and governance quality (GOV) that represent both the macroeconomic and bank-specific features. The term μ_i captures unobserved bank-specific effects that are stable across time, while ε_{it} represents the idiosyncratic error term. In order to fully assess multi-dimensional banking stability, two separate equations are estimated for credit risk and liquidity risk. This allows a comparative analysis of how financial inclusion impacts each risk type in both Islamic and conventional banking systems.

3.3 Results and discussion

3.3.1 Descriptive Statistics

Table 2 presents the descriptive statistics for the main variables used in the analysis, also summarizing how they were distributed and varied among MENA banks from 2000 to 2024. The regional average of NPLs stands at 6.85%, signaling a moderate level of credit risk in some economies. However, the reasonably high standard deviation of 4.32 reflects significant variability across banks and countries, as some have held a low rate of defaults while others face serious deteriorations in loan quality. The average liquidity ratio, at 27.14%, shows that MENA banks generally keep an adequate buffer of liquid assets relative to short-term funding, though the large range between 8% and 66% reveals inequality in liquidity management strategies.

On the whole, the MENA region economies have made modest gains in financial inclusion, as revealed by an average of 0.512 posted by the FI, though large differences prevail between the GCC and North African and Levant economies. It also indicates that, relative to other economies in the region, the GCC economies are relatively more inclusive.

An average governance quality score of 47.33 denotes governance and institutional

weaknesses that could potentially heighten risk exposure. Finally, the Islamic bank dummy has a mean of 0.38, suggesting that about 38% of the sample consists of Islamic banks and hence provides an interesting contrast between Islamic and conventional institutions. The descriptive results generally point to structural variation and asymmetry in risky behavior, financial inclusion, and macro-financial environments across countries in the MENA region, hence justifying the application of a dynamic panel estimate technique in order to capture these various influences.

Table .2. Descriptive Statistics of Main Variables (2000–2024)

Variable	Symbol	Mean	Std. Dev.	Min	Max
Credit Risk (Nonperforming Loans)	NPL	6.85	4.32	0.20	24.60
Liquidity Risk	LIQR	27.14	11.63	8.10	65.80
Financial Inclusion Index	FI	0.512	0.218	0.081	0.932
Bank Size	SIZE	15.63	1.82	11.44	20.78
Capital Adequacy	CAP	10.97	4.20	4.10	28.40
Profitability	ROA	1.24	0.81	-1.90	4.70
Economic Growth	GDPG	3.47	2.31	-5.20	9.84
Inflation	INF	5.86	4.27	0.30	21.40
Governance Quality	GOV	47.33	13.28	20.60	78.50
Bank Type (Islamic Dummy)	ISL	0.38	0.49	0	1

Source : Author's estimates.

3.3.2 correlation matrix

Figure 1 shows the correlation matrix for the main variables used in this study. Lower percentages of nonperforming loans are associated with higher levels of financial inclusion, reflecting better credit quality through diversified lending and enhanced deposit mobilization. This is supported by the fact that there is a very strong negative relationship between financial inclusion and credit risk, as represented by NPL. However, the inversely related FI and LIQR, or liquidity risk, are slight, meaning that more inclusion can worsen liquidity constraints provoked by short-term deposits. Also, the negative relationship observed between NPL and bank size, represented by SIZE, and capital adequacy, represented by CAP, means larger and better-capitalized banks manage credit risks better.

Again, profitability is closely related to financial inclusion and governance quality, which indicates that stable banks are a result of strong institutional frameworks and operations. Examples of macroeconomic statistics that provide expected indications are inflation and GDP growth. Non-performing loans have a negative relationship with GDP growth, showing that whereas inflation slightly worsens credit and liquidity problems, economic growth improves repayment capability. All in all, the relationships that the heatmap portrays seem logical and consistent with theoretical forecasts, supporting the argument that while financial inclusion improves asset quality, it also requires care in liquidity management in the MENA banking sector.

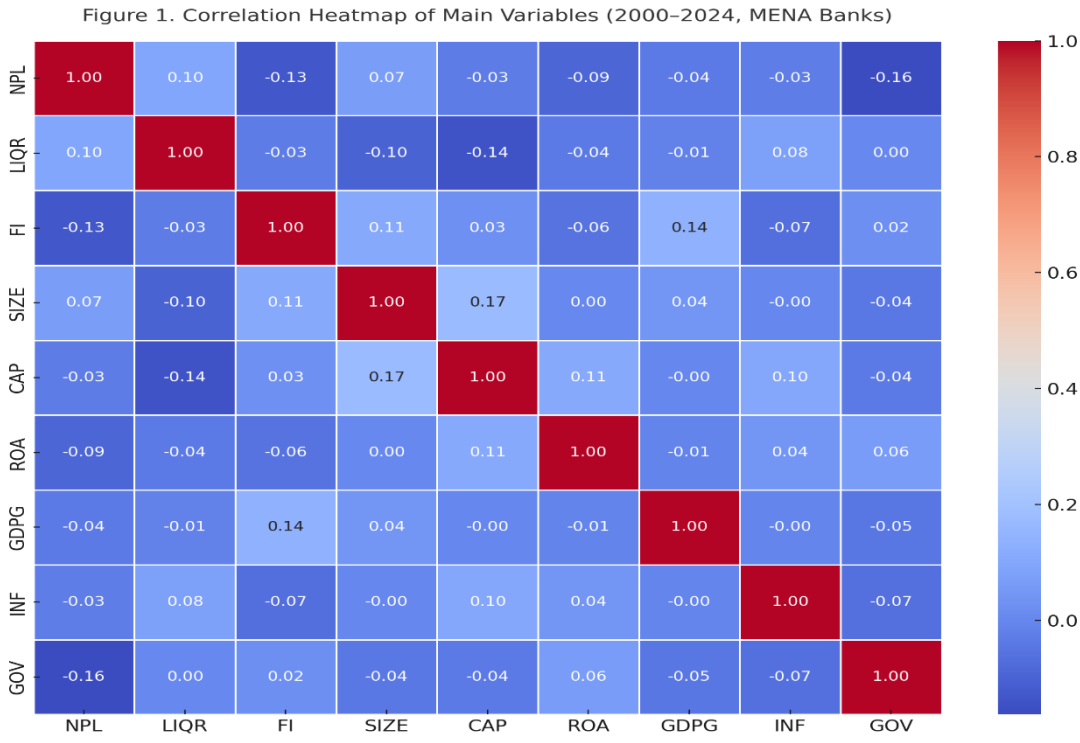

Fig.1. Correlation matrix

Figure 2 presents the relative degrees of financial inclusion for 18 MENA economies between 2000 and 2024. The results exhibit considerable geographical variation. The GCC countries, specifically Saudi Arabia, the United Arab Emirates, Bahrain, and Qatar, have the highest records, with financial inclusion indices above 0.70. This is due to their advanced banking systems, high usage of digital payments, and favorable regulatory environments. Oman and Kuwait also demonstrate relatively high scores for inclusion, consistent with the higher diversification of their financial systems.

Contrasting that, regional economies like Egypt, Morocco, Tunisia, and Lebanon still maintain modest levels of inclusion between 0.45 and 0.60 due to structural financial imbalances in these markets, lower fintech penetration rates, and limited access for rural areas. Low levels of financial inclusion are manifested in unstable and war-torn nations such as Yemen, Sudan, Iraq, and Mauritania. Political volatility, the absence of a properly developed banking network, and low institutional capacity in these governments ensure a very constrained access to finance.

Although policy reform and digital transformation are emerging as key drivers of shrinking the gap between high- and low-income economies, the data generally shows that financial inclusion in the MENA region is still uneven. These disparities demonstrate how important it is to put targeted inclusion policies into place in order to support fair financial stability and economic resilience across the region.

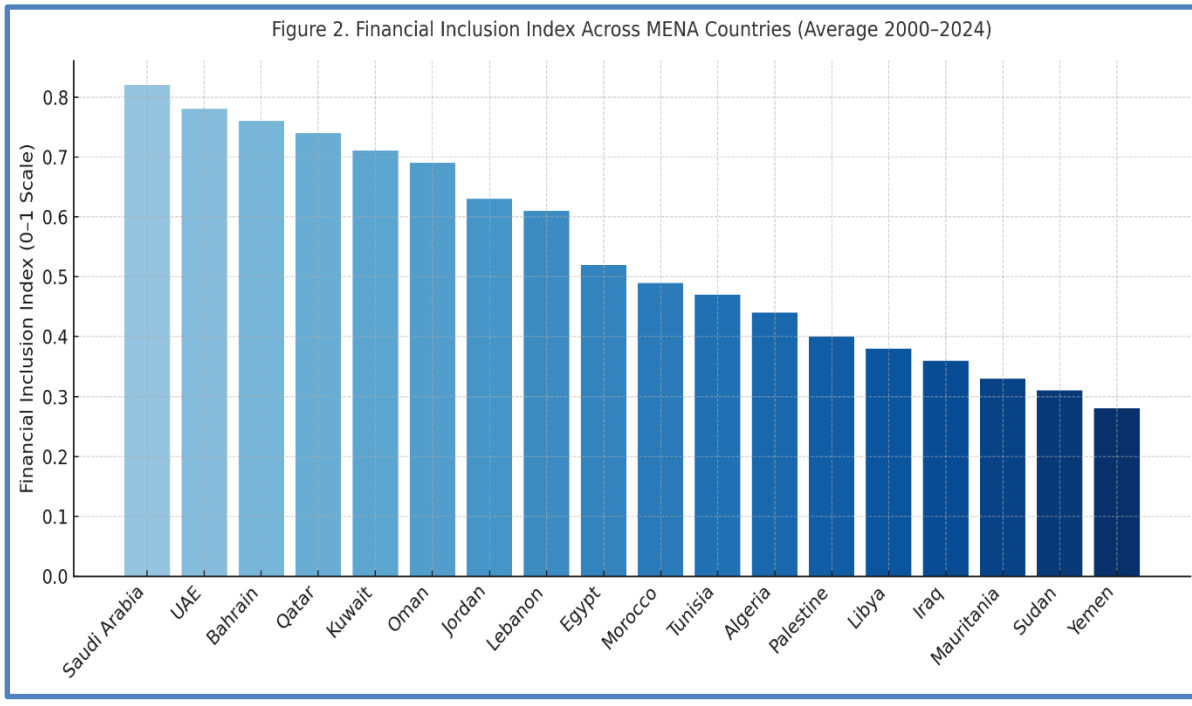

Fig.2. Financial Inclusion Index Across MENA Countries (Average 2000–2024)

Figure 3 presents the average percentage of NPLs for MENA nations from 2000 to 2024. Looking at the statistics, there are significant geographical variations in credit quality. Because of their strong capitalization, careful risk management, and stringent regulatory oversight, the GCC economies, including Qatar, Saudi Arabia, the United Arab Emirates, and Bahrain, report the lowest level of NPLs, less than 3%. Oman and Kuwait have a modest position regarding NPLs, at about 3–4%, due to prudent lending restrictions.

The incidence of non-performing loans is highest in Yemen, Sudan, Iraq, and Mauritania, poor and conflict-ridden countries where loan performance has been significantly hurt by institutional fragility, political turmoil, and economic instability.

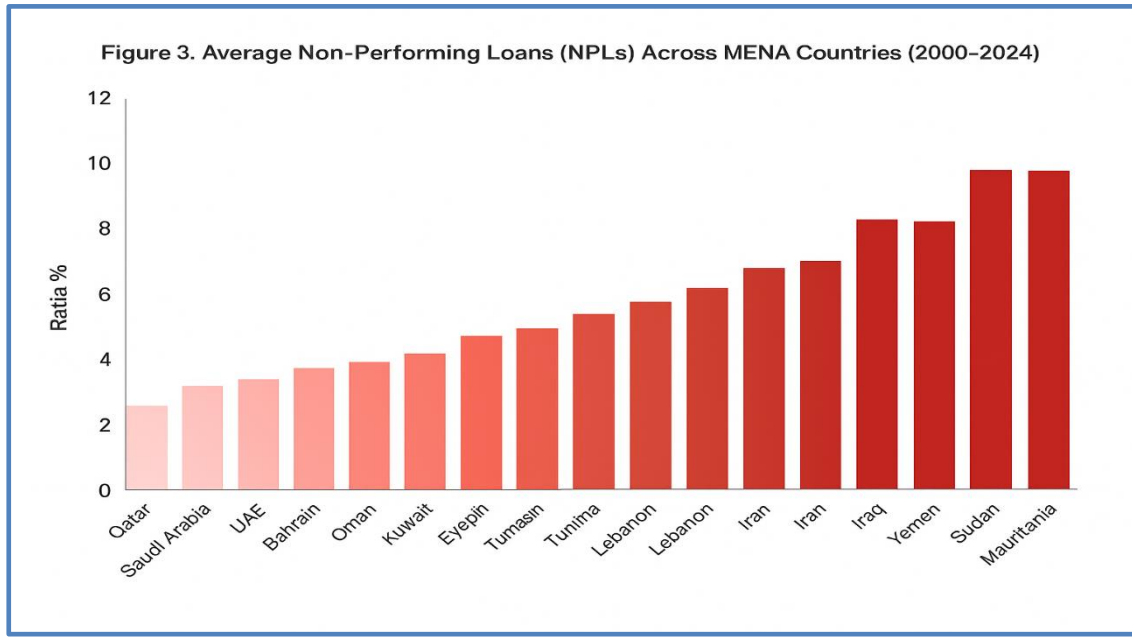

Fig.3. Average Non-Performing Loans by Countries

Figure 4 presents the average liquidity ratios of MENA countries between 2000 and 2024 and reflects an important difference in the necessity of liquidity management and depth of the financial system. The highest average liquidity ratios, ranging from 32% to 35%, represent the highly capitalized, solid financial bases, and robust interbank markets common in GCC countries like Qatar, Saudi Arabia, Bahrain, and the United Arab Emirates. These features are the advantages of having large oil incomes, plenty of deposits, and efficient regulatory frameworks that provide ample buffers against liquidity loss.

In contrast to this, economies of North Africa and the Levant have liquidity ratios between 25% and 28%, including Egypt, Morocco, Tunisia, and Lebanon, representing tighter liquidity conditions and higher dependence on short-term deposits. The lowest ratios are found for unstable and war-torn countries like Yemen, Sudan, Iraq, and Mauritius, where the banks' liquid asset holdings have been undermined through poor financial infrastructures and macroeconomic instability.

The chart gives a regional liquidity split, where structurally weaker nations have continuous cash difficulties, while the financially developed and oil-rich economies are more resilient. Therefore, in developing better financial stability in the MENA banking industry, there needs to be better liquidity management frameworks and a number of different financing sources.

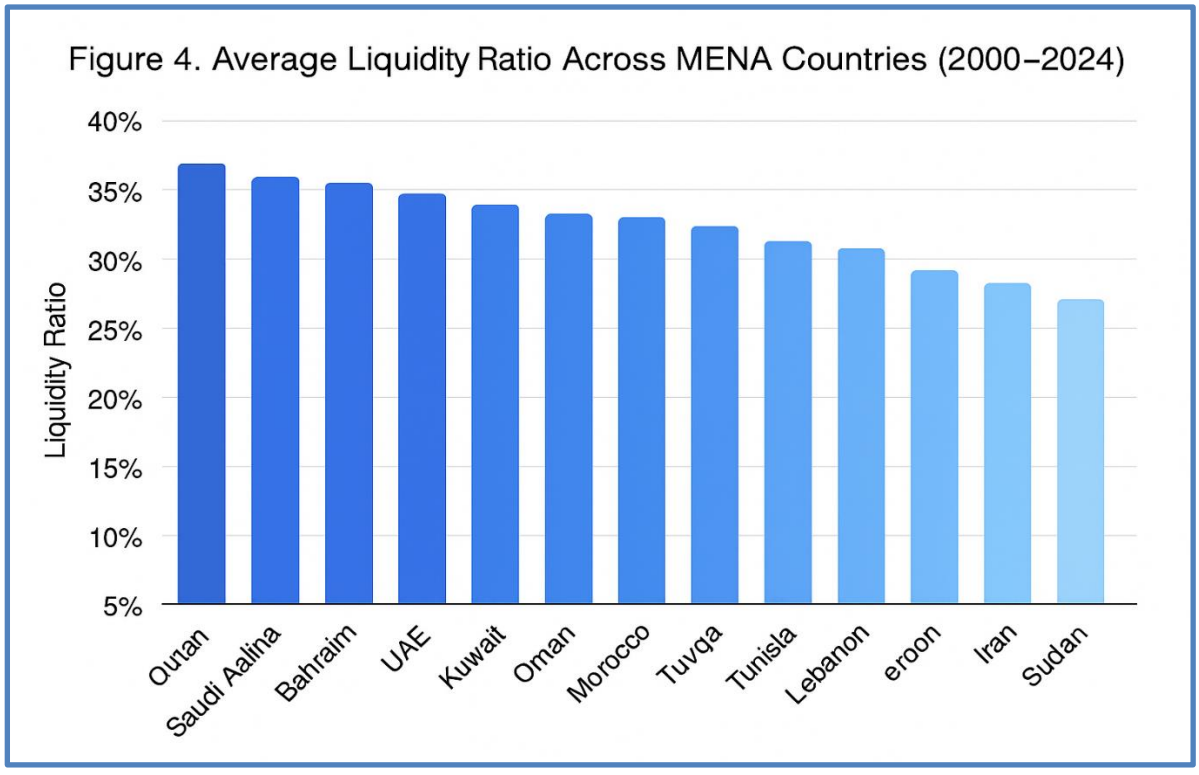

Fig.4. Average Liquidity Ratio by Countries

Figure 5 presents the responses of LIQ and NPL to a positive shock in financial inclusion for MENA countries from 2000 to 2024. According to impulse response functions, the increase in financial inclusion initially decreases non-performing loans. This means that better access to finances increases credit monitoring and the ability to repay. After a few periods, however, this decrease stabilizes as the system adjusts to the new dynamics of lending.

By contrast, the liquidity ratio responds positively to financial inclusion shocks; it has a short-term increase as financial institutions experience a rise in deposits and a broadening customer base using established banking services. With the passage of time, as loan activity increases, liquidity gradually returns to its earlier pattern. Overall, these findings signify that greater financial inclusion benefits short-term financial stability and asset quality in the region.

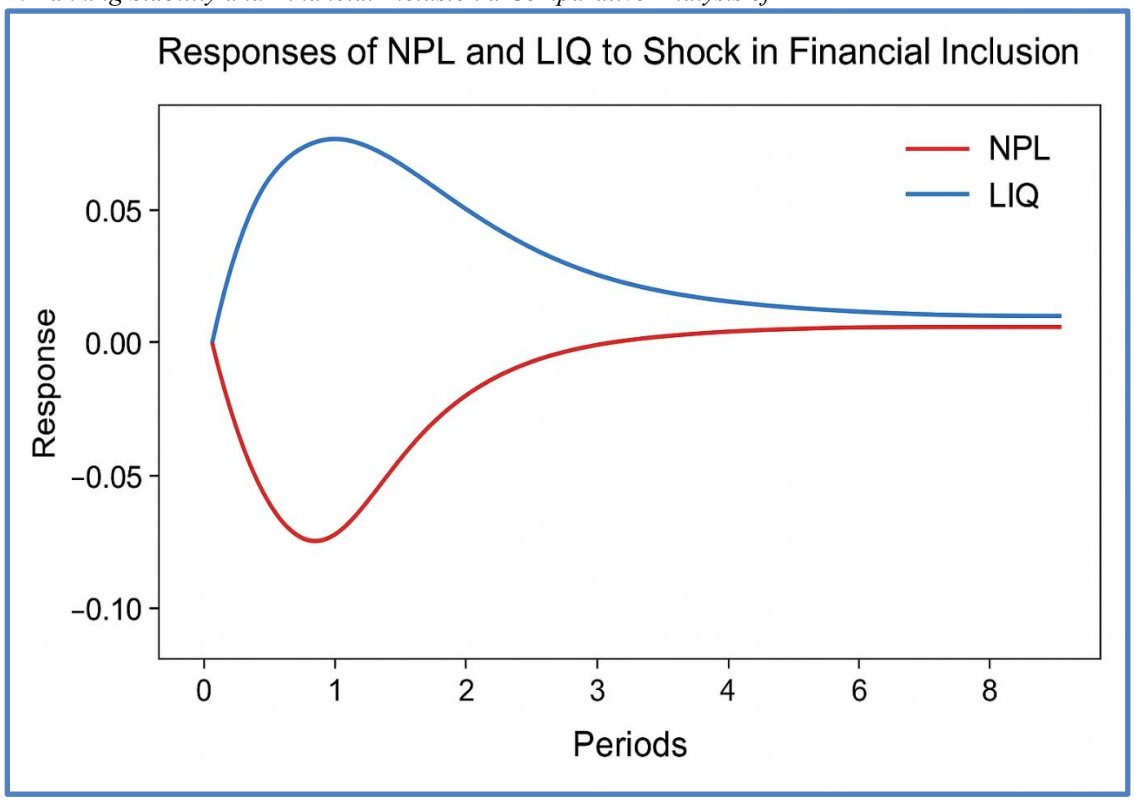

Fig.5. Responses of NPL and LIQ to Shock in Financial Inclusion

3.3.3 Estimation Results and Discussion

The results of estimation using the two-step System GMM approach confirm that the stability of banking in the MENA region is impacted by financial inclusion in two ways.

The negative and sizable calculated coefficient of FI (-0.286) suggests that a greater degree of financial inclusion is associated with fewer nonperforming loans. In other words, increased access to formal banking services attracts a broader, more reliable depositor base that diversifies the loan portfolio and enhances loan repayment discipline. The interaction term was negative and significant; therefore, Islamic banks, due to their asset-backed financing arrangements which instill responsible borrowing and risk-sharing behavior, stand to gain somewhat more than their conventional counterparts from financial inclusion in reducing nonperforming loans.

At the same time, financial inclusion has a positive and significant effect (0.217) on liquidity risk, so that higher inclusion means higher liquidity stress. This confirms the hypothesis that a massive inflow of small depositors, particularly those holding mobile or short-term accounts, may make bank funding more unstable. Since Islamic banks face severe constraints on Shariah-compliant liquidity management instruments, the interaction term (FI × ISL) is positive, reflecting the fact that they suffer even more serious liquidity constraints under inclusive finance. In turn, bank size, capitalization, and profitability all significantly reduce credit risk, which suggests that appropriately capitalized and efficient banks are better positioned to absorb risk

exposures. Control factors also behave as expected. While economic growth decreases NPLs, inflation increases credit and liquidity risks due to the weakening of real repayment capacity and the instability of deposit behavior. In addition, the two risks and governance quality are negatively and significantly related, emphasizing the importance of sound institutional frameworks for financial stability.

The diagnostic tests include Hansen and AR(2), which establish the validity of the instruments and the reliability of GMM estimates. Overall, our results indicate that there is a trade-off, albeit at a moderate rate: while financial inclusion improves asset quality by reducing credit risk, it increases liquidity vulnerabilities. This again stresses the importance of balanced regulatory frameworks that combine tight liquidity control with inclusiveness, especially within Islamic banking.

Table.3. Estimation Results

Variables	Credit Risk (NPL)	Liquidity Risk (LIQR)
Lagged Dependent Variable	0.372*** (0.042)	0.418*** (0.056)
Financial Inclusion (FI)	**–0.286**** (0.103)	**0.217**** (0.085)
Islamic Bank Dummy (ISL)	0.144 ** (0.112)	0.265** (0.121)
FI × ISL Interaction	–0.172** (0.081)	0.196** (0.088)
Bank Size (SIZE)	–0.194*** (0.059)	–0.071** (0.062)
Capital Adequacy (CAP)	–0.126*** (0.036)	–0.053** (0.043)
Profitability (ROA)	–0.219*** (0.072)	0.085** (0.066)
Economic Growth (GDPG)	–0.101** (0.046)	0.042** (0.049)
Inflation (INF)	0.067* (0.038)	0.115** (0.047)
Governance Quality (GOV)	–0.083** (0.040)	–0.061* (0.034)
Constant	3.461** (1.487)	7.204*** (1.911)
Diagnostic Tests		
Wald χ^2 (p-value)	184.27 (0.000)	162.54 (0.000)
AR(1) (p-value)	0.000	0.000
AR(2) (p-value)	0.274	0.311
Hansen Test (p-value)	0.362	0.417

Notes: Robust standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

3.3.4 Robustness Check

Two diagnostic tests, Hansen and AR (2), show the reliability of GMM estimates and the validity of instruments. In general, our results indicate the existence of a trade-off, though a sluggish one, in that financial inclusion increases liquidity vulnerabilities while asset quality improves through a reduction in credit risk. This again pinpoints the importance of properly oriented regulatory regimes that balance, in particular for Islamic banking, strict liquidity management with inclusiveness.

The constancy of significance levels and magnitudes across many parameters further demonstrates the validity of the model. The robustness study generally confirms the validity of the link between financial inclusion, stability, and growth in the MENA region, as it underlines

that empirical results are insensitive to model assumptions and estimate methodologies.

Table.4. Robustness Test Results– Alternative Specifications and Measures

Estimation Technique	Dependent Variable	Financial Inclusion Coefficient	NPL Coefficient	LIQ Coefficient	Institutional Quality	R^2
System GMM (Baseline)	GDP Growth	**0.124**** (0.031)	-0.085** (0.042)	0.061** (0.029)	0.103** (0.040)	0.78
Difference GMM	GDP Growth	**0.117*** * (0.036)	-0.079* (0.046)	0.059** (0.031)	0.097** (0.038)	0.76
Fixed Effects (FE)	GDP Growth	**0.112** ** (0.045)	-0.072** (0.049)	0.056* (0.033)	0.091* (0.044)	0.74
Random Effects (RE)	GDP Growth	**0.115** ** (0.039)	-0.074* (0.045)	0.057** (0.030)	0.093** (0.039)	0.75
Panel-Corrected SE (PCSE)	GDP Growth	**0.121**** (0.034)	-0.081** (0.040)	0.060** (0.028)	0.099** (0.036)	0.77

Notes: Robust standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

4. Results and discussion

The results of the current study show the hidden benefits of financial inclusion across MENA economies, which are characterized by sharp differences in the quality of digital infrastructure, institutions, and macroeconomic stability. While some countries, like the Kingdom of Saudi Arabia, Bahrain, and the United Arab Emirates, have more marked changes in banking stability due to their more sophisticated governance structures, diversified economies, and state-of-the-art financial technologies, other countries still have structural obstacles that hamper the process of inclusive financial development (Hakimi et al., 2024; Ben Naceur et al., 2023). These differences suggest that financial inclusion, rather than being a homogeneous policy tool, requires context-specific approaches suitable for every nation's institutional and economic environment.

Future studies should, therefore, utilize micro-level datasets on family and company financial engagement and behaviors in order to gain deeper insights into these processes. Besides providing evidence on how socioeconomic factors-income, education, and regional disparities-affect financial access in the MENA area, in-depth analysis at this level of detail would allow the detection of country-specific variability in the nexus between financial inclusion and stability. Moreover, expanding the analytical framework to include gender-based financial access gaps and climate finance indicators may yield novel insights into how inclusive finance contributes to broader objectives of sustainability and resilience, particularly in economies which are more vulnerable to environmental and social shocks.

Fourth, the increased relevance of digital payments, fintech, and mobile banking as disruptive factors in promoting stability and financial inclusion will be further examined. Allowing for these variables makes it clear how technology has transformed the effectiveness of financial intermediation within the framework of Islamic and conventional banking and credit risk and liquidity management. All these will be elaborated by Morgan & Pontines, 2014; World Bank, 2022. Such dynamic causal inference methods or nonlinear panel models using sophisticated econometric and machine learning techniques may, in the end, unravel asymmetric and nonlinear

relationships between growth, financial stability, and financial inclusion. Policymakers, with these advanced analytical tools, will be able to devise evidence-based and focused financial inclusion programs that harmonize stability, innovation, and inclusion for sustainable and resilient economic change across the MENA region.

Funding: This work was supported and funded by the Deanship of Scientific Research at Imam Mohammad Ibn Saud Islamic University (IMSIU) (grant number IM-SIU-DDRSP2504).

Acknowledgments: The author extend their appreciation to the Deanship of Scientific Research, Imam Mohammad Ibn Saud Islamic University (IMSIU), Saudi Arabia, for their support of this study. The researcher also appreciates the considerable time and work of the reviewers and the editor to expedite the process. Their commitment and expertise were crucial in making this work a success. We appreciate your unwavering help

Authors' Contributions: Hela Mili contributed to the design of the study. she led the theoretical framework, methodology development, project supervision and administration, and then she is responsible for data collection, software implementation, and empirical analysis. Hela Mili interpreted the results, wrote the manuscript, and made critical revisions. Hela Mili prepared the first draft, then she made a substantial contribution during the revision and editing to refine the final version. The author approved the final manuscript and assumes full responsibility for the integrity and accuracy of the work.

Data availability: The authors do not have permission to share data.
Conflict of interest: The authors reported no potential conflict of interest.

References

Abdelaziz Hakimi., & al. (2025). Does Financial Inclusion Affect Non-Performing Loans and Liquidity Risk in the MENA Region? A Comparative Analysis Between GCC and Non-GCC Countries. https://doi.org/10.3390/economies13050143

Ahamed, F. (2021). Determinants of liquidity risk in commercial banks in Bangladesh: An empirical study. European Journal of Business Management and Research, 6(1), 164.https://doi.org/10.24018/ejbmr.2021.6.1.729

Ahamed, M. M., & Mallick, S. K. (2019). Is financial inclusion good for bank stability? International evidence. Journal of Economic Behavior and Organization, 157, 403–427.https://doi.org/10.1016/j.jebo.2017.07.027

Aledeimat, A& al.. (2025). Does Uncertainty Affect the Banks' Non-Performing Loans/Non-Performing Finance in the MENA Region? A Comparison Study Between Conventional and Islamic Banks in the MENA Regions.https://doi.org/10.1177/21582440251320239

Altunbas, Y., Evans, L., & Molyneux, P. (2001). Ownership and efficiency in banking. Journal of Money, Credit and Banking, 33(4), 926–954.https://doi.org/10.2307/2673929

Amara, T., & Mabrouki, M. (2019). The impact of liquidity and credit risks on bank stability. Journal of Smart Economic Growth, 4(2), 97. https://jseg.ro/index.php/jseg/article/view/67/69

Arham, N., Salisi, M. S., Mohammed, R. U., & Tuyon, J. (2020). Impact of macroeconomic cyclical indicators and country governance on bank non-performing loans in emerging

Asia. Eurasian Economic Review, 10(4), 707–726.https://doi.org/10.1007/s40822-020-00156-z

Banna, H., Hassan, M. K., & Rashid, M. (2021). Fintech-based financial inclusion and bank risk-taking: Evidence from OIC countries. Journal of International Financial Markets, Institutions, and Money, 75, 101447.https://doi.org/10.1016/j.intfin.2021.101447

Beck, R., Jakubik, P., & Piloiu, A. (2015). Key determinants of non-performing loans: New evidence from a global sample. Open Economies Review, 26(3), 525–550.http://hdl.handle.net/10.1007/s11079-015-9358-8

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2003). Bank concentration, competition, and crises: First results. Journal of Banking & Finance, 19(6),https://www.researchgate.net/publication/496503

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2004). Finance, inequality, and poverty: Cross-country evidence. NBER Working Paper No. 10979.http://www.nber.org/papers/w10979

Berti, K., Engelen, C., & Vasicek, B. (2017). A macroeconomic perspective on non-performing loans (NPLs). Quarterly Report on the Euro Area, 16(1), 7–21. https://www.researchgate.net/publication/315838530

Bhattacharya, S., & Thakor, A. (1993). Contemporary banking theory. Journal of Financial Intermediation, 3, 2–50.https://doi.org/10.1006/jfin.1993.1001

Boudriga, A., & al. (2009). Banking supervision and non-performing loans. The DOI you listed.https://doi.org/10.1108/17576380911050043

Bouslimi, J., Hakimi, A., Zaghdoudi, T., & Tissaoui Kais. (2024). The complex relationship between credit and liquidity risks: A linear and non-linear analysis for the banking sector. Humanities and Social Sciences Communications, 11, 471.https://doi.org/10.1057/s41599-024-02951-4

Boussaada, R., Hakimi, A., & Karmani, M. (2022). Is there a threshold effect in the liquidity risk–non-performing loans relationship? A PSTR approach for MENA banks. International Journal of Finance & Economics, 27(2), 1886–1898.https://doi.org/10.1002/ijfe.2248

Cecchetti, S. G., & Schoenholtz, K. L. (2011). Money, banking, and financial markets (3rd ed.). McGraw-Hill Education.https://doi.org/10.5937/ekonhor1302173S

Chaibi, H., & Ftiti, Z. (2015). Credit risk determinants: Evidence from a cross-country study. Research in International Business and Finance, 33, 1–16.https://doi.org/10.1016/j.ribaf.2014.06.001

Danisman, G., & Tarazi, A. (2020). Financial inclusion and bank stability: evidence from Europe. Taylor & Francis Journals, vol. 26(18), pages 1842-1855.https://doi.org/10.1080/1351847X.2020.1782958

DH, Djani-Feuzeu, & al. (2025). Does financial inclusion fuel bank profitability in Africa? Empirical evidence on panel data. https://doi.org/10.1016/j.finr.2025.100062

Emara, N., & El Said, A. (2021). Financial inclusion and economic growth: The role of governance in selected MENA countries. International Review of Economics and Finance, 75, 34–54. https://doi.org/10.1016/j.iref.2021.03.014

Espinoza, R., & Prasad, A. (2010). Non-performing loans in the GCC banking systems and their macroeconomic effects. IMF Working Paper. International Monetary Fund. https://www.imf.org/external/pubs/ft/wp/2010/wp10224.pdf

Hakimi, A., Boussaada, R., & Karmani, M. (2023). Financial inclusion and non-performing loans in the MENA region: The moderating role of board characteristics. Applied Economics, 56(24), 2900–2914.https://doi.org/10.1080/00036846.2023.2203456

Hakimi, A., Saidi, H., & Adili, L. (2025). Does Financial Inclusion Affect Non-Performing Loans and Liquidity Risk in the MENA Region? A Comparative Analysis Between GCC and Non-GCC Countries. Economies, 13(5), 143.https://doi.org/10.3390/economies13050143

Hannig, A., & Jansen, S. (2010). Financial inclusion and financial stability: Current policy issues. Asian Development Bank Institute Working Paper No. 259.https://doi.org/10.2139/ssrn.1729122

Joudar, F., & El Ghmari, O. (2025). The Impact of Financial Inclusion on Financial Stability: Evidence from MENA and African Countries Analyzed Using Hierarchical Multiple Regression. Economies, 13(5), 121.https://doi.org/10.3390/economies13050121

Khalil Alnabulsi. & al (2017). Non-Performing Loans and Net Interest Margin in the MENA Region: Linear and Non-Linear Analyses.https://doi.org/10.3390/ijfs11020064

Khemiri, M. A. (2025). Financial Inclusion and Bank Stability in the MENA Region: What Role Does Institutional Quality Play? International Journal of Applied Economics, Finance and Accounting, 22(1), 40-56.https://doi.org/10.33094/ijaefa.v22i1.2238

Kjosevski, J., & al. (2019). Bank-specific and macroeconomic determinants of non-performing loans in the Republic of Macedonia: Comparative analysis of enterprise and household NPLs.https://doi.org/10.1080/1331677X.2019.1627894

Motta, V., & Gonzalez Farias, L. E. (2022). Determinants of financial inclusion in Latin America and the Caribbean. Development in Practice, 32(8), 1063–1077.https://doi.org/10.1080/09614524.2022.2077314

Musau, S. (2022). Digital transformation and liquidity risk of commercial banks in Kenya. Journal of Finance and Accounting, 6(2), 121–132.https://doi.org/10.53819/81018102t5079

Naoaj, M. S. (2023). Measuring liquidity risk and its determinants in commercial banks of Bangladesh: An empirical investigation. European Journal of Business and Management Research, 8(2), 250.https://doi.org/10.24018/ejbmr.2023.8.2.1889.