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Financial Inclusion and Bank Stability in the MENA Region: What Role Does Institutional Quality Play?

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Abstract

This paper has three main objectives. First, it explores how financial inclusion (FI) affects the stability of banks. Second, it examines the influence of institutional quality (IQ) on bank stability. Third, it analyzes whether IQ mediates the relationship between financial inclusion and bank stability. The Middle East and North Africa (MENA) region's 68 conventional banks are the sample used in the study, which spans the years 2005–2020. For a more in-depth analysis, the MENA region is divided into two sub-regions: 33 banks in Gulf Cooperation Council (GCC) countries and 35 banks in non-GCC countries. The empirical approach utilized is the System Generalized Method of Moments (SGMM). The results show that bank stability is negatively impacted by financial inclusion, while institutional quality enhances bank stability in MENA banks. Additionally, the results show that MENA banks benefit from the connection between financial inclusion and institutional quality, a conclusion consistent across the full sample, the two sub-regions, and three different measures of bank stability.

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1. Introduction

Banks are essential for funding the economy because they serve as middlemen between savers and borrowers, allowing money to move more easily across a nation. The fractional reserve system of the banks enables economic growth by transforming small initial deposits into more money, as explained by McLeay, Radia, and Thomas (2014). Furthermore, banks extend credit and loans to all types of borrowers, such as governments that finance infrastructure projects and company owners who expand their businesses. They also provide a wide range of financial products that are required to maintain economic functioning and stability, such as risk management, investment advising, and processing of payments, as described in works by Allen, Gu, and Kowalewski (2012); Allen, Qian, Tu, and Yu (2019) and Kahn et al. (2003).

Banks are key contributors to economic growth, serving as primary sources of funding for economies. By fostering investment and commercial activity, the banking system is essential for promoting investment and business activity, which, in turn, propels economic growth. Finding the elements that support bank stability and increase profitability is, therefore, crucial. In heavily indebted economies, a nation's stability often depends on the health of its financial sector.

Since the worldwide financial crisis that occurred between 2008 and 2009, the stability of the banking industry has been a central focus for researchers and regulators. The idea of banking stability, or financial stability, has been presented in a number of research studies. Crockett (2020) argued that banking stability is characterized by the lack of financial instability that can cause deficits for large banks and possibly bankruptcies for smaller ones. Banking stability, in broader terms, refers to the capacity of banks to function efficiently and

adapt to both present and future internal and external factors, especially economic shocks, while maintaining the capacity to meet obligations and continue normal operations.

Conversely, financial inclusion supports inclusive growth, economic expansion, and financial deepening, all of which promote human development. It is now a crucial tool for raising wealth and decreasing poverty. By providing the opportunity to use financial services and commodities, the inclusion of finance allows billions of unbanked individuals to satisfy their needs for monetary transactions, banking payments, business operations, credit, and loans.

Financial inclusion, according to the World Bank, is the process of providing people and organizations with access to reasonably priced and useful financial services and products, including credit, business payments, insurance, and monetary transactions that satisfy their requirements in an ethical and sustainable way.

Financial inclusion helps banks diversify their loan portfolios (Khan, 2011), boosting financial savings (Cull, Demirgüç-Kunt, & Lyman, 2012) and reducing the likelihood of defaults, all of which makes a contribution to the resilience of the financial system. Nonetheless, García and José (2016) argue that without proper oversight, banks may lower lending standards, bypass regulations, and fund high-risk projects to offset high transaction costs, potentially undermining financial stability.

Institutional quality refers to the strength of governance and institutions within a country or region, which can significantly impact economic and social development. Strong institutional quality is vital for achieving economic growth, attracting foreign investment, and implementing effective policies and reforms. Several studies, Uddin, Chowdhury, Sajib, and Masih (2020); Dutta and Saha (2019), and Bermpei, Kalyvas, and Nguyen (2018) suggest that strong institutional quality also seems to be a factor in increased bank stability. This is because well-functioning institutions enable governments to design and enforce policies that guide economic activities, lessening the impact of financial shocks and guaranteeing efficient economic operations (Fazio, Silva, Tabak, & Cajueiro, 2018). The detrimental consequences of market competition on bank stability are also lessened by strong institutional quality (Muizzuddin, Tandelilin, Hanafi, & Setiyono, 2021).

Prior studies on the connection between bank stability, institutional quality, and financial inclusion, including those by Ofoeda, Mawutor, and Ohenebeng (2024); Saha and Dutta (2022); Ha and Nguyen (2023) and Ahamed and Mallick (2019) have demonstrated that high institutional quality enhances the beneficial effects of financial inclusion on bank stability.

The MENA region provides a unique context in which to study financial inclusion and bank stability due to its diverse economic structures, varied levels of financial development, and institutional complexities. Despite the promotion of financial inclusion, the region still lags behind the rest of the world, with huge variations across countries. Meanwhile, economic volatility, political instability, and underdeveloped institutional frameworks have challenged the stability of banks in the region. These factors raise critical questions as to whether financial inclusion is a friend or foe of stability in the MENA context.

Though previous studies have examined the effect of financial inclusion on either the growth of the economy or poverty reduction, only a few papers have focused on the effect of financial inclusion on bank stability, especially for the MENA region. Moreover, few works consider how institutional quality influences the nexus between financial inclusion and bank stability. Institutions can make a significant difference in enforcing policies that implement financial inclusion efficiently and do not undermine the financial system's soundness. This, therefore, calls for the need to fill this gap by investigating the interplay of financial inclusion, bank stability, and institutional quality in the MENA region.

The motivation for this research is to understand how financial inclusion initiatives can be leveraged to enhance bank stability in regions with institutional weaknesses. Policymakers and practitioners require insights into whether stronger institutions can amplify the benefits of financial inclusion or mitigate its potential risks to banking systems.

By analyzing the impact of financial inclusion (FI) on banking stability in the MENA region and taking institutional quality into account as a moderating factor in the link between FI and bank stability, this study fills what is missing in the literature. The study makes several important contributions. First, few prior studies have examined the link between FI and bank stability with institutional quality as a moderating factor, particularly in the MENA region. Second, while most existing research has used specific measures of institutional quality, only a few have developed an index of institutional quality. This research is the first to examine the association across financial inclusion, institutional quality, and bank stability in both GCC and non-GCC countries, using three measures of bank stability: leverage risk, portfolio risk, and the bank Z-score return on assets (ROA). Third, many studies on the connection between financial inclusion, bank stability, and institutional quality have focused on two dimensions of FI: "access" and "usage." In contrast, this research uses three dimensions: "availability, access, and usage," and also constructs a thorough index of financial inclusion. Fourth, while previous studies often grouped all MENA countries together, this study separates the sample into GCC and non-GCC countries, allowing for tailored recommendations based on differences in their banking, economic, and financial regulations. Finally, the results of this research can help bankers and policymakers understand how to raise institutional quality to enhance bank stability while promoting financial inclusion.

The contributions of this paper are primarily aimed at answering two important questions: i) whether financial inclusion affects bank stability in the MENA region; and ii) whether institutional quality can moderate

the link between financial inclusion and bank stability. In pursuit of answers to these questions, we analyze a sample of banks in 10 countries within the MENA region between 2005 and 2020. For deeper insights and to obtain reliable results, the MENA region was divided into two sub-regions: the GCC countries with 33 banks and non-GCC countries with 35 banks. The econometric approach employed is the System Generalized Method of Moments.

Usage, access, and availability are the three main dimensions around which the financial inclusion index in this study has been built. The average of six indicators—political stability, corruption control, government efficacy, the lack of terrorism or violence, regulatory quality, rule of law, and voice and accountability—was used to evaluate the quality of an institution. Three proxies—the portfolio risk, the bank Z-score, and the leverage risk—were used to gauge bank stability.

The research results indicate that bank stability is negatively impacted by financial inclusion, while institutional quality positively impacts bank stability in MENA banks. Moreover, the findings show that MENA banks profit from the connection involving financial inclusion and institutional quality. This result holds true across the entire sample, both sub-samples (GCC and non-GCC), and for the three measures of bank stability.

The remainder of the paper is structured as follows: Section 2 offers a literature review, Section 3 outlines the sample and empirical strategy, Section 4 discusses the empirical results, Section 5 presents the robustness checks, and Section 6 concludes with findings and policy recommendations.

2. Relevant Literature and Hypotheses Development

In this section, we first examine the link between financial inclusion and bank stability. Next, we discuss recent developments in the connection between institutional quality and bank stability. Finally, we provide a summary of studies that explore how institutional quality moderates the link between bank stability and financial inclusion.

2.1. Financial Inclusion and Bank Stability

On one hand, though the connection across financial inclusion and bank stability is well discussed academically, it still remains very inconclusive. Whereas some argue that financial inclusion enhances bank stability, others find its negative implications for bank stability and sustainability. For example, Morgan and Pontines (2014) examine the association between financial inclusion and financial stability using data from Armenian small and medium-sized enterprises. Using the non-performing loan ratio and bank Z-score as proxies for financial soundness, their results showed that lending to SMEs was positively impacted by financial inclusion.

Similarly, Allen et al. (2014) argued that improving the infrastructure of the banking industry and introducing mobile banking might help overcome geographic barriers by enhancing the delivery of financial services. These technological advancements make it easier to disseminate financial knowledge to underserved populations in countries with weak physical and financial infrastructures.

Lopez and Winkler (2018), using a sample of 189 nations from 2004 to 2017, found that countries with higher levels of financial inclusion are less likely to experience sharp declines in borrowing and credit. This supports the hypothesis that a more active financial inclusion process is positively associated with a more robust financial market during times of crisis.

The effect of financial inclusion on bank stability in the MENA region was investigated by Hakimi, Boussaada, and Karmani (2022). Using data from MENA banks from 2004 to 2017, their study came to the conclusion that greater access to finance improves bank stability in the region.

Conversely, financial inclusion can also have a destabilizing effect on banks. Mendoza, Quadrini, and Rios-Rull (2009) demonstrated a conditional association between financial access and financial stability, showing that greater financial access (measured by the number of loan accounts per 1,000 individuals) was negatively correlated with non-performing loans (NPLs) and risk premiums. Ardic, Imboden, and Latortue (2013)proposed an alternative view, suggesting a nonlinear association across financial stability and inclusion, also noting that data limitations contribute to the complexity of this relationship.

Dabla-Norris, Kochhar, Suphaphiphat, Ricka, and Tsounta (2015) created an equilibrium model to explore the factors limiting financial inclusion, such as Gross Domestic Product (GDP), NPLs, and inequality. Using data from six economically developed Asian and African countries, they discovered that the trade-offs and impacts across financial inclusion and stability vary by country, highlighting the complexity of the relationship.

Čihák, Mare, and Melecky (2016) examined the interaction between financial inclusion and financial stability. The authors underline that financial inclusion is not only about access but also about the active use of financial services by households and firms. They noted that mere access does not guarantee its proper use, either for personal or business purposes. Their results tend to indicate a trade-off: increasing financial inclusion may increase borrowing risks as it could result in higher debt levels among users. Contrarily, Al-Smadi (2018) approached the topic differently by employing time-series data and completed modified least squares. The study revealed that economic integration, income disparity, and domestic lending negatively impacted financial inclusion, while confirming that financial inclusion has a modest influence on financial stability.

While existing literature provides empirical evidence on the positive link between financial inclusion and financial stability, most of the studies focus on developed and emerging economies while ignoring the unique institutional and socio-economic conditions of the MENA region. For example, Allen, Demirguc-Kunt, Klapper, and Peria (2016) document that financial inclusion enhances banking sector resilience in high-income countries but acknowledge there is a limited number of studies on regions with institutional inefficiencies, such as the MENA region. Our research, therefore, tries to fill this gap by analyzing how financial inclusion impacts bank stability in the presence of varying institutional quality.

H_1: Financial inclusion decreases bank stability.

2.2. Institutional Quality and Bank Stability

Recent studies have demonstrated that institutional quality significantly impacts bank stability. A strong institutional environment helps mitigate issues related to information asymmetry and transaction costs. By improving institutional quality, the risks faced by commercial banks can be reduced, thereby lowering moral hazard and enhancing overall stability (Cohen, Hawawini, Maier, Schwartz, & Whitcomb, 1983).

Moreover, when political stability is upheld, better loan terms can contribute to decreased moral hazard and lower default rates among borrowers. Evidence from the syndicated loan market, as highlighted by Francis et al. (2014), shows that political instability tends to drive up the costs of bank loans.

Trustworthy institutions can improve both the quantity and quality of information available about borrowers, positively influencing corporate transparency and openness (Bushman & Piotroski, 2006). This enables banks to reduce adverse selection and enhance the efficiency of loan pricing. Consequently, any improvement in institutional quality leads to a significant decrease in credit and default risk, thereby bolstering banking stability.

Conversely, numerous investigations have looked into the connection between corruption levels and banking stability. For instance, Toader, Onofrei, Popescu, and Andrieş (2018) analyzed 144 banks across 40 emerging nations and discovered that lower corruption levels had a favorable effect on bank stability, correlating with less loan losses and improved development.

Wei (1999) defends that corruption increases the asymmetry in information between lenders and borrowers in the distribution of credit, so the effect on lending rates is above the average. Chen, Jeon, Wang, and Wu (2015) studied the impact of corruption on the risk taking by bank within the period between 2000 and 2012 by looking into data derived from 1,200 banks with 35 developing countries. In fact, their findings reveal that the risks taken by banks are positively connected to corruption, which means bank risk increases with the rate of corruption in a nation.

Park (2012) investigates empirically, based on a cross-section dataset including 70 countries from 2002 to 2004, how corruption affects the resilience of the banking sector. It shows that corruption is linked to lower profitability and higher risk, as reflected in the higher NPL ratio of the banking industry. Besides, corruption may result in bank resources being channeled away from the good ventures to the destructive ones that threaten stability and economic growth Zheng, Ghoul, Guedhami, and Kwok, 2013). Nevertheless, Lalountas, Manolas, and Vavouras (2011) put a contrary argument that even though corruption increases bank profitability in the short run, long-run factors, for instance, borrowers' repayment capability, should be considered.

In the MENA region, institutional quality is characterized by significant heterogeneity. While countries like the UAE and Qatar exhibit strong governance frameworks, others face challenges such as political instability and weak legal systems. This study extends the literature by assessing whether institutional quality reinforces or dampens the stabilizing effects of financial inclusion, hence contributing to the limited literature on this issue in MENA.

H_2: Institutional quality improves bank stability.

2.3. The Moderating Effect of Institutional Quality in the Connection Between Financial Inclusion and Bank Stability

There is limited research on the connection between financial inclusion, institutional quality, and bank stability. Notable studies include those by Ahamed and Mallick (2019); Saha and Dutta (2022); Ha and Nguyen (2023), and Ofoeda et al. (2024). Ahamed and Mallick (2019) concluded that financial inclusion positively impacts banking stability, drawing from a dataset of 2,635 banks across 86 countries between 2004 and 2012. They also emphasized that these effects are enhanced in environments with strong institutional quality. Similarly, Saha and Dutta (2022) reached comparable conclusions when analyzing data at the national level.

More recently, within the 2010-2020 period, Ha and Nguyen (2023) investigated the consequences of institutional quality on the link between financial inclusion and the stability of 157 banks in eight ASEAN countries. The findings showed that, while financial inclusion can undermine bank stability, its actual realization within a sound institutional framework may dampen the effect. More precisely, whereas low regulatory quality exerts a positive impact, institutional quality factors like political stability, effective administration, rule of law, and corruption control have a beneficial impact on alleviating those consequences.

Ofoeda et al. (2024) probe into the interface between institutional quality, financial inclusion, and the stability of banks in sub-Saharan Africa. The Prais and Winsten (1954) and Hansen (2000) panel threshold estimation method is thus applied in their analysis, given data from 48 countries over the period 2002–2021.

Results indicate that financial inclusion, proxied with account ownership, Automated Teller Machines (ATMs), borrowers, and depositors generally stabilize banks, excluding bank branches that have a negative impact. Besides, institutional quality plays a vital role in enhancing bank stability through reducing information asymmetry and transaction costs. Moreover, the study emphasizes how institutional quality acts as a moderator in this case: while some institutional aspects negatively impact bank stability, they also tend to amplify the stabilizing effects of ATMs, borrowers, and depositors.

A review of the related literature reveals some important gaps. First, while the connection between financial inclusion and bank stability is well-documented worldwide, there is scant evidence focused on the MENA region, which is confronted with unique institutional and economic challenges. Second, most of the studies consider financial inclusion and institutional quality as separate determinants of bank stability without examining their interaction. Third, much of the literature has a descriptive orientation, lacking critical engagement with regional heterogeneity and methodological robustness.

This study critically addresses gaps in the existing literature by analyzing the interrelationship involving financial inclusion, institutional quality, and bank stability in the MENA region. Using the SGMM, it provides evidence of how this relationship is moderated by institutional quality and therefore offers valuable implications for policymakers and financial institutions in the region.

H_3: Institutional quality moderates the financial inclusion–bank stability relationship.

3. Sample, Empirical Methodology, and Model Specification

3.1. The Sample

The sample used to study the moderating role of the quality of institutions on the link between financial inclusion and bank stability consisted of conventional banks located in ten MENA countries over the period 2005 to 2020. The first sample consists of 109 banks. However, some institutions were excluded as bank data are available and comparable. Therefore, only 68 conventional banks formed the final sample. To obtain more precise and real data with respect to the effect of financial inclusion on bank stability, we divided the MENA area into two sub-regions in accordance with the International Monetary Fund's World Economic Outlook classification. The first bloc is represented by GCC nations, which comprises a sample of 33 banks, while the second bloc, representing non-GCC countries, includes a sample of 35 banks (See Table 1).

Table 1. Distribution of the sample by country.

GCC		NON GCC	
Countries	**Number of banks**	**Countries**	**Number of banks**
Kuwait	5	Egypt	4
Oman	3	Morocco	4
Qatar	4	Tunisia	10
Saudi Arabia	8	Jordan	13
United Arab Emirates	13	Lebanon	4
Number of banks	33	Number of banks	35
Whole sample	68 banks		

3.2. Variable Selection and Theoretical Justification

3.2.1. Dependent Variable: Bank Stability

The current study uses the Z-score as a dependent variables that reflect bank stability. This indicator is frequently utilized in the most recent banking research for evaluating the stability of banks (Al-Shboul, Maghyereh, Hassan, & Molyneux, 2020; Louhichi, Louati, & Boujelbene, 2020).

Segoviano and Goodhart (2009) contend that there is no generally accepted indicator of either banking or financial stability. The most common measure of bank stability is the so-called Z-Score, as it represents the probability of a banking system failure. In line with Danisman and Tarazi (2020) and Hakimi et al. (2022), we use the Z-score (ROA) for the measurement of bank stability. The probability of bankruptcy is negatively related to the Z-score. The higher the score, the better the level of bank stability, while lower scores mean higher levels of risk of default and insolvency.

$$Z - SCORE(ROA) = \frac{ROA+EQTA}{\partial(ROA)}$$

The Z-score variable will be split into two halves for the purpose of the robustness check. The first one, representing portfolio risk, is PRISK = (-1)*Ln [ROA/∂ROA], that is, the first component of the formula of the Z-score. While the leverage risk(LRISK) is calculated as (-1)*Ln [EQTA/−ROA] and represents the second component in the calculation of the Z-score, furthermore, Portfolio risks and leverage are converted by the natural logarithm; then, these indices are multiplied by (-1), which implies that higher values reflect more risk (Danisman & Tarazi, 2020).

$$PRISK(ROA) = (-1) * Ln[\frac{ROA}{\partial(ROA)}]$$

$$LRISK(ROA) = (-1) * Ln[\frac{EQTA}{\partial(ROA)}]$$

3.2.2. Main Explanatory Variable: Financial Inclusion

The concept of financial inclusion essentially denotes how inclusive the financial sector of a country is, and it is measured as an index of financial inclusion. It is conceptually built as a multidimensional index that collects information from a variety of financial inclusion themes, such as the usage of the banking system, the penetration of banks, and the accessibility of banking services. According to Sarma (2008), it essentially denotes the act of making formal financial services accessible, available, and used by all sectors of the economy.

The Index of Financial Inclusion is a composite index that reduces the different dimensions of financial inclusion into a single number between 0 and 1, where 0 represents complete financial exclusion and 1 stands for complete financial inclusion. Sarma (2008) constructed a rationale for the computation of IFI on different dimensions of financial inclusion. In our study, we constructed an Index of Financial Inclusion (IFI) on three main dimensions. Accessibility is defined as the density of the banking system, and it is expressed in the number of commercial bank branches and automated teller machines per 1,000 km^2. The second dimension, that of Availability, is the number of bank branches and ATMs per 100,000 people. The last dimension, Usage, refers to the number of depositors and borrowers with commercial banks per 1,000 adults.

3.2.3. Other Explanatory Variable: Institutional Quality

The following six key dimensions of governance, as defined by Kaufmann, Kraay, and Mastruzzi (2011) are applied in order to assess governance institutions in the MENA region using WGIs: government effectiveness, control of corruption, political stability and absence of violence, voice and accountability, regulatory quality, and rule of law. Each of the indicators is thus represented as a country score on a standardized scale ranging from approximately -2.5 to 2.5, with higher scores indicating better governance. Using Kaufmann, Kraay, and Mastruzzi (2010), institutional quality is then calculated as an average of the six above indicators, ranging from -2.5 (representing weak governance) to 2.5 (Strong governance).

3.2.4. Control Variables

As mentioned, in our econometric model, we included several control variables. The first class includes bank-specific variables such as the loan-to-deposit (LTD) ratio, which is a measure of the bank's liquidity risk, non-performing loans (NPLs) to total loans ratio. These also included bank size (BS) and the capital adequacy ratio (CAR), which is an important measure of banking stability. The second class of such variables includes ones defining the industry structure, including concentration (CONC). We also incorporated a set of economic variables that can have an impact on banks' stability and that are expressed through the growth rate of GDP (GDPG) and the inflation rate (INF).

The accounting and financial data were collected from the Refinitiv Eikon database and the annual reports of banks, while financial inclusion data were obtained from the Global Financial Development Database. The data at the national level regarding the economy and structure were collected from the World Bank Indicators and Global Financial Indicators databases. Finally, the institutional quality index was obtained from the World Bank Governance Indicators database.

3.3. Empirical Approach and Model Specification

Since omitted variables bias and measurement errors are common issues with conventional least squares and fixed- and random-effect models, our investigation used the SGMM model put out by Blundell and Bond (1998). In contrast to the difference generalized method of moments (DGMM) model, the SGMM model is acknowledged as a suitable option for addressing endogeneity and heterogeneity issues and yields reliable findings. In contrast to conventional estimators based on fixed or random effects, the SGMM model is better suitable for examining such relationships between institutional quality, financial inclusion, and bank stability, according to a recent study by Ha and Nguyen (2023). As a result, the SGMM method used in this study produced more valid results than the findings made with other methodologies (Danisman & Tarazi, 2020; Hakimi, Hamdi, & Khemiri, 2023). We used the SGMM model as an empirical method for all of these reasons.

The empirical technique outlined in this research consists of three phases. First, we examined the connection across financial inclusion and bank stability. The econometric model to be validated in this step is presented in Equation 1:

$$Z-ROA_{i,t} = \beta_0 + \beta_1 Z-ROA_{i,t-1} + \beta_2 \mathrm{INC}_{i,t} + \beta_3 \mathrm{BS}_{i,t} + \beta_4 CAR_{i,t} + \beta_5 \mathrm{LTD}_{i,t} + \beta_6 \mathrm{NPLs}_{i,t} + \beta_7 \mathrm{CONC}_{i,t} + \beta_8 \mathrm{GDPG}_{i,t} + \beta_9 \mathrm{INF}_{i,t} + \varepsilon_{i,t} (1)$$

In the second stage, we looked into how institutional quality affected bank stability. The following Equation 2 displays the econometric model:

$$Z-ROA_{i,t} = \beta_0 + \beta_1 Z-ROA_{i,t-1} + \beta_2 \mathrm{IQ}_{i,t} + \beta_3 \mathrm{BS}_{i,t} + \beta_4 CAR_{i,t} + \beta_5 \mathrm{LTD}_{i,t} + \beta_6 \mathrm{NPLs}_{i,t} + \beta_7 \mathrm{CONC}_{i,t} + \beta_8 \mathrm{GDPG}_{i,t} + \beta_9 \mathrm{INF}_{i,t} + \varepsilon_{i,t} (2)$$

In the third step, we investigate whether institutional quality acts as a moderator in the link among financial inclusion and bank stability. To do this, we incorporate an interaction variable into the econometric model that

captures the interplay across financial inclusion and institutional quality. Equation 3 describes the model of econometric framework that has to be validated:

$$Z-ROA_{i,t} = \beta_0 + \beta_1 Z-ROA_{i,t-1} + \beta_2 \text{INCxIQ}_{i,t} + \beta_3 \text{BS}_{i,t} + \beta_4 CAR_{i,t} + \beta_5 \text{LTD}_{i,t} + \beta_6 \text{NPLs}_{i,t} + \beta_7 \text{CONC}_{i,t} + \beta_8 \text{GDPG}_{i,t} + \beta_9 \text{INF}_{i,t} + \varepsilon_{i,t} (3)$$

All variables' definitions are given in Table 2.

Table 2. Definition and measurement of variables.

Variables	Definitions	Measures
Dependent variables (Z-ROA)		
Z-ROA	Bank stability	The ratio of the sum of the averaged ROA and the CAP to the standard deviations of ROA.
PRISK	Portfolio risk	$PRISK(ROA) = (-1) * Ln[\frac{ROA}{\partial(ROA)}]$
LRISK	Leverage risk	$LRISK(ROA) = (-1) * Ln[\frac{EQTA}{\partial(ROA)}]$
Financial inclusion and institutional quality		
INC	Financial inclusion	An index of FI (See (Sarma, 2008))
IQ	Institutional quality	An index of IQ (See (Kaufmann et al., 2010))
INCxIQ	Interactional variable	The interaction between FI and IQ
Bank specifics		
BS	Bank size	Natural logarithm of total assets
CAR	Capital adequacy ratio	Bank capital to total assets (%)
LTD	Liquidity risk	Loans to deposits ratio (%)
NPLs	Non-performing loans	Bank nonperforming loans to gross loans (%)
Industry specifics		
CONC	Bank concentration	Bank concentration (%)
Financial environment and macroeconomic conditions		
GDPG	The growth rate of GDP	Annual growth rate of GDP (%)
INF	The inflation rate	Consumer price index (%)

4. Analysis and Results

4.1. Summary Statistics and Correlation Matrix

In this paper, the descriptive statistics used to summarize some key features of the dataset are the mean, standard deviation, and minimum and maximum values for each variable. The details are presented in Table 3, which shows that the average bank stability measured by Z-ROA is 18.803, while the values range from -1.258 to 84.048. The other two bank stability proxies are an average portfolio risk of -2.008 and average leverage risk of -16.795. Financial inclusion, INC, has a mean value of 0.239, which ranges from a high of 0.878 to a low of 0.017. Institutional quality, IQ, in the MENA region varies from a high of 0.724 to a low of -1.008.

Regarding bank-specific factors, the average bank size (BS) is 9.887, with values ranging from a minimum of 2.660 to a maximum of 18.080. The ratio of capital to total assets (CAR) averages 14.869, with a minimum of 1.256 and a maximum of 40.350. Liquidity risk, measured by the loan-to-deposit ratio (LTD), averages 82.676, with a minimum of 1.438 and a maximum of 215.322. The average credit risk, represented by non-performing loans (NPLs), is 8.267, ranging from 0.010 to a maximum of 58.130.

In terms of industry characteristics, Table 3 reports that the mean of bank concentration (CONC) is 67.906, with a maximum of 100.000 and a minimum of 40.218. For macroeconomic conditions, the MENA region experienced the highest GDP growth rate of 26.17% and the lowest of -21.46%. The inflation rate ranges from a low of -4.9% to a maximum of 84.86%, with an average of 3.95%.

Table 3. Descriptive statistics.

Variable	Mean	Std. dev.	Min.	Max.
ZROA	18.803	13.463	-1.258	84.048
PRISK	-2.008	1.7612	-14.349	3.107
LRISK	-16.795	12.335	-75.708	0
INC	0.239	0.169	0.017	0.878
IQ	-0.038	0.417	-1.008	0.724
BS	9.887	2.660	5.045	18.080
CAR	14.869	4.941	1.256	40.350
LTD	82.676	27.869	1.438	215.322
NPLs	8.267	7.692	0.010	58.130
CONC	67.906	19.267	40.218	100.000
GDPG	3.225	4.465	-21.464	26.170

INF	3.955	6.403	-4.863	84.864

Table 4 shows the correlation matrix for each of the variables considered in this investigation.

Table 4. Correlation matrix.

	INC	IQ	BS	CAR	CONC	LTD	NPLs	GDPG	INF
INC	1.0000								
IQ	-0.1547*	1.0000							
	0.0000								
BS	0.6277*	-0.2628*	1.0000						
	0.0000	0.0000							
CAR	-0.0253	0.2309*	0.0079	1.0000					
	0.4044	0.0000	0.8091						
CONC	-0.0654*	0.1250*	-0.1930*	0.0556	1.0000				
	0.0310	0.0000	0.0000	0.0669					
LTD	-0.1679*	0.2992*	-0.3316*	-0.2009	-0.0866*	1.0000			
	0.0000	0.0000	0.0000	0.0000	0.0092				
NPLs	-0.0365	-0.1236*	-0.2635*	-0.2331*	-0.0205*	0.1971*	1.0000		
	0.3317	0.0010	0.0000	0.0000	0.5862	0.0000			
GDPG	-0.1608*	0.1372*	-0.0943*	0.0304	0.0101	-0.0611	-0.0590	1.0000	
	0.0000	0.0000	0.0054	0.3169	0.7399	0.0666	0.1179		
INF	0.0932*	-0.2962*	0.0920*	-0.0904*	0.1356*	-0.2014*	0.1552*	-0.1157*	1.0000
	0.0027	0.0000	0.0093	0.0037	0.0000	0.0000	0.0000	0.0002	

Note: *, indicates the level of significance at 5%.

The VIF (variance inflation factor) multicollinearity test, which assesses the degree to which predictor correlation raises the variance of an estimated regression coefficient, is used to supplement Table 4. A VIF value of 1 signifies that the variables in the model are uncorrelated. A moderate correlation is indicated by a number between 1 and 5, but a potentially severe correlation is indicated by a value greater than 5. According to Table 5 results, the first model's mean VIF is 1.30, which suggests a modest correlation across all values and rules out any potentially serious correlations between the variables.

Table 5. Variance inflation factor (VIF).

Variable	VIF	1/VIF
BS	1.82	0.550
INC	1.61	0.621
LTD	1.28	0.780
NPLs	1.20	0.830
INF	1.19	0.839
CAR	1.14	0.878
GDPG	1.11	0.901
CONC	1.06	0.942
Mean VIF	1.30	

4.2. Discussion of the Empirical Findings

4.2.1. Results of the Effect of Financial Inclusion on Bank Stability

The first part of this empirical methodology of the study applies the stability metric Z-ROA to assess the impact of financial inclusion on bank stability in the MENA region. Both the Sargan test and serial correlation test gave p-values above 5%, meaning the null hypothesis in terms of over-identifying restrictions being valid and no serial correlation cannot be rejected. These are also reflected in the empirical results in Table 6 and also hold for both the full sample as well as the GCC and non-GCC subsamples.

Table 6. Results of the effect of financial inclusion on bank stability.

	Whole sample		Sensitivity analysis			
	MENA		GCC		NGCC	
	Coef.	Z	Coef.	Z	Coef.	Z
Z-ROA (-1)	0.788	135.19***	0.771	112.78***	0.647	1.93*
INC	-4.474	-5.19***	0.439	0.14	132.50	0.94
BS	0.592	8.97***	0.592	2.47**	-2.420	-0.32
CAR	1.269	68.28***	1.051	42.33***	1.544	7.05***
LTD	-0.035	-16.53***	-0.065	-14.53***	-0.013	-1.03
NPLs	-0.062	-11.07***	-0.008	-0.62	0.332	1.56
CONC	0.162	53.65***	0.012	3.64***	0.091	6.64***
GDPG	0.015	14.13***	0.084	4.60***	0.015	0.07
INF	0.049	4.57***	0.152	23.63***	-0.076	-0.64
_cons	-19.997	-28.36***	-23.74	-14.96***	-13.22	-0.34
AR(1)	-1.6539		-1.7949		-0.8371	
Prob	0.0981		0.0727		0.4025	
AR(2)	-0.5400		0.3640		-0.2882	
Prob.	0.5892		0.7158		0.7731	
Sargan test	64.585		46.466		13.156	
Prob.	1.0000		1.0000		1.0000	

Note: ***, **and * indicate the level of significance at 1%, 5% and10% respectively.

The dependent variable, which is lagged, is positively and significantly taken; this would mean that Z-ROA from the previous year positively affects stability in the current year for any given bank. In effect, the result is the same for the whole sample as it is for sub-samples: GCC and non-GCC. From Table 6, the coefficient for INC shows a negative relationship and is taken at a significant level against the dependent variable (Z-ROA) for the entire sample. This suggests that increased financial inclusion significantly reduces bank stability. When banks diversify their portfolios across various asset classes and sectors, they become more exposed to market fluctuations and economic risks. As financial inclusion increases, particularly among lower-income populations, banks may loosen lending criteria and impose fewer credit restrictions, leading to a rise in non-performing loans, which ultimately undermines bank stability. These findings are consistent with the studies of Amatus and Alireza (2015) and Kouki, Abid, Guesmi, and Goutte (2020).

Bank size has a positive and substantial correlation with the dependent variable for both the full sample and the GCC countries, indicating that larger banks tend to have greater stability. The findings suggest that a 1% increase in bank capital leads to a 59.2% increase in bank stability. Larger banks are more likely to decrease their risk-taking practices and adopt more logical judgments as they grow, and they are less vulnerable to shocks due to their ability to absorb losses. Moreover, large banks are able to maintain higher loan loss provisions to mitigate credit risk and have the expertise to manage loan problems effectively. This result aligns with the findings of Adusei (2015).

Additionally, bank capital is found to be positively and significantly associated with Z-ROA across the entire sample, as well as in both GCC and non-GCC sub-samples. This suggests that banks with enough capital have a tendency to be more stable. A higher level of profitability that guarantees bank stability is achieved when equity rises, since the cost of capital falls. Moreover, rising projected costs and financial difficulties might result from a rise in bank capital. A greater amount of money lowers the motivation for shareholders to take on excessive risk and engage in speculative activity. Capital has the potential to improve bank profitability and stability by providing monitoring channels. In order to prevent deficits, investors are more motivated to keep an eye on things and demand more efficiency, which boosts bank profitability. This finding is in line with the works of Bourke (1989) and Molyneux and Thornton (1992).

According to the findings, bank stability is significantly and negatively impacted by liquidity risk. For both the whole sample and the GCC nations, the coefficient for liquidity risk is negative and significant at the 1% level, suggesting that bank stability is more vulnerable to a rise in the loan-to-deposit (LTD) ratio. According to Z-ROA, a rise in the LTD ratio considerably lowers bank stability. This negative relationship between liquidity risk and bank stability aligns with the findings of Hakimi and Zaghdoudi (2017) and Djebali and Zaghdoudi (2020).

As for the effect of the credit risk, it has a negative impact on bank stability only for the whole sample. Banks suffer financial losses as a result of nonperforming loans. Since loans are viewed as assets, defaults have an effect on the bank's balance sheet and lower its overall financial soundness. Furthermore, a large percentage of nonperforming loans can undermine investor trust and harm a bank's brand. This might further undermine

the bank's stability by making it difficult for it to draw in new investors or obtain finance from the market. This finding is in line with the works of Kparobo, A., and Ikeora (2022) and Katuka, Mudzingiri, and Vengesai (2023).

The findings indicate that a highly concentrated industry of banking sector is associated with higher levels of stability. The coefficient for bank concentration is positive and significant at the 1% level for the full sample as well as the GCC and non-GCC sub-samples. This suggests that banking sector concentration plays an important role in maintaining financial stability. Because fewer dominating banks are better able to control risks, a more concentrated market enables more stability, simplified rules, and more efficient risk management techniques. Furthermore, prompt remedial measures in the case of possible failures of loans are made possible by the careful oversight and surveillance of a concentrated banking industry. These results are consistent with the findings of Berti, Engelen, and Vasicek (2017).

Regarding macroeconomic effects, the results show that GDP is positively linked to bank stability across the full sample, as well as for both GCC and non-GCC sub-samples. Higher economic growth improves credit recovery, enabling borrowers to repay their loans, which reduces the level of non-performing loans (NPLs) and enhances bank stability. This finding aligns with the studies of Espinoza and Prasad (2010) and Klein (2013). The positive relationship between inflation and bank stability for the full sample and GCC countries is unexpected. While high inflation is typically linked to increased risk premiums and higher interest rates, which can negatively affect borrowers' repayment ability (Wood & Skinner, 2018), it can also make debt servicing easier. Inflation reduces the real value of outstanding debt, improving borrowers' capacity to repay loans, which lowers NPLs and strengthens bank stability. This result supports the findings of Popita (2013) and Rajha (2016).

4.2.2. Results of the Effect of Institutional Quality on Bank Stability

The impact of institutional quality on bank stability, measured by Z-ROA, is presented in Table 7. The results indicate that the quality of the institutional environment significantly improves bank stability in the MENA region, especially for countries outside the GCC. This, therefore, means that good governance promotes the stability of banks within the region.

Table 7. Results of the effect of institutional quality on bank stability.

	Whole sample		Sensitivity analysis			
	MENA		GCC		NGCC	
	Coef.	Z	Coef.	Z	Coef.	Z
ZROA (-1)	0.786	139.79***	0.786	115.87***	0.794	3.55***
IQ	3.800	13.21***	1.103	1.63	25.10	3.28***
BS	0.450	10.24***	0.665	8.93***	2.435	0.93
CAR	1.260	40.98***	1.038	38.94***	1.821	10.65***
LTD	-0.035	-12.04***	-0.058	-10.54***	-0.022	-2.24**
NPLs	-0.057	-9.06***	-0.013	-1.20	0.289	1.47
CONC	0.171	48.90***	0.013	3.76***	0.095	6.15***
GDPG	0.010	6.58***	0.055	3.28***	0.027	0.20
INF	0.059	6.50***	0.143	17.84***	0.120	2.64***
_cons	-19.283	-34.22***	-23.86	-26.09***	-26.26	-1.40
AR(1)	-1.6345		-1.8304		-1.0992	
Prob	0.1022		0.0672		0.2717	
AR(2)	-0.5405		0.3271		-0.2555	
Prob.	0.5888		0.7436		0.7983	
Sargan test	61.802		42.350		14.837	
Prob.	1.0000		1.0000		1.0000	

Note: *** and ** indicate the level of significance at 1% and 5%, respectively.

Reducing credit and default risk in the banking industry often depends on improving institutional quality. The bank becomes more stable and resistant to financial shocks as a result of the solid governance, efficient risk management, and transparency it develops. This finding is in line with the works of Cohen et al. (1983) and Bushman and Piotroski (2006).

Regarding the effects of bank-specific factors, industry characteristics, and macroeconomic conditions, there are no significant changes compared to the results presented in Table 6.

4.2.3. Results of the Interactional Effect of Financial Inclusion and Institutional Quality on Bank Stability

The results presented in Table 8 pertain to the moderating effect of institutional quality on the relationship between financial inclusion and bank stability. The findings indicate that higher levels of financial inclusion, when coupled with good institutional quality, significantly enhance stability across the entire sample, as well as in both the GCC and non-GCC sub-samples. A more inclusive system with strong governance contributes to a reduction in non-performing loans (NPLs) and bolsters banking stability. The interaction between institutional quality and financial inclusion positively influences banking stability in the MENA region. Therefore, the

negative impact of financial inclusion on banking stability can be mitigated when the institutions of a country are well-established. These results align with the studies conducted by Ahamed and Mallick (2019); Saha and Dutta (2022); Ha and Nguyen (2023); Ha and Nguyen (2023), and Ofoeda et al. (2024).

Table 8. Results of the interactional effect of financial inclusion and institutional quality on bank stability.

	Whole sample		Sensitivity analysis			
	MENA		GCC		NGCC	
	Coef.	Z	Coef.	Z	Coef.	Z
ZROA (-1)	0.790	137.34***	0.771	111.03***	0.988	2.92***
INCxIQ	7.968	11.62***	5.834	4.96***	140.35	3.27***
BS	0.672	12.71***	0.876	7.94***	1.333	0.54
CAR	1.267	71.77***	1.024	39.65***	1.721	5.71***
LTD	-0.038	-18.02***	-0.045	-8.21***	-0.021	-1.85*
NPLs	-0.040	-8.02***	0.021	1.63	0.179	0.86
CONC	0.178	29.16***	0.017	5.11***	0.063	4.56***
GDPG	0.010	8.72***	0.063	2.81***	-0.110	-0.53
INF	0.055	5.17***	0.157	23.95***	0.027	0.42
_cons	-21.115	-38.09***	-24.34	-20.37***	-18.44	-1.00
AR(1)	-1.6316		-1.7756		-1.2331	
Prob.	0.1028		0.0758		0.2175	
AR(2)	-0.5197		0.2639		-0.6408	
Prob	0.6032		0.7918		0.5216	
Sargan test	63.092		42.384		15.088	
Prob.	1.0000		1.0000		1.0000	

Note: *** and * indicate level of significance at 1%and10%.

Comparing the conclusions mentioned in Table 6 to the impact of industry characteristics, macroeconomic indicators, and bank-specific factors, no discernible changes occur.

5. Robustness Check: Portfolio Risk and Leverage Risk as Measures of Bank Stability

As a robustness check, we tested and report in this section the moderating role of institutional quality in the relationship between financial inclusion and bank stability, measured by PRISK and LRISK.

5.1. Portfolio Risk (PRISK) as a Measure of Bank Stability

We employ a similar empirical approach for the disaggregated analysis based on GCC and non-GCC countries. First, we examined the impact of financial inclusion on bank stability, measured by PRISK. Next, we analyzed the effect of institutional quality on bank stability. Finally, we assessed the interaction between financial inclusion and institutional quality concerning bank stability. The outcomes of the first phase (financial inclusion → bank stability) are presented in Table 9.

Table 9. Results of the effect of financial inclusion on bank stability (PRISK).

	Whole sample		Sensitivity analysis			
	MENA		GCC		NGCC	
	Coef.	Z	Coef.	Z	Coef.	Z
PRISK (-1)	0.770	70.03***	0.770	54.16***	0.212	0.41
INC	3.149	5.35***	0.251	0.35	-12.21	-0.29
BS	-0.225	-4.91***	0.021	0.38	0.829	0.46
CAR	-0.036	-6.39***	-0.044	-7.50***	-0.116	-2.05**
LTD	-0.004	-4.52***	-0.008	-5.80***	-0.000	-0.36
NPLs	0.005	4.14***	0.001	0.60	0.008	0.87
CONC	-0.006	-8.74***	-0.005	-4.35***	-0.010	-2.37**
GDPG	-0.044	-12.80***	-0.041	-15.89***	-0.068	-2.77***
INF	-0.018	-14.38***	-0.021	-7.95***	-0.011	-0.93
_cons	2.637	6.40***	1.282	2.18**	-3.982	-0.42
AR(1)	-3.0232		-2.5082		-1.0113	
Prob	0.0025		0.0121		0.3119	
AR(2)	-0.0903		-0.1260		-0.7023	
Prob.	0.9280		0.8997		0.4824	
Sargan test	63.291		40.219		12.168	
Prob.	1.0000		1.0000		1.0000	

Note: *** and ** indicate level of significance at 1% and 5%.

Similar to the effect of financial inclusion on bank stability measured by ZROA, we found that financial inclusion was positively and significantly associated with PRISK, meaning that financial inclusion decreases bank stability. For both the whole sample and the two sub-samples, this result is confirmed. Bank stability is considerably reduced by increased financial inclusion. Banks whose portfolios are diversified across a range of asset classes and sectors are exposed to a larger set of market volatility and economic concerns. Access to funding is now greater for all, especially the poor, which causes banks to loosen their lending standards while tightening credit limits. This increases non-performing loans and threatens to undermine the stability of banks. The results of financial inclusion on bank stability, as determined by ZROA, are comparable to the signs and significances of the other explanatory factors.

The second step from the empirical approach consists to investigate the impact of institutional quality on bank stability measured by PRISK in GCC and non-GCC countries. Empirical results are presented in Table 10.

Table 10. Results of the effect of institutional quality on bank stability (PRISK).

	Whole sample		Sensitivity analysis			
	MENA		GCC		NGCC	
	Coef.	Z	Coef.	Z	Coef.	Z
PRISK (-1)	0.765	92.44***	0.773	55.25***	0.307	0.67
IQ	-0.158	-2.33**	0.096	0.60	25.10	-0.36
BS	-0.021	-1.12	0.027	0.60	2.435	0.65
CAR	-0.036	-6.40***	-0.042	-6.22***	1.821	-1.56
LTD	-0.003	-3.73***	-0.010	-6.87***	-0.022	-0.73
NPLs	0,009	8.01***	0.004	1.48	0.289	1.03
CONC	-0.006	-8.33***	-0.003	-3.23***	-0.095	-2.44**
GDPG	-0.042	-12.62***	-0.042	-14.01***	0.027	-3.40***
INF	-0.014	-10.74***	-0.020	-5.55***	0.120	-0.81
_cons	1.244	4.35***	1.30	2.19**	-26.26	-0.51
AR(1)	-3.0279		-2.5132		-1.1829	
Prob.	0.0025		0.0120		0.2369	
AR(2)	-0.0409		-0.1343		-0.2801	
Prob.	0.9673		0.8931		0.7794	
Sargan test	61.704		43.230		11.991	
Prob.	1.0000		1.0000		1.0000	

Note: *** and ** indicate level of significance at 1% and 5%.

We found that financial inclusion had a negative and substantial correlation with PRISK, which is comparable to the link among institutional quality and bank stability as determined by ZROA. Strong governance often raises the degree of bank stability. Enhancing institutional quality is frequently necessary to lower credit and default risk in the banking sector. As the bank develops strong governance, effective risk management, and transparency, it becomes more resilient to financial shocks and more stable.

Based on Table 10, it is evident that there have been no noteworthy alterations in the link between bank stability and industry, bank characteristics, and macroeconomic conditions.

Examining the connection across financial inclusion and institutional quality as it relates to bank stability as determined by PRISK in both GCC and non-GCC countries is the third phase in the empirical strategy. Table 11 presents empirical findings.

Table11. Results of the interactional effect of financial inclusion and institutional quality on bank stability (PRISK).

	Whole sample		Sensitivity analysis			
	MENA		GCC		NGCC	
	Coef.	Z	Coef.	Z	Coef.	Z
PRISK(-1)	0.780	114.71***	0.779	56.80***	0.321	0.70
INC*IQ	-0.799	-2.86***	-0.531	-1.30	-6.582	-0.36
BS	-0.081	-4.21***	-0.013	-0.28	0.371	0.53
CAR	-0.040	-8.64***	-0.041	-6.79***	-0.105	-1.69*
LTD	-0.004	-6.59***	-0.010	-6.94***	-0.000	-0.64
NPLs	0.006	4.50***	0.005	1.89*	0.009	1.52
CONC	-0.007	-9.44***	-0.004	-3.50***	-0.009	-2.41**
GDPG	-0.044	-14.44***	-0.040	-12.16***	-0.062	-3.38***
INF	-0.018	-10.27***	-0.021	-7.03***	-0.009	-0.79
_cons	2.072	9.16***	1.743	2.81***	-2.677	-0.42

AR(1)	-3.0237		-2.5194		-1.2046	
Prob.	0.0025		0.0118		0.2284	
AR(2)	-0.0835		-0.1574		-0.2540	
Prob	0.9334		0.8749		0.7995	
Sargan test	62.378		42.410		11.997	
Prob.	1.0000		1.0000		1.0000	

Note: ***, **and * indicate level of significance at 1%, 5% and10% respectively.

As with the interactional effect of institutional quality and financial inclusion on bank stability as determined by ZROA, we discovered that the interactional effect (INC*IQ) was substantially and adversely correlated with PRISK. This further supports the idea that this relationship raises bank stability by lowering portfolio risk. It is noted that in association with high institutional quality, a more financially inclusive environment boosts the degree of stability for the whole sample and also for the two subsamples, such as GCC and non-GCC. Essentially, good governance of an inclusive system is perceived to reduce the level of NPL, thus increasing banking stability. The interplay term that exists among financial inclusion and institutional quality positively influences the banking stability of the MENA region. Because these interactions take place largely between institutions that are fairly co-developed, the degree to which financial inclusion undermines the stability of the banking sector will be a function of how entrenched the respective national institutions are.

There were no notable variations from the outcomes covered in Table 8 in terms of the impact of bank specifics, industry characteristics, and macroeconomic factors.

5.2. Leverage Risk (LRISK) as Measure of Bank Stability

We applied the identical empirical approach for the disaggregate study based on the GCC and non-GCC countries. First, we looked at how financial inclusion affected bank stability as determined by LRISK. The outcomes result of the primary stage (financial inclusion→ bank stability) are presented in Table 12.

Table 12. Results of the effect of financial inclusion on bank stability (LRISK).

	Whole sample		**Sensitivity analysis**			
	MENA		**GCC**		**NGCC**	
	Coef.	**Z**	**Coef.**	**Z**	**Coef.**	**Z**
LRISK (-1)	0.750	164.39***	0.744	125.98***	0.705	2.30**
INC	6.989	7.25***	0.740	0.48	-279.9	-1.44
BS	-0.621	-10.18***	-0.583	-3.56***	7.333	0.88
CAR	-1.271	-105.83***	-0.974	-71.35***	-1.227	-7.26***
LTD	-0.003	-4.41***	-0.033	-7.09***	0.020	1.95**
NPLs	-0.057	-6.87***	0.011	1.22	-0.348	-1.93**
CONC	0.042	24.10***	0.018	4.37***	0.100	8.83***
GDPG	-0.007	-1.50	-0.017	-1.45	0.053	0.31
INF	-0.146	-38.75***	-0.115	-22.62***	0.032	0.27
_cons	17.812	33.54***	18.834	14.21***	-4.480	-0.12
AR(1)	-1.5694		-1.7867		-0.8344	
Prob.	0.1166		0.0740		0.4040	
AR(2)	-0.2016		0.7416		0.6216	
Prob	0.8402		0.4583		0.5342	
Sargan test	63.928		37.560		9.7772	
Prob.	1.0000		1.0000		1.0000	

Note: *** and ** indicate level of significance at 1% and 5%.

Similar to the effect of financial inclusion on bank stability measured by ZROA and PRISK, we found that financial inclusion was positively and significantly associated with LRISK, meaning that financial inclusion increases leverage risk and consequently decreases bank stability. Financial inclusion can negatively impact bank stability, particularly when it exceeds certain thresholds or is poorly managed. A high degree of financial inclusion is brought about by rapid credit expansion and poor loan portfolio quality.

The macroeconomic environment, industry characteristics, and bank specifics all have signals and importance that are comparable to the financial inclusion outcomes on bank stability as determined by ZROA.

Examining how institutional quality affects bank stability as determined by LRISK in GCC and non-GCC nations is the second phase in the empirical investigation. Table 13 presents the results of the empirical research.

Table 13. Results of the effect of institutional quality on bank stability (LRISK).

	Whole sample		Sensitivity analysis			
	MENA		GCC		NGCC	
	Coef.	Z	Coef.	Z	Coef.	Z
LRISK (-1)	0.746	142.12***	0.743	80.59***	0.826	4.81***
IQ	-4.992	-24.33***	-1.729	-5.68***	-38.96	-3.65***
BS	-0.345	-9.01***	-0.518	-7.54***	-1.842	-0.92
CAR	-1.282	-74.07***	-0.968	-50.37***	-1.515	-6.15***
LTD	0.002	2.76***	-0.020	-4.87***	0.029	3.92***
NPLs	-0,058	-5.06***	0.001	0.11	-0.247	-1.25
CONC	0.046	15.07***	0.018	4.10***	0.119	10.42***
GDPG	0.005	0.66	-0.000	-0.04	0.006	0.05
INF	-0.160	-41.63***	-0.116	-18.95***	-0.141	-4.23***
_cons	16.103	34.41***	17.415	21.90***	10.813	0.54
AR(1)	-1.5315		-1.7601		-1.1814	
Prob.	0.1257		0.0784		0.2375	
AR(2)	-0.1542		0.7015		0.1747	
Prob.	0.8774		0.4830		0.8613	
Sargan test	60.959		36.034		12.138	
Prob	1.0000		1.0000		1.0000	

Note: *** indicate level of significance at 1%.

We found that there was a negative and significant association between institutional quality and LRISK, which is similar to the effect of institutional quality on bank stability measured by ZROA and PRISK. This would consequently mean that the higher the IQ, the lower the risk of bank leverage and, hence, higher the bank stability. Therefore, better governance tends to raise the level of bank stability. The improvement of institutional quality is often a prerequisite to reduce credit and default risk in banking. Thus, while the bank develops its good governance, effective risk management, and transparency, it will increase its resistance to financial shocks and become more stable.

As for the other explanatory factors, their significance and indications remain consistent with the findings regarding the impact of financial inclusion on bank stability as measured by ZROA and PRISK.

Examining how financial inclusion and institutional quality interact to affect bank stability as determined by LRISK in GCC and non-GCC nations is the third step of the empirical investigation. Table 14 displays the analysis's empirical findings.

Table14. Results of the interactional effect of financial inclusion and institutional quality on bank stability (LRISK).

	Whole sample		Sensitivity analysis			
	MENA		GCC		NGCC	
	Coef.	Z	Coef.	Z	Coef.	Z
LRISK(-1)	0.758	262.3***	0.751	80.73***	0.784	14.79***
INCxIQ	-8.568	-12.01***	-6.476	-6.66***	-193.2	-3.42***
BS	-0.502	-8.70***	-0.734	-7.30***	-3.538	-0.77
CAR	-1.249	-69.16***	-0.988	-38.9***	-1.606	-6.76***
LTD	0.001	1.78*	-0.011	-2.84***	0.022	3.38***
NPLs	-0.057	-8.38***	-0.009	-0.99	-0.184	-0.91
CONC	0.042	12.21***	0.024	5.97***	0.095	7.06***
GDPG	0.021	2.98***	0.018	1.07	0.066	0.73
INF	-0.164	-36.67***	-0.128	-18.7***	-0.047	-0.95
_cons	17.683	28.37***	18.91	19.07***	29.44	0.78
AR(1)	-1.5453		-1.7596		-1.0989	
Prob.	0.1223		0.0785		0.2718	
AR(2)	-0.1631		0.6809		-0.3605	
Prob	0.8704		0.4959		0.7185	
Sargan test	60.08		40.836		13.640	
Prob.	1.0000		1.0000		1.0000	

Note: *** and * indicate level of significance at 1% and 10%.

Similar to the interactional effect of financial inclusion and institutional quality on bank stability measured by ZROA and PRISK, we found that the interactional effect was negatively and significantly associated with LRISK. This interaction decreases bank leverage risk and consequently increases bank stability. It was revealed that the stability in both the GCC and non-GCC subsamples, as well as the overall system, increases significantly when there is an enhancement of institutional quality along with greater financial inclusion. Governance, together with a more marginalized system of extending loans, is associated with lower levels of non-performing loans and therefore enhances stability. Financial inclusiveness and the quality of institutions help to enhance banking stability in the MENA region. Hence, better custodial institutions for nations would lessen the negative effects of making deeper inroads into financial services.

Regarding the effects of bank-specific factors, industry characteristics, and macroeconomic conditions, there are no significant differences compared to the findings of the interaction across financial inclusion and institutional quality, as measured by Z-ROA and PRISK. The positive impact of the interaction involving financial inclusion and institutional quality was confirmed for all three proxies of bank stability, with the effect being most pronounced for leverage risk.

6. Conclusion

This paper investigates the connection among financial inclusion and bank stability within the MENA region, focusing on how the quality of institutions moderates this relationship. The empirical investigation is conducted with a panel data set from banks in the MENA region during the period from 2005 to 2020. Financial inclusion was assessed using a newly constructed index made up of three dimensions: usage, access, and availability. The quality of the institution is calculated as an average of six indicators from the World Bank's Governance Indicators. Bank stability is proxied with three measures: bank Z-score, portfolio risk, and leverage risk.

The empirical results support three key conclusions: (i) we discovered that the degree of bank stability declines with increased financial inclusion, (ii) good institutional quality improves bank stability, and (iii) institutional quality moderates the financial inclusion-bank stability relationship. These results held for the entire sample, as well as the GCC and non-GCC sub-samples, across the three measures of bank stability.

The implications of this study are, therefore, important for research and practice in both GCC and non-GCC countries in the MENA region. For researchers, it underlines the need to investigate how different components of institutional quality, such as governance and legal systems, differentially influence financial inclusion and bank stability across these diverse sub-regions. For practitioners, the key message is that financial inclusion strategies should be tailored to the institutional preponderance of each group. In GCC countries, where institutions are strongest, the focus could be on leveraging financial technologies and green finance toward better inclusion and stability. In contrast, non-GCC countries, generally characterized by weaker institutional frameworks, should adopt regulatory reforms, capacity building, and risk management to mitigate possible destabilizing effects of financial inclusion. Regional cooperation efforts are highly needed to share best practices and develop an inclusive and stable banking system in the MENA region.

The paper thus bridges the gap between theory and practice by providing a practical framework for applying theoretical insights on financial inclusion with banking soundness to the unique institutional contexts of GCC and non-GCC countries. Whereas theory emphasizes the stabilizing potential of financial inclusion through diversified depositor bases and improved credit access, practical implementation requires recognition of the institutional constraints that influence these outcomes. While institutional frameworks allow the theoretical benefits of financial inclusion, advanced financial technologies and regulatory oversight, for example, to occur in GCC countries, in countries without these conditions, it will take targeted interventions relative to enhancing governance, the rule of law, and risk management practices within financial institutions. This dual focus ensures that theoretical models are not only empirically validated but also translated into actionable strategies, considering the diverse economic and institutional landscapes within the MENA region.

Even though this paper's findings are fascinating and may have substantial implications for those making decisions, there are some limitations to the study. First, the analysis relies on a single index of financial inclusion. The results could be enhanced by applying this index while also assessing the many aspects of financial inclusion independently. Additionally, the sample size used in this study is relatively small. It is also possible that the link between financial inclusion and bank stability is non-linear. These factors will be considered in future research.

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