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The Nexus of Competition, Loan Quality, and Ownership Structure for Risk-Taking Behaviour

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Abstract: "The core purpose is to explore the relationship between competition, loan quality, ownership structure, and risk for MENA economies." In addition, this study examines the financial stability level of dual banking and explores the bidirectional causality of competition and risk concerning the impact of ownership structure. This study uses 748 observations from 2011 to 2020 in MENA countries. The Generalized Method of Moments (GMM) is an econometric technique used to estimate the parameters of a statistical model. The study findings indicate a negative (positive) relationship between MENA bank competition and risk (financial stability). It indicates that lower bank competition reduces bank credit risk and increases financial stability in MENA countries. Regarding ownership structure, Islamic banks display a stronger position in MENA economies than that of Commercial banks and Specialized Government Institutions. In contrast, specialized government institutions are riskier than commercial banks and Islamic banks. Loan quality shows the two-way causality between the degree to which banks compete and the quality of their loans to customers in the MENA markets. This study sets itself apart from other studies by creating a new segmented literature review portion. Finally, a significant policy implication is provided for academics, researchers, and policymakers interested in applying these findings.

Keywords: GMM; risk; financial stability; competition; ownership structure; loan quality

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1. Introduction

The competition–fragility hypothesis states that competitive markets lower bank profits but encourage excessive risk taking (Keeley 1990). Oppositely, the competition–stability theory postulates that banks with greater market power charge higher interest rates, encouraging borrowing enterprises to take on greater risk and raising the danger of economic instability. The following conclusion can be drawn from this: as competition increases, banks become safer (Boyd and De Nicolo 2005; Davis and Karim 2019). In GCC nations, rising bank competition diminishes banks' ability to create liquidity (Ali et al. 2022). A study showed that banking competition can lead to economic expansion and financial instability (Carlson et al. 2022).

The banking industry's reputation suffered greatly due to the financial crisis (Torre Olmo et al. 2021). The 2008–2009 global financial crisis (GFC) revived bank competition and risk. Competition between financial institutions during the economic boom before the crisis is thought to have caused the crisis (Davis and Karim 2019). Regarding a nation's overall economic health, growth and stability, the banking industry is an essential contributor (Claessens 2009). Theoretical and empirical research agree that the banking industry is

essential to the economic growth and development of both developed and developing nations (Levine 1997).

There have been significant shifts in banking structures due to financial deregulation, market integration, privatization and the introduction of privately held banks. Shareholding and bank capital have been restructured as a result of these changes. The uncertainty caused by the stock market's swings can quickly permeate other sectors, triggering economic and financial meltdowns at a systemic level (Zheng 2022). In a model of firm funding restrictions and long-term innovation, a threshold effect is triggered simultaneously by the unpredictability of economic policy (Hao et al. 2022). This increased emphasis on institutional ownership has led to new forms of governance and a change in how banks approach risk (Barry et al. 2011). Shareholders' actions and incentives to increase bank risk can be explained. International banking sectors have influenced financial services in the MENA area more (Kobeissi and Sun 2010).

The recent uptick in oil prices in the MENA region, which has helped oil producers but put pressure on the economies of oil importers, is primarily responsible for this modest growth. Small-scale reforms and stabilization efforts have helped boost economies in some of the region's countries, as evidenced by the uptick in their fortunes. Despite the potential for regional instability to deepen and hinder GDP, an analysied predicts that growth would continue to improve moderately, reaching an average of 2.8% by the end of 2020. Economic revival in the region, which is struggling in the face of a global coronavirus pandemic and falling oil prices, depends on its willingness to open up with regard to its struggles. More radical and far-reaching economic reforms are needed in the MENA area[1].

Our primary purpose is to explore the relationship among competition, loan quality, ownership structure and risk for MENA economies. In addition, this study examines the financial stability level of dual banking and explores the bidirectional causality of competition and risk concerning the impact of ownership structure. This study is highly motivated by the following reasons: (i) the MENA region is the fastest growing economic region due to oil prices; (ii) the improving dual banking system; and (iii) the scarcity of literature in this field. We use MENA as an example of a booming economy. This research attempts to answer five critical questions, as follows: (1) How do bank competition and ownership structure (OWS) impact risk (financial stability)? (2) How do risk and ownership structure impact competition? (3) Does competition nonlinearly affect risk simultaneously? (4) How does loan quality impact risk and financial stability? (5) How does loan composition impact risk and financial stability?

This research uses the GMM method to analyze the findings. The study findings indicate a negative (positive) relationship between MENA bank competition and risk (financial stability). It indicates that lower bank competition reduces bank credit risk and increases financial stability in MENA countries. This study further shows the bidirectional causal relationship between competition and risk concerning the impact of ownership structure.

Policymakers should apply considerable policies to alleviate credit risk to boost financial stability in a competitive environment, and investors can be aware of putting their money in a bank ownership structure.

The remaining sections are as follows: Section 2. Literature Review; Section 3. Methodology; Section 4. Regression Analysis and Discussion; Section 5. Conclusions, Policy Implications, and Future Directions.

2. Literature Review

This section can be broken up into sub-sections that give information about the competition, risk, financial stability, loan quality, loan composition and ownership structure of MENA countries, as well as how each dimension affects other dimensions in the area.

2.1. Theoretical Literature Review

2.1.1. Competition Fragility View

One of the most divisive issues in the history of the world is how competition is handled in the banking industry. Previous studies have demonstrated two competing ideas regarding the competitiveness and stability of the banking industry (Koetter et al. 2012).

The competitive fragility theory is the name given to the first proposed explanation. This theory proposes an opposite relationship between the level of competition in the banking industry and economic stability. It can be clarified that excessive competitiveness among banks harms market power and profit margins, which are negatively impacted. Consequently, financial institutions are compelled to make risky decisions (Koetter et al. 2012).

2.1.2. Competition Stability View

The second theory that has been proposed is the competition stability theory. The idea of competitive stability emphasizes the rise in banking stability directly from increased competition among banks. This idea can be articulated using falling interest rates due to more competition (Boyd and De Nicolo 2005; Schaeck et al. 2009; Koetter et al. 2012). The danger of lending money is increased when interest rates are more significant and market power is increased, which make it more likely that banks may collapse (Boyd and De Nicolo 2005). They also have an intriguing effect, which indicates that higher interest rates lead to increased bank profitability. Furthermore, they infer a U-shaped link between competitiveness and risk (Boyd and De Nicolo 2005).

2.2. Empirical Literature

2.2.1. Competition, Risk and Financial Stability (FS)

Two opposing hypotheses, competition fragility and competition stability, have been used in empirical research to quantify the effect of competition and market power on stability. Many studies, most of which have concentrated on credit risk, have examined the connection between bank competition and risk. Increased competition is hypothesized to contribute to a higher NPL ratio, as evidenced by the competition indicator's substantial negative value (Kasman and Kasman 2015). It has been claimed that increased competition makes banks less financially stable. This statement is supported by previous studies (Agoraki et al. 2011; Fu et al. 2014). This study's findings align with those of the previous study. However, opposite results were found in some studies (Yeyati and Micco 2007; Yaldiz and Bazzana 2010). Yeyati and Micco (2007) and Beck et al. (2006) further revealed results that complemented the findings of (Kasman and Kasman 2015). There is a positive link between risk and concentration, which suggests less danger when there is more competition (De Nicolò and Loukoianova 2007; Soedarmono et al. 2013). When banks compete with one another, they are encouraged to take more risks, which ultimately makes the banking system more unstable. In addition to this, other works have implied that competition increases financial stability by decreasing the likelihood of systemic risk (Schaeck et al. 2009; Leroy and Lucotte 2017).

Hypothesis 1 (H_1): *There is a negative relationship between competition and credit risk.*

Hypothesis 2 (H_2): *There is a positive relationship between competition and financial stability.*

2.2.2. Competition and Ownership Structure

According to the findings of Azar et al. (2021), there is no correlation between HHI and concentration ownership. On the contrary, researchers found a significant connection between competition and ownership structure and used common ownership and HHI as variables to measure competition (Azar et al. 2021). A study found that commercial banks are riskier than government banks (Al-Khouri 2012). According to Zhao et al. (2010), there is evidence to suggest that deregulatory policies result in a process of development in bank operations and encourage healthy competition in the lending market. They explored the

impact that shifts in the monetary division have on the characteristics of cost structures and ownership–cost–productivity. They also highlighted the influence that adjustments have had on the competitive features of the lending industry (Zhao et al. 2010). Moudud-Ul-Huq et al. (2021) showed a statistically significant relationship between competition and ownership structure (Islamic banks).

Hypothesis 3 (H_3): *Is there any relationship between competition and ownership structure*?

2.2.3. Risk and Ownership Structure

Another reason why we are studying ownership, risk and stability in connection to bank competition is the lack of relevant ownership structure studies. Many studies have examined risk and performance, but risk, financial stability, competitiveness and ownership structure are rarely correlated in other studies. When profitability pressure is high, there is a stronger positive relationship between managers and idiosyncratic risk. In contrast, when innovation levels are high, there is less pressure and more focus on long-term growth through technological innovation, so the relationship weakens. Managerial competence increases business value, but the benefit decreases as idiosyncratic risk rises (Cheng and Zhang 2022).

Altunbas et al. (2001), who studied the German banking industry, found no evidence that privately owned stock banks (POBs) are more efficient than government-owned stock banks (GOBs), despite GOBs having small cost and profit advantages over POBs. Their research was based on the assumption that privately owned stock banks (POBs) are more efficient (Altunbas et al. 2001). Sapienza (2004) investigated bank lending arrangements in Italy and compared the interest rates given to two groups of businesses with comparable credit scores that borrowed money from GOBs, POBs or both types of banks. Through an analysis of the profitability of a significant number of banks originating from both developing and developed nations (Sapienza 2004), it was found that the interest rates on GOBs are significantly lower than those on POBs.

In addition, several studies have shown that ownership concentration significantly influences risk (Saunders et al. 1990; Houston and James 1995). However, there is no consensus on the direction of this link (Demsetz et al. 1997).

Hypothesis 4 (H_4): *Is there any relationship between risk (financial stability) and ownership structure*?

2.2.4. Risk (Financial Stability) and Loan Quality

A positive relationship between credit risk (also known as non-performing loans) and loan quality was shown to exist, according to the findings of a study. During their investigation, the researchers discovered this by employing the credit risk (NPL) metric as a dependent variable. After deciding to use the Z-score as a dependent variable in their study, they revealed a negative association between financial stability (Z-score) [Z-score determined by the return on assets + (equity/total assets)/ standard deviation of total assets] and loan quality. It is interesting to note that they also revealed a positive link between overall risk (σROA) [σROA determined by the standard deviation of total assets] and loan quality. Despite this, the relationship was not statistically significant because they used overall risk (σROA) as a dependent variable in their analysis (Moudud-Ul-Huq et al. 2021).

Hypothesis 5 (H_5): *There is a positive relationship between loan quality and credit risk.*

Hypothesis 6 (H_6): *There is a negative relationship between loan quality and financial stability.*

2.2.5. Risk, Financial Stability and Loan Composition

A negative relationship between credit risk and loan composition was shown to exist, according to the findings of a study. During their investigation, the researchers discovered

this by employing the credit risk (NPL) metric as a dependent variable. After deciding to use the Z-score as a dependent variable in their study, they revealed a positive association between financial stability (Z-score) and loan composition. It is interesting to note that they also revealed a positive link between overall risk (σROA) and loan composition. (Moudud-Ul-Huq et al. 2021).

Hypothesis 7 (H_7): *There is a negative relationship between loan composition and credit risk.*

Hypothesis 8 (H_8): *There is a positive relationship between loan composition and financial stability.*

3. Methodology

This study covers 14 MENA countries. These countries are (i) Algeria, (ii) Bahrain, (iii) Egypt, (iv) Iraq, (v) Jordan, (vi) Kuwait, (vii) Lebanon, (viii) Morocco, (ix) Oman, (x) Qatar, (xi) Saudi Arabia, (xii) Tunisia, (xiii) the United Arab Emirates and (xiv) Yemen.

This study uses 748 observations from 2011 to 2020 in MENA countries. After filtering the data, we finalized it (dropping extreme value data and missing data). We used three dummy variables for ownership structure. The following dummy proxy services are provided: (i) Islamic banks (ISB), (ii) commercial banks (CB) and (iii) specialized government institutions (SGI), in the following presented order: (i) Model 1, (ii) Model 2 and (iii) Model 3. This research uses the GMM method for analysis.

Lerner index (LI): Market power and bank competition have an inverse association between them. The Lerner index is applied as a straight measure of market power and concentration and is also used as a measure of bank competition (Moudud-Ul-Huq et al. 2021). A higher LI value is defined as higher market power and less competitive market conditions (Moudud-Ul-Huq 2020). This implies that a lower value is correlated with lower market power and higher competition, allowing smaller banks to benefit from economies of scale. The index extends market power to a fixed price above the marginal cost, and it is broadly used in bank research (Tan 2016a; Moudud-Ul-Huq et al. 2021). The Lerner index performs better than other competition indicators, such as the H-statistic (Panzar and Rosse 1987) and the Boone indicator (Boone 2008). The Lerner index is a popular bank competition measurement index. Previous studies have explained why the Lerner index properly measures bank competition (Anginer et al. 2014).

The Lerner index (Equation (1)) is as follows:

$$LI_{i,t} = \frac{P_{i,t-MC_{i,t}}}{P_{i,t}} \quad (1)$$

where LI denotes the Lerner index, p defines the bank price (output) and *MC* defines the marginal cost. Price indicates operating revenues. Price is calculated with the interest income (+) plus the non-interest income divided (/) by total assets. "i" stands for banks, and t denotes 2011–2020. Therefore, marginal cost is measured by the translog function, which is as follows (Equation (2)):

$$lncost_{i,t} = \beta_0 + \beta_1 lnQ_{i,t} + \frac{\beta_2}{2} InQ^2_{i,t} + \sum_{k=1}^{3} \Upsilon_{i,t} lnw_{k,i,t} + \sum_{k=1}^{3} \partial_j \, lnQ_{i,t} \, lnw_{k,i,t} + \sum_{k=1}^{3} \sum_{j=1}^{3} lnw_{k,i,t} \; lnw_{j,i,t} + \varepsilon_{i,t} \quad (2)$$

Here, ln signifies the natural logarithm, cost denotes the total cost and Q is the bank's single output proxied by total assets. W_k and W_j denote the three input prices, W_1, W_2 and W_3 (Berger et al. 2017). W_1, W_2 and W_3 are the input prices used in the production process. W_1 defines the price of labor (i.e., personal expenses to total assets); W_2 defines the input price of the fund (i.e., interest expenses over total deposits); and W_3 defines the price of fixed capital (i.e., other operating and administrative expenses over total assets). Finally, the marginal cost is determined as follows: (Equation (3)):

$$MC_{i,t} = \frac{cost_{i,t}}{Q_{i,t}}[\,\beta_1 + \beta_2 lnQ_{i,t} + \sum_{j=1}^{3} \theta_j lnw_{k,it}] \quad (3)$$

Herfindahl–Hirschman Assets Index (HHIA): The Herfindahl–Hirschman Assets Index (HHIA) calculates the ratio of the bank assets of each bank and the sum of all bank assets by squaring that ratio (Hope et al. 2013). The HHIA is calculated as follows (Equation (4)) (Hope et al. 2013; Mdaghri and Oubdi 2021):

$$HHIA = \sum_{i=1}^{n} \left(\frac{Assets_{i,t}}{Market\ assets_{i,t}}\right)^2 \quad (4)$$

where *assets* $_{i,\,t}$ is the share of a bank's assets in each market, and Market assets$_{i,t}$ is the sum of all the shares of all bank assets.

Herfindahl–Hirschman Loans Index (HHIL): This index measures the level of market concentration at the country level; higher values indicate a greater level of market concentration (Berger et al. 2017). The HHIL is calculated by squaring each bank's market share (loans based) and then by summing the squares. The *HHIL* is calculated as follows (Equation (4a)) (Kasman and Kasman 2015; Moudud-Ul-Huq et al. 2021):

$$HHIL = \sum_{I=1}^{n} (Market\ share\ loans_i)^2 \quad (4a)$$

An HHIA and HHIL rating of zero (0) indicates that the market is homogenous. A lower value suggests lower market power, indicating intense market competition (Tan 2016b).

Credit risk: A more significant ratio value of non-performing loans (NPL) indicates a higher risk for the loan portfolio (Berger et al. 2017; Zheng et al. 2022). Credit risk is calculated as follows:

$$Credit\ risk = \frac{Non - performing\ loans}{total\ loans} \quad (5)$$

Financial stability: Z-score is used as a proxy variable for financial stability. A higher Z-score value shows higher stability that turns into lower risk (Berger et al. 2017; Tan and Anchor 2017; Tan 2019; Moudud-Ul-Huq et al. 2020, 2021). Financial stability is calculated as follows:

$$Financial\ Stability = \frac{ROA + \frac{Equity}{Total\ Assets}}{\sigma ROA} \quad (6)$$

Here, ROA is the return on assets, and σROA is the standard deviation of the return on assets.

Loan Composition (LC): The loan ratio is the ratio of the net loan to total assets (Noman et al. 2018; Moudud-Ul-Huq et al. 2021). Therefore, loan composition is calculated as follows:

$$Loan\ Composition\ (LC) = \frac{Net\ loan}{Total\ Assets} \quad (7)$$

Quality (LQ): The loan loss reserve ratio is the ratio of loan loss reserve to gross loan (Noman et al. 2018; Moudud-Ul-Huq et al. 2021). Loan quality is calculated as follows:

$$Loan\ Quality\ (LQ) = \frac{Loan\ loss\ reserve}{Gross\ Loan} \quad (8)$$

Customer (Cust): The net loan divided by deposits and short-term funding is referred to as the customer (Moudud-Ul-Huq et al. 2021). The customer is calculated as follows:

$$Customer\ (Cust) = \frac{Net\ Loan}{Deposit\ and\ short\ term\ funding} \quad (9)$$

Ownership Structure: Ownership structure dummy = Islamic banks, Islamic banks = 1, otherwise = 0 (commercial banks and specialized government institutions).

Ownership dummy = commercial banks, commercial banks = 1, otherwise = 0 (Islamic banks and specialized government institutions).

Ownership dummy = specialized government institutions, specialized government institutions = 1, otherwise = 0 (Islamic banks and commercial banks).

3.1. Econometric Model

The GMM approach is the most effective way to investigate the heterogeneity and endogeneity problem (Arellano 2002). Consequently, estimations of the parameters that this estimator produces can rely on heterogeneity and endogeneity problems. Because of the extensive number of instruments utilized, the obtained coefficients have better precision (Le and Nguyen 2020). The GMM estimator uses lagged values of the dependent variables. Additional regressors may be impacted by endogeneity as instruments to solve endogeneity issues. It allows the system to account for the possibility that the additional regressors can be affected by endogeneity. Endogeneity is a factor that can affect both of these types of regressors (Bond 2002). In the form of instruments, we use lags in the values of endogenous variables, as recommended by Bond (2002). Our approach uses instruments for all the regressors except those considered exogenous.

The Arellano–Bond autocorrelation (AR) and over-identifying restriction tests can also uncover delays. Instruments fail orthogonality limitations if the Hansen test's null hypothesis is rejected. The moment criteria are only accurate if the idiosyncratic errors have no sequence. The moment conditions are accurate if the second-order autocorrelation (AR2) cannot reject the null hypothesis (Hansen 1982).

To better understand the role that competition, loan quality and ownership structure play in determining risk in MENA countries, this study employs the GMM approach. Endogeneity and heteroskedasticity are considered regression equations applied to this investigation's panel data. The structure of this study's empirical model is as follows:

$$NPL_{i,t} = \alpha_0 + \alpha_1 NPL_{i,t-1} + \alpha_2 BC_{i,t} + \alpha_3 OWS_{i,t} + \sum_{j=4}^{7} \alpha_j BCV_{i,j,t} + \sum_{m=8}^{9} \alpha_m M_{i,m,t} + \varepsilon_{i,t} \quad (10)$$

Here, NPL indicates the non-performing loans of banks that use dependent variables. NPL is used as the proxy variable of the credit risk of banks. $NPL_{i,t-1}$ indicates a one-year lag period for NPL.

$$Z - score_{i,t} = \beta_0 + \beta_1 Z - score_{i,t-1} + \beta_2 BC_{i,t} + \beta_3 OWS_{i,t} + \sum_{j=4}^{7} \beta_j BCV_{i,j,t} + \sum_{m=8}^{9} \beta_m M_{i,m,t} + \varepsilon_{i,t} \quad (11)$$

Here, Z-score is used as the dependent variable. Z-score is used as the proxy variable of the financial stability of banks. $Z - score_{i,t-1}$ indicates a one-year lag period for the Z-score.

The "i" and "t" subscripts in Equations (10) and (11) refer to the number of banks and time, respectively (i.e., t = 2011, 2012, 2013 . . . . . .2020). Here, j and m cover a bank's control level (loan composition, loan quality, bank size and customer) and macroeconomic variables (GGDP and inflation rate).

In Equations (10) and (11), $BC_{i,t}$ specifies three bank competition indicators: (i) the Lerner index, (ii) HHIA and (iii) HHIL. $OWS_{i,t}$ represents the ownership structure of (I) Islamic banks, (II) commercial banks and (III) specialized government institutions. $BCV_{i,j,t}$ indicates the following control variables: (a) loan composition, (b) loan quality, (c) size and (d) customers. $M_{i,m,t}$ indicates the following macroeconomic variables: (i) gross domestic product growth (GGDP) and (ii) inflation rate. α and β are the estimated parameters in Equations (10) and (11), respectively, and ε signifies the error.

3.2. Unit Root Fisher Augmented Dickey–Fuller (ADF) Test

We used the ADF test, as followed by Gupta and Yesmin (2022). The individual unit root ADF test was used in this study to determine whether the data have a unit root. First, we tested the data at the unit root level. Except for those of Islamic and commercial banks in Table 1, all null hypothesis *p*-values are less than 5%, which indicates that, except for Islamic and commercial banks, all data are at a stationary level. Islamic and commercial banks are stationary for the first difference I (1).

Table 1. ADF unit root test.

Null Hypothesis (H_0): NPL Has a Unit Root					
	Level	**t**	***p*-Value**	**Decision**	**Test**
ADF test statistic		−27.5319	0.000		
Test critical values (TCV):	1%	−3.43888		Rejected at 1%	Level
	5%	−2.86519			
	10%	−2.56877			
H_0: Z-score has a unit root					
ADF test statistic		−25.61629	0.000		
TCV	1%	−3.438877		Rejected at 1%	Level
	5%	−2.865193			
	10%	−2.568771			
H_0: LERNER has a unit root					
ADF test statistic		−24.3247	0.000		
TCV	1%	−3.43888		Rejected at 1%	Level
	5%	−2.86519			
	10%	−2.56877			
H_0: HHIA has a unit root					
ADF test statistic		−15.2717	0.000		
TCV	1%	−3.43888		Rejected at 1%	Level
	5%	−2.86519			
	10%	−2.56877			
H_0: HHIL has a unit root					
ADF test statistic		−18.3796	0.000		
TCV	1%	−3.43888		Rejected at 1%	Level
	5%	−2.86519			
	10%	−2.56877			
H_0: LC has a unit root					
ADF test statistic		−10.5058	0.000		
TCV	1%	−3.43891		Rejected at 1%	Level
	5%	−2.86521			
	10%	−2.56878			
H_0: LQ has a unit root					
		−26.9711	0.000		
	1%	−3.4389		Rejected at 1%	Level
	5%	−2.8652			
	10%	−2.56878			
H_0: SIZE has a unit root					
ADF test statistic		−5.8236	0.000		
TCV	1%	−3.43891		Rejected at 1%	Level
	5%	−2.86521			
	10%	−2.56878			
H_0: CUST has a unit root					
ADF test statistic		−13.3324	0.000		
TCV	1%	−3.4389		Rejected at 1%	Level
	5%	−2.8652			
	10%	−2.56878			
H_0: D(ISB) has a unit root					
ADF test statistic		−27.2764	0.000		
TCV	1%	−3.43889		Rejected at 1%	I(1) (first Difference)
	5%	−2.8652			
	10%	−2.56877			

Table 1. *Cont.*

Null Hypothesis (H_0): NPL Has a Unit Root					
	Level	**t**	***p*-Value**	**Decision**	**Test**
H_0: D(CB) has a unit root					
ADF test statistic		−27.2764	0.000		
TCV	1%	−3.43889		Rejected at 1%	I(1)
	5%	−2.8652			
	10%	−2.56877			
H_0: SGI has a unit root					
ADF test statistic		−2.89598	0.0463		
TCV	1%	−3.43888		Rejected at 5%	Level
	5%	−2.86519			
	10%	−2.56877			
H_0: D(GGDP) has a unit root					
ADF test statistic		−18.3419	0.000		
TCV	1%	−3.43922		Rejected at 1%	Level
	5%	−2.86534			
	10%	−2.56885			
H_0: INFLATION has a unit root					
ADF test statistic		−2.96006	0.0393		
TCV	1%	−3.43902		Rejected at 5%	Level
	5%	−2.86526			
	10%	−2.56881			

Note: Level indicates that data are at a stationary level. I (1) indicates that data are stationary for the first difference. t = t-statistic, *p*-value = probability.

3.3. Descriptive Statistics

Table 2 shows summary statistics for the variables. The dependent variable is NPL. The Z-Score shows that the mean value of non-performing loans is 7.131, and the Z-score (financial stability) is at 30.858. This indicates that the NPL ratio is neither zero (0) percent nor 100 percent in these countries. A lower Z-score mean value of 30.858 indicates that financial stability is not well established in these countries. Values of 0.379, 0.418 and 0.404 on the Lerner Index, HHIA and HHIL, respectively, indicate that there is a higher level of market concentration in these countries as compared to those with perfect competition and monopolistic markets. The average value of competition measurement indicators indicates that MENA banks are more competitive among banks in these areas. Commercial banks show the highest (0.616) average value among the banks.

Table 2. Summary of statistics.

	Obs	**Min**	**Max**	**Mean**	**Std. Deviation**	**Skew**		**Kurto**	
	Stat	**Stat**	**Stat**	**Stat**	**Stat**	**Stat**	**Std. Error**	**Stat**	**Std. Error**
NPL	748.000	0.060	82.650	7.131	9.447	3.310	0.089	13.781	0.179
Z-score	748.000	−2.411	255.392	30.858	29.378	2.769	0.089	12.856	0.179
Lerner	748.000	0.004	0.178	0.157	0.027	−2.735	0.089	9.472	0.179
HHIA	748.000	0.000	0.996	0.213	0.233	1.334	0.089	0.938	0.179
HHIL	748.000	0.002	0.981	0.258	0.205	1.176	0.089	1.096	0.179
LC	748.000	0.106	7895.036	198.204	626.363	7.879	0.089	74.294	0.179
LQ	747.000	0.050	51.740	5.485	5.417	3.675	0.089	21.266	0.179
SIZE	748.000	808.538	1868.333	1469.179	207.426	−0.876	0.089	0.742	0.179
CUST	748.000	0.150	3657.850	57.838	186.109	14.949	0.089	252.298	0.179
ISB	748.000	0.000	1.000	0.318	0.466	0.782	0.089	−1.392	0.179
CB	748.000	0.000	1.000	0.616	0.487	−0.479	0.089	−1.775	0.179
SGI	748.000	0.000	1.000	0.127	0.573	0.815	0.089	−1.192	0.179
GGDP	747.000	−25.900	18.220	0.980	6.402	−1.353	0.089	5.306	0.179
Inflation	748.000	−3.730	84.860	5.539	12.940	4.850	0.089	26.068	0.179

Note NPL = Non-performing loans; Z-score = Financial stability. Lerner, HHIA and HHIL are used as competition measurement variables. LC = Loan composition; LQ = Loan quality; SIZE = Bank size, CUST = Customers, used as bank control variables. ISB represents Islamic banks; CB represents commercial banks; SGI represents specialized government institutions, used as ownership proxy variables. GGDP and inflation are used as macroeconomic variables. Stat = Statistic; Min = Minimum; Max = Maximum; Obs = Observations; Skew = Skewness; Kurto = Kurtosis.

3.4. Correlation Analysis

Table 3 shows a Pearson's correlation coefficient matrix. It shows that no coefficient value has a high correlation between the independent variables, implying that our models are free of substantial multicollinearity issues. The maximum Pearson's correlation coefficient value is −0.566 ** for Islamic and commercial banks. The multicollinearity issues occurred when the independent value was above 0.80 (Tan et al. 2020). Kennedy (2008) referred to 0.70. As no pairwise correlation value exceeded 0.70, the study's models are not multicollinear.

Table 3. Correlations.

	NPL	Z-Score	Lerner	HHIA	HHIL	LC	LQ	SIZE	CUST	ISB	CB	SGI	GGDP	Inflation
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1	1													
2	−0.005	1												
3	0.023	−0.013	1											
4	−0.036	0.044	0.093 *	1										
5	0.003	0.036	0.023	−0.0035	1									
6	0.028	−0.049	−0.133 **	−0.037	0.023	1								
7	0.013	−0.023	0.016	0.016	0.044	0.053	1							
8	0.012	0.083 *	−0.102 **	0.164 **	0.014	−0.030	0.013	1						
9	0.033	0.010	−0.060	−0.048	0.017	0.150 **	−0.008	−0.042	1					
10	−0.045	−0.032	−0.050	−0.123 **	−0.038	0.059	−0.045	−0.187 **	0.043	1				
11	0.048	0.088 *	0.026	0.105 **	0.014	−0.033	0.056	0.173 **	−0.033	−0.566 **	1			
12	−0.011	−0.113 **	0.044	0.025	0.044	−0.047	−0.025	0.012	−0.016	−0.181 **	−0.336 **	1		
13	0.023	0.107 **	−0.003	0.030	−0.029	−0.007	−0.030	0.281 **	−0.046	−0.106 **	0.131 **	−0.058	1	
14	0.064	−0.021	0.000	−0.033	0.055	0.034	0.073 *	−0.102 **	0.068	0.036	−0.051	0.033	−0.532 **	1

Note NPL = Non-performing loans; Z-score = Financial stability used as dependent variables. Lerner, HHIA and HHIL are competition measurement variables. LC = Loan composition; LQ = Loan quality; SIZE = Bank size; CUST = Customers, used as bank control variables. ISB represents Islamic banks; CB represents commercial banks; SGI represents specialized government institutions, used as ownership proxy variables. GGDP and inflation are used as macroeconomic variables. *, ** = 5% and 1% significance levels, respectively.

3.5. Variance Inflation Factor (VIF) Test

We also ran the VIF test to confirm our claim of no multicollinearity (see Table 4). In a model, the VIF quantifies the relationship between one predictor and another. We used the VIF test as followed by Gupta and Yesmin (Table 4 shows the variance inflation factors).

Table 4. Variance inflation factors (VIFs).

Model		Coefficients		Coefficients	t	Sig.	Collinearity Statistics
		B	Std. Error	Beta			VIF
	Constant Variables	5.077	3.582		1.418	0.157	
	Lerner	10.155	12.568	0.030	0.808	0.419	1.750
	HHIA	−1.516	1.519	−0.038	−0.998	0.318	1.054
	HHIL	−0.258	1.686	−0.006	−0.153	0.879	1.011
	LC	0.000	0.001	0.027	0.720	0.472	1.049
	LQ	0.006	0.064	0.003	0.087	0.930	1.014
	SIZE	0.000	0.002	0.006	0.155	0.877	1.167
	CUST	0.001	0.002	0.027	0.717	0.474	1.032
	ISB	−0.936	0.774	−0.046	−1.210	0.227	1.096
	CB	−1.662	0.384	−0.026	−0.599	0.385	1.003
	SGI	−0.620	1.422	−0.016	−0.436	0.663	1.046
	GGDP	0.106	0.066	0.072	1.598	0.110	1.520
	Inflation	0.074	0.032	0.101	2.326	0.020	1.416
Dependent Variable: NPL							

Table 4. *Cont.*

Model	Coefficients		Coefficients	t	Sig.	Collinearity Statistics
	B	Std. Error	Beta			VIF
Constant Variables	22.683	11.038		2.055	0.040	
Lerner	−16.027	38.736	−0.015	−0.414	0.679	1.050
HHIA	5.106	4.680	0.041	1.091	0.276	1.054
HHIL	6.207	5.197	0.044	1.194	0.233	1.011
LC	−0.003	0.002	−0.055	−1.491	0.136	1.049
LQ	−0.154	0.197	−0.028	−0.778	0.437	1.014
SIZE	0.006	0.006	0.046	1.175	0.240	1.167
CUST	0.003	0.006	0.021	0.567	0.571	1.032
ISB	−1.665	20.384	−0.026	−0.699	0.485	1.096
CB	−0.662	0.284	−0.027	−0.583	0.652	1.007
SGI	−14.081	4.382	−0.119	−3.214	0.001	1.046
GGDP	0.503	0.204	0.110	2.461	0.014	1.520
Inflation	0.108	0.098	0.048	1.109	0.268	1.416

Dependent Variable: Z-score.

VIF test predictor values of 1 and 10 indicate no correlation and a significant correlation, respectively (Thompson et al. 2017).

4. Regression Analysis and Discussion

This study used two equations to analyze the relationship among competition, loan quality, ownership structure and risk (financial stability) for MENA economies. Equation (10) is as follows:

$$NPL_{i,t} = \alpha_0 + \alpha_1 NPL_{i,t-1} + \alpha_2 BC_{i,t} + \alpha_3 OWS_{i,t} + \sum_{j=4}^{7} \alpha_j BCV_{i,j,t} + \sum_{m=8}^{9} \alpha_m M_{i,m,t} + \varepsilon_{i,t}$$

Tables 5–7 show Equation (10)-based results, where non-performing loans (NPL) are used as dependent variables. $NPL_{i,t-1}$ indicates a one-year lag period for NPL. (1) Model-1, (2) Model-2 and (3) Model-3 represent the ownership structure of specific I) Islamic banks, II) commercial banks and III) specialized government institutions, respectively. Equation (11) is as follows:

$$Z - score_{i,t} = \beta_0 + \beta_1 Z - score_{i,t-1} + \beta_2 BC_{i,t} + \beta_3 OWS_{i,t} + \sum_{j=4}^{7} \beta_j BCV_{i,j,t} + \sum_{m=8}^{9} \beta_m M_{i,m,t} + \varepsilon_{i,t}$$

Tables 8–10 show Equation (11)-based results, where the Z-score (financial stability) is used as the dependent variable. $Z - score_{i,t-1}$ indicates a one-year lag period for the Z-score.

Table 5 shows that the relationship between Lerner Index and NPL is negative but statistically significant (coefficient is −0.015, and *p*-value is 0.000) in Model 1. It indicates that lower bank competition reduces bank credit risk (NPL). Model 2 and Model 3 also showed that the relationship between Lerner index and NPL is negative but statistically significant (coefficients are −0.011 and −0.107, and the *p*-values are 0.000 and 0.004, respectively). They also indicate that lower bank competition reduces bank credit risk (NPL) in MENA countries. In Table 6, HHIA uses the bank's competition measurement variable for all three models. Table 6 further shows a negative relationship between HHIA and NPL, which is statistically significant with coefficients of −0.007, −0.082 and −0.009 and *p*-values of 0.000, 0.000 and 0.000, respectively. In Table 7, HHIL uses the bank's competition measurement variable for all three models. Table 7 further shows a negative relationship between HHIL and NPL, which statistically significant with coefficients of −0.002, −0.004 and −0.017 and *p*-values of 0.000, 0.000 and 0.003, respectively.

Table 5. Effects of competition (based on the Lerner index), loan quality and ownership structure on credit risk.

Variable	Coefficient	t	*p*.	Coefficient	t	*p*.	Coefficient	t	*p*.
	Model 1			Model 2			Model 3		
$NPL_{(t-1)}$	0.172	6.190	0.000	0.032	7.180	0.000	0.071	7.502	0.000
LERNER	−0.015	5.381	0.000	−0.011	4.702	0.000	−0.107	−3.205	0.004
ISB	−0.760	−2.124	0.001						
CB				−0.780	−2.181	0.008			
SGI							−0.213	−0.163	0.101
LC	0.000	2.304	0.001	0.000	2.298	0.016	0.000	2.070	0.004
LQ	0.005	2.071	0.004	−0.001	−4.017	0.087	0.006	4.082	0.000
SIZE	0.000	3.085	0.002	0.000	2.115	0.018	0.000	2.077	0.039
CUST	0.001	4.522	0.002	0.001	4.529	0.007	0.001	2.485	0.028
GGDP	−0.105	−2.601	0.010	−0.112	−3.692	0.001	−0.103	−1.544	0.123
INFLATION	0.069	2.709	0.088	0.074	2.829	0.068	0.071	1.733	0.083
C	5.386	2.634	0.103	0.786	4.441	0.050	5.352	1.619	0.106
Sargan's J test (*p*-value)	0.873				0.891			0.827	
AR—(1)	0.000				0.001			0.000	
AR—(2)	0.497				0.543			0.492	
R^2	0.482				0.520			0.380	
Adj-R^2	0.471				0.485			0.371	
Instrument rank	13.000				13.000			13.000	

Note: J-statistic indicates Sargan's J test's *p*-value. Sargan's test's null hypothesis demonstrates that the instruments do not correlate with the residuals (over-identifying restrictions). AR—(1) and AR—(2) represent autocorrelations of the first and second order, respectively. NPL is used as the dependent variable. The lag value of the dependent variable is utilized by $NPL_{(t-1)}$. The GMM method was used to obtain these results. R^2 = R-squared, Adj-R^2 = Adjusted R-squared. t = t-statistic. *p*. = probability value.

Table 6. Effects of competition (Based on HHIA), loan quality and ownership structure on credit risk.

Variable	Coefficient	t	*p*.	Coefficient	t	*p*.	Coefficient	t	*p*.
	Model 1			Model 2			Model 3		
$NPL_{(t-1)}$	0.102	2.836	0.000	0.009	6.050	0.000	0.007	4.142	0.000
HHIA	−0.007	−7.073	0.000	−0.082	−8.207	0.000	−0.009	−7.001	0.000
ISB	−0.900	−2.187	0.036						
CB				0.894	3.234	0.018			
SGI							−0.267	−2.191	0.032
LC	0.000	2.636	0.025	0.000	2.609	0.003	0.000	3.567	0.071
LQ	0.007	4.113	0.010	0.006	4.097	0.023	0.010	4.162	0.071
SIZE	0.000	2.045	0.004	0.000	2.061	0.051	0.000	3.223	0.024
CUST	0.001	3.688	0.002	0.001	2.681	0.006	0.001	2.659	0.010
GGDP	−0.110	−1.657	0.008	−0.107	−1.622	0.105	−0.114	−1.717	0.186
INFLATION	0.074	2.334	0.020	0.074	2.338	0.020	0.074	2.355	0.019
C	0.866	2.582	0.010	5.993	2.327	0.020	6.087	2.361	0.019
Sargan's J test (*p*-value)	0.838				0.865			0.529	
AR—(1)	0.001				0.000			0.002	
AR—(2)	0.417				0.471			0.462	
R^2	0.313				0.313			0.311	
Adj-R^2	0.302				0.302			0.300	
Instrument rank	13.000				13.000			13.000	

Note: J-statistic indicates Sargan's J test's *p*-value. NPL is used as the dependent variable. The lag value of the dependent variable is utilized by $NPL_{(t-1)}$. The GMM method was used to obtain these results.

Table 7. Effects of competition (based on HHIL), loan quality and ownership structure on credit risk.

Variable	Coefficient	t	*p*.	Coefficient	t	*p*.	Coefficient	t	*p*.
	Model 1			Model 2			Model 3		
$NPL_{(t-1)}$	0.132	2.136	0.000	0.005	5.063	0.000	0.000	3.830	0.000
HHIL	−0.002	−5.108	0.000	−0.004	−7.013	0.000	−0.017	−6.019	0.003
ISB	−0.756	−2.108	0.068						
CB				0.843	3.166	0.044			
SGI							−0.287	−2.205	0.037
LC	0.001	2.659	0.010	0.000	3.633	0.027	0.000	3.590	0.056
LQ	0.064	2.106	0.016	0.006	2.089	0.029	0.010	2.151	0.080
SIZE	0.002	5.088	0.030	0.000	5.073	0.002	0.000	2.096	0.024
CUST	0.002	2.720	0.002	0.001	3.713	0.076	0.001	0.688	0.092
GGDP	−0.066	−1.689	0.092	−0.109	−1.654	0.099	−0.115	−1.740	0.182
INFLATION	0.032	2.364	0.018	0.075	2.366	0.018	0.075	2.378	0.018
C	2.688	2.578	0.010	6.106	2.348	0.019	6.178	2.375	0.018
Sargan's J test (*p*-value)	0.642				0.405			0.414	
AR—(1)	0.000				0.000			0.000	
AR—(2)	0.423				0.472			0.402	
R^2	0.311				0.301			0.310	
Adj-R^2	0.300				0.544			−0.301	
Instrument rank	13.000				13.000			13.000	

Note: J-statistic indicates Sargan's J test's *p*-value. NPL is used as the dependent variable. The lag value of the dependent variable is utilized by $NPL_{(t-1)}$. The GMM method was used to obtain these results.

Table 8. Effects of competition (based on Lerner index), loan quality and ownership structure on financial stability.

Variable	Coefficient	t	*p*.	Coefficient	t	*p*.	Coefficient	t	*p*.
	Model-1			Model-2			Model-3		
$Z\text{-score}_{(t-1)}$	0.032	2.836	0.000	0.105	4.003	0.000	0.109	7.030	0.000
LERNER	0.014	6.028	0.000	0.005	3.073	0.012	0.019	5.270	0.000
ISB	0.181	2.526	0.009						
CB				0.141	2.957	0.003			
SGI							−0.093	−5.554	0.000
LC	−0.002	−2.698	0.007	−0.002	−2.627	0.009	−0.003	−2.976	0.003
LQ	−0.137	−4.706	0.000	−0.254	−3.310	0.091	−0.182	−3.958	0.008
SIZE	0.008	5.540	0.024	0.003	2.541	0.089	0.010	1.960	0.050
CUST	−0.004	−2.848	0.065	−0.004	−3.961	0.050	−0.003	−1.528	0.127
GGDP	0.530	3.394	0.001	0.479	3.109	0.002	0.466	3.008	0.003
INFLATION	−0.107	−1.359	0.175	−0.094	−1.211	0.227	−0.111	−1.417	0.157
C	19.894	1.799	0.072	26.774	2.612	0.009	19.382	1.883	0.060
Sargan's J test (*p*-value)	0.916				0.937			0.863	
AR—(1)	0.000				0.000			0.000	
AR—(2)	0.452				0.461			0.495	
R^2	0.317				0.021			0.332	
Adj-R^2	0.307				0.011			0.321	
Instrument rank	13.000				13.000			13.000	

Note: J-statistic indicates Sargan's J test's *p*-value. Z-score is used as the dependent variable. The lag value of the dependent variable is utilized by $Z\text{-score}_{(t-1)}$. The GMM method was used to obtain these results.

Table 9. Effects of competition (based on HHIA), loan quality and ownership structure on financial stability.

Variable	Coefficient	t	*p*.	Coefficient	t	*p*.	Coefficient	t	*p*.
	Model 1			Model 2			Model 3		
Z-score$_{(t-1)}$	0.031	3.136	0.000	0.001	3.078	0.000	0.009	4.530	0.000
HHIA	0.007	2.407	0.004	0.192	2.242	0.009	0.660	3.748	0.000
ISB	0.305	2.580	0.002						
CB				0.996	2.883	0.004			
SGI							−0.380	−5.626	0.000
LC	−0.002	−2.704	0.007	−0.002	−2.569	0.010	−0.003	−3.030	0.003
LQ	−0.132	−3.681	0.006	−0.249	−3.285	0.099	−0.177	−2.927	0.014
SIZE	0.008	3.589	0.013	0.003	2.623	0.033	0.010	1.994	0.047
CUST	−0.004	−1.930	0.054	−0.004	−2.004	0.046	−0.003	−1.642	0.101
GGDP	0.533	3.405	0.001	0.477	3.087	0.002	0.465	2.995	0.003
INFLATION	−0.111	−1.417	0.157	−0.097	−1.261	0.208	−0.111	−1.435	0.152
C	16.554	2.075	0.038	21.948	3.098	0.002	16.640	2.344	0.019
Sargan's J test (*p*-value)	0.900				0.902			0.630	
AR—(1)	0.000				0.003			0.000	
AR—(2)	0.428				0.403			0.474	
R^2	0.318				0.322			0.333	
Adj-R^2	0.308				0.311			0.323	
Instrument rank	13.000				13.000			13.000	

Note: J-statistic indicates Sargan's J test's *p*-value. Z-score is used as the dependent variable. The lag value of the dependent variable is utilized by Z-score $_{(t-1)}$. The GMM method was used to obtain these results.

Table 10. Effects of competition (based on HHIL), loan quality and ownership structure on financial stability.

Variable	Coefficient	t	*p*.	Coefficient	t	*p*.	Coefficient	t	*p*.
	Model 1			Model 2			Model 3		
Z-score$_{(t-1)}$	0.001	3.036	0.000	0.201	5.178	0.000	0.018	3.160	0.000
HHIL	0.568	4.694	0.008	0.744	3.924	0.006	0.995	2.978	0.029
ISB	0.158	2.516	0.006						
CB				0.204	2.971	0.003			
SGI							−0.321	−5.654	0.000
LC	−0.002	−2.737	0.006	−0.002	−2.580	0.010	0.003	3.073	0.002
LQ	−0.114	−3.588	0.057	−0.225	−2.157	0.048	−0.148	−2.773	0.040
SIZE	0.007	2.420	0.056	0.002	2.391	0.096	0.009	1.754	0.080
CUST	−0.004	3.721	−0.086	0.004	−1.819	−0.069	−0.003	−1.390	0.165
GGDP	0.548	3.443	0.001	0.504	3.211	0.001	0.497	3.148	0.002
INFLATION	−0.106	−1.342	0.180	−0.095	−1.227	0.220	−0.109	−1.400	0.162
C	17.091	2.169	0.030	22.380	3.193	0.002	17.447	2.490	0.013
Sargan's J test (*p*-value)	0.800				0.902			0.695	
AR—(1)	0.000				0.001			0.000	
AR—(2)	0.401				0.427			0.495	
R^2	0.319				0.322			0.334	
Adj-R^2	0.308				0.312			0.323	
Instrument rank	13.000				13.000			13.000	

Note: J-statistic indicates Sargan's J test's *p*-value. Z-score is used as the dependent variable. The lag value of the dependent variable is utilized by Z-score $_{(t-1)}$. The GMM method was used to obtain these results.

However, Tables 8–10 use the Z-score as the dependent variable. Table 8 shows a statistically significant positive association between the Lerner Index and the Z-score (the coefficient is 0.014, and the *p*-value is 0.000). This implies that fewer banks competing for business in emerging countries would result in more secure banking institutions. Corre-

lations between the Lerner index and Z-scores were found to be positive and statistically significant in Models 2 and 3 (coefficient = 0.005, *p*-value = 0.012; coefficient = 0.019, *p*-value = 0.000, respectively), echoing the findings of Model 1. Moreover, it seems that less competition among banks in the MENA region is beneficial for the financial stability of countries in this region.

In Table 9, HHIA uses the bank's competition measurement variable for all three models. Table 9 further shows a positive relationship between HHIA and Z-score, which is statistically significant with coefficients of 0.007, 0.192 and 0.009 and *p*-values of 0.004, 0.009 and 0.000, respectively. In Table 10, HHIL uses the bank's competition measurement variable for all three models. Table 10 further shows a positive relationship between HHIL and Z-score, which is statistically significant with coefficients of 0.568, 0.744 and 0.995 and with *p*-values of 0.008, 0.006 and 0.029, respectively.

The findings indicate that a negative association exists between non-performing loans and competition variables. In contrast, all models show a positive relationship between financial stability (Z-score) and competition variables. This suggests that lower levels of bank competition result in lower levels of bank credit risk, which ultimately results in more robust levels of financial stability in emerging nations. These findings contradict the Competition Stability Theory but are consistent with the Competition Fragility Theory (Boyd and De Nicolo 2005; Koetter et al. 2012).

In the context of ownership structure, Table 5 demonstrates that the negative relationships between Islamic banks and NPL and between commercial banks and NPL are statistically significant in both Model 1 (coefficient = −0.760, *p*-value = 0.001) and Model 2 (coefficient = 0.780, *p*-value = 0.008). Table 5 demonstrates a negative but insignificant link between SGI and NPL according to Model 3. In contrast, Table 6 illustrates negative and positive associations that exist among Islamic banks, SGIs and commercial banks, with respective coefficients of −0.900, −0.267, and 0.894 and *p*-values of 0.036, 0.032, and 0.018. Table 7 illustrates negative and positive associations among Islamic banks, SGIs and commercial banks. The coefficients for this relationship are −0.756, −0.287, and 0.843, and the *p*-values for each of these variables are 0.068, 0.037 and 0.044, respectively. Table 8 shows positive and negative relationship among Islamic banks, commercial banks and SGIs, with coefficients of 0.181, 0.141 and −0.093 and *p*-values of 0.009, 0.003 and 0.000, respectively. Tables 9 and 10 show similar findings to Table 8.

We conclude that, among all the models presented in Tables 5–10, Model 1 demonstrates a negative relationship between NPL and Islamic banks. In contrast, Model 1 demonstrates a positive relationship between Islamic banks and financial stability (Z-score). In contrast, reports from commercial banks and SGIs are inconsistent, suggesting that Islamic banks have a lower credit risk position compared to commercial banks and that Islamic banks in MENA countries have a stronger financial position than commercial banks and SGI banks.

In Table 5, it can be seen that, across all three models, there is a positive and statistically significant correlation between loan composition and NPL (where the coefficients are 0.000, 0.000 and 0.000 and the *p*-values are 0.001, 0.016 and 0.004, respectively). This result persists in Table 6, where the coefficients are 0.000, 0.000 and 0.000 and the *p*-values are 0.025, 0.003 and 0.071 in all models, respectively. This result is retained in Table 7, where the coefficients are 0.000, 0.000 and 0.000 and the *p*-values are 0.025, 0.003 and 0.071 in all models, respectively. On the other hand, Tables 8–10 illustrate negative and (positive) relationships between the financial stability of emerging countries and Islamic banks, commercial banks and (SGIs). According to our findings, an increase in loan composition leads to an increase in non-performing loans, which, in turn, decreases financial stability in emerging nations.

Table 5 shows a relationship between loan quality and NPL that is positive and significant, with coefficients of 0.005 and 0.006 and *p*-values of 0.004 and 0.000 for Models 1 and 3, respectively. However, Model 2 shows a negative relationship between loan quality and NPL, with a coefficient of −0.001 and a *p*-value of 0.087. Tables 6 and 7 show that the

relationship between loan quality and NPL is positive and significant, with coefficients of 0.007, 0.006, 0.010, 0.064, 0.006 and 0.010 and *p*-values of 0.010, 0.023, 0.071, 0.016, 0.029 and 0.080 in all models respectively. On the other hand, Tables 8–10 show that the relationship between loan quality and Z-score is negative but statistically significant, with coefficients of −0.137, −0.254, −0.182, −0.132, −0.249, −0.177, −0.114, −0.22 and −0.148 and *p*-values of 0.000, 0.091, 0.008, 0.006, 0.099, 0.014, 0.057, 0.048 and 0.040 in all models respectively. These findings indicate that, if loan quality is increased in MENA countries, NPL would also be increased in these countries, which would finally reduce financial stability in emerging countries.

Table 5 shows that the relationship between bank size and NPL is positive and statistically significant, with coefficients of 0.000, 0.000 and 0.000 and *p*-values of 0.002, 0.018 and 0.039 in all models, respectively. Tables 6 and 7 show similar results to Table 5, with coefficients of 0.000, 0.000, 0.000, 0.002, 0.000 and 0.000 and *p*-values of 0.004, 0.051, 0.024, 0.030, 0.002 and 0.024, respectively. It is interesting that Tables 8–10 also show a negative relationship between bank size and financial stability, with the coefficients of −0.008, −0.003, −0.010 −0.008, −0.003, −0.010, −0.007, −0.002 and −0.009 and *p*-values of 0.024, 0.089, 0.050, 0.013, 0.033, 0.047, 0.056, 0.096 and 0.080 respectively. They specifies that, if bank size increases in MENA countries, NPL would also be increased in these countries, which would reduce financial stability in emerging countries.

Table 5 shows that the positive relationship between customers and NPL is statistically significant, with coefficients of 0.001, 0.001 and 0.001 and *p*-values is 0.002, 0.007 and 0.028 in all models, respectively. Tables 6 and 7 show similar results to Table 5, with coefficients of 0.001, 0.001, 0.001, 0.002, 0.001 and 0.001 and the *p*-values of 0.002, 0.006, 0.010, 0.002, 0.076 and 0.092. This indicates that, if bank customers increase, NPL would also be increased in MENA countries. Tables 8–10 show a negative relationship between bank customers and financial stability in MENA countries in all models. This demonstrates that, if bank customers increase, NPL would also be increased in MENA countries, which would finally reduce financial stability in emerging countries.

Table 5 demonstrates negative but statistically significant and (insignificant) relationships between GGDP and NPL, with coefficients of 0.105, 0.112 and 0.103 and *p*-values of 0.010, 0.001 and 0.123 in Model 1, Model 2, and (Model 3), respectively. Tables 6 and 7 show similar results to Table 5, with coefficients of −0.110, −0.107, −0.114, −0.066, −0.109 and −0.115 and *p*-values of 0.008, 0.105, 0.186, 0.092, 0.099 and 0.182. This demonstrates that credit risk would be minimized during an economic boom in MENA countries. Tables 8–10 show a positive relationship between bank GGDP and financial stability in emerging countries in all models. This demonstrates that, if GGDP increases, NPL would be minimized in MENA countries, which would finally improve financial stability in emerging countries.

Table 5 demonstrates a positive and statistically significant relationship between inflation and NPL, with coefficients of 0.069, 0.074 and 0.071 and *p*-values of 0.088, 0.068 and 0.083 in all models, respectively. Tables 6 and 7 show similar results to Table 5, with coefficients of 0.074, 0.074, 0.074, 0.032, 0.075 and 0.075 and *p*-values of 0.020, 0.020, 0.019, 0.018, 0.018 and 0.018. This indicates that, during a period of inflation, credit risk would be high in MENA countries. Tables 8–10 show a negative relationship between inflation and financial stability in emerging countries in all models. The coefficients are −0.107, −0.094, −0.111, −0.111, −0.097, −0.111, −0.106, −0.095 and −0.109, and the *p*-values are 0.175, 0.227, 0.157, 0.157, 0.208, 0.152, 0.180, 0.220 and 0.162. This indicates that, during a period of inflation, credit risk would be high for this reason, reducing financial stability in emerging countries. Unfortunately, the Z-score shows an insignificant relationship between financial stability and inflation. Therefore, there is no relationship between financial stability and inflation in MENA countries.

The Bidirectional Causality of Competition and Risk Concerning the Impact of Ownership Structure

In addition, this study examines the financial stability level of dual banking and explores the bidirectional causality of competition and risk concerning the impact of ownership structure. This study uses competition as a dependent variable to investigate the bidirectional correlation among competitiveness, risk and ownership structure. The Lerner index, HHIA and HHIL are three competition factors used in this study.

Table 11 shows the bidirectional causality of competition and risk concerning the impact of ownership structure in MENA countries. Credit risk shows a negative but statistically significant relationship between competition (Lerner, HHIA and HHIL) and NPL. The coefficients are −0.072, −0.001 and −0.018, and the *p*-values are 0.000, 0.080 and 0.000, respectively. In contrast, the Z-score shows a positive and statistically significant (coefficients = 0.028, 0.040 and 0.029; *p*-values = 0.016, 0.009 and 0.045, respectively) relationship between competition and financial stability in Table 11. These findings are consistent with those in Tables 5–10. This suggests that bank competitiveness impacts risk and financial stability and vice versa.

Table 11. Bidirectional causality of competition and risk concerning the impact of ownership structure.

Variable	Coefficient	t	*p*.	Coefficient	t	*p*.	Coefficient	t	*p*.
	Dependent Variable = Lerner			Dependent Variable = HHIA			Dependent Variable = HHIL		
$Lerner_{(t-1)}$	0.071	8.073	0.000						
$HHIA_{(t-1)}$				0.042	3.002	0.000			
$HHIL_{(t-1)}$							0.063	6.001	0.000
NPL	−0.072	−6.450	0.000	−0.001	−2.707	0.080	−0.018	−5.115	0.000
ZSCORE	0.028	3.290	0.016	0.040	3.861	0.009	0.029	4.164	0.045
LC	0.001	2.901	0.058	0.027	2.089	0.076	0.018	3.450	0.053
LQ	0.041	2.568	0.070	0.001	7.825	0.000	0.032	6.897	0.000
SIZE	0.100	3.433	0.001	0.019	4.140	0.000	0.037	6.253	0.000
CUST	0.023	2.114	0.066	0.016	2.439	0.051	0.104	5.672	0.002
ISB	−0.116	−2.787	0.074	−0.049	−4.688	0.007	−0.047	−5.393	0.019
CB	−0.102	−5.724	0.000	−0.003	−5.094	0.000	−0.035	−2.081	0.080
SGI	0.002	0.724	0.470	0.203	0.094	0.125	0.010	0.135	0.192
GGDP	0.010	1.927	0.155	0.001	1.949	0.143	0.001	1.063	0.288
INFLATION	−0.000	−3.371	0.010	−0.001	−2.910	0.063	−0.256	−3.780	0.000
C	0.193	24.132	0.000	−0.027	−0.447	0.655	0.012	0.098	0.286
Sargan's J test (*p*-value)	0.917				0.925			0.824	
AR—(1)	0.000				0.001			0.002	
AR—(2)	0.593				0.484			0.397	
R^2	0.492				0.440			0.410	
Adj-R^2	0.481				0.427			−0.403	
Instrument rank	14.000				14.000			14.000	

The data presented in Table 11 show a positive correlation between competition (Lerner, HHIA and HHIL) and loan composition. The coefficients are 0.001, 0.027 and 0.018, and the *p*-values are 0.058, 0.076 and 0.053, respectively. Tables 5–7 display an inverse link between non-performing loans and loan composition related to credit risk. Tables 8–10 show a positive correlation between financial stability and loan composition, which can be seen using the Z-score. This seems to imply that bank competition in MENA nations affects loan composition. Loan composition also affects bank competitiveness in MENA countries.

Table 11 shows a positive correlation between competition (Lerner, HHIA and HHIL) and loan quality in MENA countries. Here, the coefficients are 0.041, 0.001 and 0.032, and the *p*-values are 0.070, 0.000 and 0.000, respectively. Tables 5–7 show a positive correlation between non-performing loans and loan quality in MENA countries. Tables 8–10 show a negative correlation between financial stability and loan quality according to the Z-score.

This indicates a two-way causality between the degree to which banks are competitive and the quality of their loans to customers in the Middle East and North Africa (MENA).

There is a statistically significant and positive relationship between competition (Lerner, HHIA and HHIL) and size in Table 11. The coefficients are 0.100, 0.019 and 0.037, and the *p*-values are 0.001, 0.000 and 0.000, respectively. This shows that competition increases with bank size in MENA countries, and Tables 5–7 show that credit risk increases with non-performing loans and bank size in MENA countries. Tables 8–10 show that the Z-scores indicate a positive relationship between financial stability and bank size. Bank size appears to affect bank competitiveness in MENA nations and vice versa.

There is a statistically significant and positive relationship between competition (Lerner, HHIA and HHIL) and customers in Table 11. The coefficients are 0.023, 0.016 and 0.104, and the *p*-values are 0.066, 0.051 and 0.002, respectively. Tables 5–7 show a positive relationship between non-performing loans and customers in MENA countries. Tables 8–10 show a negative relationship between financial stability and customers according to the Z-score. This seems to imply that customers in MENA nations are affected by the level of competition among banks.

There is a statistically significant but negative relationship between competition (Lerner, HHIA and HHIL) and ownership structure (Islamic banks) in Table 11. The coefficients are −0.116, −0.049 and −0.047, and the *p*-values are 0.074, 0.007 and 0.019, respectively. This shows that there is a negative correlation between competition and ownership structure in Islamic banks, and Tables 5–7 show a negative correlation between non-performing loans and Islamic banks in MENA countries. Tables 8–10 show a positive correlation between Z-score and Islamic banks and financial stability. This indicates that the ownership structure of banks (Islamic banks) in MENA nations is affected by bank competition.

There is a statistically significant but negative relationship between competition (Lerner, HHIA and HHIL) and ownership structure (commercial banks) in Table 11. The coefficients are −0.102, −0.003 and −0.035, and the *p*-values are 0.000, 0.000 and 0.080, respectively. This shows that there is negative correlation between commercial banks and competition, and Tables 5–7 show negative and positive correlations between non-performing loans and commercial banks in MENA countries. Tables 8–10 show a positive correlation between commercial banks and financial stability according to the Z-score. This finding implies that the ownership structure of banks (commercial banks) in MENA nations is affected by bank competition.

There is a positive relationship between competition (Lerner, HHIA and HHIL) and ownership structure (specialized government institutions) in Table 11. The coefficients are insignificant at 0.002, 0.203 and 0.010, and the *p*-values are 0.470, 0.125 and 0.192, respectively. This shows a positive but not statistically significant correlation between competition and ownership structure. Tables 5–7 show a negative correlation between non-performing loans and SGIs in MENA countries. Tables 8–10 show a negative correlation between SGI and financial stability. These results imply that the ownership structure (SGI) of banks in MENA nations is affected by the degree to which they are competitive.

There is a positive relationship between competition (Lerner, HHIA and HHIL) and GGDP in Table 11. The coefficients are 0.010, 0.001 and 0.001, and the *p*-values are insignificant at 0.155, 0.143 and 0.288, respectively. This demonstrates a positive but insignificant correlation between competition and GGDP in MENA countries. Moreover, Tables 5–7 show a negative correlation between NPL and GGDP in MENA countries due to credit risk. Tables 8–10 show a positive correlation between financial stability and GGDP. This finding implies that GGDP in MENA countries affects bank competitiveness and that bank competitiveness in MENA affects GGDP.

There is a negative relationship between competition (Lerner, HHIA and HHIL) and inflation in Table 11. The coefficients are −0.000, −0.001 and −0.256, and the *p*-values are insignificant at 0.010, 0.063 and 0.000, respectively. This indicates that competition and inflation have a negative relationship in MENA countries. In contrast, credit risk shows

a positive relationship between non-performing loans (NPL) and inflation in Tables 5–7. Z-score further shows a negative relationship between financial stability and inflation in Tables 8–10. This seems to imply that the competitiveness of banks in MENA nations affect the rate of inflation in those countries and vice versa.

5. Conclusions, Policy Implications and Future Directions

"The core purpose is to explore the relationship between competition, loan quality, ownership structure, and risk for MENA economies." In addition, this study examines the financial stability level of dual banking and explores the bidirectional causality of competition and risk concerning the impact of ownership structure. This study uses 748 observations from 2011 to 2020 in MENA countries. The Generalized Method of Moments (GMM) is an econometric technique used to estimate the parameters of a statistical model.

The study findings indicate negative and positive relationships between MENA bank competition and risk and between MENA bank competition and financial stability, respectively. This indicates that lower bank competition reduces bank credit risk and increases financial stability in MENA countries. Regarding ownership structure, Islamic banks display a stronger position in MENA economies than commercial banks and specialized government institutions. In contrast, specialized government institutions are riskier than commercial banks and Islamic banks. Loan quality shows two-way causality between the degree to which banks compete and the quality of their loans to customers in the MENA markets. The findings also show a positive relationship between competition and loan composition. Furthermore, they show negative and positive relationships between credit risk and loan composition and between financial stability and loan composition in MENA countries, respectively. This indicates two-way causality between the degree to which banks compete and the risk (financial stability) of their loans to customers in the MENA markets.

This study has implications for policymakers of MENA countries. Because this study shows a negative but statistically significant relationship between competition and NPL, whereas the Z-score shows a positive and statistically significant relationship between competition and financial stability, policymakers should create lower competitive banking markets in emerging (MENA) countries. Banks in the MENA region need to enhance their methods of managing and monitoring their non-performing loans. As a result, the level of credit risk can decrease, resulting in increased financial stability. Policymakers and other stakeholders need to modify the risk they assume and their level of financial stability based on ownership structure. Notably, stakeholders in this region can concentrate their attention on Islamic banks because, compared to alternative ownership arrangements, Islamic banks have proven to be superior. This study found that, if loan quality increases, credit risk increases, thus reducing financial stability in MENA countries. This study also found that, if loan composition increases, NPL would increase, reducing financial stability in MENA countries. It also suggests that quick improvements should be made in this region to both the loan quality and loan composition to reduce financial disruption, which would lead to financial stability in MENA countries.

Additionally, competition among banks reduces each bank's market share and clientele, exceptionally when supply is constrained. Reduced profit margins for each service might result from a competitive market's need to cut prices to remain competitive. It should be kept in mind, too, that increased competition might push banks to take more significant risks. Increased risk taking may result in a financial market catastrophe and an economic crisis. Finally, policymakers should apply considerable policies to alleviate credit risk for boosting financial stability in a lower competitive environment, and investors can be aware of putting their money in a bank ownership structure.

This study uses dummy ownership variables, which is the main limitation of this study. Future researchers should focus on concentrated ownership patterns and regulatory variables to address the impact of macroeconomic prudential policies. By adding these variables, future researchers can improve this research.

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Note

[1] https://www.worldbank, accessed on 15 May 2022.

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