Financial inclusion, competition and banking stability: Evidence from MENA countries

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ABSTRACT

Prior studies have shown in the finance industry that bank stability and financial inclusion are related, but the study on the role of the financial sector in influencing this relationship remains underexplored. This study aims to determine whether increased access to financial services leads to greater stability or introduces risks to the concentrated banking market. The research examines panel data from 96 banks across 13 Middle Eastern and North African (MENA) countries between 2010 and 2022. The empirical methods employed include the system Generalized Method of Moments (GMM) and fixed-effects panel regressions. Principal component analysis (PCA) is used to develop a composite financial inclusion index that considers access, consumption, and depth. The findings indicate that financial inclusion, particularly the access component, has the potential to enhance bank stability. However, this stabilizing effect is less pronounced and may even invert under conditions of high market power of banks. These negative impacts are most significant in countries within the lowest quartile of financial inclusion, suggesting that increasing access to monetary services could inadvertently lead to systemic risks in less competitive banking systems. These results highlight the importance of aligning financial inclusion policies with measures that promote competition. For policymakers in the MENA region, the optimal approach to improving access involves offering services through branches, ATMs, and digital channels, complemented by regulatory reforms aimed at ensuring stability without introducing additional risks.

Contribution/Originality: This study contributes to the current literature by evaluating the moderating impact of bank competition on the relationship between financial inclusion and stability. It involves PCA-based indices and GMM estimation and is among the limited studies examining MENA banks, using empirical evidence and policy implications for competitive, inclusive financial systems.

1. INTRODUCTION

The inclusion of financial services is a crucial engine for economic growth as well as poverty alleviation, particularly among families in emerging nations (Allen, Demirguc-Kunt, Klapper, & Peria, 2016; Demir, Pesqué-Cela, Altunbas, & Murinde, 2022; Demirgüç-Kunt, Klapper, Singer, & Van Oudheusden, 2015). Previous research (Ahamed & Mallick, 2019; Beck, Demirgüç-Kunt, & Pería, 2011; Čihák, Mare, & Melecky, 2016; Demirgüç-Kunt, Beck, & Honohan, 2008; Poghosyan & Čihak, 2011) suggests that financial inclusion improves customer aggregation, reduces banks' reliance on wholesale sources of capital, and promotes stability. Studies by Han and Melecky (2013); Han and

Melecky (2017) and Ahamed and Mallick (2019), and Danisman and Tarazi (2020) examined the resilience of bank funding during a crisis. These findings also yield evidence that augmenting access to deposits, savings use, ownership of an account, and e-payments does indeed increase the strength and consistency of the banks.

Concurrently, there has been a renewed interest in the relationship between sustainability and bank sector competitiveness, particularly during the GFC of 2007–2008 (Fu, Lin, & Molyneux, 2014). The competition-fragility and competition-stability hypotheses are the two opposing theories that have emerged from the literature. According to the competition-fragility theory, rivalry in the banking industry puts additional strain on earnings, encouraging banks to take on excessive risk, resulting in increased fragility. Furthermore, in an intensely competitive financing environment, banks receive fewer informative benefits from their connections with borrowers, reducing their incentive to scrutinize those who borrowed and expanding the risk of instability (Agarwal & Ben-David, 2018; Allen & Gale, 2000; Allen & Gale, 2004; Boot & Greenbaum, 1995; Dell'Ariccia & Marquez, 2004; Saif-Alyousfi, Saha, & Md-Rus, 2020). However, on the contrary, the competition-stability hypothesis claims that marketplace dominance may influence such behaviors of a bank, such as attempting to charge higher interest rates. This subsequently induces borrowing companies to take higher risks, increasing the likelihood of overdue loans (Boyd & De Nicolo, 2005). Moreover, a more consolidated financial system with fewer banks leads policymakers to consider bank collapse and bailout policies towards troubled banks. This has resulted in a situation of being too big to fail, where public policymakers intervene to rescue ailing banks by offering subsidies. As a result, banks with substantial market dominance are more inclined to take risks, thereby increasing their vulnerability (Albaity, Mallek, & Noman, 2019; Fu et al., 2014; Goetz, 2018; Mishkin, 1999). Have all published research validated the competition-stability hypothesis? However, some authors have demonstrated that the association between competitive edge and the banks' financial soundness is either ambiguous or negligible (Arping, 2019; Bandaranayake, Das, & Reed, 2020; Zigraiova & Havranek, 2016).

A limited number of studies have examined the relationship between financial services accessibility and the stability of the banking industry (Ahamed & Mallick, 2019; Sha'ban, Girardone, & Sarkisyan, 2020) and they have mostly concentrated on a worldwide level. As such, a gap exists in the literature on this relationship at the regional level, especially for emerging market economies and developing countries.[1] Countries within the EU and GCC often strive to integrate their economic, political, and social structures at the regional level. This regional integration frequently results in spillover effects from cross-border trade, commerce, and banking services. Therefore, a regional examination of access to financial services with banking sector stability may expand existing understanding and open up new avenues for research into the implications of access to financial services with banking sector stability.

To deepen the understanding, the study is the first to examine the controlling role of rivalry on the association across the MENA region. In this sense, the research sheds light on a very essential aspect of the bank's financial soundness. Additionally, the findings contribute to current research on access to financial services and banking sector stability by providing a regional perspective, since the latter bodies of work focus on global samples.

The remaining study is organized in the following order: Section 2 presents the data, sample, and methodology employed. Section 3 presents and examines the findings. Finally, Section 5 offers a conclusion and recommendations for policy.

2. DATA AND METHODS

2.1. Data And Variable Description

Based on data availability in 13 MENA countries, 96 banks have been selected for the study. Orbis Bank Focus is used to obtain consolidated bank data. Macroeconomic statistics and financial inclusion data are sourced from the

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[1] "Some studies have examined the link between financial inclusion, competition and bank stability at regional levels (Leroy & Lucotte, 2017)".

World Development Indicators (WDI), the Financial Access Survey (FAS) database, and the International Monetary Fund (IMF). The final sample spans the years 2010–2022.

2.1.1. Bank Z-Score

Following previous research, Beck, De Jonghe, and Schepens (2013) and Fu et al. (2014) the Z-score is used to assess the resilience of banks. It is derived as follows:

$$Z_{i,t} = \frac{ROA_{i,t} + ETA_{i,t}}{\sigma ROA_{i,t}} \quad (1)$$

Where $ROA_{i,t}$ Is the Return on Assets of the bank i at time t, $ETA_{i,t}$ is the Equity-to-Asset ratio of the bank i at time t, and, $\sigma ROA_{i,t}$ is the SD of the ROA of the bank i at time t estimated using a three-year rolling average. Return on Average Assets (ROAA), accounts for average asset values over time. Consistent with Beck et al. (2013) $ln(\sigma ROA)$) is multiplied by -1 to account for an improvement in the resilience of banks and the interpretation of the Z-score.

2.1.2. Financial Inclusion Indices

Sha'ban et al. (2020) technique is employed to evaluate financial inclusion using three variables: use, access, and depth. The FI index is measured as below.

$$FI\ Index_{j,t} = Use_{j,t} + Access_{j,t} + Depth_{j,t} \quad (2)$$

Where, Use is the overall amount of deposit accounts with banking institutions for each 1,000 individuals, and the amount of loan accounts with industrial banks for each 1,000 individuals; Access corresponds to the number of commercial bank branches per 100,000 individuals, and the number of Automated Teller Machines (ATMs) per 100,000 individuals; Depth is the amount of unpaid deposits and credits with industrial banks as a percentage of GDP; as well as bank credit to autonomous companies individually.

First, all six access indicators are normalized to financial services indicators. Following that, PCA is then used to allocate weights to each indicator in each of the three dimensions. The weightings obtained from the main component analysis are then applied to the normalized indicators in each dimension.

2.1.3. Competition Measure

The "Lerner index" is used in evaluating banks' position in the market. It assesses the difference between the average price and the marginal cost above the average price, as well as the degree to which banks raise their prices over the marginal cost (Berger, Klapper, & Turk-Ariss, 2009; Fu et al., 2014). It also evaluates market power on a scale of 0 to 1, with lower scores indicating a more competitive banking sector and higher scores suggesting a less competitive industry. It is designed to serve the following purpose:

$$Lerner_{i,t} = \frac{P_{i,t} - MC_{i,t}}{P_{i,t}} \quad (3)$$

Where $P_{i,t}$ represents the selling price of all assets for bank i at time t. $MC_{(i,t)}$ represents the marginal cost of producing an extra unit of output for bank i at time t. The marginal expense is calculated using "Stochastic Frontier Analysis (SFA)."

2.1.4. Descriptive Statistics

Table 1 presents the main highlights for the factors explored in this study. The average bank Z-score is 3.92, with a standard deviation of 1.28, implying that the typical bank's ROA must be reduced by 3.92 SD to remove equity capital. The Lerner index average score is 0.82, indicating strong market power in the MENA area, with a maximum recorded market power of 0.98. The financial inclusion index (FI index) averages 0.3, while the use, access, and depth dimensions have averages of 0.08, 0.25, and 0.18.

Table 1. Descriptive Statistics.

Variables	Mean	Standard deviation	Min.	Max.	No of Obs.
Panel A: Bank-Level measures					
ln(Z-score)	3.927	1.280	0.042	8.251	1,423
-ln(sd(roaa)	0.537	0.663	0.005	2.897	1,423
Lerner index	0.824	0.065	0.451	0.982	1,128
Bank Size	15.266	2.138	10.219	19.639	1,423
Loan ratio	0.461	0.238	0.000	1.261	928
Loan loss provision	0.031	0.046	0.000	0.579	1,301
Income diversification	43.107	53.827	-1385.984	345.927	1,423
Management quality	0.796	0.162	0.007	0.997	1,419
Capitalization	21.648	22.159	3.433	96.122	1,422
Panel B Country-level data					
Financial inclusion index (FI index)	0.300	0.112	0.072	0.487	458
Use	0.082	0.035	0.011	0.188	588
Access	0.251	0.097	0.023	0.519	1,004
Depth	0.186	0.108	0.012	0.444	885
ln (GDP per Capita)	10.841	2.682	6.067	19.001	1,303
Inflation	7.107	26.395	-4.863	359.093	1,232

2.2. Methods

To evaluate the association of access to financial services with resilience of banks, along with the moderating role of competitive edge, the equation below is used for banks i in a region j at time t.

$$Stability_{i,j,t} = B_0 + \beta_1 FI_{j,t-1} + \beta_2 Market\ power_{i,j,t-1} + \beta_3 FI_{j,t-1} * Market\ power_{i,j,t-1} + \beta_4 \sum_{n=1}^{6} X_{1_{i,j,t-1}} + \beta_5 \sum_{n=1}^{2} X_{2_{j,t-1}} + \theta_i + v_j + \gamma_j + \varepsilon_{i,j,t} \qquad (4)$$

where $Stability_{i,j,t}$ is an indicator of bank stability (Z-score and $-ln(\sigma ROA)$), $FI_{j,t-1}$ is the financial inclusion measure for the region, $Market\ power_{i,j,t-1}$ is the measure of the bank, $X_{1_{i,j,t-1}}$ refers to bank-specific controls, $X_{2_{j,t-1}}$ refers to country controls. θ_i denotes bank-level fixed effects, v_j represents country constant impacts, γ_j denotes year-fixed effects and $\varepsilon_{i,j,t}$ is the factor of error.

3. RESULTS AND DISCUSSION

3.1. Main Results

Table 2 highlights the key findings. Columns 1-4 demonstrate the findings employing the bank's Z-score as the dependent variable, whereas Columns 5-8 present the results using the inverse of the SD of ROA. To decrease potential endogeneity induced by using variables from the same period, the explanatory variables and controls (bank-specific and country-level) are lagged by one year in each case.

The coefficients for access to financial services (financial inclusion) indicators show a beneficial correlation between all three dimensions of access to financial services and banks' financial soundness; however, only the Access dimension index is statistically significant. The favorable and highly significant coefficient for the Access dimension index is consistent with earlier research (Čihák et al., 2016) and those mentioned above. It is also discovered that the Lerner index is positively connected to bank resilience. This data lends support to the competition-fragility hypothesis, demonstrating that a bank's dominant market position correlates with a stabler banking sector (Beck, 2008; Beck et al., 2013).

The interaction of access to financial inclusion with the Lerner index, a negative connection across Columns 1-8 of Table 2.

Nonetheless, only Columns 3 and 7 show statistically significant coefficients for the Access dimension indicator of financial inclusion. This study demonstrates that when banks have market dominance, having access to monetary services exerts a detrimental influence on their stability. Furthermore, coefficients in Column 3 indicate that, in the

context of bank market dominance, a one-standard-deviation increase (equal to 0.097 from Table 1) in the Access Dimension dimension index of access to financial services reduces the banks' Z-score by 6.62% (0.097*68.274). Similarly, Column 7 demonstrates that in the presence of the bank's dominance in the market, a one-standard-deviation rise in the access dimension index of access to financial services increases the SD of ROAA by 7.92% (11.995*0.663). These results are financially significant, showing that enhanced financial inclusion through additional branches and ATMs in a less competitive banking system may harm bank stability. This implies that in concentrated markets, increasing access does not diminish risk-taking and may weaken stability. Thus, it suggests that financial inclusion will negatively influence bank stability when the banking industry is less competitive, most likely due to a lack of diversification in loan portfolios or lending activities.

3.2. Robustness

In the following section, robustness tests are conducted to determine the strength of the statistically significant outcomes from the previous section. We initially re-estimate Equation 4 with the "Two-Step System GMM" to account for potential endogeneity. Second, we use "Quantile Regression" to assess the reliability of our conclusions over various sections of the dependent variable's conditional distribution. For the "Two-Step System GMM" (Blundell & Bond, 1998), we define an efficient variance-covariance estimator and employ the bank-specific controls' first lags as instruments. Table 3 displays the framework's GMM estimates for the influence of the Access Dimension Index of Financial Inclusion on the bank's financial soundness. The Arellano-Bond (AR) test verifies that there is no second-order serial correlation, and the Hansen J p-value indicates that the non-significant (null) hypothesis of overidentified items cannot be rejected.

Table 2. Results of fixed-effects regression examining bank stability, financial inclusion, and competition.

Variables	(1) ln(Z-score)	(2) ln(Z-score)	(3) ln(Z-score)	(4) ln(Zscore)	(5) −ln(sd(roaa))	(6) −ln(sd(roaa))	(7) −ln(sd(roaa))	(8) −ln(sd(roaa))
FI index	−5.449 (68.075)				−7.341 (6.182)			
Lerner index	−2.363 (20.774)	11.653 (9.760)	19.805*** (6.284)	9.799 (6.374)	−3.204 (2.325)	0.748 (2.185)	2.860* (1.501)	0.782 (0.887)
FI index × Lerner index	11.848 (75.378)				9.709 (6.781)			
Use dimension index		121.231 (77.319)				10.908 (20.041)		
Use dimension × Lerner index		−153.606 (99.691)				−13.901 (25.363)		
Access dimension index			48.671*** (17.943)				8.898** (3.967)	
Access dimension × Lerner index			−68.274*** (21.160)				−11.955** (4.893)	
Depth dimension index				34.921 (27.485)				4.420 (3.346)
Depth dimension index × Lerner index				−40.683 (34.434)				−4.912 (4.296)
Size of bank	0.426 (0.328)	0.335 (0.301)	0.250 (0.247)	0.182 (0.271)	0.026 (0.037)	0.021 (0.053)	0.036 (0.048)	0.018 (0.044)
Loan ratio	−0.192 (0.830)	−0.722 (0.777)	0.193 (0.641)	0.487 (0.704)	−0.147 (0.164)	−0.213 (0.166)	−0.024 (0.131)	0.016 (0.139)
Loan loss provision	−8.918 (6.170)	−21.029*** (7.109)	−7.878 (6.127)	−0.347 (6.106)	−1.240 (0.765)	−4.163*** (1.120)	−1.499 (1.157)	−0.053 (1.076)
Income diversification	−0.005 (0.009)	0.007** (0.004)	0.007 (0.005)	−0.007 (0.007)	0.000 (0.001)	0.002*** (0.001)	0.002** (0.001)	−0.001 (0.001)
Capitalization	0.004 (0.038)	−0.016 (0.026)	0.013 (0.024)	0.017 (0.035)	−0.009* (0.005)	−0.014** (0.006)	−0.008 (0.006)	−0.005 (0.007)
Management quality	1.448 (1.748)	3.463*** (0.984)	3.334*** (0.764)	1.456 (1.252)	0.261 (0.191)	0.874*** (0.187)	0.928*** (0.179)	0.437** (0.211)

GDP per capita	−0.275	−0.909	0.208*	0.216	0.115	−0.128	0.057***	0.028
	(3.734)	(1.551)	(0.123)	(0.244)	(0.475)	(0.277)	(0.021)	(0.039)
Inflation	−0.046	−0.006	−0.007	−0.054*	0.005	−0.001	0.001	−0.004
	(0.047)	(0.005)	(0.009)	(0.031)	(0.006)	(0.001)	(0.003)	(0.006)
Constant	0.648	−1.975	−20.111***	−10.788	0.268	−0.190	−4.482***	−1.968*
	(32.021)	(18.776)	(7.015)	(7.307)	(4.081)	(3.468)	(1.418)	(1.166)
Observations	257	358	509	425	257	358	509	425
R-squared	0.151	0.454	0.348	0.176	0.256	0.521	0.416	0.234
Number of banks	39	43	65	61	39	43	65	61

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

Table 3. Estimation outcomes using the dynamic panel system GMM approach.

Variables	(1) ln(Z-score)	(2) –ln(sd(roaa))
Lagged ln(Z-score)	0.452*** (0.143)	
Lagged –ln(sd(score))		0.579*** (0.208)
Access dimension index	63.132** (46.801)	18.256* (10.655)
Lerner index	20.040** (9.141)	4.880* (2.496)
Access dimension × Lerner index	–76.051** (36.513)	–21.404* (12.854)
Bank Size	–0.443 (2.159)	0.269 (0.290)
Loan Ratio	1.529 (2.201)	0.045 (0.316)
Loan Loss Provision	–23.829 (37.051)	–5.910 (6.153)
Income Diversification	–0.009 (0.031)	–0.006 (0.004)
Capitalization	0.034 (0.077)	0.011 (0.018)
Management Quality	2.188 (3.875)	0.650 (0.597)
GDP per Capita	–0.437 (1.542)	–0.367** (0.178)
Inflation	0.003 (0.025)	0.000 (0.006)
Constant	–19.591 (16.576)	–1.977 (3.057)
Hansen (p-value)	(1.000)	(1.000)
AR(2)	(0.533)	(0.802)
Bank fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	422	422
Number of banks	59	59

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

Table 4 shows the quantile regression outcomes linking bank stability with financial inclusion and competition. Quantile regression was performed at the 25th, 50th, and 75th quantiles with bootstrapped standard errors. It was predicted that the model would incorporate bank-year fixed effects.

The outcome results suggest that the correlation factor of access as well as the Lerner index, has a negative and highly significant influence in the first quartile (25th quantile), but not in the median (50th quantile) or 75th quantile, for bank Z-scores in Columns 1–3.

Overall, robustness tests corroborate the key findings: bank competition exerts a strong negative regulating effect on the association between access to financial services and the financial stability of banks in countries with lower quantile distributions of the access dimension index of financial inclusion.

Table 4. Quantile regression linking bank stability with financial inclusion and competition.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Bank Z-score			-ln(sd(roaa)		
	(0.25)	(0.50)	(0.75)	(0.25)	(0.50)	(0.75)
Access dimension index	39.641*	38.397	36.624	4.557	3.441	2.066
	(21.807)	(33.576)	(35.603)	(5.169)	(4.054)	(3.704)
Lerner index	14.494**	17.150	16.764*	2.177	1.433	0.777
	(6.071)	(11.196)	(10.143)	(1.835)	(1.484)	(1.331)
Access dimension index × Lerner index	-55.946**	-55.249	-56.701	-7.257	-4.833	-3.324
	(24.819)	(41.310)	(42.812)	(6.366)	(4.889)	(4.294)
Bank size	0.129	0.089	0.536	0.025	0.037	0.052
	(0.531)	(0.556)	(0.596)	(0.063)	(0.085)	(0.070)
Loan ratio	-0.101	0.502	0.209	-0.025	0.064	0.008
	(0.775)	(0.742)	(0.863)	(0.113)	(0.091)	(0.084)
Loan loss provision	1.082	-5.323	-6.916	-1.587	-1.499	-0.674
	(9.023)	(8.883)	(8.158)	(1.525)	(1.688)	(1.362)
Income diversification	0.011	0.007	0.010	0.002	0.001	0.001
	(0.007)	(0.007)	(0.007)	(0.002)	(0.001)	(0.001)
Capitalization	0.009	0.025	0.025	-0.008	-0.003	-0.001
	(0.043)	(0.044)	(0.041)	(0.008)	(0.007)	(0.006)
Management quality	4.300***	3.272**	3.871***	0.991***	0.657***	0.552**
	(1.199)	(1.375)	(1.117)	(0.233)	(0.206)	(0.217)
GDP per capita	0.479	0.263	0.110	0.107	0.043	0.020
	(1.066)	(1.190)	(1.020)	(0.104)	(0.126)	(0.079)
Inflation	-0.012	-0.009	0.001	-0.004	-0.002	0.001
	(0.010)	(0.012)	(0.014)	(0.004)	(0.004)	(0.002)
Constant	-19.169	-17.290	-21.145	-4.417**	-3.159	-2.411
	(13.007)	(17.969)	(17.381)	(1.788)	(2.409)	(1.760)
Ban-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Equality Test	Quantile	F-Statistics	p-value	Quantile	F-Statistics	p-value
Access dimension × Lerner index	0.25 vs 0.50	0.000	0.988	0.25 vs 0.50	0.14	0.705
Observations	509	509	509	509	509	509

Note: * p < 0.10, ** p < 0.05, *** p < 0.01. Bootstrapped standard errors are in parentheses.

4. CONCLUSION AND POLICY IMPLICATIONS

The present study examined the mediating influence of banking industry competition between access to financial services (financial inclusion) and banking sector stability as obtained in 13 MENA countries. Multiple regression models show that finance improves bank stability; however, the impact is negative in areas with high bank market dominance. The estimates obtained are resistant to endogeneity issues, which are validated by the estimation of "Two-Step System GMM". The "Quantile Regression" also demonstrates that the negative moderating influence of market dominance has a major effect on the outcomes of banking institutions in countries that rank in the bottom quartile of the Access Dimension Index of financial inclusion. As a whole, the research demonstrates the presence of significant market power can undermine the stability advantages of financial inclusion.

This beneficial relationship between access to financial services and banking sector stability implies that there is a need for strengthening the presence of financial systems promoting inclusion. Nevertheless, in order to reap all of these benefits, authorities must address the concentration of dominance in the sector of banking. For low-access countries, financial infrastructure development, digital banking facilitation, and expanded outreach to underbanked communities should be prioritized. In moderate-access environments, they ought to combine the inclusion policies with reforms carrying down boundaries to smaller banks and fintechs to drive competition, such as in the developing fintech environment in MENA, sponsored by permitting regulations (McKinsey, 2025). Meanwhile, in countries with high market power that have made significant access improvements, policies to boost competition, such as the Saudi

Arabian Open Banking Framework, can be used to ensure that the improved access results in enhanced stability (Saudi Central Bank (SAMA), 2022, 2023).

This layered, context-based policy framework integrates plans with each country's level of financial inclusion and banking market structure to ensure that inclusion, growth, and competition work together to strengthen bank stability.

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