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The Impact of Risk Taking and Institutional Quality on MENA Region Banking Performance

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Abstract

This study analyzes banking profitability by examining the impact of bank risk taking and institutional quality on the performance of banks operating in the MENA region between 1999 and 2021. Using the generalized method of moments (GMM) panel data estimator, we identify that banking performance is influenced by specific-bank variables, country-level macroeconomic variables, and the quality of institutions. Our findings demonstrate that an increase in the capital requirement ratio and banks' size has a positive impact on the Return on Assets ratio (ROA), while the Non-Performing Loans to Gross Loans ratio (NPL) and Liquidity (LIQ) have a negative effect on banking performance. It is evident that banks under study expand their interest rates in line with economic growth and high inflation rates, negatively influencing banking performance. Additionally, we find that control of corruption and political stability leads to an increase in banking profitability, whereas the rule of law negatively affects banking profitability.

Keywords: banking performance, bank-risk taking, institutional quality, capital requirements, MENA region

1. Introduction

The past decade has witnessed a radical transformation in the banking sector due to rapid financial market innovation and the internationalization of financial flows. Technological advancements and deregulation have not only created new opportunities for banks and nonbanks but have also intensified competition within the industry. In the late 1980s, profits from traditional banking activities started to decline, coinciding with the rise in capital adequacy standards. Responding to these challenges, banks demonstrated resilience by venturing into new sectors with strength and imagination (Hirsch-kreinsen, 2000). The expansion of international financial markets and the proliferation of financial instruments have provided banks with diversified access to finances, underscoring their crucial role in economic growth. Banks, through the financial services they offer, maintain an indelible connection to economic growth, acting as catalysts for stability and growth. The stability of the financial sector hinges on the profitability and capital sufficiency of banks. Given their dynamic structure and the intricate economic environment they navigate, banks encounter various risks (Heinlein, 2019). Koch and MacDonald (2014) classify these risks into six categories: credit risk, liquidity risk, market risk, operational risk, nominal risk, and legal risks. Each of these risks carries the potential to adversely impact the profitability, market value, liabilities, and equity of financial institutions.

Credit risk, characterized by the possibility of partial or complete loss on outstanding loans due to late payment, stands out as a significant risk for banks. The Basel Committee on Banking Supervision identifies credit risk as a key factor increasing the marginal cost of debt and equity, thereby elevating the cost of bank funding. With an expanding exposure to credit risk, the likelihood of financial disasters rises. Credit creation, a primary income source for banks, introduces risks for both lenders and borrowers, particularly when contractual obligations are not met. High credit risk increases the probability of financial disaster and bankruptcy, posing a threat to depositors. Effective credit risk management has become paramount for the survival and growth of financial institutions, impacting their profitability and contributing to economic stability (Ekinci & Poyraz, 2019). However, in response to the recent global financial crisis, the Basel Committee on Banking Supervision introduced Basel III, proposing additional rules for capital, leverage, and liquidity to fortify banking regulation,

supervision, and risk management. The new standards necessitate banks to retain more and higher-quality capital than Basel II guidelines required. While regulators worldwide are moving toward adopting the new accord, the recent financial crisis underscores the imperative to comprehend the causes of bank risk in a low-capital environment (Festic, 2011).

Regarding MENA region, the deregulation policies implemented in various countries of this region during the 1990s have effectively heightened competition within their banking markets. Concurrently, financial reforms instituted by regulatory authorities in the MENA region have significantly impacted the number of banks and market structure, resulting in a simultaneous increase in both. This evolution has had diverse effects on the performance and profitability of MENA banking sectors, showcasing a distinctive pattern following the implementation of reform policies and financial deregulation. Consequently, the MENA region seems to be an attractive case study to explore the correlation between risk-taking, economic environment, institutional environment and banking performance, emphasizing the need to consider the changes in banking market structures and the influence of risks on the performance of banks in the region.

This study aims to test the influence of bank risk taking and institutional environment on banking performance in the MENA region, utilizing a sample of 188 banks spanning the period from 1999 to 2019 and employing a system GMM method. The novelty of this research lies in its connection of banks' performance with risk taking, revealing that the latter significantly determines the former.

The study unfolds as follows: *Section 2* presents the literature review and hypothesis development, *Section 3* illustrates the methodology and variables specifications, *Section 4* details the data and sources, *Section 5* delves into the empirical results, *Section 6* shows the robustness tests of our empirical results, and, finally, *Section 7* offers the conclusion.

2. Literature Review

2.1 The Impact of Capital Requirements on Banking Performance

Capital plays a pivotal role in enhancing banking performance, instilling confidence among depositors and the public. In an examination of the impact of capital requirements on risk-taking and banking performance in the Middle East and North African (MENA) region, Bitar, Saad, and Benlemlih (2016) discover that higher capital ratios correspond to larger loan loss reserves, increased efficiency, and greater profitability. This influence is more pronounced for too-big-to-fail institutions and in well-governed countries, fostering conservative lending, improved risk management, and enhanced supervision. In a similar vein, Lee and Hsieh's (2013) study, employing the Generalized Method of Moments (GMM) on data from 42 Asian countries (1994–2008), demonstrates that higher capital ratios positively affect bank profitability. Banks with robust capital buffers exhibit greater profitability due to their capacity to absorb losses, enabling them to undertake more risk. Paradoxically, higher capital ratios are associated with reduced risk, as these banks have less incentive to engage in speculative activities. Neyapti and Nergiz Dincer (2014) further support this, emphasizing the role of legal quality in reducing non-performing loans and promoting efficient resource allocation. Additionally, the impact of bank capital on profitability and risk is contingent on financial regulations. Countries with robust financial regulations exhibit a stronger relationship between bank capital and performance. During economic crises, this impact intensifies, as banks may pursue riskier investments to secure profits. Kim and Santomero (1988) contribute by highlighting the positive relationship between capital requirements and risk-taking, asserting that banks with lower capital are more prone to failure during financial crises due to their tendency to engage in riskier assets. Despite the potential unintended consequences of regulatory arbitrage, the authors advocate for capital regulation as an effective means to reduce the riskiness of banks, emphasizing the importance of balancing risk reduction with regulatory efficiency in setting capital requirements. Moreover, Alshatti (2016) contends that the determinants of capital adequacy, capitalization, and leverage positively impact the profitability of Jordanian banks, assessed by Return on Assets (ROA) and Return on Equity (ROE) ratios. Similarly, the research of Majumder and Li (2018) found a favorable and notable correlation between bank capital and performance. Specifically, higher capital adequacy ratios, surpassing the minimum thresholds outlined in Basel II, are associated with increased profitability for banks in Bangladesh. Consequently, the following hypothesis arises:

H1: Capital adequacy standards positively affects MENA banking performance.

2.2 The Impact of Credit Risk on Banking Performance

Credit risk stands out as the most significant threat to banks throughout their activities (Chen & Pan, 2012), it entails the loss incurred by the bank when the borrower fails to meet the debt obligation by the due date or loan

maturity, potentially leading to bankruptcy if not managed effectively (Coyle, 2000). Particularly, non-performing loans (NPLs) are a persistent cause of failure in the banking sector. Given that deposits from depositors constitute over 85% of banks' liabilities, the vulnerability of the banking business is pronounced. The impact of credit risk on bank profitability varies significantly within the banking sector. For instance, Ruziqa (2013) investigated the influence of credit risk on financial performance in Indonesian conventional banks from 2007 to 2011. The regression study revealed a substantial negative impact of credit risk on both Return on Assets (ROA) and Return on Equity (ROE). Also, Kargi(2011) found a negative correlation between profitability and loan levels, indicating that credit risk adversely affects the bank's value. In the same context, Dietrich and Wanzenried (2011); Ongore and Kusa (2013); and Islam and Nishiyama (2016) concurred that credit risk detrimentally affects banking profitability. Most recently, Ekinci and Poyraz (2019) explore the influence of credit risk on banks' performance, relying on a dataset encompassing 26 Turkish commercial banks over the period 2005-2017. The findings reveal a negative impact of Non-Performing Loans (NPLs) on both Return on Assets (ROA) and Return on Equity (ROE). This implies that elevated levels of NPLs on a bank's balance sheet diminish profitability, adversely affecting the financial performance of deposit banks in Turkey and resulting in lower ROA and ROE. Furthermore, the relationship between credit risk and financial performance is contingent on macroeconomic conditions, with the negative effect of credit risk on financial performance intensifying during economic recessions. Based on these findings, the following hypothesis is formulated:

H2: Credit risk negatively affects MENA banking performance.

2.3 The Impact of Liquidity Risk on Banking Performance

Banks face significant vulnerability to liquidity risk (Arif & Anees, 2012). Excessive withdrawal of funds by clients contributes to elevated liquidity risk in the banking industry, negatively impacting banking performance by deterring potential clients and manageable buyers. Consequently, the bank's value experiences a substantial decline, leading to a severe reduction in profits (Ejoh, 2014). Liquidity risk, in essence, arises from a bank's incapacity to meet short-term obligations and unexpected outflows of cash (Diamond & Rajan, 2005). In exploring bank profitability and its determinants, Bourke (1989) found that banks with higher liquidity levels tend to earn greater profits. Kosmidou (2008) supports this by noting that banks with ample liquidity typically exhibit good profitability. A study by Chen (2018) utilizing panel data from 12 developed nations spanning 1994 to 2006, delves into the factors influencing liquidity risk and the connection between liquidity risk and bank profitability. The findings reveal a fundamental and inverse relationship between liquidity risk, forecasted by the funding gap, and Return on Assets (ROA) and Return on Equity (ROE). A larger financing gap, indicative of greater liquidity, impacts bank profitability positively according to ROA and ROE. Moreover, Chen, Chen, and Huang (2021) investigate the impact of liquidity risk on bank performance during financial crises. Using data of U.S. banks operating between 1996 and 2013, the authors reveal a significant negative influence of liquidity risk on bank performance during the subprime crisis of 2007-2009. Banks with higher liquidity risk experienced lower survival probabilities, decreased Return on Assets, reduced net interest margins, and an increased loan loss provision reserve. This adverse effect was more pronounced for banks with lower capital ratios and higher credit risk, particularly impacting small banks with total assets below 1 billion US dollars. Building on these observations, this study proposes the following hypothesis:

H3: Liquidity risk negatively affects MENA banking performance.

2.4 The Impact of Economic Environment on Banking Performance

The concept of the "economic environment" encompasses all external economic factors influencing consumer and business purchasing behaviors, thereby impacting a company's performance. These elements, often beyond a company's control, can range from macro to micro scales. Crucial macroeconomic indicators include GDP and inflation. As per Hassan and Bashir (2003), the macroeconomic environment and regulatory tax variables positively influence bank profitability, while the scale of the banking system has a negative impact. Real GDP growth enhances banking performance through three key channels: net interest income, loan loss reduction, and operating costs (Jiménez, 2009; Bolt, 2012; & Calza, 2006). Firm profitability rises in economic upturns and falls during recessions. Therefore, robust GDP growth boosts company loans and deposits, improving banks' net interest revenue and reducing loan losses. Additionally, higher GDP growth leads to increased disposable income, lower unemployment, and decreased consumer credit defaults. Consequently, net interest income and loan losses correlate with GDP growth. Regarding inflation, Demirgüç-Kunt and Huizinga, (1999) suggest that high inflation positively impacts bank performance due to effective expense management, a finding corroborated by Bashir (2003) in the Middle Eastern Islamic banking sector. In addition, Naili and Lahrichi (2022) apply the GMM technique on a sample of 53 banks from MENA emerging markets spanning the period 2000 to 2019. The

authors identify that macroeconomic factors, such as slowing GDP growth, rising unemployment, and increasing inflation, heighten the riskiness of banks' loan portfolios. In emerging markets, these factors exert a stronger influence compared to developed markets, likely attributed to the greater volatility and less developed financial systems inherent in emerging economies, making them more susceptible to economic shocks. Building on these observations, the study proposes the following hypothesis:

H4: Improvements in the MENA region economic environment positively affects banking performance.

2.5 The Impact of Institutional Environment on Banking Performance

The overall quality and effectiveness of institutions and regulatory frameworks within a specific country or region can significantly impact banking performance. On one hand, Dinc (2005) suggests that state-owned banks markedly increase lending during election years, implying that politicians may exploit their influence to shape bank loans for personal gain. Similarly, Khwaja and Mian (2005) demonstrate that politically connected enterprises secure more bank loans but face a higher default rate. In terms of the legal environment, Arias, Maquieira, and Jara (2020) emphasize the importance of a legal framework that provides protection for both creditors and borrowers. A higher level of legal protection empowers banking systems to improve collateral quality, elevate debt recovery rates in case of borrower default, and compel debt payment, all contributing to an enhancement in banking sector performance. Additionally, a study by Athari (2021) reveals that domestic political stability positively influences Ukrainian banks' profitability, while global economic policy uncertainty has a negative effect. The results underscore that increased profitability in Ukrainian banks is closely tied to reduced levels of domestic political and global risk.

In the context of emerging economies, Athari et al. (2023) assert that clear and robust regulatory frameworks play a crucial role in promoting responsible lending practices and minimizing risk-taking behavior. Elevated corruption levels undermine confidence in the financial system and intensify credit risk. Furthermore, political stability contributes to economic growth and establishes a more predictable environment for banks to navigate, while the enforcement of the rule of law is essential in ensuring fair and efficient contract enforcement, thereby reducing credit risk. Moreover, Hakimi, Hamdi, and Khemiri (2023) utilize the System Generalized Method of Moments (SGMM) on a sample of 83 conventional banks operating in MENA countries during the period 2005–2020. The authors find that the positive impact of financial freedom on bank profitability is more pronounced for more diversified banks. Therefore, governments in the MENA region should foster financial and economic freedom to enhance the banking sector's performance, and banks in the MENA region should diversify their activities to mitigate risk and bolster profitability. Furthermore, Athari and Bahreini (2023) indicate that robust external governance, marked by elements such as political stability, regulatory quality, adherence to the rule of law, and effective control of corruption, substantially boosts the profitability of Islamic banks in the Arab markets spanning the years 2003 to 2017. These characteristics cultivate confidence in the financial system, stimulate economic activity, and diminish uncertainty, thereby contributing to improved operational performance and financial returns.

Regarding the rule of law, Dutra, Teixeira, and Dias (2023) investigate how banking regulation influences banks' risk through the lens of investors' protection, considering three fundamental factors: activity restrictions, capital stringency, and supervisory power. The authors' findings, derived from panel data covering a sample of 535 banks from OECD countries during the period 2004–2016, indicate that investor protection enhances the positive impact of activity restrictions and capital requirements on bank risk. This implies that investors are more inclined to accept higher levels of risk from banks when they enjoy sufficient protection. Building on these observations, the study proposes the following hypothesis:

H5: Improvement in the MENA region institutional environment positively affects banking performance.

3. Methodology and Variables

3.1 Measurement of Banking Performance

Risk-taking in banking terms refers to the possibility of something unpleasant happening in the banking sector. In our empirical study, we aim to explain banking performance through risk-taking. Therefore, the ratio of Return on Assets (ROA), serving as a measure of bank profitability, constitutes our dependent variable modeled using a range of control and independent variables. ROA is a ratio that represents how effectively a bank can generate a return on its asset investment and it is computed as:

$$ROA = \frac{Net\ Income}{Total\ Assets}$$

Where a bank with high profits and good performance possesses a high ROA since the ratio reflects the amount of gain or profits. Conversely, a higher ratio of return on assets indicates that banks engage in riskier activities and investments (Birken & Curry, 2021).

3.2 Determinants of Banking Performance

To achieve a more accurate estimation of the correlation between bank-risk taking and banking performance, and to mitigate the risk of omitted-variable bias, we incorporate into the regression certain control variables that were considered in the previous literature as determinants of banking performance. These variables represent the solvency, size, credit risk and liquidity of the banks within their respective banking markets, the macroeconomic conditions of the relevant countries, as well as the regulatory and supervisory context of their banking markets.

First, to investigate the influence of capital requirements on risk and banking performance we include the Capital Adequacy Ratio (CAR), consistent with the studies of Bitar, Saad, and Benlemlih (2016), Yuhasril (2019), and Sunary (2019). The existing literature, including the study by Atmaja and Sujana (2014), reveals a positive and significant impact of CAR on profitability, as measured by ROA. Likewise, the findings of Dwi and Abundanti's (2018) support this relationship, highlighting the positive and significant effect of CAR on ROA. These conclusions align with the results of Samsurizal and Astohar (2016), who ascertain that CAR positively and significantly affects profitability (ROA). A high CAR ratio suggests the bank exceeds the minimum requirements, indicating solvency. Consequently, a higher CAR equips a bank with enhanced capacity to absorb financial crises or unforeseen losses, thereby contributing to improved bank profitability (Beers, 2021). This underscores CAR's potential to positively impact banking performance.

$$CAR = \frac{Total\ Equity}{Total\ Assets}$$

Another crucial factor influencing banks' profitability is banks' size (SIZE), generally representing the natural logarithm of each bank's total assets, as presented on its balance sheet. This logarithmic measure is utilized as an indicator of size and has been employed by Ekinci and Poyraz (2019) and Gupta, Mahakud, and McMillan (2020), as highlighted in our literature review chapter. Its primary purpose is to distinguish between small and large banks. Large banks enjoy more favorable funding conditions, superior credit, and liquidity risk diversification compared to other credit institutions. Larger banks outperform their smaller counterparts due to advantages such as claims on public funds that smaller banks lack. Consequently, we anticipate a positive coefficient for the bank size, indicating a positive impact on profitability.

$$SIZE = ln\ ln\ (Total\ Assets)$$

Moreover, the Non-Performing Loans to Gross Loans (NPL) ratio is a critical factor that banks consider as a proxy of credit risk. NPL ratio in the banking sector serve as an indicator of a bank's ability to manage non-performing loans (Fricilia & Lukman, 2015). Specifically, NPLs are expected to exert a negative impact on ROA. Buchory (2015) emphasizes that the NPL ratio is useful for evaluating a bank's capacity to cover the risk associated with loan payback. Despite previous research findings suggesting an insignificant effect of NPL on ROA (Muttaqin, 2017; Stephani, Adenan, & Hanim, 2017; and Pinasti & Mustikawati, 2018), Martoyo (2005) and Ekinci and Poyraz (2019) argue that the greater the bank's NPL, the less favorable its performance will be. High NPL values result in a decline in ROA, signifying a weakening financial performance of the bank. The NPL ratio is calculated using the following formula (Mandagie, 2021):

$$NPL = \frac{NonPerforming\ Loans}{Gross\ Loans}$$

Finally, the Liquid Asset to Total Asset (LIQ) ratio gauges the speed at which a firm or financial institution can convert its assets into cash. It is calculated by dividing the value of liquid assets (such as cash, marketable securities, and current accounts) by the value of total assets:

$$LIQ = \frac{Liquid\ Assets}{Total\ Assets}$$

This ratio is commonly employed by various authors, including Bhunia, Khan, and Mukhuti (2011), and Manyo and Ogakwu (2013), to investigate the impact of the liquid asset to total asset ratio on banks' profitability. Consequently, firm liquidity is positively associated with profitability (ROA), indicating that prudent investment of liquid assets results in significant returns. Therefore, liquidity is projected to exert a positive impact on banks' profitability.

3.3 Measurements of Economic Environment

This study investigates the impact of two macroeconomic factors, Gross Domestic Product Per Capita (GDPC) and Inflation (INF), on bank profitability. Firstly, GDP is a key indicator of a country's economic health, signifies the size of the economy. A rising GDP indicates economic expansion, stronger spending, and aids investors in making informed decisions, thereby contributing positively to banking profitability (Sultan, 2020). Contrastingly, Jadah, Alghaumin, AL Dahaan, and Al Husainy (2020), Almansour; Alzoubi; Almansour; Almansour (2021) discover a strong negative correlation between inflation and bank financial performance. Secondly, inflation, defined as a continuous increase in the general price level, leads to a loss of currency value, reducing purchasing power. Inflation negatively affects purchasing power, bank exchange rates, opportunity cost, loan policy, business planning, and bank equity performance. However, some argue that inflation can enhance bank performance if banks accurately forecast the future (Ben Moussa, Boubaker & Hdidar, 2021). The Consumer Price Index (CPI) is a reliable measure of inflation, and its anticipated negative impact on bank performance is explored in this study.

3.4 Measurements of Institutional Environment

To address how the quality of the institutional environment where the banks are operating affects their behavior and performance, we incorporate certain institutional features into our model as proxies for a country's institutional quality, extracted from the World Bank Governance Indicators datasets. The variables include corruption control, rule of law, and political stability.

- Corruption Control (COCR): The banking system plays a critical role in a country's economy by facilitating the transfer of funds from lenders to borrowers. However, challenges in the financial system, such as corruption, can impede its effective functioning. After the financial crisis, bank lending experienced a significant decline (Ivanshina, 2009), and corruption is posited to influence bank lending behavior. In many countries, corruption emerges as a major contributor to non-performing loans (Bougatef, 2016; Goel & Hasan, 2011; Park, 2012). Studies by Lambsdorff (2005) and Mauro (1995) highlight the substantial impact of corruption on the economy. Empirical investigations by Hung Son, Liem, Khuong and Luo (2020) reveal a positive relationship between corruption and the ratio of non-performing loans, indicating that corruption weakens the banking sector. Additionally, they find evidence that corruption, through its impact on bad loans, negatively affects economic growth.
- Rule of Law (RLAW): This type of government regulation establishes binding rules, limits, and standards for banks to ensure market transparency in their dealings with individuals and organizations. Arias, Maquieira and Jara (2019) introduce regulatory quality as an indicator of the institutional framework's strength. Cross-country studies explore the impact of regulatory and supervisory policies on banking performance, considering various measures of both performance and regulations. Despite extensive literature on the subject, (Barth, Caprio & Levine 2004; Barth, Lin, Ma, Seade & Song 2013; Ben Naceur & Omran 2011; Delis, Molyneux & Pasiouras 2011; Demirguc-Kunt 2008; Pasiouras, Gaganis & Zopounidis 2006; Pasiouras, Tanna, & Zopounidis 2009), the empirical relationship between regulation and bank performance remains a question due to the diverse nature of regulations and supervisory practices.
- Political Stability (POLS): This indicator analyzes political instability in MENA nations, considering the presence of violence and terrorism. Studies on the effects of conflicts and political instability on the banking sector are limited. Huang (2019) investigated the impact of political instability on banking sector development across 49 countries from 1960 to 2004, finding that political instability adversely affects banks' balance sheets, operational efficiency, and asset and liability allocation. Hasanov and Bhattacharya (2019) explored the effect of political factors on the likelihood of a banking crisis in OECD countries, revealing that higher government stability correlates with a lower likelihood of a banking crisis. Thus, political stability is estimated to have a positive relationship with banking performance.

3.5 Methodology and Model Specification

After explaining and investigating all factors, the chosen approach for testing research questions involves the use of the Generalized Method of Moments (GMM) as an estimator in dynamic panel data. GMM offers the flexibility of one or two-phase analysis based on the homoscedastic or heteroscedastic nature of the weight matrix. For this study, one-step estimators are employed, using a homoscedastic weight matrix for estimation. Labra and Torrecillas (2018) highlight two challenges associated with GMM estimation: instrument proliferation and error serial autocorrelation.

Instrument proliferation refers to an excessive number of instruments, potentially causing overidentification. The Sargan test is employed to assess the sufficiency of instruments and identify overidentification. Additionally, the Arellano and Bond (1991) test is used to address serial autocorrelation of errors. The GMM estimator can be applied as a difference GMM or a system GMM. Following Lee and Hsieh (2013); Gupta, Mahakud, and McMillan (2020); Terraza (2015); Naili and Lahrichi (2022); Bouteska, Büyükoglu and Halil Eksi (2023); Hakimi, Hamdi and Ali Khemiri (2023); Mohammed Sissy, Amidu and Yindenaba Abor (2017), the study employs the Generalized Method of Moments in Difference (DGMM), with the one year lagged dependent variable as an explanatory variable. This approach is currently popular for estimating dynamic panel models.

Considering the above, the proposed equation connects the return on assets ratio (dependent variable) with independent variables representing bank-specific, macroeconomic, and institutional quality.

$$ROA_{i,t} = \beta_0 + \beta_1 ROA_{i,t-1} + \beta_2 BANK\_DETER_{i,t} + \beta_3 MACRO_{c,t} + \beta_4 INST\_QUAL_{c,t} + \varepsilon_{i,t}$$

In this model, i, c and t stand for bank, country and year respectively. The variable $ROA_{i,t}$ stands for the ratio of return on assets while $BANK\_DETER_{i,t}$ is a vector of specific bank variables. That include: the capital adequacy ratio (CAR); bank's size (SIZE); the non-performing loans to gross loans ratio (NPLs) the liquid asset to total assets ratio (LIQ). Furthermore, $MACRO_{c,t}$ is a macroeconomic indicator that tracks the business cycle in a vector form. This represents the indices of a country's economic. The two macroeconomic variables that make up $MACRO_{i,t}$ are the consumer price index (CPI) based inflation rate (INF) and the per capita gross domestic product ($GDPC$). Additionally, $INST\_QUAL_{c,t}$ is a vector of the following institutional quality variables: Corruption Control ($COCR$), Rule of Law ($RLAW$), and Political Stability ($POLS$). Finally, $\varepsilon_{i,t}$ is a white noise random error with a zero mean and constant variance that is supposed to be normally distributed $\varepsilon_{i,t} \sim iid\ (0,\sigma^2)$. The random effects presented by the error term $\varepsilon_{i,t}$ have two orthogonal components: (μ_i) that is the fixed random effects over time and $(\vartheta_{i,j})$ idiosyncratic time-varying random shocks.

Including the lagged dependent variable $ROA_{i,t-1}$ as an explanatory variable in the above model, consistent with the work reported by Arellano and Bond (1991) accounts for avoiding the correlation problems between variables.

4. Data

To estimate our empirical model, in this paper we employ an unbalanced panel data of 188 banks situated in 15 different countries of the MENA region, that are as follows: Algeria (14 banks), Bahrain (6 banks), Egypt (23 banks), Israel (9 banks), Jordan (12 banks), Kuwait (5 banks), Lebanon (24 banks), Malta (7 banks), Morocco (11 banks), Oman (7 banks), Qatar (4 banks), Saudi Arabia (6 banks), Tunisia (14 banks), Turkey (30 banks), and United Arab Emirates (16 banks). Bank-specific data are sourced from the Orbis Bank Focus database, while macroeconomic factors (per capita GDP and inflation) and institutional quality variables are extracted from the World Bank Governance Indicators database. All variables are used annually over the period 1999-2021. *Table 1* displays the descriptive statistics for the variables utilized in examining the relationship between bank risk-taking, institutional quality, and banking performance in the MENA region. Meanwhile, *Table 2* illustrates the correlation matrix of these variables. The matrix indicates a mild correlation among the variables, implying that incorporating all of them into a single model would not result in multicollinearity issues. Notably, concerning the institutional variables, a robust correlation is observed between corruption, political stability, and the rule of law. Consequently, it is advisable to avoid simultaneously incorporating these three institutional variables into the econometric model.

Table 1. Variables descriptive statistics

	Mean	Median	Maximum	Minimum	Standard Deviation	Observations
ROA	0.0130	0.0115	0.3221	-0.3961	0.0184	3937
CAR	0.1235	0.1055	0.9569	-0.0894	0.0912	3937
SIZE	15.2214	15.1830	19.5203	8.4782	1.6796	3937
NPLG	0.0787	0.0442	1.1516	0.0060	0.1268	3937
LIQ	0.3178	0.2538	7.8063	0.1489	0.2450	3937
GDPC	0.0135	0.0179	0.2734	-0.1975	0.0461	3937
INF	0.0678	0.0342	1.5476	-0.0486	0.1225	3937
COCR	-0.0609	-0.1496	1.5672	-1.2297	0.6198	3937
RLAW	0.0315	0.0266	1.6296	-1.0736	0.5542	3937
POLS	-0.5403	-0.6401	1.5994	-2.1168	0.8575	3937
COST	0.0578	0.0484	4.0317	0.0022	0.0796	3937
LLR	0.0605	0.0388	1.0813	0.0256	0.0933	3937
REQU	0.0752	0.0195	1.5761	-1.3034	0.5895	3937

Source: Orbis Bank and author's calculation.

Table 2. Correlation matrix of the dependent variable, bank-specific and macroeconomic explanatory variables

	ROA	CAR	SIZE	NPLG	LIQ	GDPC	INF	COCR	RLAW	POLS	COST	LLR	REQU
ROA	**1**												
CAR	0.343	**1**											
SIZE	-0.017*	-0.361	**1**										
NPLG	0.017*	0.250	-0.227	**1**									
LIQ	0.002**	0.200	-0.357	0.128	**1**								
GDPC	0.031**	-0.005***	-0.057	-0.018***	0.023***	**1**							
INF	-0.065	0.009**	-0.043	0.058	0.171	-0.129	**1**						
COCR	0.091	0.094	0.195	-0.079	-0.266	-0.041***	-0.273	**1**					
RLAW	0.013**	0.032**	0.172	-0.076	-0.222	-0.004***	-0.222	0.900	**1**				
POLS	0.072	0.079	-0.001***	-0.031**	-0.134	-0.066	-0.287	0.698	0.682	**1**			
COST	-0.150	0.023**	-0.115	0.084	0.140	-0.001***	0.319	-0.128	-0.068	-0.121	**1**		
LLR	0.095	0.373	-0.224	0.574	0.167	0.020**	0.043	-0.050	-0.038	0.006***	0.060	**1**	
REQU	-0.011***	-0.015***	0.189	-0.056	-0.200	0.041*	-0.200	0.814	0.870	0.553	-0.060	-0.015***	**1**

Note: ***, **, * implies significant at the 1%, 5%, and 10% level respectively.

5. Empirical Results

The dynamic GMM predictions on the influence of bank risk-taking on banking performance are outlined in T*able 3*, consisting of five regression equations testing various combinations of independent and control factors on the dependent variable. Model I focus solely on bank-specific factors and per capita gross domestic product (GDPC) effects on banking performance. Model II includes the macroeconomic factor inflation (INF) along with previous variables to assess its impact on return on assets (ROA). Model III examines bank-specific and macroeconomic factors, along with control of corruption (COCR), to understand its influence on banking performance. Model IV estimates the effects of bank-specific and macroeconomic factors, including rule of law (RLAW), on banking performance. Furthermore, Model V explores the impact of bank-specific factors, macroeconomic variables, and political stability (POLS) on banking profitability.

To assess the instruments used in the study's one-step estimations, a Sargan J-statistic test was conducted, showing that all models have a J-statistics probability greater than 0.05, indicating the validity of the employed instruments without over-identification. The study examines serial autocorrelation through the Arellano-Bond test. AR (1) and AR (2) tests indicate no autocorrelation among residuals, supporting the null hypothesis of no autocorrelation. Finally, the Durbin-Watson test, performed under the same null hypothesis, also suggests the absence of autocorrelation among error terms, as the values in *Table 3* are close to 2.

Table 3. The impact of bank-risk taking on banking performance – method: GMM

	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	-0.0053*** (0.0018)	-0.0056*** (0.0018)	-0.0054*** (0.0019)	-0.0052*** (0.0018)	-0.0042** (0.0017)
ROA (-1)	0.3013*** (0.1006)	0.3030*** (0.1049)	0.3179*** (0.1047)	0.3038*** (0.1026)	0.3901*** (0.0963)
CAR	0.0667*** (0.0109)	0.0673*** (0.0114)	0.0656*** (0.0113)	0.0682*** (0.0113)	0.0543*** (0.0100)
SIZE	0.0005*** (0.0001)	0.0005*** (0.0001)	0.0005*** (0.0001)	0.0005*** (0.0001)	0.0004*** (0.0001)
NPLG	-0.0065*** (0.0015)	-0.0066*** (0.0016)	-0.0064*** (0.0015)	-0.0069*** (0.0016)	-0.0055*** (0.0015)
LIQ	-0.0007	-0.0002	0.0001	-0.0005	0.0003

	(0.0005)	(0.0006)	(0.0006)	(0.0006)	(0.0005)
GDPC	-0.0168** (0.0068)	-0.0171** (0.0069)	-0.0186*** (0.0067)	-0.0176** (0.0073)	-0.0234*** (0.0064)
INF		-0.0049** (0.0022)	-0.0046** (0.0023)	-0.0050** (0.0024)	-0.0013 (0.0022)
COCR			0.0001 (0.0002)		
RLAW				-0.0004*** (0.0002)	
POLS					0.0008*** (0.0002)
Durbin-Watson stat	1.6839	1.6304	1.542	1.6127	1.5472
Prob(J-statistic)	0.2256	0.2325	0.1193	0.259	0.3297
Arellano-Bond Serial Correlation Test					
Prob. AR (1)	0.000	0.000	0.000	0.019	0.000
Prob. AR (2)	0.3598	0.3096	0.2191	0.1818	0.2644
Observations	3370	3370	3370	3370	3370
Number of banks	188	188	188	188	188

*Note: Standard error in parentheses. ***, **, * implies significant at the 1%, 5%, and 10% level respectively.*

The one-year lagged dependent variable (ROA_{t-1}) exhibits a positive relationship with (ROA_t) in all presented models in *Table 3*, confirming the dynamic nature of our model. This signifies that the current bank's profitability is influenced by the profit of the previous year. The coefficient of 0.3013 (Model I) indicates that for every one-unit increase in the return on assets ratio (ROA) from the previous year, the current year's ROA is expected to increase by 0.3013 units. This suggests that a company's performance tends to persist over time. Concerning the capital adequacy ratio, all presented models indicate a positive and significant effect of (CAR) on banking profitability. This aligns with studies by Bitar, Saad and Benlemlih (2016) and Lee and Hsieh (2013), emphasizing the importance of maintaining higher capital requirements for facing risks and maximizing profits. The link between bank capitalization and profit indicates that higher levels of capital compared to risk-weighted assets contribute to improved or sustained profitability. Higher (CAR) suggests greater financial stability and resilience, providing a larger cushion to absorb losses during economic downturns or financial crises, ultimately aiding in remaining profitable. Moreover, our empirical findings reveal a positive relationship between bank size and banking performance, with (SIZE) being positively and significantly related to return on assets ratio (ROA). Larger banks in the MENA region tend to exhibit higher profitability relative to their total assets. This suggests that as the size of banks increases, their ROA tends to increase as well. Larger banks may have more diversified portfolios, spreading risk and leading to more stable and profitable operations, consistent with Gupta, Mahakud and McMillan (2020), and Terraza (2015). Regarding non-performing loans to gross loans ratio (NPLG) in *Table 3*, Model I through V exhibits a significant negative impact on bank profitability. This implies an inverse correlation between NPLG and ROA, indicating that as (NPLG) increases, return on assets (ROA) decreases, and vice versa. This finding suggests that an increase in the ratio of non-performing loans to gross loans is associated with higher credit risk and a greater likelihood of loan defaults, impacting the bank's overall financial health and profitability. This aligns with Ekinci and Poyraz (2019), highlighting the link between a higher non-performing loan to gross loans ratio and increased credit risk, leading to a lower level of return on assets. Whereas, liquid assets to total asset ratio (*LI*Q) exhibits a non-significant negative relationship with the dependent variable return on assets (ROA) in all presented models except Models III and V. These models record a positive association between (LIQ) and bank profitability. This suggests that the relationship between these variables may not be strong enough to conclude its existence. However, it indicates that as the LIQ ratio increases (indicating a larger proportion of liquid assets to total assets), there may be a tendency for ROA to decrease, but this tendency is not statistically significant. Therefore, other factors and variables should be considered to better understand the drivers of ROA and make informed decisions about a bank's financial performance. This result aligns with the findings documented by Chen, Chen and Huang (2021).

Concerning macroeconomic control variables, rising rates of per capita gross domestic product (GDPC) growth appear to have a negative effect on banking performance in *Table 3*. The findings reveal an association between decreasing return on assets (ROA) and rising (GDPC), significant at the 1% level in Models III and V, and at the 5% level in Models I, II, and IV. This is consistent with Naili and Lahrichi, (2022) statistics, suggesting that rapid economic growth may lead to higher interest rates, increasing funding costs for banks and compressing

their net interest margins, negatively impacting profitability. Moreover, rapid economic growth may increase lending activities but also raise default risk, especially if lending standards are relaxed or economic conditions become unstable, potentially resulting in higher loan losses and affecting profitability. Additionally, there is a statistically significant negative relation between inflation rates (INF) and banks' profitability (ROA). After adding the variable (INF) in *Table 3*, the significance is at the 5% level in Models II through IV. Higher inflation rates can lead to central banks raising interest rates to control inflation, increasing borrowing costs for banks and reducing net interest margins and profitability. The results align with Naili and Lahrichi, (2022), suggesting that higher inflation leads to decreased profitability. However, the inflation coefficient exhibits a non-significant negative relationship with the dependent variable return on assets (ROA) in *Table 3*, Model V, indicating that this relation may significantly depend on other factors.

Furthermore, we aim to determine the impact of institutional environment quality on banks' performance in the MENA region, as previous research has shown that institutional quality factors are key determinants of profitability for banks. Therefore, we add three distinct institutional quality variables: corruption control (COCR), rule of law (RLAW), and political stability (POLS) respectively in *Table 3*, Model III through V. The empirical results of Model III show a positive non-significant relationship between the coefficient of control of corruption index (COCR) and return on assets ratio (ROA), suggesting a weak relation with limited impact on a bank's profitability in the analyzed model. Moreover, in Model IV, a high level of rule of law (RLAW) captures a negative and significant relationship with banks' profitability (ROA), indicating that challenges in implementing the rule of law in the MENA region significantly impact the banking sector's financial performance. This contradicts with the results of (Dutra, Teixeira and Dias, 2023; and Bouteska, Büyükoglu and Halil Eksi, 2023), where regulations positively affected banking performance. The negative impact in our results is attributed to the ineffective implementation of a high level of rule of law in the MENA region, leading to increased operational costs and reduced profitability. This could be due to factors such as regulatory burdens, compliance costs, or limitations on business operations. Additionally, in Model V, the political stability index (POLS) captures a positive and significant relationship with banks' profitability (ROA), aligning with expectations that in politically stable countries, banks may face fewer regulatory disruptions, legal challenges, and operational risks related to political instability, positively impacting profitability. Also, in countries with political stability, there is often greater confidence in borrowers' ability to repay loans, leading to lower loan defaults and improved asset quality for banks, resulting in lower credit risk and increased banks' return. Similar results are found by Ashraf (2017), and Hakimi, Hamdi, and Khemiri (2023) statistics.

6. Robustness Check

To maintain model applicability and provide additional support for the reported empirical results, first, we rerun the regression models I and II of Table 3, incorporating two new bank-specific variables using the same empirical approach, the generalized method of moments. *Table 4* presents the outcomes of the added institutional quality indicator, Regulation Quality (REQU), along with explanatory control variables on both measures of banks' performance return on assets (ROA) and return on equity (ROE). We utilize Operating Cost (COST), directly impacting a bank's profitability, as reflected in ROA and ROE. Contrary to expectations, *Table 4* shows that (COST) demonstrates a positive and significant relationship with banks' performance (ROA and ROE). This unconventional result could be attributed to strategic investments aimed at business growth, where increased operating costs positively impact both ROA and ROE. Furthermore, Loan Loss Reserve (LLR) exhibits a statistically significant negative impact on banks' profitability (ROA and ROE) in all models in *Table 4*. This implies that as a bank increases its loan loss reserves, economic profitability measured by ROA and ROE tends to decrease. The results of Sargan J-statistic tests, AR (1), and AR (2) tests affirm that the used instruments are not over-identified. All the models provided in *Table 4* demonstrates that the one year lagged dependent variables (ROA_{t-1}) and (ROE_{t-1}); regressed as independent variables; are positively correlated and statistically significant at 1% level with (ROA_t) and (ROE_t), indicating stability after introducing (COST) and (LLR) variables. Moreover, Capital to Adequacy ratio (CAR) retains a positive and significant impact on (ROA_t) in both *Tables 3* and *4* but shows no significant impact on (ROE_t). Regarding regulation quality, (REQU) emerges as the added institutional quality indicator with a negative and significant relationship with return on assets (ROA_{II}) in *Table 4*. The explanation lies in higher-quality regulations imposing stricter requirements and compliance standards, leading to increased compliance costs and reduced net income and profitability. However, in *Table 4*, Model (ROE_t), regulation quality has a negative non-significant impact on profitability as measured by return on equity.

Second, we re-execute all the regression models outlined in *Table 3* employing an alternative empirical approach. In lieu of Panel data econometrics and as a remedy for endogeneity concerns, we employ two-stage least square

(2SLS) regression analysis. The outcomes regarding the influence of institutional and control variables on Return on Assets (ROA_t) are incorporated in *Table 5*. In general, the findings in *Table 5* closely align with those presented in *Table 3*, underscoring the robustness of these results even when employing a distinct econometric methodology. Notably, capital requirements continue to exhibit a positive and statistically significant impact on (ROA_t) in *Table 5*, affirming the robust and enduring influence of capital requirements on banking performance in the MENA countries. Additionally, institutional factors consistently demonstrate a substantial effect on the Return on Assets ratio of MENA banks.

Table 4. The impact of explanatory control variables with (COST) and (LLR) on MENA banking performance -dependent variable: ROA_t / ROE_t – method: GMM

	ROA_I	ROA_{II}	**ROE**
Constant	-0.0086*** (0.0020)	-0.0081*** (0.0019)	-0.0143 (0.0143)
Y (-1)	0.3546*** (0.0857)	0.3675*** (0.0848)	0.6263*** (0.0878)
CAR	0.0668*** (0.0096)	0.0663*** (0.0096)	0.0118 (0.0164)
SIZE	0.0006*** (0.0001)	0.0006*** (0.0001)	0.0031*** (0.0010)
COST	0.0287*** (0.0074)	0.0277*** (0.0074)	0.2970*** (0.0778)
LLR	-0.0160*** (0.0029)	-0.0154*** (0.0029)	-0.0355** (0.0156)
LIQ	0.0000 (0.0006)	-0.0002 (0.0006)	0.0011 (0.0059)
GDPC	-0.0304*** (0.0084)	-0.0300*** (0.0087)	-0.3010*** (0.0770)
INF	-0.0062* (0.0034)	-0.0068* (0.0036)	-0.0285 (0.0415)
REQU		-0.0005*** (0.0002)	-0.0014 (0.0017)
Durbin-Watson stat	1.5398	1.5763	2.2211
Prob (J-statistic)	0.7595	0.6781	0.3116
Arellano-Bond Serial Correlation Test			
Prob. AR (1)	0.0004	0.000	0.000
Prob. AR (2)	0.2379	0.3284	0.4304
Observations	3370	3370	3558
Number of banks	188	188	188

Note: Standard error in parentheses. ***, **, * implies significant at the 1%, 5%, and 10% level respectively.

Table 5. The impact of bank-risk taking on banking performance – method: Two-stage least square (2SLS)

	Model I	**Model II**	**Model III**	**Model IV**	**Model V**
Constant	-0.013*** (0.003)	-0.012*** (0.002)	-0.012*** (0.002)	-0.012*** (0.002)	-0.013*** (0.002)
ROA (-1)	0.280*** (0.108)	0.297*** (0.116)	0.293*** (0.102)	0.228*** (0.101)	0.281*** (0.117)
CAR	0.087*** (0.014)	0.078*** (0.012)	0.078*** (0.012)	0.076*** (0.010)	0.078*** (0.013)
SIZE	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.001)	0.001*** (0.001)	0.001*** (0.000)
NPLG	-0.006*** (0.002)	-0.007*** (0.002)	-0.007*** (0.002)	-0.007*** (0.001)	-0.006*** (0.002)
LIQ	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.000 (0.001)	0.001 (0.005)
GDPC	0.033*** (0.010)	0.027*** (0.008)	0.026*** (0.008)	0.029*** (0.008)	0.022*** (0.008)
INF		-0.001	-0.002	-0.002	-0.003

		(0.002)	(0.002)	(0.002)	(0.002)
COCR			0.000 (0.000)		
RLAW				-0.001*** (0.001)	
POLS					0.001*** (0.001)
R-squared	0.448	0.500	0.490	0.523	0.497
Durbin-Watson stat	1.951	1.109	1.081	1.165	1.064
Prob(J-statistic)	0.937	0.721	0.848	0.577	0.497
Observations	3746	3746	3746	3746	3746
Number of banks	188	188	188	188	188

*Note: Standard error in parentheses. ***, **, * implies significant at the 1%, 5%, and 10% level respectively.*

7. Conclusion, Policy Implications and Limitations

The 2008 global financial crisis had a varied impact on the MENA area, with banks facing challenges due to decreased liquidity and global economic decline. The Arab Spring further added political instability, impacting banking performance. Many MENA countries responded by enhancing regulatory systems, implementing Basel III principles, and improving governance standards. The 2020s witnessed increased digital banking due to rising internet and mobile usage, transforming risk-taking methods. However, the MENA banking history reflects a complex interplay of political, economic, and regulatory forces.

The study explores the relationship between bank risk-taking, institutional quality, and banking performance using GMM methodology on a sample of 188 banks in 15 MENA countries from 1999-2021. The findings reveal various factors influencing rising bank profitability, including unique bank characteristics, macroeconomic features, and institutional quality. Notably, higher capital adequacy ratio positively affects profitability, striking a balance between safety and financial intermediation. Bank size and non-performing loans to gross loan ratio show positive and negative relationships with profitability, respectively. Liquidity ratios negatively impacts profitability, as excess liquidity may result in lower returns on assets. Macroeconomic variables, such as lower economic growth and stable inflation, positively affect banks' profitability. Institutional variables like control of corruption and political stability positively correlate with return on assets, indicating stable countries face fewer challenges. Finally, rule of law negatively impacts banking performance due to ineffective implementation of laws in the MENA region.

Our findings are important for policy makers in the MENA region and it suggest some interesting recommendations. Regulatory bodies in MENA countries should continue emphasizing and enforcing capital adequacy regulations. These regulations strike a balance between ensuring the safety of the banking sector and facilitating financial intermediation. As well as, banks should adopt effective risk management practices, with a particular focus on managing non-performing loans Policymakers may consider periodic assessments and adjustments to capital adequacy requirements to align with the changing economic landscape, and they should prioritize measures that contribute to macroeconomic stability, such as fostering economic growth and maintaining stable inflation, and efforts should be directed towards enhancing institutional quality, particularly in areas of corruption control and political stability.

However, the inclusion of both MENA commercial and investment banks in the study introduces a limitation in our work, as the characteristics and risk profiles of these two types of banks can vary significantly. Future research could consider a more nuanced approach by separately analyzing commercial and investment banks to provide a comprehensive understanding of their individual dynamics. Also, the study's reliance on accounting-only performance measures, excluding market measures and market risk perception measures, represents a limitation. Future research opportunities exist to broaden the scope by incorporating additional performance metrics. Including market-related indicators could offer a more comprehensive evaluation of banks' performance, considering both accounting and market perspectives.

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Authors contributions

Dr. Elie El Hokayem and Dr. George El Kazzi were responsible for designing and performing this manuscript. Dr. Elie El Hokayem was responsible for data collection. Dr. George El Kazzi drafted the manuscript and performed

the empirical analysis along with Dr. Elie El Hokayem. All authors read and approved the final manuscript and they both contributed equally to the study.

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No additional data are available.

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