

CREDIT RISK AND FINANCIAL PERFORMANCE IN THE MIDDLE EAST AND NORTH AFRICA BANKS

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ABSTRACT

Considering the MENA region, this research examines how the banks' financial performance is influenced by credit risk. Despite its development and expansion, credit risk remains to be a major concern for the MENA banking industry. Therefore, it is crucial to empirically explore and understand the nexus between the bank's financial performance and credit risk in MENA region. In this regard, credit risk is measured through loans and advances to total deposits, while three different measures of the banks' returns are incorporated to capture their financial performance. Return on assets, net interest margin, and return on equity represent examples of these measures. Panel regression analysis was conducted on the sample data of 135 MENA region banks, covering the time period from 2015 to 2019. This research found that profitability and financial performance were adversely and seriously impacted by credit risk. Results indicate that loans and advance to total deposits ratio adversely affected MENA banking institutions' performance. Moreover, the bank size was also found as a vital aspect in influencing financial performance. This research's results imply that the banks' management needs to efficiently administer credit risk operations to achieve their financial goals and maximise shareholders' benefits.

Keywords: Credit Risk; Financial Performance; Loans and Advance to Total Deposits.

JEL Classification: G01, G21

1. INTRODUCTION

With 19 countries and a 357.3 million population, the MENA (Middle East and North Africa) region is developing rapidly and becoming a significant player in the global economy. Geographically, it acts as a bridge between Europe and Asia. It is one of the world's most affluent areas when it comes to natural resource, including the oil-rich Gulf Cooperation Council (GCC) countries. It also houses one of the world's largest Islamic banks. Many of these banks play a global role in assisting both Muslim and non-Muslim people worldwide. The MENA region includes countries such as Jordan, Oman, Morocco, Kuwait, Djibouti, Egypt, Syria, Oman, Iraq, Tunisia, Qatar, Yemen, Palestine, United Arab Emirates, Lebanon, Saudi Arabia, Algeria, Iran, and Libya (World Bank Group, 2020).

According to Otero, Razia, Cunill, and Mulet-Forteza (2020), the financial markets around the world have become unstable since the 2007/2008 global financial crisis (GFC). The result was a slew of critiques on the risk management systems, sparking a hunt for more suitable methodologies to cope with the erratic events that resulted in a significant impact. Many economies have led to the deregulation of the banking

systems to boost productivity, profitability, and performance as well as enhance international competitiveness. Through the guidance of the World Bank and the International Monetary Fund, developing countries have made endless efforts to boost the performance and efficiency of their financial sectors, as well as their overall economic performance. During a crisis, the impact on the market structure is more significant than ever, particularly at the institutional level, where inflation and GDP are positively related to the overall cost function. Therefore, regulators should formulate policies that can enable the financial market sector to enhance their competency to overcome the future financial crisis.

In the MENA region, similar issues have happened. As in 2007/2008, the GFC increased the banks' risk exposure, resulting in the reduction of the banks' profitability during the crisis in 2014 (Olson & Zoubi, 2011). This demonstrates the inability of MENA banks to recover capital and returns while being exposed to risk in the post-crisis period. Larger banks, for example, can recover the capital, as they can liquidate sufficient assets and capital for the bank to survive. However, smaller banks that commonly exist in MENA (Olson & Zoubi, 2011) have little capital as compared to the larger banks. In particular, such banks struggle to recover as they have lower capital reservations. Thus, liquidating assets will ultimately jeopardise their future survival.

According to Abdelaziz et al. (2020) and Djebali & Zaghdoudi (2020), MENA banks face a problem in which their profitability in the MENA region is negatively and significantly affected by credit risk. The Basel Committee on Banking Supervision (BCBS) stated that giving the responsibility for approving credit risk strategies and then implementing the procedures to control, monitor, and measure credit risk to the board of directors is the best practice in the credit risk environment (BCBS, 1999; Bhattarai, 2016; Li & Zou, 2014).

With the highly developed banking system in the MENA region, the competition among banks is beyond monitoring (Albaity, Malek & Noman, 2019). Large banks are intensely competitive, putting them at risk of reduced profits and insolvency. Most of the well-established MENA banks come from less competitive markets. The banks' profits may decline in the highly competitive market, putting them in a volatile position as they take excessive risks (Albaity et al., 2019). MENA banks face significant challenges in reducing the impact of financial risk on profitability. Besides, ongoing problems relating to the economic crisis, terrorism, political issues, oil prices, and civil war have exacerbated the banks' vulnerability. These problems have slowed down the economic growth of the MENA region and lead to inefficient bank performance (Mrad & Mateev, 2020).

Risks are defined as anything that can pose obstacles in attaining specific objectives, internal or external factors, and unexpected variability of turbulence in returns (Holton, 2004; Fatemi & Fooladi, 2006). Market risks, liquidity, and credit are examples of such risks. The financial performance's unpredictability can be attributed to all of these factors (Tafri, Omar, Meera & Hamid, 2009; Dimitrakopoulos, Kavussanoss & Spyrou, 2010). Particularly, the risk of a counterparty defaulting on loans or bank's advances is the definition of credit risk, where it is highly critical for the performance of financial institutions. According to Bandyopadhyay (2016), credit risk is a vital component in

determining the banks' financial performance worldwide. The banks' management and regulators should learn essential lessons from previous mistakes and experiences to detect, identify, and efficiently manage credit risk. Likewise, determining the appropriate level of capital is also crucial to mitigate these risks and adequately compensate for the risks taken. Therefore, researchers have been striving to explore the risk and performance nexus to understand real operational scenarios from different markets and regions. Considering the issues mentioned above, there is a strong need to analyse and understand the management of credit risk and how the banks' financial performance can be driven by it in the MENA region.

Hence, investigating how the banks' financial performance is related to credit risk is this study's aim. In particular, the research emphasises the exploration of the influence of credit risk in determining three different indicators of financial performance. The provision of empirical evidence regarding the banks in MENA region is this research's key contribution to the current literature. As for the method of analysis, this research employs the panel regression technique that is considered suitable in the case of data with diverse entities. Similarly, panel regression analysis is less sensitive to the common econometric problems such as heteroscedasticity and data normality. The management of credit risk is represented by the loans and advances to total deposit. These parameters are used frequently in existing studies and they possess characteristics which are linked to the management of credit risk; hence, they are utilised as the model's indicator of credit risk. There are three financial performance indicators, namely the banks' return on equity (ROE), return on asset (ROA), and net interest margin (NIM) ratio. Incorporating three different indicators for financial performance will help in providing detailed insights for the management and researchers. Using the Bankscope Database, the sample for this study was collected from 135 banks from 14 MENA countries, covering five years from 2015-2019. This research highlights a number of implications based on the findings for both the authorities and researchers with respect to policies and operations, which will ultimately help in boosting the MENA banks' financial performance.

The gap in prior literature is filled through the contribution of this research via the evaluation of how MENA banks' financial performance can be influenced by credit risk, concentrating majorly on loans and advances. This helps us to ascertain how poor credit management, which results in distress in the selected banks, affects the financial performance, hence giving an insight to policymakers and investors in the MENA region. In practice and the economic literature, there are numerous common bank competitiveness indicators; nevertheless, with regard to bank performance, they do not lead to much knowledge contribution. Nonetheless, there are developed indicators that can contribute in the progress towards a better understanding of profitability and competition. They must work well to be useful as explanatory variables in a model where competition is significant. The necessary indicators provide adequate information on the competition and how to achieve profitability. Therefore, we used ROA, ROE, and NIM. Because they represent the banks' profits, they may be key sources of bank profitability, thus security affects the banks.

For this research, the remaining sections' structure is as follows. The empirical and theoretical perspective from the previous literature is discussed in the following section. Then, employed data sources as well as the research methodology are included in Section three, followed by Section four, which elucidates the empirical findings. Finally, the discussion is concluded and a number of implications and recommendations are provided in Section five.

2. LITERATURE REVIEW

2.1 Theoretical foundation

There are several theoretical works that provide grounds regarding financial performance's association with credit risk. A theory is an abstract, cognitive generalisation, or the consequences of such a thought that is contemplative and reasonable. It is a coherent set of broad statements that are generally considered correct and may be used for a class of phenomena as principles of interpretation and prediction. The viability, implementation, and interpretability to support a framework for a study that links the researcher to the current knowledge and applies to the research topic all play a role in the selection of a theory (Kiaritha, 2015; Kombo & Tromp, 2009; and Trochim, 2006). Banks face one of the most crucial kinds of risk, namely credit risk (Fields et al., 2004). It indicates the possibility of defaulting on credit, i.e., implying that on-time loan payment by the borrower is impossible. Generally, the real value of banks may decrease if the credit risk is high (Cabedo and Tirado 2004). This research incorporates the agency theory due to its theoretical foundation, which theorises a contractual relationship between the agent and principal. The agency theory is relevant as it emphasises on resolving issues that exist in the principal and agent relationship because of the differences in the levels of risk aversion (Orichom and Omeke, 2020).

Hence, corporations can ascertain the risk tolerance to be considered by reviewing the agent-principal risk trade-off through the use of the agency theory (Wiseman, 1997). Principals and agents with distinct goals concerning credit risk-taking are included in the definition of risk relationship in the literature (Jensen, 1976). This theory explains why there is a mismatch in risk avoidance between management and investors because they do not consider their investors' requirements. Also, because managers do not cover competitive risks as much, risk aversion is higher when it is the other way around (Tufano 1998). However, Fatemi and Luft (2002) revealed that because of the opposition to risk management operations and comprehensive protection, the investors' wealth is transferred to the managers, according to the advocates of the Agency Theory.

2.2 Credit risk

The counterparty's risk in defaulting on a loan or a bank's advance is known as credit risk, which is highly critical to the banks' financial performance because they rely on the betterment of the banks (Ekinici and Poyraz, 2019). It is broadly referred to as the major risk factor that influences the banks' financial performance (Boffey and Robson, 1995). Having many non-performing loans generally causes the banks to lose their

profitability. Hence, a key aspect for the banks' survival is the understanding regarding credit risk's dynamics (Afriyie and Akotey, 2012). It is widely believed that effective credit risk administration in the banks is not only vital for the growth of the financial sector, but it is also considered highly crucial for economic stability (Psillaki, Tsolas and Margaritis, 2010).

The proportion of the total loans and advances to the total deposits is the loans and advances ratio, which is used to measure the credit risk (Ali and Dhiman, 2019). If the ratio is less than one, the bank lends to the customers based on its promises rather than borrowing from outside sources. Furthermore, if the balance is more than one, refinancing at higher rates through external borrowing is preferable to relying on its deposits. Banks do not achieve or obtain profit if the ratio decreases. If the balance is too high, banks may be unable to meet any sudden financial needs (Epure & Lafuente, 2015). The practice of giving the board of directors the responsibility to set procedures to control, supervise, and measure credit risk and to regularly review and implement approved credit risk strategy is necessary in the credit risk environment that was recommended by the Basel 1 committee (BCBS, 1999).

2.3 Financial Performance

In this study, ROA, ROE, and NIM are the three financial ratios for measuring the banks' financial performance. The ROA is chosen because of its ability to measure the banks' profitability based on asset utilisation. Net profit before tax to total assets is the basis of how it measures profitability. A company that can utilise its assets efficiently in generating profits from its operations corresponds to a higher ROA (Ahmed, Ahmed, Islam & Ullah, 2015). The second measure, i.e., ROE, represents the profits generated from the shareholders' equity. It captures a percentage of the net income before tax on the shareholder's equity. High ROE represents the companies' capability to attain profits by utilising the shareholders' equity efficiently in their operations. Next, expressed in the form of a percentage of the total assets, NIM is the third metric. It computes the net interest income's difference with the earning assets (Anbar & Alper, 2011). The gap between the borrowed funds' interest cost and the interest income received by the banks via securities and loans is reflected by this metric. Also, it is utilised in predicting profitability and it represents a vital aspect in the operation of a bank, including offering loans to borrowers and taking deposits; hence, it is considered a direct bank profitability predictor. The strategies that are focused on making profits are the bank's main objectives (Ongore & Kusa, 2013).

As they are indicators of financial performance, the existing literature has extensively utilised these three variables. For instance, various recent studies from different regions of the world (Sari et al., 2022; Yeasin, 2022; Sari, 2021; Ahmed et al., 2021; Isibor et al., 2021; Ekinci and Poyraz, 2019; Khaddafi et al., 2014) had used ROA to indicate the banks' financial performance. Likewise, in a number of recent studies, ROE was also found to be widely used as measure of financial performance (Ahmed et al., 2021; Isibor et al., 2020; Gadzo et al., 2019; Ekinci and Poyraz, 2019). Although the NIM indicator is not as popular as ROA and ROE, there were still many studies (Isibor et al., 2020; Gadzo et al., 2019; Egly et al., 2018; Marinkovic and Radovic,

2014; Memmel and Schertler, 2011; Shen et al, 2009) that had also incorporated NIM for evaluating the banks' financial performance.

2.4 The relationship between Financial Performance and Credit Risk

Inconclusive and mixed results regarding credit risk's effects on financial performance were observed in the literature. A negative relation was discovered in some empirical studies (Abdelaziz et al., 2020; Cucinelli, 2015; Sari et al., 2022; Yeasin, 2022; Sari, 2021; Ahmed et al., 2021; Isibor et al., 2021; Ekinci and Poyraz, 2019; Khaddafi et al., 2014). However, a positive relation was discovered in other studies (Flamini, Valentina, McDonald, & Liliana, 2009; Hakimi, Hamdi, & Djelassi, 2011). Sari et al. (2022) and Sari (2021) investigated how profitability was affected by capital adequacy and financial risks. The findings indicate that banking was significantly and negatively affected by it. Also, in Ekinci and Poyraz's (2019) examination of how the banks' performance was affected by the credit risk, ROA and ROE were discovered to be negatively related to the credit risk. Additionally, Ahmed et al. (2021) studied how financial performance was affected by financial risk management by measuring the liquidity risk and credit. The results show that the banks' financial performance was affected by the financial risk. The banks' income growth was affected in a significant but mixed manner by net profit margin, ROA, and ROE, as discovered by Khadafi et al. (2014). Also, Gadzo et al. (2019) found that financial performance was negatively impacted by credit risk.

Credit risk is considered to be a significant contributor and an important component of a bank's risk (Colquitt, 2007). It specifically refers to the counterpart's failure to make debt payments or fulfil contractual obligations. Similarly, it also accounts for a sizable portion of fixed-income investments, which is why rating agencies particularly evaluate the credit risks for organisations and issuers. From a technical perspective, it can be described as the probability that a counterparty will fail to fulfil their commitments owing to the inability to complete the contract or a decline in their ability to repay (Ammann, 2002; Bessis, 2002; Schroeck, 2002; Colquitt, 2007). According to Basel I, credit risks are related to bank loans, options, bonds, futures swaps, an extension of the commitment guarantee, trade financing, and foreign exchange. Therefore, banks should implement an effective method for calculating and monitoring progress in credit management, develop an internal credit risk scoring framework, and implement systems to monitor the credit portfolio's overall composition (BCBS, 2015).

Credit risk models' primary aim is to determine the counterparty default risks (Fatemi & Fooladi, 2006). Furthermore, the data indicates that banks in the United Arab Emirates faced three substantial risks: operating risks, credit risks, and foreign exchange risks. The banks' financial performance was found to be negatively affected when credit risk management's impact was assessed over ten years using a panel regression analysis by researchers (Isibor et al., 2021; Yeasin, 2022). The findings reveal a negative association between financial performance and credit risk. UAE banks' largest risk is credit risk, as noted by Al-Tamimi (2002). Checks by bank risk officers, physical inspections, risk surveys, and financial statement analysis are the most common approaches utilised. The findings show that banks are becoming more advanced in terms of their risk administration. In other research on GCC countries, an

assessment was carried out on Islamic banks' financial risk and success. The study discovered that capital, operational risks, and ROE were negatively related. Furthermore, credit risk had a non-significant relation with ROE. The model had no impact on the country's gross domestic product (Hussein, Hela, and Walaa, 2015; Sari et al., 2022 and Sari, 2021).

As a crucial determinant of financial performance, credit risk has been widely investigated in the existing literature. The banks' financial performance was significantly impacted by credit risk management, as discovered by Ravindran (2021). Similar findings were obtained in the research by Orichom & Omeke (2021). According to Kariuki (2017), credit risk control, monitoring, analysis, and identification had a crucial importance in improving the microfinance banks' financial performance. Several existing studies found credit risk to be adversely associated with the banks' financial performance. For instance, Munangi and Bongani (2020) reported that financial performance was negatively and significantly influenced by credit risk. The significant decrease of the banks' profitability due to non-performing loans may be the implication of this. Likewise, how financial performance was impacted by credit risk was explored by Afolabi (2020) via a panel data regression model. According to their discoveries, underperforming loans had a considerable and negative impact on asset returns, while investment returns were negatively but marginally impacted by loan-loss provisions. As a result, it was proven that the financial success of banks can be predicted through the significant predictor of credit risk. Next, Anas and Fauziah (2014) had also shown that Islamic banks' profitability was inversely associated to credit risk. Ugirase (2013) also stated that the banks' performance was substantially bettered through the crucial credit risk management factor.

On the other hand, there are also studies that have shown credit risk to be positively linked to the banks' financial performance. In this regard, this positive relation was shown in the research by Fan and Shaffer (2004). Hosseininassab et al. (2013) also discovered the risk characteristics' impacts on the banking systems' efficiency. According to their findings, capital adequacy and asset ratio were both positively and significantly related to the performance indicators. However, it was suggested that additional studies should be carried out to quantify the influence of bank efficiency on risk efficiency through an increased understanding of the input and output variables. Some other studies (Gupta & Sikarwar, 2020; Munangi & Bongani, 2020) that examined how the banks' financial performance was impacted by credit risk discovered an adverse effect on the banks. Meanwhile, Ali and Oudat (2020) found a positive relationship in their research.

Furthermore, by employing the panel regression analysis, some research (Oudat & Ali, 2021; Oudat & Ali, 2021) examined how financial performance was influenced by risk management. As a result, these studies found a negligible impact. This indicates that banks with significant capital risk tend to be exposed to inadequate provisions as they will be unable to cover hazardous assets. In addition, some other studies had also confirmed that the financial performance of financial institutions was not positively impacted by credit risk management (Obamide et al., 2015; Warsame, 2016). Hence,

based on the given contradictory evidence, this study adds to the debate over how credit risk management affects financial performance.

3. RESEARCH METHODOLOGY

3.1 Data and Sample

Covering a period of five years from 2015–2019, 135 commercial banks from 14 MENA countries were included as the sample of this study. The selected years represent the most recent years for which the banks' data was available. Specifically, various financial information was needed to calculate the variables of credit risk, banks size, ROA, ROE, and NIM. Hence, this study collected financial statements data for these 135 banks from the Bankscope database.

3.2 Variable Measurements

Table 1 presented below describes the variables' measurements used in this study. The ratio of net profit to the bank's total assets represents the measured ROA. As a percentage of the total assets, it is defined as the bank's ability in generating income by utilising its assets, which represents the bank's total profitability (Zarrouk et al., 2016; Olson & Zoubi, 2011; Khrawish, 2011). Specifically, by taking the after-tax net profit of the bank and dividing it by the total assets, this ratio can be determined. Efficient resources utilisation by a firm is the implication of a high ROA ratio (Guillén et al., 2014). Next, performing division of the net profit with the shareholders' equity will result in the ROE. The banks' capability in the production of profits by utilising their equity financing is represented by this ratio. In this case, efficient profit production by a bank through the utilisation of the capital of the shareholders is the implication of a high ROE (Khrawish, 2011; Ben Selma Mokni & Rachdi, 2014 and Zarrouk et al., 2016). Then, as a percentage of the total assets, the last indicator of financial performance, i.e., net interest margin (NIM), can be determined by evaluating the difference between interest expense and interest income. Besides, the ratio of the total advances and loans to the total deposits is how the credit risk is measured, as the main predictor variable of this research (Epure & Lafuente, 2015; Ali and Dhiman, 2019). The model's control variables are the indicators of the bank's size, geographical region, and age. The bank size is determined via the bank's total assets, whereas the geographical region is incorporated as a dummy variable of zero and one for the MENA countries, respectively.

Table 1. Variable description

Variable	Measurement	Abbreviation	Author
DEPENDENT VARIABLE			
Financial performance	ROA = Net income to total assets	ROA	(Albaity et al., 2019; Anbar and Alper, 2011; Fang et al., 2019)
	ROE = Net income to Total equity	ROE	(Albaity et al., 2019; Anbar and Alper, 2011; Fang et al., 2019)
	NIM = Net Interest Income to Earning Assets	NIM	(Anbar and Alper, 2011; Fang et al., 2019)
INDEPENDENT VARIABLES			
Credit Risk	Loan and Advance = Total Loan to Total Deposit	LAA	(Epure & Lafuente, 2015; Ali and Dhiman, 2019)
Controlling Variables			
Bank' Size	logBSZ	BSZ	(Berrone et al., 2007; Garegnani et al., 2015; Abidin et al., 2017; Al-slehat & Altameemi, 2021)
Bank' Geographical region	Bank' Geographical region Measure using dummy variable of banks' location in MENA region	GEO	Khasawneh, 2016
Banks's age	Years since the firm constitution (log)	AGE	(Jaffar and Abdul Shukor, 2016; García-Meca et al., 2017; Irfan et al., 2018)

3.3 Econometric model and estimation technique

This study has developed the model mentioned in equation 1 below for the investigation of how MENA banks' financial performance is affected by credit risk. This model's aim is the improvement of MENA banks' credit risk management. An analysis performed by regressing the banks' financial performance on the banks' liquidity risk is this study's objective. Similarly, three control variables, i.e., bank size, geographical region, and bank age, are also included in the regression model.

$$FP = \beta_0 + \beta_1 LAA_{it} + \beta_2 BSZ_{it} + \beta_3 GEO_{it} + \beta_4 AGE_{it} + \epsilon_t \quad (1)$$

Where:

FP = banks' financial performance proxies by ROA, ROE, and NIM.

LAA = advances and loan ratio risk at time, t.

BSZ = bank size proxies by total assets

GEO = dummy bank's geographical location (1= Middle East region; 2=North Africa Region)

AGE= bank age, years since the firm constitution (log)

β_0 = the intercept

ϵ_t = the error term.

This study examines the influence of MENA banks' financial performance on credit risk by employing the panel regression analysis, similar to the method by Kasman et al. (2011) and Ekinci (2016). In the panel analysis, random and fixed effects are used to achieve results. Then, among these effects, the appropriate effect is determined through the Hausman test. Further, the parameters of the model in this study are predicted using the estimation technique known as ordinary least square (OLS).

4. RESULTS AND DISCUSSION

4.1 Descriptive Analysis

The variables' descriptive statistics are shown in Table 1. The standard deviation, maximum, minimum, and mean values are included in this table. The results show ROA's mean value was 0.025 with a minimum of -4.366 as well as a maximum of 1. Results also indicate a standard deviation of 0.221 for ROA. Meanwhile, for ROE, the results reveal that the standard deviation was estimated as 0.431, while the values for mean, minimum, and maximum were 0.037, -9.595, and 1.538, respectively. Moreover, the results also reveal that 0.261 was the mean value for NIM. As for the minimum, maximum, and standard deviation values for NIM, they were estimated as -0.036, 20.465, and 1.66, respectively.

On the other hand, with 88.06 as the maximum and 0 as the minimum, the loans and advances to total deposits' (LAA) mean value was 1.567, as shown by the results for the independent variables. Further, with a maximum of 20.527 and minimum of 9.934, the bank size's (BSZ) mean value was 15.577. The bank size had a standard deviation of 1.861. Moreover, results also reveal that on average, the banks in the sample were aged around 40 years. Likewise, the newest bank in the sample was found to be 5 years of age, whereas the oldest bank was revealed to be 192 years of age.

For the empirical estimation, Table 1 exhibits the considered variables' Descriptive Statistical Tests.

Table 1: Summary statistics

	Mean	Sd	Min	Max
variables				
Dependent Variable				
ROA	0.025	0.221	-4.366	1
ROE	0.037	0.431	-9.595	1.538
NIM	0.261	1.66	-0.036	20.465
Independent Variable				
LAA	1.567	5.491	0	88.06
BSZ	15.577	1.861	9.934	20.527
AGE	40.652	24.206	5	192

4.2 Multivariate Regression Analysis

This section presents results of the multivariate regressions for the three main models of this research, which were performed to evaluate credit risk's influence on the banks' performance in MENA region via prediction using panel data analysis. In order to examine the objectives, this research specifically employed pooled OLS, random effect, and fixed effect models. These three models were compared using different statistical tests to determine the most adequate findings for this study. Pooled OLS and panel regression results were compared through the Breusch-Pagan LM test. Then, Hausman test was employed for comparing the random and fixed effect models within the panel regression analysis.

The first model's results are presented in Table 2, in which ROA was regressed on credit risk, bank size, bank age, and geographic region. The more appropriate model was the fixed effect model, as indicated by the findings of Breusch-Pagan LM test (86.45, 0.000) and Hausman test (25.75, 0.000). At 5% level of significance, the findings show that the banks' ROA was negatively impacted by credit risk. Besides that, bank size as a control variable was also discovered to be positively and substantially associated to the banks' profitability. However, AGE and GEO were omitted in the fixed effect model due to their categorical nature. Next, the simple OLS estimator results indicate that ROA was negatively impacted by bank age at 1% level of significance. Further, results show insignificant impacts of bank size and age on ROA. Similarly, an insignificant coefficient of the variable GEO indicates that how the ROA of the bank was affected by credit risk was similar for both Middle East and North African regions.

Table 2: The panel data analysis result. ROA is the dependent variable

	Pooled OLS	Random Effect	Fixed Effect
Constant	0.178** (2.38)	0.072 (0.62)	-2.203*** (-4.17)
LAA	-0.0109*** (-7.09)	-0.008*** (-4.96)	-0.005** (-2.50)
BSZ	-0.007 (-1.41)	0.00002 (0.000)	0.144*** (4.23)
GEO	-0.006 (-0.26)	-0.005 (-0.14)	0 0
AGE	-0.001 (-1.51)	-0.0007 (-1.26)	0 0
Breusch-Pagan LM test		161.01*** (0.000)	
Hausman test			25.75*** (0.000)
R-squared	0.076	0.073	0.052

1. Except for Hausman test and Breusch-Pagan LM test, parenthesised figures represent t-values.

2. 10%, 5%, and 1% significance levels are represented by *, **, and ***, respectively.

Next, for the investigation regarding how the banks' ROE was impacted by credit risk, the findings are reported in Table 3. These results indicate similar relations, thus proving that both models produced consistent findings regarding how the bank performance was influenced by credit risk. Here, in comparison with random effect, the fixed effect model was again found to be more appropriate. Specifically, the banks' ROE in the MENA region was significantly and positively impacted by the advances and loans to total deposits ratio, as shown in the findings for the fixed effect model. Likewise, ROE was discovered to be positively associated with bank size at 1% level of significance. However, the banks' AGE and GEO were found to be insignificant in the analysis. Thus, this implies that credit risk's relationship with the banks' ROE is similar in both Middle East and North African regions. Further, for the sake of robustness, this research also incorporated NIM as a proxy of bank performance, with the aim to verify the findings and provide further valuable insights regarding how the banks' net interest margin can be impacted by credit risk. The third model's findings regarding the investigation of NIM's association to credit risk are presented in Table 4. The estimated results from the Breusch-Pagan LM and Hausman tests support the fixed effect model. Results show that NIM was significantly impacted by credit risk in all three estimated models. The coefficients of credit risk were found to be negative at 1% level of significance. Interestingly, the results from pooled OLS regression also show that the banks' age was significantly associated with NIM. The coefficient was

found to be negative at 10% level of significance. This indicates that newly established banks perform better in comparison with the MENA region's old banks.

This research's discoveries are similar to the existing literature, such as the research by Ramadan (2011), Alshatti, A. S. (2015), Myrna and Modern (2013), Kipngetich and Muturi (2015), and Boahene et al. (2012), who unveiled that LAA, as a proxy of credit risk, significantly impacted the bank performance. Specifically, Ekinci and Poyraz (2019) had also proved that credit risk was adversely associated with the banks' ROA and ROE. Moreover, several recent studies had also similarly exhibited credit risk's adverse relation to profitability indicators, such as ROE and ROA (Abdelaziz, Rim, and Helmi, 2020; Munangi and Sibindi, 2020; Ravikumar et al., 2020; Al-Eitan and Bani-Khalid, 2019). The existing literature also suggested that NIM was significantly affected by the banks' vulnerability and risk (Angori, Aristei, and Gallo, 2019).

Inadequate borrowers screening and monitoring as well as the increase of the provided bank loans' amount contribute to such findings. Similarly, the fact that the bank performance was adversely impacted by credit risk can be explained by the increase of unsecured assets that are not profitable. For instance, with regard to credit loss provisions, more money needs to be put aside due to the rise in unsecured assets. As a result, the growth in unsecured assets will significantly reduce the bank's profitability. Hence, findings from this research indicate that commercial banks of the MENA region will find credit risk to be a vital issue. Previous studies had also shown bank size's significant relationship with financial performance. For example, the findings of Ekinci and Poyaraz (2019) revealed that the performance was positively and significantly impacted by bank size. It was found that the banks obtain a cost advantage because of the economies of scale, which further enabled them to enhance profitability.

Table 3: The panel data analysis Result. ROE is the dependent variable.

	Pooled OLS	Random Effect	Fixed Effect
Constant	0.258* (1.78)	0.149 (0.78)	-4.65*** (-4.06)
LAA	-0.024*** (-7.95)	-0.019*** (-6.16)	-0.010*** (-2.62)
BSZ	-0.007 (-0.76)	-0.0004 (-0.03)	0.302*** (4.11)
GEO	-0.028 (-0.66)	-0.026 (-0.45)	0
AGE	-0.001 (-1.57)	-0.001 (-1.35)	0
Breusch-Pagan LM test		44.22*** (0.000)	
Hausman test			26.65*** (0.000)
R-squared	0.09	0.09	0.051

1. Except for Hausman test and Breusch-Pagan LM test, parenthesised figures represent t-values.
2. 10%, 5% and 1% significance levels are represented by *, **, and ***, respectively.

Table 4: The panel data analysis result. NIM is the dependent variable.

	Pooled OLS	Random Effect	Fixed Effect
Constant	0.077 (0.85)	-0.044 (-0.34)	-3.91*** (-5.78)
LAA	-0.02*** (-9.59)	-0.014*** (-7.21)	-0.01*** (-3.64)
BSZ	0.001 (0.21)	0.009 (1.07)	0.253*** (5.83)
GEO	-0.026 (-0.98)	-0.025 (-0.64)	0 0
AGE	-0.001* (-1.77)	-0.001 (-1.52)	0 0
Breusch-Pagan LM test		86.45*** (0.000)	
Hausman test			43.98*** (0.000)
R-squared	0.13	0.13	0.10

1. Except for Hausman test and Breusch-Pagan LM test, parenthesised figures represent t-values.

2. 10%, 5% and 1% significance levels are represented by *, **, and ***, respectively.

5. Conclusions and recommendations

Various financial risks are considered to be significant challenges for all financial organisations, including banks. Particularly, the insolvency of a bank depends on the most crucial component, namely credit risk. Because of the economy's micro and macro asset-liability structure, systemic crises primarily arise due to this variable. Considering the period from 2015-2019, the examination of how MENA banks' financial performance will be affected by credit risk is the aim of this article. As the MENA region faces numerous challenges and issues such as geopolitical crisis, oil prices, and political issues, banks in this region are struggling to improve their performance as various external institutional forces expose and lead them to a more volatile market. Thus, the MENA region is considered a highly competitive market for the financial sector. Therefore, such conditions encourage banks to take excessive risks. This can lead to poor bank performance, subsequently resulting in a high nonperforming loan to total asset ratio and poor asset quality. As a result, banks with higher quality assets and lower nonperforming loans have better chances to be

successful. An increase in loan provision reduces capital, which inversely impacts profitability. Hence, it is crucial to investigate the issue and provide valuable insights to improve the MENA region's financial system.

Net interest margin, return on equity, and return on assets are the three different indicators of a bank's profitability in the MENA region which are used in this study to determine profitability's relation to credit risk management. At the same time, the total loans and advances to total deposits ratio represents the credit risk. The banks' financial statement data was acquired from the DATASTREAM database. The model includes credit risk as an explanatory factor, while different control variables are also included to reduce omitted variable biases. Based on the Breusch-Pagan LM and Hausman tests results, it was found that the data structure was represented best using the fixed effects model; hence, the coefficient estimates calculated using the panel fixed effects model are considered appropriate in this research. The findings reveal that MENA region banks' credit risk adversely influenced all three indicators of the financial performance. The existing literature also indicates that profitability and the banks' financial performance possess a substantial and inverse relation to advances and loans to total deposits as a proxy of credit risk exposure. Therefore, a conclusion can be made that with regard to the banks' profitability in the MENA region, excessive liabilities are a fundamental issue. Thus, there is a strong need for the banks to drive capital growth by considering high profit-generating strategies. The results also indicate that the banks' profitability is directly influenced by the bank size, thus indicating that economies of scale exist for the banks of the MENA region.

Credit risk management becomes increasingly important as the evaluation of the banks' performance relies on the significant factor of credit risk. Thus, the process of efficient credit risk management will be critical and banks of the MENA region are recommended to emphasise on credit risk management, particularly loan monitoring.

Moreover, the improvement of credit risk management and evaluation, as well as loan management abilities, are recommended in this research for the MENA banks' management. Specifically, credit legislation and lending guidelines must be transparent. Likewise, banks should confirm that the contract terms are adhered to in loans approval. There are certain limitations in this research, which can be considered in future studies. First, this paper is particularly focused on credit risk, while ignoring other critical financial risk dimensions. Therefore, future studies should incorporate multiple risk measures to provide better insights for the banks in the MENA region. Future research is recommended to specifically expand on the different types of risk, such as liquidity and market factors, to investigate their impact on the banks' performance. Secondly, this study targets commercial MENA banks. However, investigating the issue through a country-level analysis will also provide valuable findings in the future.

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