

# “The influence of financial inclusion on banks’ performance and risk: new evidence from MENAP”

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# THE INFLUENCE OF FINANCIAL INCLUSION ON BANKS' PERFORMANCE AND RISK: NEW EVIDENCE FROM MENAP

## Abstract

This study seeks to investigate the relationship between financial inclusion factors and banks' performance and risk among MENAP countries. The sample includes 271 banks located in 24 countries in the region that are interconnected, and micro- and macro-variables that affect the performance and risk levels of these banks. The results indicate that enhancing the level of financial inclusion in the region can increase banks' performance and decrease their risk. They also point out where these banks could benefit more from financial inclusion in terms of reducing their risks. Future research may include investigating financial inclusion tools to explore the relationship between financial inclusion and banks' performance and risk in developing countries. More research can be conducted on each MEANP country to analyze their characteristics and the influence of financial inclusion on bank performance and risk. In addition, future research should be conducted to study the relationship between regulations, rules and financial inclusion across countries and economies.

## Keywords

financial inclusion, branches, performance, risk, bank penetration, MENAP

## JEL Classification

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## INTRODUCTION

Banks expand their networks through branches, ATMs, points of sale (POS) and other electronic terminals (Shihadeh & Liu, 2019). They are aimed at attracting deposits and reaching more customers by offering direct and indirect credit and other services. The opening of new branches allows banks to invest in technology and equipment and hire more staff. This benefits local economies because it enables individuals to access formal financial services, especially in disadvantaged areas. Through branch banking, these institutions can offer their services and receive feedback from their customers. This enables them to implement innovative services targeting young people, women, craftsmen, farmers, and other groups of people who are usually marginalized in access to credit. By offering these services through their branches, banks can earn more profits, especially if this type of extension comes with innovative services and appropriate loans conditions, such as reasonable collateral requirements and credit cost.

There are two sides to the investment process: one is in the revenues earned and profits made from banking operations; the other is in carrying the risks associated with this process. The relationship between profits and risk is a direct one in that if banks are looking to earn more profits, then they will incur more risk. When a bank expands its banking network by opening more branches, this is considered a capital investment. Making the decision to venture into this type of investment is considered a critical



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### Conflict of interest statement:

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point for a bank. In order to open a new branch, a bank will incur an initial investment cost in the building, equipment, staff, training, technology and other logistics. These factors add more costs to the bank's expenses, thereby decreasing its revenues and profits and potentially negatively influencing its financial performance.

Banks need to pay attention to their costs in order not to incur more risk. Some of these costs are related to lending to individuals and small and medium-sized enterprises (SMEs) as financial inclusion factors. SMEs pose high risks for banks for several reasons: inadequate collateral, high competition, inadequate capital, and high competition at this level (Shihadeh, Gamage, & Hannon, 2019). These issues require banks to strike the balance between the risks they incur and the revenues they earn from lending to SMEs or other clients. For example, banks may use a backing from a "credit guarantee corporation." This type of institution can encourage banks to lend more to SMEs (to enhance their financial inclusion and earn more profits) by guaranteeing their loans to SMEs in cooperation with governments and other funds in several countries in the region (i.e., this is already occurring in Palestine).

This study investigates the link between banks' goals of making more profit while incurring less risk with financial inclusion as key to sustainable development. Its purpose is to determine if financial inclusion factors influence banks' performance and risk. The research question can be summarized as follows: Does financial inclusion affect banks' performance and risk in MENAP countries.

## 1. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

### 1.1. Literature review

Financial inclusion studies examine how limited access and use of formal financial services are. Many financial inclusion studies focus on individual characteristics and obstacles and analyze the effects of financial inclusion (or the lack thereof) on the poor and the determinants of financial inclusion across countries, economies, and regions. These studies cover the demand side and, until now, there is little research on supply. Therefore, there is a need for new evidence that will help banks increase their financial inclusion by investing in additional branches, ATMs, and online payment methods and increasing their lending.

Shihadeh and Liu (2019) presented global evidence that enhancing financial inclusion would improve banks' performance and reduce their risk. They used data on 701 banks in 189 countries and economies to examine the relationship between financial inclusion indicators such as branches, savings, loans, credit cards, debit cards, and formal accounts. They also used non-performance loans, return on average assets (ROAA) and return on average equity (ROAE) as indicators of banks' risk and

performance, respectively. The result show that increased financial inclusion will positively affect banks' performance and risk. Shihadeh, Hannon, Guan, Ul Haq, and Wang (2018) examined the relationship between financial inclusion and banks' performance among Jordanian banks. Here, financial inclusion indicators consisted of the total value of credit extended to SMEs, the number of ATMs and ATM services, the number of credit cards issued, and the number of new services offered. The return on assets (ROA) and gross income were used as these banks' performance indicators. The study has found that financial inclusion has a positive impact on performance of Jordanian banks.

Berger, Leusner, and Mingo (1997) studied branch efficiency for commercial banks in the USA. The authors used panel data on 761 observations for the banks. Thus, they used intermediation approaches to evaluate the branches' profits and expenses. Furthermore, the study used 769 observations for its production approaches, thus using operating costs and accounts opened, loan origination, debits, number of deposit accounts, credits as inputs, and closed accounts as output factors to determine output and costs for these branches. The findings show that banks can earn more revenue if they provide suitable places for customers to access their services and when they invest more in branch banking. The findings also show that more branches can cover more costs, as the num-

ber of branches increases and the costs per branch decrease as some costs are shared across branches. Furthermore, bank management cannot control branch performance, while branch managers can play an important role in the efficiency of their branch. In addition, these banks were unable to achieve cost savings from mergers and acquisitions.

Hirtle (2007) studied the effect of the size of bank networks on banks' performance through branch networks for commercial banks in the USA for the period 1995 to 2003. The results show that as deposits grow, costs decrease as branch networks expand. Further, network size has no significant effect on banks' performance. Harimaya and Kondo (2012) used data on regional and second-tier regional banks under the Japanese regional financial institutions classification to study the impact of expanding bank branch networks on costs and profits. The study found that if banks concentrated on activities throughout their own areas, they would improve their cost-efficiency. In addition, if regional banks do not expand their branches, they will achieve low-profit efficiency. While these findings are interesting, it is noteworthy that this study excludes banks operating in urban areas.

Nguyen (2014) used US bank branches closed and merged with other bank branches to examine whether the physical existence of a branch is still important in terms of obtaining financing and access to the financial sources. The data covers the years 1999 to 2012 and measures the impact of closed and merged branches on the volume of local loans. The study concluded that bank branches were still very important, especially for disadvantaged communities, and the closure of branches leads to a lack of lending, especially for small firms.

Skillern (2002) reviewed the literature on the benefits of bank branch availability to low-income people and those living in rural areas and, thus, its impact on economic development. The findings indicate that when the bank branches are closed and it becomes difficult to obtain credit from the traditional bank branches, the alternative financial services offered come with higher fees. In these situations, low-income individuals will have less access to financial services, while these same services are typically required for economic development. Humphrey (1994) used cross-sectional data on 161 banks for the period

1991 to 1992 to study the impact of the increased use of ATMs on banks' performance. The study found that ATMs offer easy and convenient services to customers, but for banks, the costs appear to be slightly higher. The increased number of ATMs reduces the cost of each deposit transaction, but as depositors increase their transactions, this results in total costs being relatively equal to or slightly higher than before ATMs were introduced. The provision of additional banking access achieved through ATMs has raised revenues and bank profits, but this change was found to be weak and consistently insignificant.

## 1.2. Hypotheses development

Several years ago, researchers discussed the role of banks in the country's economy through the aggregation of deposits, investments and loans they continue to offer to entities that are in deficit (Matthew & Thompson, 2005; Dewatripont, Rochet, & Tirole, 2010; Stein, 2014). Banks look to increase their deposits by encouraging more people to open accounts (Shihadeh, Gamage, & Hannon, 2018; Andrieş, 2009; Dewatripont & Tirole, 1994; Pilloff, 1996; Bernini & Brighi, 2017). These deposits allow banks to offer services to their clients and, therefore, earn profits from the difference between the interest paid on these accounts and the interest received from loans. These studies are based on banking theory, especially the financial intermediation theory of banking, which states that banks generate deposits so that they can lend this money to those seeking credit. This principle is in line with the financial inclusion mechanism that gives citizens of the country access to its formal financial system (i.e., through its banks). Here, citizens can open accounts, make deposits, and borrow to cover their needs and set up their businesses. This theory argues that in order for these banks to lend money, they need deposits.

Banks seek to extend their networks to reach clients in rural areas and, thus, attract more clients and more deposits to increase their credit portfolios. Banks' investment processes are based on their credit portfolios and their diversification. By distributing their various credit components across individuals, SMEs, companies, and banks can increase their financial performance and decrease their risk. It is noteworthy that the philosophy of financial inclusion is based on including all citizens in the formal

financial system and, thus, ensuring that all citizens have access to and can use financial resources. Thus, the philosophy of financial inclusion is consistent with banks' targets and can help to earn more profit and reduce their risk.

To develop a hypothesis that examines the relationship between financial inclusion and banks' performance and risk in MENAP countries, this analysis uses the following dependent variables: the ROAA and ROAE as the performance indicators, where the value of non-performance loans is used as the risk indicator. The analysis also includes two levels of independent variables: First, micro-independent variables, which include the national financial-inclusion index, the value of banks' net assets, the value of loans to the value of total deposits ratio, and the number of branches for each bank among the 26 countries reviewed in this study. Second, macro-independent variables include the annual growth of GDP, the growth of broad money, and the asset concentration of the five major banks as a competition indicator.

From all of the above and based on the findings of previous studies discussed, the study hypotheses can be written as follows:

*H0: Financial inclusion has no significant influence on banks' performance and risk in MENAP.*

*H1: Financial inclusion has a significant influence on banks' performance and risk in MENAP.*

## 2. METHODOLOGY

### 2.1. Data

This study obtained data from BankScope, which provides data on banks around the world. This data includes the number of branches, asset values, capital to asset ratios, return on equity, return on assets, asset concentrations of the top five banks, and the percentage of loans to deposits. The World Bank's databases on economic development and financial development are linked to its global financial inclusion indicators for 2011 and 2014. The data covers 664 banks from 24 countries, including

data on 332 banks for 2011 and 332 banks for 2014. To examine the relationship between the number of bank branches and the national financial inclusion index (NFI) and link this data to bank performance, this study eliminated all banks for which data about their number of branches could not be found. Finally, the study includes complete data for 271 banks across 24 MENAP countries (see Appendix A, Table A1). Table 1 presents the definitions of variables and data sources.

**Table 1.** Definition of variables

Variables	Definition	Expected effect	Sources
Dependent variables			
<i>NPL</i>	Impaired loans, non-performance loans as a percentage of gross loans		BankScope
<i>ROAA</i>	Return on Average Assets = Net income/ Net Assets (%)		
<i>ROAE</i>	Return on Average Equity = Net income/ Total Equity (%)		
Micro-independent variables			
<i>National Financial Inclusion (NFI)</i>	Index of: branches per 100,000 individuals formal account % at age 15+ formal saving % at age 15+ formal loans % at age 15 + credit cards % at age 15+ debit cards % at age 15+		Financial development databases
<i>Assets</i>	Net assets	+/-	BankScope
<i>LTD</i>	Loan/Total deposits	+/-	
<i>Branches</i>	Number of branches for each bank	?	
Macro-independent variables			
<i>GDP</i>	Annual growth of GDP (%)	+	World Bank
<i>M2</i>	Broad money growth (%)		BankScope
<i>Competition</i>	Asset concentration of five banks	+/-	BankScope

#### 2.1.1. Dependent variables

As indicators of bank performance, the return on average assets (ROAA) and return on average equity (ROAE) are used as they have been used in



several studies (i.e., Heffernan & Fu, 2008, 2010; Hassan & Bashir, 2003; Sufian & Habibullah, 2009; Shihadeh, Gamage, & Hannon, 2018). The risk indicator is the number of impaired loans and the number of non-performance loans as a percentage of the gross number of loans (Delis & Staikouras, 2011; Delis, Staikouras, & Tsoumas, 2016; D. T. Nguyen, Ta, & H. T. Nguyen, 2018; Shihadeh & Liu, 2019). Given that performance and risk work in opposite directions, banks need to balance these factors, as their final targets order to maximize shareholders' wealth.

### 2.1.2. Independent variables

The data includes the financial inclusion index of MENAP countries', which is the number of bank branches per 100,000 people, and the value of their formal accounts, formal saving accounts, formal loans, credit card balances, and the number of debit cards as a percentage of the population aged 15 years and over were used as the NFI, which indicates financial inclusion at the country level. The principal component analysis was used to reduce these six national-level financial inclusion indicators to one factor. As the study focuses on banking penetration as a financial-inclusion indicator, the number of branches was used as a key variable for financial inclusion at the bank level.

At the bank level, the study used control variables that may affect banks' performance and risk; these variables include banks' total assets,

capital ratio (%), and loans to deposits ratio (%). In contrast, at the country level (as this study is based on cross-sectional data), the study used the asset concentration of the five main banks and the percentage growth in GDP and broad money.

To test whether the multicollinearity problem exists in the study models, the variance inflation factor (VIF) test was used. The VIF result indicated that the mean VIF was 1.58 (see Appendix A, Table A2), which means that the multicollinearity problem did not exist in the independent variables in this study. A number of studies that addressed the VIF value noted that it should not be more than 10 (Hassan, 2009; Field, 2000; Shihadeh, Gamage, & Hannon, 2018). For the heteroscedasticity problem, which appears when the error variance differs across observations, the study used the Breusch-Pagan test to examine whether the data has this problem. The test results indicated that the study's data has this problem, which is common in cross-sectional data (see Appendix A, Table A3). Therefore, the study employed the OLS robustness test as a basic regression to solve the issue.

### 2.1.3. Empirical models

To continue the empirical analysis, the study used OLS (robustness) and the quantile technique by Shihadeh and Liu (2019), based on the following conditions:

$$BP_{it} = f \left( \begin{array}{l} \text{branches per 100,000 individuals} \\ \text{formal account \% at age 15+} \\ \text{formal saving \% at age 15+} \\ \text{formal loans \% at age 15+} \\ \text{credit cards \% at age 15+} \\ \text{debit cards \% at age 15+} \end{array} \right), Ban5_{it}, GDP_{it}, M2_{it}), \quad (M.1)$$

$$NPL_{it} = f \left( \begin{array}{l} \text{branches per 100,000 individuals} \\ \text{formal account \% at age 15+} \\ \text{formal saving \% at age 15+} \\ \text{formal loans \% at age 15+} \\ \text{credit cards \% at age 15+} \\ \text{debit cards \% at age 15+} \end{array} \right), Ban5_{it}, GDP_{it}, M2_{it}). \quad (M.2)$$

The equations (M.1) and (M.2) are re-written so that they become (M.1.1) and (M.2.1). OLS technique is also used in these equations as it is more suitable for data. Therefore, the relationship between dependent and independent variables is as follows:

$$\begin{aligned} BP_{it} = & \beta_0 + \beta_1 \ln Branches_{it} + \\ & + \beta_2 \ln Assets_{it} + \beta_3 LTD_{it} + \\ & + \beta_4 NFI_{it} + \beta_5 Banks5_{it} + \beta_6 GDP_{it} + \\ & + \beta_7 M2_{it} + \varepsilon_i, \end{aligned} \quad (M.1.1)$$

$$\begin{aligned} NPL_{it} = & \beta_0 + \beta_1 \ln Branches_{it} + \\ & + \beta_2 \ln Assets_{it} + \beta_3 LTD_{it} + \\ & + \beta_4 NFI_{it} + \beta_5 Banks5_{it} + \beta_6 GDP_{it} + \\ & + \beta_7 M2_{it} + \varepsilon_i. \end{aligned} \quad (M.2.1)$$

To obtain robust results at the various levels of branch expansion and to determine whether banks can earn more profits and reduce their risks through financial inclusion, the study used the quantile estimation technique based on equations (M.1.2) and (M.2.2). This is a regression that is widely used in economics and financial research (see, i.e., Wellalage & Locke, 2014; Bonaccolto & Caporin, 2016; Shihadeh & Liu, 2019). This regression will present a clear view of the influence of financial inclusion on banks' performance and risk. The quantile estimation technique can be written as follows:

$$\begin{aligned} BP_{it} = & \beta_0 + \beta_1(q) \ln Branches_{it} + \\ & + \beta_2(q) \ln Assets_{it} + \beta_3(q) LTD_{it} + \\ & + \beta_4(q) NFI_{it} + \beta_5(q) Banks5_{it} + \\ & + \beta_6(q) GDP_{it} + \beta_7(q) M2_{it} + \varepsilon_i, \end{aligned} \quad (M.1.2)$$

$$\begin{aligned} NPL_{it} = & \beta_0 + \beta_1(q) \ln Branches_{it} + \\ & + \beta_2(q) \ln Assets_{it} + \beta_3(q) LTD_{it} + \\ & + \beta_4(q) NFI_{it} + \beta_5(q) Banks5_{it} + \\ & + \beta_6(q) GDP_{it} + \beta_7(q) M2_{it} + \varepsilon_i, \end{aligned} \quad (M.2.2)$$

where *BP* represents bank performance indicators, ROAA, ROAE, and NPL represent its non-performance loans (risk indicator). *Branches* indicate the number of branches per bank; *Assets* are a bank's total assets; *LTD* is the percentage of loans to de-

posits. *NFI* is the national financial inclusion index; *Banks 5* represents the asset concentration of the top five banks; *GDP* is the percentage *GDP* growth; and *M2* is the percentage growth of broad money.

### 3. EMPIRICAL ANALYSIS

#### 3.1. Descriptive statistics

Table 2 shows the descriptive statistics, including the means, standard deviations, and the minimum and maximum observations for the outcomes and the predictor variables.

**Table 2.** Descriptive statistics of variables

Source: BankScope, World Bank databases on economic and financial development. Calculated by the author.

Variables	Obs.	Mean	Std. dev.	Min	Max
<i>NPL</i>	271	10.262	14.713	0.054	95.801
<i>ROAA</i>	271	1.440	1.612	-6.743	19.961
<i>ROEA</i>	271	11.041	9.345	-49.6	42.206
<i>Inbranches</i>	271	208.107	407.27	1	3331
<i>Inassets</i>	271	1.96e+12	8.01e+12	1.10e+07	7.40e+13
<i>LTD</i>	271	60.636	21.25095	11.216	130.79
<i>NFI</i>	271	-0.300	0.499	-0.979	0.944
<i>Banks 5</i>	271	77.231	14.696	57.130	100.000
<i>GDP</i>	271	3.983	2.907	-1.917	13.375
<i>M2</i>	271	9.753	5.225	-7.810	35.11

Table 3 shows the correlation matrix to obtain the initial indicator of the relationship between the dependent and independent variables. Table 3 shows a large ratio between the number of branches and ROAE and ROAA as banks' performance indicators. The results also indicate that the correlation between the number of branches and NPLs is very small, but negative, which means that a bank having more branches can reduce the number of non-performing loans. Meanwhile, the number of bank branches also has a greater impact on banks' performance than their risk indicators.

The national financial inclusion index moves in the opposite direction to ROAE, since the coefficient of banks' performance is small. Further, the national financial inclusion index consist-

**Table 3.** The correlation matrix

Source: BankScope, World Bank databases on economic and financial development. Calculated by the author.

Variables	<i>NPL</i>	<i>ROAA</i>	<i>ROAE</i>	<i>Branches</i>	<i>Assets</i>	<i>LTD</i>	<i>NFI</i>	<i>Banks 5</i>	<i>GDP</i>	<i>M2</i>
<i>NPL</i>	1.000	–	–	–	–	–	–	–	–	–
<i>ROAA</i>	–0.437***	1.000	–	–	–	–	–	–	–	–
<i>ROAE</i>	–0.429***	0.837***	1.000	–	–	–	–	–	–	–
<i>Branches</i>	–0.089	0.155*	0.242**	1.000	–	–	–	–	–	–
<i>Assets</i>	–0.068	–0.079	0.014	–0.071	1.000	–	–	–	–	–
<i>LTD</i>	–0.315***	0.044	–0.136	0.039	–0.358***	1.000	–	–	–	–
<i>NFI</i>	–0.255***	0.008	–0.064	–0.099	0.160*	0.418***	1.000	–	–	–
<i>Banks 5</i>	0.027	0.025	0.005	–0.134	0.155*	–0.149	–0.091	1.000	–	–
<i>GDP</i>	–0.151*	0.064	–0.012	0.214**	–0.261***	0.415***	0.214**	–0.310***	1.000	–
<i>M2</i>	0.026	0.136	0.079	0.168*	–0.369***	0.128	–0.289***	–0.223**	0.466***	1.0000

Note: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

ently moves according to ROAA, but the coefficient is small here. For the risk indicator, the results indicate that non-performing loans move in the opposite direction (decrease) to the number of branches and the national financial inclusion index. Therefore, more banking penetration by increasing the number of branches and enhancing the country's financial inclusion index, by increasing its financial inclusion tools, can reduce the number of bank non-performing loans in MENAP, thus enhancing its profits and performance.

### 3.2. Basic estimation – robust OLS

The analysis is as follows: model (M1.1) includes bank branches as a financial inclusion factor and the national financial inclusion index as an overall measure of financial inclusion. These key variables were added to the other control variables so one can examine whether financial inclusion (branches and NFI) has a significant impact on banks' performance and risk in MENAP. Table 4 presents the OLS estimation results for models (M1.1) and (M2.1). These models present the regression results for banks' performance and risk as an outcome. The regression results are presented in Table 4.

The estimation results for the model (M1.1) in Table 4 show that the number of branches can enhance banks' performance indicators. Further, more bank branches can increase the bank's ROAE by 128.5%, while there is no relationship between ROAA and banking pene-

tration as measured by the number of branches. Moreover, there is no correlation between the national financial inclusion index and ROAA and ROAE as bank performance indicators. Therefore, the low values of financial inclusion indicators among banks at the regional or country level are reflected in the banks' performance in MENAP (as presented in Shihadeh, 2018; Wang & Shihadeh, 2015).

The results indicate that there is no relationship between the national financial inclusion index and bank risk as measured by NPL. This result may refer to the low index of financial inclusion in MENAP as measured in Shihadeh (2018), and Demircug-Kunt, Leora, Singer, and Van Oudheusden (2015). These results confirm the assumption that implementing bank policies that promote financial inclusion in MENAP can reflect both the demand and supply sides of banking services and, thus, contribute to the economic growth of a country within the region and of the region itself (Zins & Weill, 2016; Allen, Demircug-Kunt, Klapper, & Peria, 2016; Wang & Shihadeh, 2015). However, an unstable political regime can impact the business cycle in the region and, thus, NPLs can be significantly influenced by other factors not related to financial inclusion and the national financial inclusion index. The results also show that more banking penetration through the increased number of branches can decrease a bank's NPL as a risk indicator by about 150%. This analysis also shows that there is no relationship between NPLs of the largest five banks, GDP and broad money in MENAP.



**Table 4.** OLS estimation results for M1.1 and M2.1

Source: BankScope, World Bank databases on economic and financial development. Calculated by the author.

Variables	Performance indicators M1.1		Risk indicator M2.1
	ROAA	ROAE	NPL
<i>Inbranches</i>	0.033 (0.096)	1.285** (0.653)	-1.503* (0.855)
<i>Inassets</i>	0.057 (0.037)	0.505** (0.247)	-0.593 (0.547)
<i>LTD</i>	0.008 (0.006)	-0.042 (0.033)	-0.179 (0.128)
<i>NFI 2011–2014</i>	-0.026 (0.035)	1.316 (2.242)	-4.047 (3.716)
<i>Banks 5</i>	0.003 (0.007)	-0.000 (0.053)	-0.015 (0.063)
<i>GDP</i>	-0.011 (0.027)	-0.106 (0.207)	-0.024 (0.266)
<i>M2</i>	0.034 (0.024)	0.257 (0.169)	0.061 (0.271)
<i>Constant</i>	-1.27 (1.006)	-6.003 (6.664)	41.05* (23.18)
<i>Observations</i>	271	271	169
<i>R-squared</i>	0.0433	0.1262	0.1851
<i>Prob. &gt; F</i>	0.1432	0.0000	0.0000

Note: Robust standard errors are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

### 3.3. Robust estimation – quantile regression

This section examines how banks can reduce risk and enhance performance by increasing their penetration through their increased number of branches and moving up the national financial inclusion index. Therefore, quantile regression for the number of NPLs, and ROAA and ROAE are used, based on the basic equations (M1.2) and (M2.2). Quantile regression allows us to study the impact of independent variables on different quantiles of the dependent variable distribution. Thus, it gives a complete picture of the relationship between NPLs, ROAA, and ROAE as outcomes and micro- and macro-interpreters. Quantile regression also considers the robustness of outliers in observations and does not distribute estimation and conclusions. Table 5 presents the quintile estimation results for the model (M1.2).

It is noted that banks in the first quintile of ROAA and the second and third quintiles of ROAE could enhance their performance by opening additional branches: i.e., by enhancing their banking penetration through branching and, thereby, by enhancing their financial inclusion. Branching could enhance the performance of banks with

**Table 5.** Quintile estimation results for M1.2

Source: BankScope, World Bank databases on economic and financial development. Calculated by the author.

Variables	ROAA			ROAE		
	QR 25	QR 50	QR 75	QR 25	QR 50	QR 75
<i>Inbranches</i>	0.133* -0.0689	0.0104 -0.0688	-0.0343 -0.065	-0.0343 -0.065	1.238** -0.483	0.877* -0.48
<i>Inassets</i>	0.0223 -0.0457	0.0169 -0.0456	-0.0225 -0.0431	-0.0225 -0.0431	0.373 -0.32	0.186 -0.318
<i>LTD</i>	-0.00081 -0.00523	0.00537 -0.00522	0.00953* -0.00493	0.00953* -0.00493	-0.0342 -0.0366	-0.00968 -0.0364
<i>NFI</i>	0.112 -0.228	0.0619 -0.228	-0.194 -0.215	-0.194 -0.215	-0.705 -1.599	-0.926 -1.587
<i>Banks 5</i>	0.00366 -0.00628	0.00499 -0.00627	-0.00152 -0.00592	-0.00152 -0.00592	-0.0304 -0.044	-0.00653 -0.0437
<i>GDP</i>	0.023 -0.0395	0.0101 -0.0394	-0.0153 -0.0372	-0.0153 -0.0372	-0.103 -0.277	-0.184 -0.275
<i>M2</i>	0.00502 -0.0278	0.0614** -0.0278	0.0596** -0.0262	0.0596** -0.0262	0.332* -0.195	0.495** -0.194
<i>Constant</i>	-0.732 -1.249	-0.395 -1.247	1.609 -1.178	1.609 -1.178	-1.473 -8.761	3.518 -8.699
<i>Observations</i>	271	271	271	271	271	271

Note: Standard errors are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

low ROAAs and mid-level ROAEs. In the second ROAA quintile, which presents the highest ROAA, the effect of adding additional branches is insignificant but still positive. In short, banks that achieve a high ROAA may not benefit from more branches as these banks may have reached their expansion limit in terms of improving their ROAA (Shihadeh & Liu, 2019; Chang, Lin, Cao, & Lu, 2011). Besides, there is no relationship between national financial inclusion and performance indicators of all banks. Thus, these results become consistent with those of the OLS regression, and this means that the study analysis and its results are robust to this data.

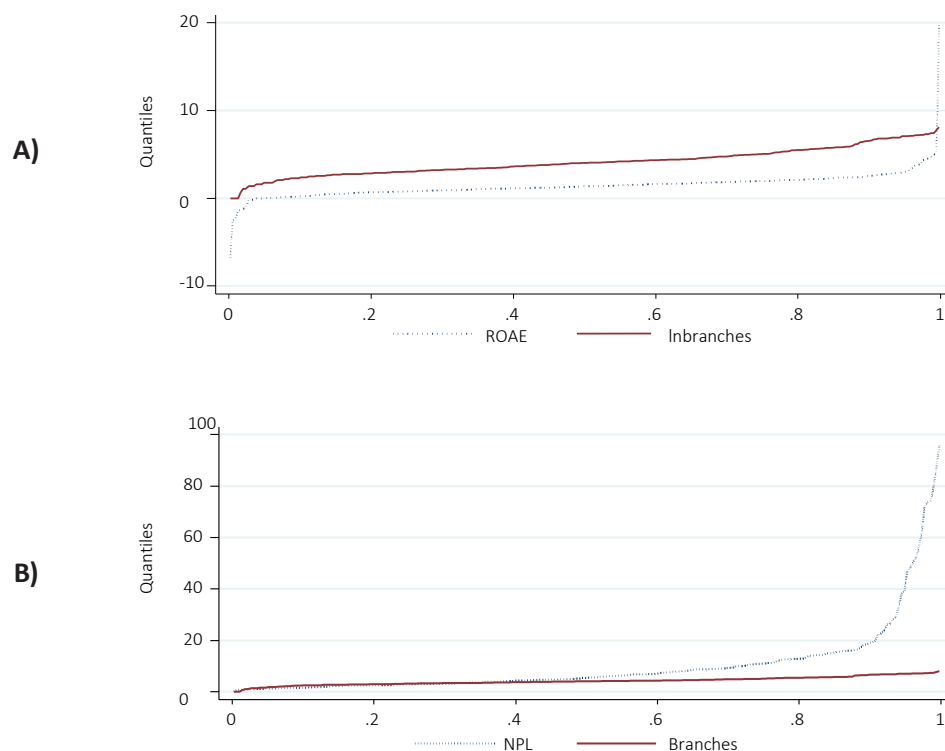
Table 6 shows that there is no link between the number of branches and banks' risk in all quintiles, except in the first quintile, which means that banks with fewer non-performance loans could benefit from having more branches at that particular risk level. There is a relationship between the level of national financial inclusion and bank risk. Consequently, financial inclusion may reduce banks' risk in the second and third risk quintiles, with advantages for these banks in the third quintile. These results are in line with Shihadeh and Liu (2019).

**Table 6.** Quintile estimation results for M2.2

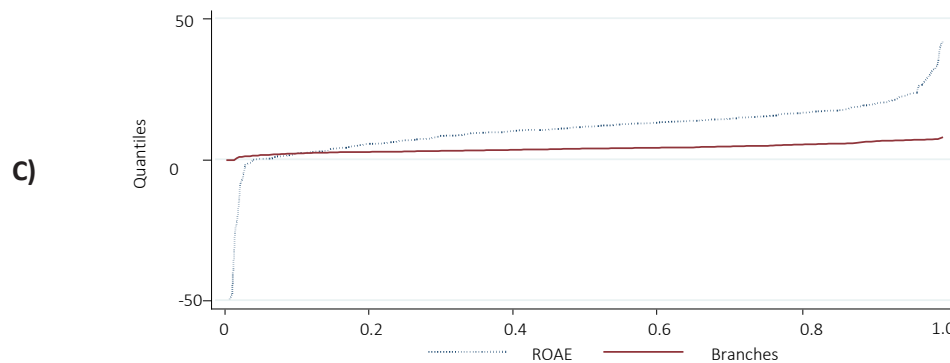
Source: BankScope, World Bank databases on economic and financial development. Calculated by the author.

Variables	NPL		
	Q – 25%	Q – 50%	Q – 75%
Inbranches	0.877* (-0.48)	0.0291 (-0.372)	-0.856 (-0.827)
InAssets	0.186 (-0.318)	-0.317 (-0.241)	-0.153 (-0.536)
LTD	-0.01 (-0.036)	-0.0244 (-0.0304)	-0.0373 (-0.0675)
NFI	-0.926 (-1.587)	-5.357*** (-1.211)	-7.389*** (-2.694)
Banks 5	-0.00653 (-0.044)	0.0162 (-0.032)	-0.0347 (-0.0713)
GDP	-0.184 (-0.275)	-0.0912 (-0.202)	-0.493 (-0.45)
M2	0.495** (-0.194)	-0.199 (-0.151)	0.0625 (-0.336)
Constant	3.518 (-8.699)	15.52** (-6.794)	22.37 (-15.11)
Observations	271	271	271

Note: Standard errors are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .



**Figure 1.** Quantile regression results



**Figure 1 (cont.).** Quantile regression results

## CONCLUSION

This study examines the influence of financial inclusion on banks' performance and risk in the MENAP region. The sample consists of 271 banks in 24 countries of the region. Two regression techniques are used to achieve robust results when examining two levels of financial inclusion: the bank level and the national level. The variables used to measure financial inclusion are the number of bank branches and the national financial inclusion index. Micro- and macro-control variables are used to measure banks' performance and risk. The findings show that increased financial inclusion through banking penetration in MENAP can reduce bank risk measured by the value of non-performing loans, while there is no relationship between the national financial inclusion index and bank risk at the country level.

For the basic regression used to find banks' performance measured by ROAA and ROAE, the analysis indicates that banking penetration, measured by the number of branches, significantly influences ROAE as a performance indicator at the bank level. Although there is no significant relationship between banking penetration and ROAA, the relationship is still positive. Furthermore, there is no significant relationship between where banks rank by the national financial inclusion index and their financial performance in MENAP.

For the quantile regression, the results show that banking penetration can significantly increase the ROAA in the first quantile for MENAP banks, while there is no correlation between banking penetration in the second and third quantiles and banks' ROAA. Furthermore, broader banking penetration through branches may enhance the second and third quantile of ROAE, while there is no relationship between the region's first-quantile banks. Although no relationship was found between the national financial inclusion index and banks' performance indicators among their quantiles, these results could be due to the low level of financial inclusion in the region.

The results show that banking penetration is significantly related to the risk for banks in the first quantile. This means that opening more branches can reduce banks' risk in the region. Further, the national financial inclusion index is significantly linked to the risk of banks in the second and third quantiles. These results suggest that increased financial inclusion in the region may reduce banks' risk. From these results, it can be concluded that enhanced financial inclusion through banking penetration can increase banks' performance and reduce their risk, with the advantage being a reduced risk.

## RECOMMENDATIONS

Based on the above results, further studies can be conducted on the links between banks' performance and risk at the country level among MENAP banks. In addition, more financial tools can be added to

banks' service packages to increase financial inclusion in the region and to positively reflect the banks' performance.

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## APPENDIX A

**Table A1.** Countries and the number of banks

No.	Country name	Country code	Number of banks	
			2011	2014
1	Afghanistan	AFG	4	5
2	Algeria	DZA	3	3
3	Bahrain	BHR	7	10
4	Djibouti	DJI	3	3
5	Egypt, Arab Republic	EGY	4	5
6	Iran, Islamic Republic	IRN	6	6
7	Iraq	IRQ	4	4
8	Jordan	JOR	9	9
9	Kuwait	KWT	6	6
10	Lebanon	LBN	4	40
11	Libya	LBY	2	5
12	Mauritania	MRT	3	3
13	Morocco	MAR	8	10
14	Oman	OMN	3	5
15	Pakistan	PAK	4	6
16	Qatar	QAT	3	7
17	Saudi Arabia	SAU	2	4
18	Sudan	SDN	2	4
19	The Syrian Arab Republic	SYR	2	2
20	Tunisia	TUN	4	10
21	Turkey	TUR	6	12
22	United Arab Emirates	ARE	4	7
23	West Bank and Gaza	PSE	4	5
24	Yemen, Republic	YEM	1	2
Total			98	173

**Table A2.** Variance inflation factor – VIF-MENAP

Variable	VIF
<i>Assets</i>	1.76
<i>GDP</i>	1.74
<i>NFI</i>	1.68
<i>LTD</i>	1.60
<i>M2</i>	1.59
<i>Branches</i>	1.51
<i>Banks5</i>	1.20
<i>Mean VIF</i>	1.58

**Table A3.** Heteroskedasticity – MENAP

Breusch-Pagan	Chi2(1)	Prob. > chi2
ROAA	5.20	0.0226
ROAE	31.23	0.0000
NPL	162.92	0.0000