

FACTORS AFFECTING NET INTEREST MARGIN IN THE BANKING SECTOR: EVIDENCE FROM THE ARAB REGION

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Abstract

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The net interest margin is an important measure for assessing the operational efficiency of the banking sector, and it also evaluates the performance of the bank's management, as well as the success of its strategies in generating revenues through its core business (Obeid & Adeinat, 2017). In this paper, we examine the determinants of the net interest margin in the banking sector for selected Arab countries, including the cost-income ratio, the bank's assets, the provisions, the main interest rate of the monetary policy, the real gross domestic product (GDP) growth rate, and the inflation rate, for a sample of 18 commercial banks in six Arab economies during the period 2015–2020. We use panel data models and the Hausman test to select the appropriate model. The results show that there is a significant positive effect of the bank size and the cost-to-income ratio on the net interest margin, while there is a negative impact of inflation, interest rates on monetary policy tools, and the coronavirus pandemic on the net interest margin. The results did not show a significant relationship between real GDP growth and loan provisions on the one hand, and the operational efficiency of the banking sector on the other hand.

Keywords: Net Interest Margin, Monetary Policy Instruments, Panel Data, Fixed Effects, Random Effects, COVID-19, Hausman Test

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1. INTRODUCTION

In terms of their intermediary position in managing savings and distributing loans, the net interest margin (NIM) is one of the most significant indicators that assess operational efficiency in the banking industry. An exaggerated increase in the NIM would lead to a decline in investment, resulting in a slowing of real gross domestic product (GDP) growth. As a result, it is critical to examine the components of the NIM, as well as its implications for the banking industry. According to Brock and Suarez (2000), a greater NIM may reduce savings and raise the cost of lending, thus decreasing investments, while Saunders and Schumacher (2000) argue that a greater NIM may help to enhance banking resilience if the profits are used to increase the institutions' capital buffers.

Furthermore, the NIM is considered as one of the financial soundness indicators that central banks follow up periodically to verify the resilience of the banking sector since the financial soundness indicators can be used to predict bank failure (Obeid, 2022a).

The examination of the reactions of the banking sector's NIM to changes in several factors has increased attention in the relevant literature. This paper revisits this topic for the Arab banking industry by examining a panel of 18 Arab banks from 2015 to 2020. In this paper, we attempt to fill the gap in the literature related to the determinants of the NIM in the Arab banking sector. There is much previous literature that has examined the determinants of the NIM in Arab countries individually, but few studies have examined the determinants of the NIM in

the banking sector in a group of Arab countries. In addition, this study investigates a time period characterized by the presence of difficult risks and challenges facing the Arab banking sector, including the coronavirus pandemic, economic challenges and fluctuations, and the challenges of implementing the requirements of Basel III and International Financial Reporting Standard No. 9 (IFRS9), as well as adopting accommodative monetary policies. Therefore, this study contributes by attempting an in-depth analysis of the response of the NIM to these variables. Accordingly, the study attempts to answer the following research questions:

RQ1: What is the impact of economic and banking factors on the operational efficiency of the Arab banking sector?

RQ2: Is there an impact of the coronavirus crisis on the NIM in the Arab banking sector?

RQ3: What is the role of accommodative monetary policy in the behavior of interest rates on deposits and loans in the Arab banking sector? Did this contribute to reducing or expanding the NIM?

RQ4: Are operating expenses passed through the NIM in the Arab banking sector?

RQ5: What is the impact of building provisions in accordance with the application of IFRS 9 on the NIM in the banking sector?

The paper includes testing a set of factors related to internal banking factors (bank-specific factors), in addition to external factors that measure the banking industry, monetary policy, economic environment, and the coronavirus pandemic. The results indicate that the set of banking variables has a positive impact on the net interest margin, while the economic variables, monetary policy, and the coronavirus crisis are associated with a negative relationship with the operational efficiency of the banking sector in Arab countries. But in general, the negative effects of the external factors are greater than the positive effects of the internal factors.

The rest of the paper is structured as follows. Section 2 provides a literature review on the determinants of the NIM. Section 3 introduces the research methodology. Section 4 describes the estimation results and testing procedures. Section 5 discusses and analyses the results of the econometric model. Section 6 provides a conclusion and some recommendations.

2. LITERATURE REVIEW

Several empirical papers in the literature have examined the link between the NIM and a variety of associated factors. Indeed, Doliente (2005) investigates the factors that may affect the NIM in four Southeast Asian countries. According to the study results, bank-specific characteristics (liquid assets, credit risk, collateral, operational cost, and capital) have a significant impact on NIM.

Ben Khediri and Ben-Khedhiri (2011) examine the drivers of the NIM in the Tunisian banking system using a sample of ten banks from 1996 to 2005. The findings show that bank capital, bank reserve opportunity costs, operational expenses, and implicit interest payments are all positively linked to the NIM. However, management quality might have a detrimental impact on the NIM. It is also indicated that credit risk has no significant impact on the NIM. Fungacova and Poghosyan (2011) investigate

the sensitivity of the Russian banking sector's NIM to changes in various factors from 1999 to 2007. The findings show that operational expenses have a significant positive influence on NIM, while liquidity has a significant negative impact on NIM. Regarding the market share index, the study found that there are no significant effects of this variable on the NIM.

According to Poghosyan (2013), the optimal NIM may be estimated by considering many factors, including the operational expenses, the cost of the required reserve ratio, the provisions cost for credit impairment, non-interest income, and profitability. Raharjo et al. (2014) examine the determinants of commercial banks' NIM in Indonesia using internal factors (bank size, profitability, capital adequacy ratio, risk, and liquidity) and external factors (market competitiveness, interest rate, and inflation) from 2008 to 2012. The results show that internal variables and inflation have a significant impact on the NIM.

Obeid and Adeinat (2017) investigate the factors of the NIM in Jordan's banking industry from 2005 to 2015. The findings show that banking industry variables have a greater effect on NIM than other factors. The paper also shows that bank-specific factors and the required reserve ratio have a clear effect on NIM. Regarding the economic variables, the result has not shown any significant relationship between these variables and the NIM.

Angori et al. (2019) analyze the factors that affect the NIM in the European banking system during the global financial crisis and post-crisis period. They found that bank's market power (represented by the Lerner index), capitalization, operational costs, and efficiency (gross income to operating costs) have positive effects on the NIM, while economic factors, represented by GDP, unemployment, and inflation have negative effects on the NIM. The results also reveal that the regulatory environment is an important driver of the NIM, which remained lower in countries with higher capital requirements and greater supervisory power.

Abaidoo and Anyigba (2020) focus on the potential impact of the economic environment on the performance of American banks. Economic indicators include economic uncertainty, economic recession, inflation, and inflation expectations, while bank performance indicators include return on assets, return on equity, and the NIM. Regarding the NIM determinants, the results showed that the actual inflation rate positively affects the net interest margin, while expected inflation has a negative effect.

Jouni and Obeid (2021) examine the determinants of operational efficiency for the Arab banking sector by considering a panel of 18 banks over the 2014-2019 period. The results show that the NIM reacts significantly and positively to the changes in the operational expenses and the bank's assets. The results also show that there is a negative relationship between the interest rate on monetary policy tools and inflation rates on the one hand and NIM on the other hand.

Mohammed et al. (2022) explore the effects of some banking and economic variables on NIM in developing and developed economies during the period 2016-2021. The results show that the factors affecting the bank spread (NIM) have the

same effects in developing and developed economies, taking into account the difference in the magnitudes of the effect. Regarding the impact of the coronavirus pandemic, it reduced the NIM in Asian banks while increasing the margin in European banks.

Abdeljawad and Bahlaq (2023) try to determine the factors that affect the NIM for the banking sector in Palestine during the period 2011-2020. The results revealed that some variables, namely risk aversion, loan to deposits, and earning costs, have a positive impact on the NIM, while credit risk has negative effects on the NIM in the banking sector in Palestine.

Addai et al. (2023) investigate the NIM across fifty-two African countries based on the annual data of 552 banks during the period 2011-2018. The results indicate that risk aversion, bank concentration, credit risk, interest rate volatility, non-interest income, operating expenses, and transaction size were among the determinants of the NIM, in addition to financial innovation and GDP.

$$NIM_{it} = \beta_0 + \beta_1 PRV_{it} + \beta_2 CIR_{it} + \beta_3 SIZ_{it} + \beta_4 ITR_{it} + \beta_5 INF_{it} + \beta_6 GDP_{it} + \beta_7 COVID_t + \varepsilon_{it} \quad (1)$$

$$i = 1, 2, \dots, N; \quad t = 1, 2, \dots, T$$

where, i refers to country and t refers to time; NIM_{it} is the net interest margin (the difference between income from interest on loans and interest paid on deposits divided by total income); PRV_{it} is the provisions (the coverage ratio of the non-performing loans); CIR_{it} is the cost-to-income ratio; SIZ_{it} is the logarithm of assets; ITR_{it} is the main interest rate of the monetary policy; INF_{it} is the inflation rate; GDP_{it} is the real GDP growth rate; $COVID_t$ is a dummy variable take the value 1 in 2020 and the value zero otherwise; and ε_{it} refers to the disturbance term.

The coefficient β_1 determines the effect of the coverage ratio of the non-performing loans (the provisions) on the NIM. The provision expenses may be passed by the bank through raising the NIM, resulting in a greater net interest margin. According to International Accounting Standards (IAS), commercial banks deduct provisions from revenues to cover credit risks, so any increase in the provisions may lead to a higher burden on the NIM, thus raising the NIM (Raharjo et al., 2014; Sidabalok & Viverita, 2011).

The coefficient β_2 evaluates the impact of the cost-to-income ratio on the NIM. The expected sign of the relationship between these two variables may be positive or negative. In the case of a positive relationship, the systemic banks may pass any additional expenses to their clients by raising loan interest rates and/or cutting deposit interest rates (Obeid & Adeinat, 2017). Nevertheless, the relationship between the NIM and the cost-to-income ratio may be negative, as banks (particularly small-sized banks) may keep the NIM constant or reduce it in order to maintain their competitive edge, thereby retaining and attracting new customers (Dumicic & Ridzak, 2013).

The coefficient β_3 measures the responsiveness of the NIM to changes in bank size. The reactions are likely to be positive since systemic banks (large-sized banks) often have higher operational efficiency

It should be noted that there is a lot of previous literature that has also examined other factors that may affect the performance of companies in general (not necessarily banks). However, we focus on the factors that may affect banks, taking into account the specificity of this sector in the Arab region.

3. RESEARCH METHODOLOGY

3.1. Model and data

We examine the determinants of the NIM in the banking sector for selected Arab countries, including the cost-income ratio, the bank's assets, the provisions, the main interest rate of the monetary policy, the real GDP growth rate, and the inflation rate, for a sample of 18 commercial banks in six Arab economies (Jordan, Egypt, Morocco, Oman, Tunisia, and Qatar) during the period 2015-2020. Analytically, we use the following model to investigate the factors that affect the NIM in the Arab banking sector:

in managing their assets and controlling expenses (Obeid, 2022b).

The coefficient β_4 measures the net interest margin's sensitivity to changes in the main interest rate of the monetary policy. The monetary policy interest rate (regardless of the type of instrument) is anticipated to have a negative or positive impact on the NIM. In the case of a negative relationship, reducing interest rates on monetary policy tools injects more liquidity into the market, since the cost of lending is decreased, this will encourage bank customers to borrow because interest rates are low, and thus generate more returns for the bank even if interest rates decrease, the amount of increase in the NIM depends on the size of the gap between interest rates on loans and deposits. On the other hand, and in the case of a positive relationship, raising interest rates on monetary policy tools raises lending costs, and therefore the bank would raise interest rates on credit for new customers, and raise interest rates on old customers because their credit contracts included linking variable interest rates with monetary policy interest rate, and then generate profits. The arbitrage between the negative and positive effects of changing interest rates depends eventually on the efficiency of risk management at the bank and the adoption of the responsible finance concept.

The coefficient β_5 illustrates how the NIM responds to changes in the inflation rate. The effect of the inflation rate on the NIM is determined by whether the inflation is anticipated or not. If inflation is expected, then the response is positive, as commercial banks keep maximizing their returns by raising interest rates on credit (Obeid, 2023). On the other hand, if inflation is unexpected, then the response is negative, as commercial banks will not have enough time to adjust interest rates on credit, and this will lead to higher costs for commercial banks and lower their profits (Perry, 1992). Despite this, the high inflation rates lead to a decrease in the disposable income for

the household sector and thus push them to borrow to meet their essential needs, which may increase the bank's profits from interest income.

The coefficient β_6 reveals the sensitivity of the NIM to fluctuations in the real GDP growth rate. It is anticipated that the real GDP growth rate will have a positive effect on the NIM, given the increase in loan demands due to an attractive economic environment. So, there will be an improvement in the quality of assets, as the probability of borrower default decreases, influencing the NIM positively.

As for the coefficient β_7 , we add this variable to the study model in order to capture the effects of the emerging coronavirus pandemic on the NIM in the banking sector, it is expected that the relationship between these two variables will be negative, given the significant negative repercussions on the world economies, the consequences that led to a decline in economic variables, and banks' reticence in granting credit in light of the decline in the creditworthiness of the household and corporate sectors, as well as the uncertainty conditions (Arab Monetary Fund, 2021).

The data is collected annually from various sources. Indeed, the banking variables data are collected from the Arab Monetary Fund's database, whereas the economic variables are collected from the World Bank's World Development Indicators.

3.2. Regression model

3.2.1. Fixed effects model

The fixed effects model takes the following form:

$$Y_{it} = \alpha_i + \beta' X_{it} + u_{it} \quad (2)$$

$$i = 1, 2, \dots, N; \quad t = 1, 2, \dots, T$$

where, Y_{it} refers to the net interest margin; α_i refers to the individual effects represented by constants; β' is a vector of coefficients of the independent variables; X_{it} is a vector that represents the independent variables; and u_{it} refers to the independent and identically distributed process.

The ordinary least squares (OLS) estimator of the coefficients α_i and β' , called Fixed Effects Model (Within estimator) or least square dummy variable (LSDV) estimator, is Best Linear Unbiased Estimator (BLUE). The estimates of the individual effects can only be analyzed at a relative level and not at an absolute level.

3.2.2. Random effects model

The structure of the error terms approximates several determinants that affect the dependent variable but are not explicitly included as explanatory factors. In this context, there are three sorts of omitted factors to consider:

$$u_{it} = \alpha_i + \lambda_t + v_{it} \quad (3)$$

$$i = 1, 2, \dots, N; \quad t = 1, 2, \dots, T$$

where, α_i represents the individual effects (random) that refer to all structural specificities, independent of time, of the dependent variable, which differ across individuals; λ_t represents the random effects

(temporal effects) which are identical for all individuals; and v_{it} represents the component of the total error term u_{it} orthogonal to the individual and temporal (random) effects. We suppose that the error terms u_{it} are distributed independently and identically.

We assume that there is no temporal effect ($\lambda_t = 0$), and we investigate the following model:

$$\begin{cases} Y_{it} = \mu + \beta' X_{it} + u_{it} \\ u_{it} = \alpha_i + v_{it} \\ i = 1, 2, \dots, N; \quad t = 1, 2, \dots, T \end{cases} \quad (4)$$

The presence of the individual effects α_i in the model's error term u_{it} causes correlations between the levels of this error for a specific intra-individual correlation. Therefore, the Within estimator is consistent and unbiased, but not efficient. The model is then estimated using the generalized least squares (GLS) estimation technique, yielding a BLUE estimator. This attribute is especially relevant when doing the appropriate specification test to distinguish between the fixed effects model and the random effects model (Hausman, 1978).

3.2.3. Specification tests for individual effects

The challenge with individual effects models is the specification of these individual effects (fixed effects or random effects). When the time series dimension goes to infinity, the GLS estimate of the random effects model is asymptotically identical to the Within estimator. However, for panels with small time series dimensions, there are differences between the Within and GLS estimators (Hausman, 1978). Consequently, for this form of panel to accurately estimate model coefficients, the selection of an appropriate specification is essential.

The correlation problem between the independent variables and the individual effects α_i , (i.e., $E(\alpha_i | X_i) \neq 0$), appears in the context of random effects models, thus the determination of the level of the independent variables will be affected by the influence of the individual structural specificities. The testing strategy compares the Within and GLS estimators. The divergence reflects the presence of a correlation between the independent variables and the individual effects, necessitating the use of the Within estimator (the Fixed Effects Model). Alternatively, if the results of the two estimators are essentially identical, we can use the random effects model (GLS estimator). Consequently, the correct specification of the individual effects is a crucial aspect of applied panel applications.

The following hypotheses support the application of the Hausman test for the specification of individual effects:

$$\begin{cases} H_0: E(\alpha_i | X_i) = 0 \\ H_1: E(\alpha_i | X_i) \neq 0 \end{cases} \quad (5)$$

The model is specified with random effects (GLS estimator) under the null hypothesis H_0 , whereas it is specified with fixed effects (Within estimator) under the alternative hypothesis H_1 , the Hausman test statistic is expressed as follows:

$$H = (\hat{\beta}_{MCG} - \hat{\beta}_{LSDV})' [Var(\hat{\beta}_{MCG} - \hat{\beta}_{LSDV})]^{-1} (\hat{\beta}_{MCG} - \hat{\beta}_{LSDV}) \quad (6)$$

Under H_0 , the test statistic HI follows asymptotically (N approaches infinity) a chi-square distribution with k degrees of freedom. We reject the null hypothesis H_0 and, thus, adopt the Within estimator (fixed effects model) if the test statistic HI value is greater than a given significance level.

Notably, the test statistic HI has degenerated as the time series dimension T approaches infinity, as the GLS estimator converges towards the Within estimator, causing all components of HI to tend towards 0. The fixed effects models and the random effects are identical under these conditions; therefore, the issue of specifying individual effects is irrelevant.

It is worth mentioning that this study could be conducted through interviews or by preparing a questionnaire to be distributed to experts in central banks, commercial banks, and academics. The results of the questionnaire are then analysed using appropriate statistical methods. However, it was preferred to use the direct econometric approach based on historical data for several reasons related to the specificity of the Arab region, the geographical distances between Arab countries, the difference in banking and economic concepts

used in the Arabic language, and challenges represented by the possibility of regulatory or legal obstacles that prevent conducting interviews or distributing the questionnaire to specialists. Finally, we also think that using a survey approach may lead to some subjective answers.

4. RESULTS

4.1. Descriptive analysis

Table 1 reports descriptive statistics, it discloses that the NIM varies between commercial banks in the Arab countries, and the NIM varies between 60% and 80% across commercial banks in the Arab countries.

The net interest margin has fallen below 60% for the three Tunisian banks, in addition to one bank in Morocco. The average NIM value for the whole sample reaches (67%). As indicated by the standard deviation values, the volatility of the NIM varies between commercial banks. There is also evidence of differences in the average and volatility of the independent variables across countries.

Table 1. Summary statistics of the variables (Part 1)

Variable	Bank 1	Bank 2	Bank 3	Variable	Bank 1	Bank 2	Bank 3
<i>Jordan</i>				<i>Oman</i>			
NIM				NIM			
Mean	0.721	0.779	0.698	Mean	0.614	0.622	0.669
Std. Dev.	0.015	0.055	0.005	Std. Dev.	0.021	0.011	0.017
PRV				PRV			
Mean	0.821	0.647	0.797	Mean	0.621	0.721	0.755
Std. Dev.	0.007	0.009	0.021	Std. Dev.	0.012	0.009	0.005
CIR				CIR			
Mean	0.442	0.521	0.651	Mean	0.413	0.410	0.617
Std. Dev.	0.021	0.032	0.021	Std. Dev.	0.008	0.007	0.147
SIZ				SIZ			
Mean	8.562	6.741	7.251	Mean	8.504	8.615	7.213
Std. Dev.	0.049	0.140	0.141	Std. Dev.	0.082	0.124	0.118
ITR				ITR			
Mean	0.032	0.032	0.032	Mean	0.015	0.015	0.015
Std. Dev.	0.006	0.006	0.006	Std. Dev.	0.008	0.008	0.008
INF				INF			
Mean	0.024	0.024	0.024	Mean	0.009	0.009	0.009
Std. Dev.	0.016	0.016	0.016	Std. Dev.	0.004	0.004	0.004
GDP				GDP			
Mean	0.021	0.021	0.021	Mean	0.017	0.017	0.017
Std. Dev.	0.008	0.008	0.008	Std. Dev.	0.023	0.023	0.023
<i>Egypt</i>				<i>Tunisia</i>			
NIM				NIM			
Mean	0.721	0.779	0.698	Mean	0.489	0.516	0.563
Std. Dev.	0.015	0.055	0.005	Std. Dev.	0.089	0.042	0.049
PRV				PRV			
Mean	0.821	0.647	0.797	Mean	0.519	0.502	0.608
Std. Dev.	0.007	0.009	0.021	Std. Dev.	0.025	0.014	0.022
CIR				CIR			
Mean	0.442	0.521	0.651	Mean	0.622	0.604	0.495
Std. Dev.	0.021	0.032	0.021	Std. Dev.	0.012	0.082	0.103
SIZ				SIZ			
Mean	8.562	6.741	7.251	Mean	5.081	5.902	5.241
Std. Dev.	0.049	0.140	0.141	Std. Dev.	0.189	0.211	0.126
ITR				ITR			
Mean	0.032	0.032	0.032	Mean	0.068	0.068	0.068
Std. Dev.	0.006	0.006	0.006	Std. Dev.	0.004	0.004	0.004
INF				INF			
Mean	0.024	0.024	0.024	Mean	0.051	0.051	0.051
Std. Dev.	0.016	0.016	0.016	Std. Dev.	0.009	0.009	0.009
GDP				GDP			
Mean	0.021	0.021	0.021	Mean	0.005	0.005	0.005
Std. Dev.	0.008	0.008	0.008	Std. Dev.	0.041	0.041	0.041

Table 1. Summary statistics of the variables (Part 2)

Variable	Bank 1	Bank 2	Bank 3	Variable	Bank 1	Bank 2	Bank 3
Morocco				Qatar			
NIM				NIM			
Mean	0.621	0.718	0.502	Mean	0.808	0.622	0.775
Std. Dev.	0.025	0.014	0.083	Std. Dev.	0.020	0.014	0.023
PRV				PRV			
Mean	0.641	0.651	0.704	Mean	0.925	0.812	0.851
Std. Dev.	0.011	0.009	0.008	Std. Dev.	0.025	0.013	0.012
CIR				CIR			
Mean	0.461	0.424	0.451	Mean	0.203	0.439	0.272
Std. Dev.	0.028	0.031	0.041	Std. Dev.	0.013	0.057	0.019
SIZ				SIZ			
Mean	10.333	9.561	8.315	Mean	11.821	10.261	10.613
Std. Dev.	0.024	0.041	0.317	Std. Dev.	0.011	0.072	0.081
ITR				ITR			
Mean	0.031	0.031	0.031	Mean	0.047	0.047	0.047
Std. Dev.	0.009	0.009	0.009	Std. Dev.	0.003	0.003	0.003
INF				INF			
Mean	0.012	0.012	0.012	Mean	0.013	0.013	0.013
Std. Dev.	0.005	0.005	0.005	Std. Dev.	0.016	0.016	0.016
GDP				GDP			
Mean	0.028	0.028	0.028	Mean	0.023	0.023	0.023
Std. Dev.	0.012	0.012	0.012	Std. Dev.	0.026	0.026	0.026

Table 2 represents the empirical correlations that provide evidence of a mixed (negative and positive) relationship between the NIM and the independent variables across countries. The results indicate that the NIM is positively correlated with bank size and coverage ratio (provisions), and negatively correlated with

the remaining variables. These correlation results do not tell us about the determinants of the NIM, which means that we need to conduct a more in-depth analysis of the relationships between the NIM and the independent variables by applying the appropriate estimation and testing issues in order to achieve the study's goals.

Table 2. Correlations between the net interest margin and the related determinants

Bank	PRV	CIR	SIZ	ITR	INF	GDP	COVID-19
JOR - Bank 1	-0.388	-0.835	0.167	0.307	-0.202	-0.793	-0.451
JOR - Bank 2	-0.731	-0.278	-0.051	0.103	-0.452	0.315	-0.357
JOR - Bank 3	-0.921	-0.689	0.115	0.132	-0.643	0.045	-0.125
EGP - Bank 1	0.411	-0.652	0.432	0.820	-0.312	-0.389	-0.251
EGP - Bank 2	0.121	0.723	0.071	-0.041	-0.149	-0.621	-0.152
EGP - Bank 3	0.844	0.998	0.113	0.432	-0.412	-0.256	-0.351
MOR - Bank 1	-0.297	0.951	0.296	-0.241	-0.215	0.872	-0.145
MOR - Bank 2	-0.889	-0.789	-0.941	-0.842	-0.174	0.092	-0.215
MOR - Bank 3	-0.351	-0.714	-0.481	-0.481	-0.499	-0.085	-0.315
OMN - Bank 1	-0.848	0.759	0.278	0.810	-0.189	-0.361	-0.154
OMN - Bank 2	-0.281	0.777	-0.803	-0.411	-0.380	0.432	-0.251
OMN - Bank 3	0.294	-0.511	0.664	0.331	0.081	-0.708	-0.310
TUN - Bank 1	0.584	0.899	0.939	-0.898	-0.771	0.073	-0.223
TUN - Bank 2	0.716	0.954	0.996	-0.931	-0.487	-0.098	-0.315
TUN - Bank 3	0.774	0.800	0.895	-0.963	-0.480	-0.143	-0.405
QAT - Bank 1	0.201	0.931	0.770	0.496	-0.622	-0.793	-0.251
QAT - Bank 2	0.833	-0.546	0.738	0.710	-0.568	-0.926	-0.115
QAT - Bank 3	-0.280	0.331	-0.495	0.288	0.072	-0.271	-0.102
Full panel	0.222	-0.041	0.315	-0.033	-0.141	-0.062	-0.251

4.2. Selecting the appropriate model

The observed value of the test statistic $H1$ (Hausman test) for the sample of banks is 9.214. Since we use seven independent variables in the study model, ($k = 7$), the test statistic follows a chi-square distribution with seven degrees of freedom; therefore, the critical values are 18.475 (1%), 14.067 (5%), and 12.017 (10%). Therefore, we cannot reject the null hypothesis (H_0) of no correlation between the individual effects and the independent variables, indicating that these variables are not correlated with the structural specificities, independent of time, of the level of the NIM of the commercial banks in the sample. Consequently, we select a model with random effects and retain the GLS estimator.

5. DISCUSSION

Table 3 displays the GLS estimates for the random effects model. First, we interpret the estimates of the individual effects on a relative scale by contrasting the individual values. Clearly, the first bank in Qatar has the greatest NIM from a structural standpoint. In contrast, the first bank in Tunisia and the third bank in Morocco have negative individual effects. In fact, for a given quantity of the considered determinants, these two commercial banks have the lowest NIM among the samples in this paper. These results are in line with the descriptive results presented in Table 1.

Table 3. GLS estimates of the random effects model

<i>Variable</i>	<i>Coefficient</i>	<i>Prob.</i>
CONSTANT	0.312**	0.032
PRV	0.211	0.142
CIR	0.082**	0.043
SIZ	0.141**	0.020
ITR	-1.201**	0.000
INF	-1.082*	0.063
GDP	-0.173	0.270
COVID19	-0.521***	0.000
<i>Individual effects</i>		
α_1 - JOR - Bank 1	0.022	
α_2 - JOR - Bank 2	0.014	
α_3 - JOR - Bank 3	0.023	
α_4 - EGP - Bank 1	0.051	
α_5 - EGP - Bank 2	0.112	
α_6 - EGP - Bank 3	0.091	
α_7 - MOR - Bank 1	-0.098	
α_8 - MOR - Bank 2	0.085	
α_9 - MOR - Bank 3	-0.124	
α_{10} - OMN - Bank 1	0.213	
α_{11} - OMN - Bank 2	-0.009	
α_{12} - OMN - Bank 3	0.051	
α_{13} - TUN - Bank 1	-0.134	
α_{14} - TUN - Bank 2	0.065	
α_{15} - TUN - Bank 3	0.016	
α_{16} - QAT - Bank 1	0.261	
α_{17} - QAT - Bank 2	0.089	
α_{18} - QAT - Bank 3	0.141	

Note: ***, **, and * stands for statistical significance at the 1%, 5%, and 10% levels, respectively.

Regarding the estimation of the econometric model, we start by analyzing the impact of banking factors on the net interest margin, as the results show that the banking factors represented by the assets of the commercial bank and the costs-to-income ratio have a significant positive effect on the NIM. These results can be interpreted by the fact that large banks usually have an efficient management of their assets and liabilities, considering the availability of resources and capabilities that characterize those banks. The bank's market share makes it more capable of attracting more customers, the significant positive relationship between bank size and NIM reveals the ability of large banks to influence market interest rates and generate greater profits, in addition, customers are increasingly trusting large banks, which usually have a good reputation. This result is consistent with several previous studies (Raharjo et al., 2014; Obeid & Adeinat, 2017; Jouni & Obeid, 2021). About the cost-to-income ratio, the results show that it also has a positive significant effect on the net interest margin, and this leads us to explain this by the fact that banks pass the increase in expenses through raising interest rates on loans and possibly reducing interest rates on deposits. If there is an exaggeration in raising interest rates, this will increase the net interest margin. This finding is in line with much of the previous literature (Ben Khediri & Ben-Khedhiri, 2011; Fungacova & Poghosyan, 2011; Angori et al., 2019; Jouni & Obeid, 2021). Regarding the last banking variable, there is no evidence of a significant relationship between provisions and net interest margin, and this may indicate that banks do not have to raise interest rates in order to face credit risks and may suffice by deducting part of the annual profits. This result is consistent with Obeid and Adeinat (2017) and Jouni and Obeid (2021).

The NIM responds significantly and negatively to changes in interest rates of the monetary policy. This finding is in line with Raharjo et al. (2014), and Jouni and Obeid (2021). In fact, a one-unit increase in the monetary policy interest rate results in a 1.201 unit decrease in the NIM. This result reflects the importance of the role of monetary policy in directly and indirectly affecting market interest rates, as a number of central banks included in the study sample impose the commercial banks to link interest rates on the loans to the interbank lending interest rate (or the LIBORs reference rate) or one of the monetary policy tools, which it means that any raising (lowering) interest rates on monetary policy tools will lead to raising (lowering) interbank lending interest rates (through the corridor system), and therefore this will inevitably lead to raising (lowering) lending costs and raising (lowering) interest rates on clients. The significant and negative relationship between inflation and the NIM can be explained by the fact that price increases reduce the disposable income of the household sector, thereby increasing their demand for loans to meet their essential needs, which compels commercial banks to raise the interest rate on credit (Obeid & Awad, 2017). This increase in loan interest rates may be greater than inflation increases. It is also conceivable that price increases could reduce customers' ability to fulfill their obligations to banks, thereby reducing the net revenues of banks. This result is in line with much of the previous literature (Obeid & Adeinat, 2017; Angori et al., 2019; Jouni & Obeid, 2021), but at the same time, it is inconsistent with the results of some other previous studies that showed a significant positive relationship between inflation and the NIM (Raharjo et al., 2014; Abaidoo & Anyigba, 2020).

The results also reveal that real GDP growth does not have any effect on the NIM in the Arab banking sector of the selected Arab countries. It should be noted that the relationship between economic growth and the interest rate margin is still a controversial one in previous literature, as some previous studies found that the relationship is positive (Obeid & Adeinat, 2017), other previous studies found the relationship negative (Angori et al., 2019), and other previous studies did not find any evidence of a significant relationship (Jouni & Obeid, 2021). This is explicable by the fact that a stable economic environment might encourage more savings and investments, enhance cash flows to economic sectors, and lower unemployment rates. Ultimately, this will lead to an increase in liquidity in the banking sector, and at the same time, it will encourage banks to grant more loans to their customers in light of positive economic changes. But at the end of the day, the impact of the stable economic environment on the net interest margin depends on multiple aspects that must be taken into consideration, including, for example, the monetary policy followed by the central bank, the macroprudential policy tools applied (e.g., loan-to-value ratio, debt-to-income ratio), the bank's risk appetite, the amount of raising (reducing) interest on deposit rates compared to the amount of raising (reducing) interest on loans, the presence of restrictions on market interest rates, and other factors.

Finally, the results show that there is a significant negative relationship between the coronavirus pandemic and the net interest margin, and this result is reasonable because the coronavirus pandemic (COVID-19) led to a decline in economic variables and led to banks' reticence in granting loans in light of the state of uncertainty and high credit risks, and thus a decline in profitability indicators. As we mentioned previously, there are few previous studies that analyzed the impact of the coronavirus pandemic (COVID-19) on the net interest margin of commercial banks, given the recent time period of the pandemic, but our finding in this study is consistent with Mohammed et al. (2022) regarding Asian banks and is not consistent with the same study regarding European banks. Meaning that the impact depends on the specificity of each regional area and the extent to which there are other challenges and risks that must be taken into consideration.

It is worth mentioning that the negative impact of inflation, interest rates on monetary policy tools, and the coronavirus pandemic on the net interest margin is greater and more important than the positive effects of the bank size and the cost-to-income ratio.

6. CONCLUSION

The paper investigates potential factors that may affect the net interest margin in a selected sample of Arab countries, for this purpose, we test a number of banking and economic factors on the operational efficiency of 18 commercial banks in six Arab countries during the period 2015-2020, and the results show there are positive significant relationships between the bank size and the cost-income ratio on the NIM, while the results show the presence of negative significant relationships between the inflation rate, interest rates on monetary policy tools, and the coronavirus pandemic on the NIM, noting that there are no evidence of a significant effect of the GDP growth and provisions on NIM.

Considering the foregoing, the paper recommends the importance of continuing to

improve the operational efficiency of commercial banks in the Arab region, and to control their administrative and operational expenses. Moreover, it's very important to price the banking products fairly based on customer risks.

It is also important for commercial banks to bear the moral responsibility not to pass on excessively high operational costs and expenses within the NIM. Even though the commercial bank makes profits in the short term, the Central Bank's role in this situation is to morally persuade these banks not to excessively raise interest rates because doing so would increase credit risks in the medium term and necessitate additional provisions deducting from profits to deal with the rise in non-performing loans.

Central banks should also be alert to the effects of rising interest rates and inflation rates on the household sector, which may cause systemic risks. Finally, the paper recommends the importance of central banks and researchers conducting more research to analyze the determinants of the net interest margin.

In conclusion, it must be noted that the subject of this research is considered extremely important to the Arab region, given the important and vital role that the banking sector plays in the economy of the Arab region, as well as in light of the high size of the assets of the Arab banking sector relative to the gross domestic product, which indicates the importance of analyzing its performance indicators, especially operational efficiency indicators, which are considered among the most important financial soundness indicators. Therefore, this research is considered an opportunity to explore the components of the net interest margin in the Arab banking sector. The research also provides recommendations to both economic policymakers and commercial bank management to improve the performance of the banking sector. However, there is a need to conduct more future research to cover many other aspects that may affect banking performance, including geopolitical risks, Islamic banks, banking competition, corporate governance, exchange rate risk, oil price fluctuations, increasing reliance on Fintech and social media risk.

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