Evaluating financial performance of some Arab Banks: A static Panel Data Approach (2012-2019)

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Abstract:

   This study examines the financial performance of commercial banks in some Arab countries during the period 2012-2019. For this purpose, Return on assets was taken as indicator of the banks' financial performance. On the other hand, the factors affecting the performance of banks were Loans to deposits ratio, Deposits to total assets, Total debt to total assets and Retained earnings to total assets. A random effect model of Panel Data used to analyse the data. Therefore, the study results revealed that Deposits to total assets, Total debt to total assets, and Retained earnings to total assets are among the independent factors that have a statistically significant effect on commercial banks' financial performance for the Arab banks in this study.

Keywords: Financial Performance; Financial ratios; banks; random effect model; Panel data.

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Introduction:

Commercial banks are financial institutions that are an integral part of financial system of any country. Banks play a major role in collecting funds and transfer it into investments opportunities, this what makes banks effective in the process of economic development and relate the health of the economy to the soundness of its banking system.

Banks are known for being fast growing institutions. Every bank is trying to enhance overall performance to occupy a better position in financial system. Since profit is the primary goal of the banks and all decisions taken are designed to achieve this goal, banks should be evaluated and analyzed; The performance evaluation process is very important because it reflects the efficiency of the bank in using the available resources, as well as showing strengths and deviations, and then suggesting the necessary solutions, which enhances future performance.

1. Main Question:

In light of the previous, the main question of our research revolves around the following: What is the extent of the impact of factors on the financial performance of the Arab banks in this study during the period 2012-2019?

2. Research hypotheses: To answer the above question, we formulate the following hypotheses:

- **H1:** The Leverage has a statistically significant effect on banks financial performance represented by ROA.

- **H2:** The Total deposit to total assets ratio has a statistically significant effect on banks financial performance represented by ROA.

- **H3:** The Retained earnings to total assets ratio has a statistically significant effect on banks financial performance represented by ROA.

- **H4:** The Total loans to total deposits ratio has a statistically significant effect on banks financial performance represented by ROA.

3. Objectives of the Research: The research aims to achieve the following:

- Indicate the most important factors for financial performance evaluation in banks ;

- To analyze the financial performance of the selected banks ;

- To examine the relationship between the financial performance represented by ROA and the other factors represented by LEV, LDR, DTA, and RETA in the Arab banks in this study during the period 2012-2019.

4. Literature Review:

There is large number of studies had been carried out based on evaluating the performance of banks using different statistical techniques, for example:

Naser J Najjar, Can Financial Ratios Reliably Measure the Performance of Banks in Bahrain?, International Journal of Economics and Finance; Vol. 5, No. 3; 2013

The aim of this study is to analyze the financial performance of major banks in Bahrain. This study examined the impact of financial ratios on the financial performance of Bahraini commercial and Islamic banks. The results of the analysis showed that, the financial performance of banks was strongly and positively influenced by their operational efficiency, asset management, and, their size. However, ratios themselves cannot indicate the size of the banks, which means that banks can only be measured by their overall financial performance. (Najjar, 2013)

Mustafa Hassan Mohammad Adam, Evaluating the Financial Performance of Banks Using Financial Ratios- A Case Study of Erbil Bank for Investment and Finance, European Journal of Accounting Auditing and Finance Research Vol.2, No.6, pp. 162-177, August 2014

This study examines the impact on the financial performance of Erbil Bank, Returns on asset, return on equity and return on deposit were taken as dependent variables while bank size, asset management and operational efficiency were taken as independent variables. Results showed that the ROA of the banks were strongly and negatively influenced by the bank size. Operational efficiency was statistically significant and negatively related with the ROA. Interest income of the banks was strongly positive influence by the bank size and is statistically significant. Interest income showed negative relation with the

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operational efficiency and results were also statistically significant. (Adam, 2014)

Hamid Mohsin Jadah and Noor Hashim Mohammed, Financial Performance Evaluation of Domestic Commercial Banks: An Empirical Study in Malaysia, Asian Journal of Multidisciplinary Studies, Vol.4, Issue 8, July 2016

This study aims to evaluate the financial performances of commercial banks over the period from 2011 to 2015 in Malaysia. This data is analyzed by multiple regression and DEA efficiency scores to check the relationship between bank performance and bank size, operational efficiency and asset management. The asset management, operational efficiency and bank size are taken as independent variables along return on asset (ROA) as dependent variable. The findings of this study reveal there is significant relationship between ROA and asset management. The operational efficiency shows less significant relationship with bank performance. (Jadah & Mohammed, 2016)

Abdul Rashid and Sana Jabeen , Analyzing performance determinants: Conventional versus Islamic Banks in Pakistan, Borsa Istanbul Review 16-2 (2016) 92-107

The aim of this study is to empirically examine the bank-specific financial and macroeconomic determinants of performance of Islamic and conventional banks in Pakistan covering the period 2006-2012 using panel data. The GLS regression results show that operating efficiency, reserves, and overheads are significant determinants of conventional banks' performance, whereas, operating efficiency, deposits, and market concentration are significant in explaining performance of Islamic banks. The study also shows that the impact of GDP and the lending interest rate on performance is negative for both types of banks. (Rashid & Jabeen, 2016)

Palamalai Srinivasan and John Britto, Analysis of Financial Performance of Selected Commercial Banks in India, Theoretical Economics Letters, 2017, 7, 2134-2151.

The study attempts to evaluate the financial performance of selected Indian commercial banks for the period from 2012/13 to 2016/17. The study comprises 16 commercial banks, 11 representing public sector and 5 from private sector, and the financial performance of these banks are analyzed using the financial ratios, by employing a panel data estimations ; The empirical results from the panel data estimations

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revealed that the liquidity ratio and solvency ratio, and the turnover ratio and solvency ratio are found to have positive and significant impact on the profitability of selected public sector and private sector banks, respectively, bearing testimony to the fact that profitability is a function of those ratios. (Srinivasan & Britto, 2017)

Rawan Abuzarqa, EVALUATING BANKS FINANCIAL PERFORMANCE USING FINANCIAL RATIOS: A CASE STUDY OF KUWAIT LOCAL COMMERCIAL BANKS, Oradea Journal of Business and Economics, Volume 4, Issue 2 Published on September 2019

This study investigates the effect of Leverage, Total deposit to total assets, Total loans to total assets, Retained earnings to total assets, and Tangible book value per share ratios on banks' financial performance for Return on Assets (ROA) as the dependent variable. The results were found by analyzing the financial ratios of five commercial banks in Al-Kuwait throughout five years (2013–2017). MANOVA and ANOVA analysis were used to show the difference between banks in their financial situation and performance, and then the panel regression model used to study relationships among variables. The findings shows that the independent variables Total deposit to total assets and Retained earnings to total assets have a strong significant impact on our dependent variable ROA. Leverage and Total loans to total assets have a less significant effect on the banks' financial performance (ROA) while Tangible book value per share does not affect the ROA. (Abuzarqa, 2019)

Mohamed Sayed Abou Elseoud , Mohamed Yassin & Mahmood Asad Moh'd Ali, Using a panel data approach to determining the key factors of Islamic banks' profitability in Bahrain, Cogent Business & Management, 7:1, 2020

This study examines the effect of bank-specific and macroeconomic key determinants of Islamic retail banks profitability in Bahrain. It used panel data of six Islamic retail banks from 2013 to 2019. Return on Assets (ROA) and Return on Equity (ROE) are two main profitability measures are used in this study. Random effect regression model and Fixed effect regression model are the two statistical models adopted in this study. Random effect regression model shows that Bank size is significantly positively related to banks' ROA, while operating efficiency and GDP growth have significant and negative relationship with banks' ROA. Fixed effect regression model shows that there are negative significant effects of credit risk, operating efficiency and GDP

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growth rate on banks' ROE. Finally, inflation rate has positive and statistically significant effect on both ROA and ROE. (Abou Elseoud, Yassin, & Moh'd Ali, 2020)

Firstly. Evaluating bank performance:

1. financial performance :

The financial performance of the bank shows the use of the resources to achieve the banks goals; it covers a set of indicators showing the bank status and its ability to achieve the objectives. The performance of banks is assessed to determine their operational results and their overall financial condition. (Ebrahimi, Fekete-Farkas, Bouzari, & Magda, 2021, p3)

The financial performance of a bank is very important as it can maintain its positive reputation and attract more investor to invest in the bank. The good performance of a bank will shown by how efficiently the resources of the company are use to generate the income. (Mohd Samsudin, 2018, p6)

Evaluating financial performance can be defined as a set of procedures in which the achieved results of the bank are compared with its established objectives in order to indicate the extent to which those results are consistent with the objectives in order to assess the level of effectiveness of the bank's performance, It also compares the bank's inputs with its outputs. (Atawi, 2015, p66)

several reasons covers the evaluation of a commercial bank's financial performance and over a given period, this evaluation is intended to determine the general efficacy and long-term feasibility of senior management decisions or governance as well as to minimize, if not solve, future financial failures. (Hawaldar, Lokesha, Abhaya Kumar, Pinto, & M. Sison, 2017, p730)

So evaluation of financial performance is an important tool for the banks, as it can give the financial position of the bank in the banking system, it also shows either the bank's method of investing its money is correct or not, and then it contributes to correcting the existing error In order to develop future financial performance.

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2. The importance of evaluating the financial performance of banks :

The importance of financial performance evaluation is highlighted through many points, for example:

- Evaluating the financial performance of the banks shows the bank's ability to implement the goals that were planned while comparing them with the actual achievement and detecting deviations while developing the necessary plans to address these deviations in a way that helps the bank to survive and continue to work;

- The process of performance appraisal helps the bank to identify the development achieved by the bank during its existence by comparing its performance for the current period with previous periods, as well as comparing its performance with other similar banks in activity;

- The performance clarifies the role of the bank in the national economy for the various administrative levels and the way to enhance that;

- It reveals the extent of the bank's contribution to the process of economic and social development by achieving the largest returns at the lowest costs and working to eliminate the factors of waste in time, money and effort;

- It provides employees with data on how they perform the tasks entrusted to them, which contributes to directing and dedicating efforts to achieve successful performance, detecting deviations from the established plans, and searching for their causes in order to take the necessary corrective steps to ensure that they are not repeated in the future;

- It increases coordination between the various marketing and financing activities of the bank; (Al-Subaihi & Abdul-Kadhim, 2019, p102)

- It helps management to build future plans and make decisions;

- Competition arises between banks, which motivates management to improve their performance. (Diaa Abdul-Ali Al-Tai, 2019, p48-50)

3. Factors of evaluating bank's financial performance:

Performance is evaluated in a variety of ways, in this paper we focus on the return on assets (ROA), and for the financial ratios we are going to use loans to deposits ratio (LDR), deposits to total assets ratio (DTA), total debt to total assets (LEV) and retained earnings to total assets (RETA).

3.1. Return on assets (ROA): this rate measures the share of each unit of assets from net profit after taxes, an increase in this rate means efficient use of the funds invested in the assets (RASHID, SALEH, JASIM, & HAMIN, 2020, p10) or in other words it is an indicator of bank's financial performance and managerial efficiency, which demonstrates how efficient the bank uses its assets to generate profit. (Abobakr, 2018, p385)

3.2. Loans to deposits ratio (LDR): This ratio compares illiquid assets to their own financial source. This liquidity or funding ratio indicates to what extent the banks relatively illiquid loans are funded by relatively stable customer deposits rather than wholesale or market funding. Ideally this ratio should be below 100%. Indeed, the higher the ratio is, the higher the dependence on non-deposit funding. Since deposits are viewed to be more stable and cheaper source of funding, greater dependence may signal higher funding risks and higher riskiness for a bank. A range between 70- 90% of this ratio is seen as optimal. Loans to deposits ratio assess the liquidity level of banks. (Lardic & Terraza, 2019, p24) A very high loan to deposits ratio suggests that the bank's liquidity is not enough to cover unforeseen financial requirements whereas a very low ratio means lesser profitability from the bank. (Hawaldar, Lokesha, Abhaya Kumar, Pinto, & M. Sison, 2017, p734)

3.3. Deposits to total assets ratio (DTA): This measure reflects the amount of deposits gathered by the bank to finance its assets. It is furthermore, considered as a liquidity measure. Deposits are one of the cheap and stable financial resources compared with other financing alternatives. Therefore, more deposit can be transformed to more loans and higher interest margin, and accordingly higher profit unless the bank fails to do such transformation efficiently, in general high level of deposit associated with high profit. (Abobakr, 2018, p385)

3.4. Total debt to total assets (LEV): It measures the amount of total debt firm used to finance its total assets. It is an indicator of financial strength of the bank. It provides information about the ability of the firm to obtain additional financing for potentially attractive investment opportunities; (DUFERA, 2010, p32) the higher LEV means the bank has financed most of its assets through debt as compared to the equity financing. This implies the bank is involved in more risky business. (Mengistu, 2015, p90)

3.5. Retained earnings to total assets (RETA): This ratio shows the earning of each unit of the bank's assets from Retained earnings. (Fahd, 2009, p60-61)

Secondly. Methods and Materials:

1. Variables description:

In this research we analyzed some indicators that may have an effect on banks' financial performance for 25 Arab banks, this study covered the period (2012-2019) by using a panel data approach.

The data are gotten from the published annual reports of the banks, and Excel program was used to calculate the ratios. In addition, Stata 15.0 econometric software used for analyzing the data.

Table N°01: List of variables and their coding in the model

Variables	Description
DEPENDENT VARIABLE	
Return on Assets **(ROA)**	Net Income / Total Assets
INDEPENDENT VARIABLES	
Loans to deposits ratio **(LDR)**	Total Loans / Total Deposits
Deposits to total assets ratio **(DTA)**	Total Deposits/ Total Assets
Total debt to total assets **(LEV)**	Total debt / total assets
Retained earnings to total assets **(RETA)**	Retained earnings/ total assets

Source: Prepared by the researchers.

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Table N°02: List of the Arab banks in this study

Country	Bank	Website
United Arab Emirates	RAK Bank	https://rakbank.ae/wps/portal/retail-banking
	Bank of Sharjah	https://www.bankofsharjah.com/en
	Commercial Bank of Dubai	https://www.cbd.ae/
	ADCB	https://www.adcb.com/en/personal/
	United Arab Bank	https://www.uab.ae/
Jordan	Societe Generale	http://www.sgbj.com.jo/sgbj/en/Home
	Jordan Kuwait	https://www.jkb.com/
	Jordan Commercial Bank	https://www.jcbank.com.jo/
	INVESTBANK of Jordan	https://www.investbank.jo/
	Bank of Jordan	https://bankofjordan.com/
Kingdom Saudi Arabia	Al Rajhi Bank	https://www.alrajhibank.com.sa/
	Riyad Bank	https://www.riyadbank.com/en/personal-banking
	Saudi fransi Bank	https://www.alfransi.com.sa/english/home
	Bank Albilad	https://www.bankalbilad.com/ar/personal/Pages/home.aspx
	Alinma Bank	https://www.alinma.com/wps/portal/alinma
Oman	Oman Arab Bank	https://www.oman-arabbank.com/
	Sohar International	https://soharinternational.com/personal-banking/
	Bank Muscat	https://www.bankmuscat.com/en/Pages/default.aspx
	National Bank of Oman	https://www.nbo.om/en/Pages/Personal-Banking/Home.aspx
	Ahli bank Oman	https://ahlibank.om/en-us
Qatar	Al khaliji Bank	https://www.alkhaliji.com/web/
	Ahlibank Qatar	https://www.ahlibank.com.qa/en/personal
	Doha Bank	https://qa.dohabank.com/
	Qatar Commercial Bank	https://www.cbq.qa/EN/personal/Pages/default.aspx
	Qatar National Bank	https://www.qnb.com/sites/qnb/qnbqatar/page/en/en-home.html

Source: Prepared by the researchers.

2. Model Specification:

The multiple linear regression model is as follows:

$$ROA_{i.t} = \beta 0 + \beta 1 LDR_{i.t} + \beta 2 DTA_{i.t} + \beta 3 LEV_{i.t} + \beta 4 RETA_{i.t} + ei$$

Where:
- **ROA $_{i.t}$** = Return on assets of bank i at time t.
- **LDR $_{i.t}$** = Loans to deposits ratio of bank i at time t.
- **DTA $_{i.t}$** = Deposits to total assets ratio of bank i at time t.
- **LEV $_{i.t}$** = Total debt to total assets of bank i at time t.
- **RETA $_{i.t}$** = Retained earnings to total assets of bank i at time t.
- **ei** = Error term.

Thirdly. Results and discussion :
1. Descriptive Statistics:

Table (3) presents descriptive statistics relating to dependent and independent variables that were used in regression analysis. Results indicate that, on average, the bank's mean value for ROA was 0.0151 this implies that banks net profit after tax represents 0.015% of total assets in the Arab banks in this study which is an unsatisfactory return. While LEV has the highest mean value of 6.295.

Table N°03: The Descriptive Statistics

```
. summarize ROA  LEV DTA RETA LDR
```

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	200	.0151384	.0082593	-.0246146	.0514786
LEV	200	6.295726	1.626845	2.241348	12.32484
DTA	200	.6892985	.078574	.4827909	.8321983
RETA	200	.0221988	.0151951	-.0469473	.0522018
LDR	200	.9322211	.1681468	.3281751	1.290544

source**:** Stata 15.0 outputs

2. Multicollinearity Test :

A multicollinearity test was performed by constructing a correlation matrix. From table (4), the correlation matrix output insures the absence of multicollinearity between the independent variables.

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Table N°04 : Multicollinearity test

```
. correlate ROA LEV DTA RETA LDR
(obs=200)

                  ROA      LEV      DTA     RETA      LDR

      ROA      1.0000
      LEV     -0.4114   1.0000
      DTA      0.1775   0.0970   1.0000
     RETA      0.5508  -0.1974   0.0496   1.0000
      LDR      0.1145  -0.0993  -0.4998   0.1143   1.0000
```

source**:** Stata 15.0 outputs

3. Regression analysis:

Table (5) shows the results of estimating the model of the impact of independent variables on the financial performance of the banks.

In table (5), ROA is regressed against all variables of the Arab banks using the pooled regression model (PRM) and the results are explained as follows: The R-squared statistics and the adjusted-R squared statistics of the model are 45.28% and 44.15% respectively.

The result indicates that the changes in the independent variables explain 45.28% of the changes in the dependent variable. That means variables included in the model are collectively explaining 45.28% of the changes in ROA, While 54.72% is due to other factors not included in the study. Consequently, these variables together are good explanatory variables of the bank's financial performance for the Arab banks included in the study sample.

As shown in the table (5), all factors had a statistically significant effect on performance at 5% significance level. When it comes to comparing between PRM and FEM, Fisher test result shows that FEM is the best model (Annexe 1) since it is statistically significant; and moreover when it comes to choosing between PRM and REM we used xttest0 which is Breusch and Pagan Lagrangian multiplier test (Annexe 2), and as the result shows REM is the best model.

Finaly, to identify the financial performance of the banks, a Random-effect model was applied according to the Hausman test, we accept H0 REM is the best model (Annexe 3).

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Table N°05: PRM

```
      Source │       SS           df       MS            Number of obs   =       200
─────────────┼──────────────────────────────            F(4, 195)       =     40.33
       Model │  .006146164        4   .001536541         Prob > F        =    0.0000
    Residual │  .007428799      195   .000038096         R-squared       =    0.4528
─────────────┼──────────────────────────────            Adj R-squared   =    0.4415
       Total │  .013574963      199   .000068216         Root MSE        =    .00617


─────────────┬────────────────────────────────────────────────────────────────────
         ROA │      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
─────────────┼────────────────────────────────────────────────────────────────────
         LEV │  -.0016843   .0002761    -6.10   0.000    -.0022288   -.0011397
         DTA │   .0283197     .0065      4.36   0.000     .0155004    .041139
        RETA │   .2463171   .0297933     8.27   0.000     .1875587   .3050756
         LDR │   .0080765   .0030449     2.65   0.009     .0020713   .0140817
       _cons │  -.0067757   .0065361    -1.04   0.301    -.0196663   .0061148
```

source**:** Stata 15.0 outputs

If we input variables shown in Random-effect model in Table (6) into the previous equation, the prediction model becomes:

ROA $_{i.t}$ = - 0.008 - 0.001 LEV $_{i.t}$ + 0.033 DTA $_{i.t}$ + 0.255 RETA $_{i.t}$ + 0.005 LDR $_{i.t}$

The table (6) shows regressions between return on assets (ROA) and independent variables, where only LEV, DTA and RETA was statistically significant at 5% level.

The **LEVREGE** ratio is negative and statistically significant at 5% significance level. This indicates that reducing commercial bank's total debts would certainly increase the bank's financial performance in this case. We can say that the banks rely on financing through their equity.

For **DTA** ratio, this variable has a positive and statistically significant effect on the bank's financial performance. Deposits are banks' primary sources of funds that they can invest to generate income. This finding suggests that Arab banks in this study increase their profits by converting the increasing amount of deposit into profitable investment opportunities and earning assets.

For **RETA** ratio, this variable has a positive and statistically significant effect on Arab bank's performance. This result means that Arab banks in this study effectively convert their retained earnings into profitable assets.

For **LDR**, we found insignificant positive effect on (ROA), meaning that it is considered as a positive indicator of performance and it generates a higher return. This indicates that there is a policy of investing the available funds obtained from deposits in meeting the needs of customers in terms of loans and advances in these banks.

Table N°06 : REM

```
Random-effects GLS regression            Number of obs    =       200
Group variable: ind                      Number of groups =        25

R-sq:                                    Obs per group:
    within  = 0.3188                                 min =         8
    between = 0.6087                                 avg =       8.0
    overall = 0.4465                                 max =         8

                                         Wald chi2(4)     =    114.04
corr(u_i, X)   = 0 (assumed)             Prob > chi2      =    0.0000
```

ROA	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
LEV	-.0017127	.000322	-5.32	0.000	-.0023438	-.0010816
DTA	.0338964	.0089685	3.78	0.000	.0163185	.0514743
RETA	.2554238	.0368783	6.93	0.000	.1831436	.3277041
LDR	.0058853	.0039832	1.48	0.140	-.0019216	.0136921
_cons	-.0086003	.0085704	-1.00	0.316	-.0253979	.0081973
sigma_u	.00316114					
sigma_e	.00542739					
rho	.25330767	(fraction of variance due to u_i)				

source: Stata 15.0 outputs

Conclusion:

This study specified an empirical framework to investigate the effect of Loans to deposits ratio, Deposits to total assets ratio, Total debt to total assets ratio and Retained earnings to total assets ratio on banks' financial performance represented by ROA. To perform the analysis, the researchers rely on a sample contains 25 banks operating in some Arab countries, during the period (2012 – 2019) using the Panel Data. The study reached the following results:

- Financial performance evaluation is an important process for determining the financial position of banks;
- LEV ratio is negative and statistically significant. This indicates that that the Arab banks in this study rely on financing through their equity That means H1 is accepted;
- DTA ratio has a positive impact on Arab banks performance in this study and it is statistically significant so we accept H2;
- RETA has also a positive impact on Arab banks performance in this study and it is statistically significant so we accept H3;
- The analysis revealed that there is an insignificant effect between Loans to deposits ratio (LDR) on the performance of Arab banks in this study, This means that H4 is rejected;
- For LDR we found insignificant positive effect on (ROA) this indicates that there is a policy of investing the available funds obtained from deposits in meeting the needs of customers in terms of loans and advances in these banks ;

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- Overall, it can be said that Arab banks in this study have a good ability to convert deposits and retained earnings into profitable assets.

Recommendations:

- The administrations of the Arab banks in this study should pay attention to evaluating financial performance to avoid financial problems by identifying strengths and weaknesses;
- Arab Banks in this study should get more deposits in order to employ them and maintain a good level of liquidity;
- Banks should reduce overall debt in order to improve their profits ;
- Arab Banks in this study, and Algerian banks in particular should maximize their profits by expanding their sources of funds and investing them in profitable and diversified investments.

Prospects:

- Explore new variables that could have an impact on the financial performance of banks ;
- A comparative study of performance between Arab banks and international banks ;
- Studying the financial performance of Arab banks and Algerian banks during the Corona virus crisis (covid 19).

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Annexes :

Table N°07: Fisher test and FEM

```
Fixed-effects (within) regression              Number of obs     =        200
Group variable: ind                            Number of groups  =         25

R-sq:                                          Obs per group:
    within  = 0.3269                                         min =          8
    between = 0.5359                                         avg =        8.0
    overall = 0.4127                                         max =          8

                                               F(4,171)          =      20.76
corr(u_i, Xb)  = -0.2850                        Prob > F          =     0.0000


        ROA       Coef.    Std. Err.      t     P>|t|     [95% Conf. Interval]

        LEV    -.0018256     .000387    -4.72   0.000    -.0025896    -.0010616
        DTA     .0467154    .0133193     3.51   0.001     .0204241     .0730068
       RETA     .2639306     .046153     5.72   0.000     .1728276     .3550335
        LDR     .0030853    .0053692     0.57   0.566    -.0075131     .0136838
      _cons     -.014304    .0118949    -1.20   0.231    -.0377837     .0091757

    sigma_u    .00407962
    sigma_e    .00542739
        rho     .361027    (fraction of variance due to u_i)

F test that all u_i=0: F(24, 171) = 3.38                  Prob > F = 0.0000
```

source**:** Stata 15.0 outputs

Table N°08: XTTEST0 test

```
Breusch and Pagan Lagrangian multiplier test for random effects

        ROA[ind,t] = Xb + u[ind] + e[ind,t]

        Estimated results:
                            Var      sd = sqrt(Var)

                 ROA    .0000682         .0082593
                   e    .0000295         .0054274
                   u    9.99e-06         .0031611

        Test:   Var(u) = 0
                        chibar2(01) =    28.09
                   Prob > chibar2 =   0.0000
```

source**:** Stata 15.0 outputs

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Table N°09: Hausman test

```
. hausman fe

                 ──── Coefficients ────
                   (b)          (B)          (b-B)      sqrt(diag(V_b-V_B))
                   fe           re        Difference          S.E.

        LEV     -.0018256    -.0017127     -.000113          .0002148
        DTA      .0467154     .0338964      .0128191         .0098473
        RETA     .2639306     .2554238      .0085067         .0277504
        LDR      .0030853     .0058853     -.0027999         .0036004

                        b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

      Test:  Ho:  difference in coefficients not systematic

                   chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                           =         4.44
                 Prob>chi2 =       0.3498
```

source**:** Stata 15.0 outputs