

The Effect of Capital Adequacy on Profitability -Panel data Evidence from North Africa and Middle East Commercial Banks (2014-2020)-

تأثير كفاية رأس المال على الربحية-دراسة باستخدام نماذج البانل على عينة من البنوك التجارية في شمال إفريقيا والشرق الأوسط (2014-2020)

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Abstract:

The objective of this study is to scrutinize and measure the impact of the capital adequacy ratio as required by the Basel Committee on a set of bank's profitability that operating in the Middle East countries and North Africa, during the period (2014-2020).

Thus, we estimate banks' profitability using return on equity (ROE) as the dependent variable, while using the capital adequacy ratio set by the Basel Committee as the independent variable. Hence, to attain the aim of this study, we depend on panel data models.

The study came to a conclusion, that the capital adequacy ratio has a significant negative impact on return on equity. So, the increase in the capital adequacy standard observed among the banks in the sample drove to a decrease in the banks' ROE. furthermore, this is by virtue of the procedures used to raise capital, which also require internal or external financing, which in turn causes the latter to distribute profits and add them to capital over a longer period of time, which cause a decrease in the return on equity ratio.

Key words: Profitability, return on Equity, Capital Adequacy, Basel Committee requirements.

الملخص:

تهدف هذه الدراسة إلى فحص وقياس أثر نسبة كفاية رأس المال حسب ما تتطلبه لجنة بازل على مجموعة من ربحية البنوك العاملة في شمال إفريقيا والشرق الأوسط خلال الفترة (2014-2020)، حيث قمنا بتقدير ربحية البنوك باستخدام العائد على حقوق الملكية كمتغير تابع، في حين يتم استخدام نسبة كفاية رأس المال التي حددتها لجنة بازل كمتغير مستقل. ومن أجل تحقيق هدف هذه الدراسة، فإننا اعتمدنا على نماذج البانل.

توصلت الدراسة إلى نتيجة مفادها أن نسبة كفاية رأس المال لها تأثير سلبي كبير على العائد على حقوق الملكية، لذا فإن الزيادة في معيار كفاية رأس المال الملحوظة لدى بنوك العينة أدت إلى انخفاض العائد على حقوق المساهمين للبنوك وذلك بحكم الإجراءات المتبعة لزيادة رأس المال، والتي تتطلب أيضاً تمويلًا داخليًا أو خارجيًا، والذي بدوره يؤدي إلى قيام الأخير بتوزيع الأرباح وإضافتها إلى رأس المال على مدى فترة زمنية أطول، مما يؤدي إلى انخفاض العائد على نسبة حقوق الملكية.
الكلمات المفتاحية: الربحية، العائد على حقوق الملكية، كفاية رأس المال، مقررات لجنة بازل.

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1. INTRODUCTION

The goal of achieving profitability is one of the main goals that various banks seek to achieve, as it is an indication of the continuation of its work and the consolidation of its financial position, as profitability helps to instill confidence in current and potential depositors and investors and guarantee their rights. It is also a measure of performance upon which the bank's management relies. As it is considered a good criterion that reflects the efficiency of the management of this bank, whether in terms of operational, investment or financing.

However, in order for banks to seek to achieve the largest possible profit through their activities, they face many risks, as the banking sector witnessed many developments as a result of the multiplicity of financial innovations and technological progress that occurred in addition to the liberalization of financial markets, which led to an increase in competition between various banks and thus a rise in and increasing the size of the risks that threaten its existence and continuity. In light of the escalating pace and the increase in the size and diversity of risks, it has become necessary for banks to work intensively on managing these risks and mitigating their severity, which is what various international bodies have worked on.

As the banks' orientation towards strengthening their financial centers has become one of the modern trends that they rely on in their management, which has developed significantly in light of the efforts of various banking agencies in various countries of the world in order to develop their competitive capabilities in the framework of financial transactions, especially after the emergence of successive developments in the global financial markets. Where any banking sector has become exposed to risks due to intense competition. Especially after the bankruptcy of many banks as a result of the global indebtedness crisis. In this context, the efforts of the Basel Committee on Banking Control and Supervision emerged through its enactment of a set of supervisory principles related to the issue of capital adequacy, and the formulation of a new framework that supports the strengthening of the international banking system and financial stability. The capital adequacy criterion is among the most important tools that are used in order to know the level of solvency of the bank, its efficiency, and its ability to measure, direct and monitor potential risks, in order for the bank's management to take decisions that help it achieve profits, as it is one of the most important goals that banks seek to achieve.

In order to improve the degree of capital adequacy measurement in banks at the global level, the Basel International Committee on Banking Supervision issued three agreements with the aim of improving the degree of measuring the capital adequacy standard in banks. On this basis, this study aims to analyze and measure the impact of the capital adequacy standard, according to the decisions of the Basel Committee, on the profitability of a group of active banks in Algeria and some Middle Eastern countries during the period (2014-2020).

1.1. Main Question

In light of the above, the main question of our research revolves around the following question:

What is the extent of the impact of the capital adequacy according to the Basel Committee standards on the commercial banks' profitability under study?

1.2. Hypothesis

Based on the study main question, the study hypotheses can be defined as follows:

- There is a statistically significant effect of the capital adequacy standard according to the Basel Committee agreement on the profitability of the commercial banks under study, as return on equity.
- There is not a statistically significant effect of the capital adequacy standard according to the Basel Committee agreement on the profitability of the commercial banks under study, as return on equity.

1.3. Research objectives

The objectives of the study can be defined as follows:

- Specify of the concept of profitability in banks
- Specify the concept of the capital adequacy standard and the development of its measurement in banks in accordance with the Basel Committee agreements;
- Identify of the impact of the capital adequacy standard according to the decisions of the Basel Committee on the profitability of the commercial banks under study.

2. Theoretical framework of the study:

2.1. The concept of Profitability

Profitability implies a situation wherein the income generated during a particular period exceeds the expenses incurred during the same period of time for the sole purpose of generating income.¹

Profitability is also defined as an indicator that reveals and expresses the bank's competitive position in the banking markets, the quality of its management and its exploitation of available resources, in addition to indicating the extent to which the bank can increase its capital, bear potential risks, absorb losses, and provide an appropriate return for investors.²

In addition, profitability is the relationship between the profits achieved by the establishment and the investments that contributed to the realization of these profits.³

Thus, it can be said that profitability is a primary goal of the bank, and it reflects the bank's ability to achieve profits through investments that contributed to that.

2.2. Definition of capital adequacy standard in accordance with Basel Committee regulations

2.2.1. Basel III

Following the meeting of central bank governors and financial officials representing members

(27) of the Basel Committee after its expansion at the committee's headquarters at the Bank for International Settlements in Basel, Switzerland, in September 2010, the committee declared that they would implement Basel III regulations, which will impose stricter regulations on bank management.

In November 2010, this project. Was carefully considered and adopted by the G20 leaders during their summit in Seoul. Then, on December 16, 2010, the final texts defining the regulatory rules for Basel 3 decisions were issued, which were expected to be applied to banks. Mandatory as of the end of the year 2012, and the Basel III agreement entered into force according to a phased program extending from January 1, 2013 to January 1, 2019.⁴

2.2.2. Basel III goals

The Basel III agreement is considered as a continuation of the efforts made by the Basel Committee to improve the regulatory frameworks for banks and is based on the first and second agreements. Where these measures are based on the following objectives:⁵

- Improving resilience in the banking sector by improving its ability to face shocks arising from economic and financial stress, whatever their source, thus reducing the risk which moves from the financial sector to the economy;
- Improving corporate governance and risk management methods;
- Promote transparency and disclosure is more effectively.

2.2.3. Strengthening the global capital framework

The Basel III agreement provided for improving the quality, structure and transparency of capital in banks, and making the concept of basic capital (the first Tier) limited to subscribed capital and undistributed profits, in addition to capital instruments that are not conditional on returns and are not tied to a maturity date, instruments capable of absorbing losses. as soon as it happens. As for the supporting capital (the second Tier), in turn it is limited to capital instruments that are restricted to at least five years and that are capable of bearing losses before deposits or before any liabilities to others, and the Basel 3 agreement dropped other than that the capital components that were acceptable in the previous agreement.⁶

The reforms related to capital, with the aim of strengthening the global framework for capital, include a set of basic points, represented in:

- **Enhancing capital requirements in terms of component quality and raising the minimum**

The Basel Committee regarding capital requirements in accordance with the Basel III agreement approved the following amendments:⁷

- Raising the minimum level of high-quality capital (Common Equity), which consists of common shares in addition to reserves and retained earnings, from 2% of risk-weighted assets to 3.5% in 2013, and then to 4% in 2014, to reach 4.5% in 2015;
- Increasing the minimum ratio of basic capital (Tier 1) to risk-weighted assets from 4% to 4.5% at the beginning of 2013 and then to 5.5% at the beginning of 2014 to reach 6% in 2015, noting

that the basic capital consists of a total of high-quality capital and preferred shares;

- Subtracting the exceptions from the regulatory capital from the common equity capital, instead of subtracting 50% from the basic capital (Tier 1), and 50% from the additional capital (Tier 2), Note that this amendment will be applied gradually over a period of five years, starting from the beginning of 2014 until the beginning of 2018, at a rate of 20% of these investments for each year.
- Adding a conservation buffer of 2.5% of the risk-weighted assets, provided that it consist of high-quality capital. This margin will be added gradually from 2016 to 2019, which will raise the minimum level of high-quality capital (Common Equity) to 7% by 2019;
- Cancellation of the supporting capital (Tier 3), which is a short-term supporting loan (for a period of two years) that the bank obtains to support its capital, and it bears common characteristics between capital and debt, since the entity that provides this loan waives the priority right to repayment;
- Adding an additional margin related to the stages of the business cycle (Countercyclical Buffer), ranging between (0 - 2.5%) of the risk-weighted assets, as it will be added gradually from 2016 to 2019, according to the local conditions of the country, noting that this margin will be added only when High credit growth is occurring in the country, which may result in high risks to the banking and financial system, and if this margin is added, the minimum capital adequacy ratio will rise to 13% in 2019.

The following are the most important new capital standards in accordance with Basel III decisions:

Table 1. Minimum Capital Requirements 3

| Standard | Shareholders' equity | Tier 1 capital ratio | percentage of total capital |
|--|-----------------------------|-----------------------------|------------------------------------|
| Minimum | 4.5% | | |
| | | 6% | 8% |
| Hedge capital | 2.5% | | |
| | | | |
| Minimum shock reserve | 7% | | |
| | | 8.5% | 10.5% |
| Shock reserve to counter cyclical fluctuations | 0 – 2.5% | | |

Source: *Basel Committee on Banking Supervision, basel 3: A global regulatory framework for more resilient banks and banking systems, bank for International Settlements, Basel, Switzerland, june 2011, p: 64*

On this basis, the capital adequacy ratio increased from 8% to 10% in accordance with the Basel III agreement, in addition to focusing on the quality of capital by providing a greater amount of capital consisting of shareholders' equity in the total capital of the bank, and the capital adequacy ratio is calculated as follows:

Capital Adequacy Ratio = (Basic Capital + Supplementary Capital / Credit Risk + Market Risk + Operational Risk) ≥ 10.5%

The following table represents a summary of the capital quality improvement process from Basel II to Basel III:

Table 2. Improving the quality of capital from Basel II to Basel III

| standard | Basel 1 | | Basel 2 |
|----------------------|--|----------------------|--|
| The Fundamental Tier | Common shares, reserves, minority interests | The Fundamental Tier | Common stock (discount for some contributions), reserves, minority interests |
| Tier1 | Preferred stock, non-term subordinated notes | Tier1 | Preferred stock, non-term subordinated notes |
| Tier2 | indefinite term subordinated bonds, indefinite term subordinated bonds | Tier2 | Some of the subordinated bonds have a maturity of less than 5 years |
| Tier3 | Bonds intended to cover market risks | Tier3 | Cancellation of Tier3 |

Source: Barakat Asma, *The Role of Precautionary Measures in Facing the Risks of Bad Governance, with Reference to the Case of Algeria, Economic and Administrative Research Journal, Issue 17, 2015, p.101.*

Transition Arrangements

The Basel III agreement granted banks a deadline for implementation through different time stages, as the application of the minimum requirements for ordinary shares and the first tranche of capital begins on January 1, 2013 gradually until January 1, 2019, as shown in the following table: (All dates listed are January 1st)

Table 3. Transition Arrangement

| Test 1 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|--|------|------|--------|-------|--------|-------|
| Ordinary minimum equity ratio | 3.5% | 4% | 4.5% | 4.5% | 4.5% | 4.5% | 4.5% |
| hedge capital ratio | 0% | 0% | 0% | 0.625% | 1.25% | 1.875% | 2.5% |
| Minimum Equity of Common Stock + Hedge Equity Ratio | 3.5% | 4% | 4.5% | 5.125% | 5.75% | 6.375% | 7% |
| Application of deductions from Tier1 | | 20% | 40% | 60% | 80% | 100% | 100% |
| Minimum Tier 1 capital | 4.5% | 5.5% | 6% | 6% | 6% | 6% | 6% |
| Total minimum capital | 8% | 8% | 8% | 8% | 8% | 8% | 8% |
| Lower cheek capital + hedge capital | 8% | 8% | 8% | 8.625% | 9.25% | 9.875% | 10.5% |
| Capital instruments that are no longer classified as Tier1 or Tier2 | It shall be canceled within a horizon of 10 years, starting from the year 2013 | | | | | | |

Source: Basel Committee on Banking Supervision, *basel 3 Monitoring Report, bank for International Settlements, Basel, Switzerland, march 2014, p: 39*

From the table, these measures include the following:

Implementation will begin at the national level by member states on January 1, 2013, as countries should translate these rules into national laws and regulations before this date, as banks will be required to meet new minimum requirements related to risk-weighted assets⁸, as follows:⁹

- 3.5% of Equity/RWA;
- 4.5% of Tier 1 capital / risk weighted assets;
- 8% of total capital / risk weighted assets;
- After that, banks will have to meet the minimum equity requirements of 4% and the requirements of Tier1 by 5.5%, on January 1, 2015, and in the following year, banks will also have to meet the requirements of Equity by 4.5%, and the requirements for Tier1 by 6%, while the total capital requirements remain at the level of 8%, and therefore do not need to be graduated at any stage;
- The regulatory amendments will start at 20% of the required deductions from Tier1 on January 1, 2014, then they will follow from year to year according to the following percentages: 40%, 60%, 80%, until it reaches 100% on January 1, 2018;
- The application of the reserve for preserving capital (prudential capital) will be launched between January 1, 2016 and the end of 2018, to be fully implemented on January 1, 2019;
- As it starts with 0.625% of risk-weighted assets, and that percentage will increase annually at a rate of 0.625% until it reaches 2.5% on January 1, 2019, as countries that suffer from excessive credit growth should consider accelerating the building of capital preservation and counter-cyclical reserves;
- Capital instruments that do not meet the listing criteria of the first tranche, and which are no longer eligible for the second tranche, will be canceled within a period of ten years starting from January 1, 2013;
- The committee will establish accurate reporting processes in order to monitor ratios during the transitional period, and will continue to review the effects of these standards on financial markets, as well as the extension of credit and economic growth, and address unintended results when needed.

3. RESULTS AND DISCUSSION

Description of the framework and variables of the measurement study

3.1. Spatial framework:

Our study is based on determining the impact of the capital adequacy standard according to the decisions of the Basel Committee on the profitability of a group of commercial banks in banks located in the countries of the Middle East and North Africa, and on this basis we used a sample consisting of 27 banks distributed over 6 countries, according to the availability of statistical data related to the variables The study in these banks, which are distributed over a group of countries, is as follows:

- **North African countries:** Algeria.
- **Middle East countries:** Qatar, Sultanate of Oman, Bahrain, Kuwait, Saudi Arabia.

3.2. Time framework:

Our Measurement and Analysis study covers the period from 2014 to 2020, and this is based on the availability of data for all variables in all commercial banks under study, in addition to focusing on the method of calculating the capital adequacy standard in the commercial banks under study, where it should be noted that all sample banks It started the interim application of the new capital adequacy standard in accordance with the decisions of the Basel III agreement, starting from the year 2014.

3.3. Variable Description

- **Table 4.** List of Variables and their coding in the model

| Variables | Description |
|-----------------------------|------------------------------------|
| Dependent Variable | |
| Return on Equity (ROE) | Net Income after Tax/ Total Equity |
| Independent Variable | |
| Capital Adequacy | CAR basel3 |

- **Source:** Prepared by the researchers.

3.4. Regression Analysis

3.4.1. Model Specification

The multiple linear regression models are as follows

ROE Model:

$$ROE_{i,t} = \beta_0 + \beta_1 CAR_{i,t} + e_i$$

Where:

- **ROE_{i,t}** = Return on equity of bank i at time t.
- **CAR_{i,t}** = Capital Adequacy of bank i at time t.
- **e_i** = Error term.

3.4.2. Submitting the panel data for the ROE model:

The following table shows the general information related to the return on assets model and the type of panel data according to the structure of the study database:

Table 5. ROE

```
. xtset bank years, yearly
      panel variable:  bank (strongly balanced)
      time variable:  years, 2014 to 2020
      delta: 1 year
```

Model

Source: Stata 15 output.

We note from the table above that the panel data is balanced, which shows that each of the commercial banks under study has data for all years, where:

$$N = n \times T = 189, n = 27, T = 7$$

The table also indicates model variables as:

- **Bank:** Refers to the cross-section units, which in our study represent the commercial banks under study, where each bank will be referred to with its own number in the form as follows: bank_1, bank_2, ..., Bank_27
- **1_year:** Refers to the study period, meaning annual data for the period from 2014 to 2020.

3.4.3. Estimation of Static Models for the ROE Model

In order to estimate the study model, we can rely on the methodology of cross-sectional time series data through the application of static Panel models represented in: Pooled Regression Model, Fixed Effect Model, and Random Effect Model.

Table 6. Results of estimate the Panel Models

| Period: 2014-2020 / N=27 / T=7 / Total Panel Views: 189 | | | |
|---|-------------------------------|---------------------------|----------------------------|
| Explanatory Variable | Pooled regression Model (PRM) | Fixed Effects Model (FEM) | Random Effects Model (REM) |
| Constant | 12.70 (0.000) | 13.63 (0.000) | 13.16 (0.000) |
| CAR | -0.14 (0.001) | -0.18 (0.029) | -0.16 (0.009) |
| R2 | 0.055 | 0.029 | 0.029 |
| F-statistic | 10.92 | 8.63 | 6.74 |
| Prob (F-statistic) | 0.0011 | 0.000 | 0.0095 |

Source: Prepared by researchers rely on Appendices 1, 2 and 3.

After estimating the three models: the pooled regression model, the fixed effects model, and the random effects model, we compare them by choosing the preferred model using the following statistical tests:

- **Fisher test**

Through the table 6, we note that the value of (Cross-section F) is 8.63 and the probability value is 0.000 and it is less than 5%. Therefore, we reject the null hypothesis and accept the alternative hypothesis, so fixed effects model is the best.

- **Breusch-Pagan test**

The test results are shown in the following table

Table 7. Breusch Pagantest results

| | | | |
|---|----------|------------------|--------|
| . xttest0 | | | |
| Breusch and Pagan Lagrangian multiplier test for random effects | | | |
| roe[bank,t] = Xb + u[bank] + e[bank,t] | | | |
| Estimated results: | | | |
| | Var | sd = sqrt(Var) | |
| roe | 19.4551 | 4.410793 | |
| e | 8.968164 | 2.994689 | |
| u | 10.19811 | 3.193447 | |
| Test: Var(u) = 0 | | | |
| | | chibar2(01) = | 148.43 |
| | | Prob > chibar2 = | 0.0000 |

Source: Prepared by researchers rely on Stata15 Output

Through the above table, we notice that the value of (Chibar2 (01)) is 0.00 and the probability value is equal to 0.0000 which is more than 5%. Therefore, we reject the null hypothesis and accept the alternative hypothesis, so the FEM is the best .

- **Hausman test**

Table 8. Hausman test results

```

. hausman fe
----- Coefficients -----
      (b)      (B)      (b-B)      sqrt(diag(V_b-V_B))
      fe      re      Difference      S.E.
-----+-----
car      -.1871539      -.1637712      -.0233827      .0566355

      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(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
              =      0.17
      Prob>chi2 =      0.6797
    
```

Source: Prepared by researchers rely on Stata15 Output

The results of Hausman test indicate that it is statistically insignificant at the level of 5%, whereas the probability value of the test is (0.6797) Therefore, we accept the null hypothesis indicating that the random effects model is the appropriate model for our study.

3.4.4. Study the measurement problems of the (ROE) model

After selecting the fixed effects model as the most appropriate model from both the pooled and random effects model, there are many tests that are relied upon to diagnose the success of the model in explaining the studied phenomenon, because of the possible presence of some measurement problems, the most important of which is the problem of instability of variance. and the problem of autocorrelation.

- **Modified Wald Test**

The results of this test were as follows:

Table 9. Modified Wald Test results

```

. xttest3
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2(27) =      2128.97
Prob>chi2 =      0.0000
    
```

Source: Prepared by researchers rely on Stata15 Output

Through what is shown in Table 9, we note that the probability value is less than 5%, therefore we reject the null hypothesis, and the residuals of the fixed effects model are not homogeneous between banks, and on this basis, there is a problem of instability of variance in this model.

• **Wooldridge Test for autocorrelation**

The results of this test were as follows:

Table 10. Wooldridge Test for autocorrelation results

```

. xtserial roe car

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
      F( 1,      26) =      2.233
      Prob > F =      0.1472
    
```

Source: Prepared by researchers rely on Stata15 Output

Through the Table above, we notice that the probability value is completely greater than 5%, and this means that the estimated model does not contain a problem of autocorrelation between the estimated errors, and therefore it can be said that the study model does not suffer from the problem of autocorrelation between errors.

On this basis, and in order to eliminate the problem of instability of variance, we will re-estimate the model using the (Panels corrected standard errors model), and accordingly the problem of instability of variance will be eliminated, and the corrected model can be estimated in the following way:

Table 11. Panels corrected standard errors model

```

. xtpcse roe car, rhtype(dw) hetonly

Linear regression, heteroskedastic panels corrected standard errors

Group variable:  bank                Number of obs   =      189
Time variable:  years                Number of groups =      27
Panels:         heteroskedastic (balanced)  Obs per group:
Autocorrelation: no autocorrelation
                                     min =      7
                                     avg =      7
                                     max =      7

Estimated covariances   =      27      R-squared       =      0.0552
Estimated autocorrelations =      0      Wald chi2(1)    =      7.69
Estimated coefficients   =      2      Prob > chi2     =      0.0056
    
```

| | Het-corrected | | | | | |
|-------|---------------|-----------|-------|-------|----------------------|-----------|
| | Coef. | Std. Err. | z | P> z | [95% Conf. Interval] | |
| roe | | | | | | |
| car | -.140921 | .0508181 | -2.77 | 0.006 | -.2405227 | -.0413192 |
| _cons | 12.70479 | 1.023184 | 12.42 | 0.000 | 10.69939 | 14.7102 |

Source: Prepared by researchers rely on Stata15 Output

Based on the results of the corrected panel model in Table 11, it is possible to reformulate the estimated model equation as follows:

$$ROE = 12.70 - 0.14 CAR$$

Through the results of this regression, we note that the independent variable represented by the capital adequacy criterion according to the Basel Committee requirements has a statistically significant negative effect on the profitability of banks represented by the rate of return on assets during the period (2014-2020), and we also note an increase in the explanatory capacity of the

model after correction Where it was estimated at: 2.72%

4. CONCLUSION

The study reached the following results:

Profitability is a primary goal for banks, as it is an indicator of the banks' ability to achieve profits through the investments that they contributed to achieving them. Therefore, it is considered as an indicator of the quality and efficiency of the bank's management, and the extent of its competitiveness.

The capital adequacy standard expresses the ratio of the bank's capital to its risk-weighted assets, and therefore it is an indicator that shows the relationship between the bank's capital and the risks related to its assets. The capital adequacy standard is also an important tool in measuring the bank's solvency, and therefore it is a safety valve that protects the bank from falling into financial crises and facing potential risks in order to achieve the goal of profitability;

The analysis study for the ROE model related to the impact of the capital adequacy standard on the rate of return on equity of the commercial banks under study during the period (2014-2020), has been found a statistically significant negative effect of the capital adequacy rate on the profitability of banks expressed as the rate of return on equity. As the rate of return on equity decreases by (14%) in the case of an increase in the capital adequacy standard by 1%, and this is mainly due to what is stipulated in the economic theory according to which the increase in the bank's capital results in a decrease in risks and thus a decrease in returns. This negative impact is also due to the measures taken to raise the capital in accordance with what was stipulated in the Basel III Committee agreement, which also requires financing either internally or externally. Which leads the latter, in turn, to distribute profits and include them in the capital for a longer period, and it has to record a decrease in the rate of return on equity. Hence, we accept the first hypothesis and acknowledge that the capital adequacy criterion adversely affects the rate of return on equity.

5. Bibliography List:

- AYANDA, M. A., EKPO, I. C., & MUSTAPHA, A. M. (2013). *Determinants of banks' profitability in a developing economy: evidence from Nigerian banking industry. Interdisciplinary journal of contemporary research in business*, 4(9).
- ElSaidi, A. (2015). *Bank profitability and factors affecting it: an applied study on Iraqi banks listed in the Iraq Stock Exchange. Arab Journal of Management*, 35(1).
- GREUNING, H., & BARATANOVIC, S. (2003). *Analysing and managing banking risk a framework for assessing corporate governance and financial risk (second edition ed.)*. USA: The World Bank.
- HMIDI, K. (2019). *The new framework of the Basel III agreement and its role in strengthening banking supervision mechanisms and achieving global banking safety. Journal of scientific research and studies*, 13(1), pp. 386-403.
- ILIFI, M. (2014). *Methods of minimizing the risk of bank failure in developing countries, with a case study in Algeria. PhD thesis in economic sciences, specialization: Money and Finance, Faculty of Economic, Commercial and Management Sciences, Hassiba Ben Bouali University, Chlef. Algeria*.
- KALI, M., & SMAILI, N. (2019). *Basel 3 decisions and their applications in the Arab countries as an entry point to achieving financial stability and managing banking crises. Al-Maqar Journal for Economic Studies*, 3(1), pp. 20-36.

KWIDER, I. (2021). The use of the CAMELS model in measuring banking performance and supporting the control system, a comparative study. PhD Thesis in management sciences. Algeria: Faculty of Commercial Economics and Management Sciences, Abdelhamid Mehri University, Constantine 2.

SAIDANE, D. (september, 2012). L'impact de la réglementation de Bâle III sur les métiers des salariés des banques : 1ère partie, Bâle III, explication du dispositif. Documents de travail: Les études de l'observatoire, étude thématique. Université Lille Nord de France et SKEMA.

ZENKRI, M. (2017). Capital adequacy in Islamic banks between privacy and globalization. Cairo, Egypt: Arab Organization for Administrative Development.

6. Appendices

Appendices 1. PRM Model

| . reg roe car | | | | | | |
|---------------|------------|-----|------------|---------------|---|--------|
| Source | SS | df | MS | Number of obs | = | 189 |
| Model | 201.772321 | 1 | 201.772321 | F(1, 187) | = | 10.92 |
| Residual | 3455.78632 | 187 | 18.4801408 | Prob > F | = | 0.0011 |
| Total | 3657.55865 | 188 | 19.4550992 | R-squared | = | 0.0552 |
| | | | | Adj R-squared | = | 0.0501 |
| | | | | Root MSE | = | 4.2989 |

| roe | Coef. | Std. Err. | t | P> t | [95% Conf. Interval] | |
|-------|----------|-----------|-------|-------|----------------------|-----------|
| car | -.140921 | .0426479 | -3.30 | 0.001 | -.2250538 | -.0567882 |
| _cons | 12.70479 | .9097082 | 13.97 | 0.000 | 10.91018 | 14.4994 |

Source: Stata 15 outputs

Appendices 2. FEM Model

| . xtreg roe car, fe | | | | | | |
|-----------------------------------|---|--------|------------------|---|-----|--------|
| Fixed-effects (within) regression | | | Number of obs | | = | 189 |
| Group variable: bank | | | Number of groups | | = | 27 |
| R-sq: | | | Obs per group: | | | |
| within | = | 0.0294 | min | = | 7 | |
| between | = | 0.0742 | avg | = | 7.0 | |
| overall | = | 0.0552 | max | = | 7 | |
| corr(u_i, Xb) = -0.1033 | | | F(1,161) | | = | 4.87 |
| | | | Prob > F | | = | 0.0287 |

| roe | Coef. | Std. Err. | t | P> t | [95% Conf. Interval] | |
|--|---|-----------|----------|-------|----------------------|-----------|
| car | -.1871539 | .0847923 | -2.21 | 0.029 | -.3546024 | -.0197054 |
| _cons | 13.63088 | 1.712382 | 7.96 | 0.000 | 10.24926 | 17.01251 |
| sigma_u | 3.3427218 | | | | | |
| sigma_e | 2.9946892 | | | | | |
| rho | .55475203 (fraction of variance due to u_i) | | | | | |
| F test that all u_i=0: F(26, 161) = 8.63 | | | Prob > F | | = 0.0000 | |

Source: Stata 15 outputs

Appendices 3. REM Model

```

. xtreg roe car, re
Random-effects GLS regression           Number of obs   =       189
Group variable: bank                   Number of groups =        27

R-sq:                                  Obs per group:
    within = 0.0294                    min =           7
    between = 0.0742                   avg =          7.0
    overall = 0.0552                   max =           7

corr(u_i, X) = 0 (assumed)             Wald chi2(1)    =        6.74
                                         Prob > chi2     =       0.0095

```

| | Coef. | Std. Err. | z | P> z | [95% Conf. Interval] | |
|---------|-----------|-----------------------------------|-------|-------|----------------------|-----------|
| car | -.1637712 | .0631043 | -2.60 | 0.009 | -.2874532 | -.0400891 |
| _cons | 13.1625 | 1.421643 | 9.26 | 0.000 | 10.37613 | 15.94887 |
| sigma_u | 3.1934474 | | | | | |
| sigma_e | 2.9946892 | | | | | |
| rho | .53208612 | (fraction of variance due to u_i) | | | | |

Source: Stata 15 outputs

7. Citations:

- ¹ AYANDA, M. A., EKPO, I. C., & MUSTAPHA, A. M. (2013). Determinants of banks' profitability in a developing economy: evidence from Nigerian banking industry. *Interdisciplinary journal of contemporary research in business*, 4(9),p 161.
- ² GREUNING, H., & BARATANOVIC, S. (2003). *Analysing and managing banking risk a framework for assessing corporate governance and financial risk (second edition ed.)*. USA: The World Bank,p 81.
- ³ ELSaidi, A. (2015). Bank profitability and factors affecting it: an applied study on Iraqi banks listed in the Iraq Stock Exchange. *Arab Journal of Management*, 35(1),p 360
- ⁴ HMIDI, K. (2019). The new framework of the Basel III agreement and its role in strengthening banking supervision mechanisms and achieving global banking safety. *Journal of scientific research and studies*, 13(1), p 391.
- ⁵ SAIDANE, D. (september, 2012). L'impact de la réglementation de Bâle III sur les métiers des salariés des banques : 1ère partie, Bâle III, explication du dispositif. *Documents de travail: Les études de l'observatoire, étude thématique*. Université Lille Nord de France et SKEMA,p 7
- ⁶ KWIDER, I. (2021). The use of the CAMELS model in measuring banking performance and supporting the control system, a comparative study. *PhD Thesis in management sciences*. Algeria: Faculty of Commercial Economics and Management Sciences, Abdelhamid Mehri University, Constantine 2,p 67
- ⁷ KALI, M., & SMAILI, N. (2019). Basel 3 decisions and their applications in the Arab countries as an entry point to achieving financial stability and managing banking crises. *Al-Maqar Journal for Economic Studies*, 3(1), p 22.
- ⁸ ZENKRI, M. (2017). Capital adequacy in Islamic banks between privacy and globalization. Cairo, Egypt: Arab Organization for Administrative Development,p 221.
- ⁹ ILIFI, M. (2014). Methods of minimizing the risk of bank failure in developing countries, with a case study in Algeria. *PhD thesis in economic sciences, specialization: Money and Finance*, Faculty of Economic, Commercial and Management Sciences, Hassiba Ben Bouali University, Chlef. Algeria,p 146.