The Impact of Financial Risk Management Practices on the Profitability of Commercial Bank Assets
- An econometric Study of a sample in Algerian banks -
أثر إدارة المخاطر المالية على ربحية أصول البنوك التجارية- دراسة قياسية لعينة من البنوك الجزائرية

Dr. BENMESSAOUD Mohammed[1], Dr. MESSAOUDI Abdelhamid[2]

[1] University of Ahmed Draia-Adrar (Algeria) med.benmessaoud@univ-adrar.edu.dz
[2] University of Ahmed Draia -Adrar (Algeria) mes.hamid@univ-adrar.edu.dz

Abstract:

The study aims at measuring the impact of financial risk management on the profitability of commercial banks' assets. Financial risk management is expressed through capital adequacy, credit risk, and liquidity risk. Asset profitability is represented by the return on total assets. The study included 15 commercial banks operating in Algeria during the period of 2010-2019, utilizing Eviews12 software to estimate the basic models for panel data.

The key findings of the study indicate a positive impact of capital adequacy management on the profitability of commercial banks' assets. However, there is no significant impact of credit risk management and liquidity risk on the profitability of commercial banks' assets.

The study also recommends the importance of focusing on capital adequacy management indicators to achieve a better level of asset profitability, while adhering to the Basel Committee's standards.

Keywords: Asset profitability, Capital adequacy, Credit risk, Commercial banks, liquidity risk.

JEL Classification Codes: M49, G21, C23.

ملخص:

تهدف الدراسة إلى قياس أثر إدارة المخاطر المالية على ربحية أصول البنوك التجارية، وتمت الدراسة على 15 بنكا تجاريا عاملا بالجزائر خلال الفترة (2010-2019). حيث تمت الاستعانة ببرنامج Eviews12 في تقدير النماذج الأساسية لبيانات بانل. وتوصلت نتائج الدراسة إلى أن هناك أثرا موجبا لإدارة كفاية رأس المال على ربحية أصول البنوك التجارية، كما أنه لا يوجد أثر لإدارة خطر الائتمان وخطر السيولة على ربحية أصول البنوك التجارية. كما أوصت الدراسة بضرورة الاهتمام بإدارة مؤشر كفاية رأس المال من أجل تحقيق أفضل مستوى لربحية الأصول، مع الالتزام بمعايير لجنة بازل.

كلمات مفتاحية: ربحية الأصول، كفاية رأس المال، خطر الائتمان، البنوك التجارية، خطر السيولة.

تصنيفات **JEL**: M49، G21، C23.

Corresponding author: BENMESSAOUD Mohammed, **e-mail:** med.benmessaoud@univ-adrar.edu.dz

INTRODUCTION:

Commercial banks strive to maximize profits and achieve the highest returns. To maintain these returns, they take precautionary measures to ensure the security and protection of funds from potential financial risks. Commercial banks have experienced numerous financial crises that have led to their bankruptcy due to a lack of hedging against such risks. Therefore, experts attach great importance to the management of financial risks in banks by establishing financial indicators as measures of risk management. This requires banks to hold a portion of their funds as a safety valve that is not used to generate profits or returns, but rather as a mechanism to protect against any potential financial danger, aiming to maintain the confidence of stakeholders.

However, adhering to financial risk management indicators imposes additional costs on commercial banks due to the non-utilization of funds allocated for risk management in profit generation. This may impact the profitability and efficiency of these banks. Based on this premise, the problem of this study arises to examine the impact of complying with financial risk management indicators on the profitability of operating assets in commercial banks in Algeria. The main question is as follows:

- What is the impact of financial risk management indicators on the profitability of the assets of commercial banks operating in Algeria during the period (2010-2019)?

The study hypotheses:

By expressing financial risk management through the capital adequacy ratio, the credit risk index, and the liquidity risk index; the problem of the study can be addressed through the following hypotheses:

- There is no impact of capital adequacy management on the profitability of the assets of commercial banks operating in Algeria during the study period.

- There is no impact of credit risk management on the profitability of the assets of commercial banks operating in Algeria during the study period.

- There is no impact of liquidity risk management on the profitability of the assets of commercial banks operating in Algeria during the study period.

Literature review:

Previous studies will be discussed in terms of their subject matter, methodology, and tools used, as well as the results obtained.

In terms of subject matter, a study by (Kurdi Hammoud, 2019) aimed at identifying the risks facing Iraqi banks and work on their development by bridging the gaps and using necessary measures to minimize the gap in changes, while considering development requirements and proposals. Another study by (Bouaziz, Bouamra, and Hosseini, 2022)

focused on understanding the impact of credit risks on the profitability of commercial banks in terms of the return on equity of operating banks in Algeria during the period of 2010-2018. Similarly, a study by (Hada, Zerguoun, and Ben Saha, 2018) highlighted the extent of the impact of liquidity risk management on the profitability of commercial banks in Algeria. Additionally, a study by (Bouchaker and Noui, 2022) examined the impact of liquidity risks on the profitability of operating commercial banks in Algeria, expressing liquidity risks as the ratio of loans to total assets and the ratio of liquid assets to total assets, and expressing bank profitability through the return on assets (ROA).

Regarding the methodology and tools, the study by (Kurdi Hammoud, 2019) relied on financial tools for data analysis, and profitability was measured through the return on equity model in banks. On the other hand, the study by (Bouaziz, Bouamra, and Hosseini, 2022) employed the analysis of cross-sectional time series (Panel Data) using the Eviews software. The study by (Hada, Zerguoun, and Ben Saha, 2018) involved a standard study based on annual data from 06 active commercial banks in Algeria during the period of 2011-2016. Panel Data models were utilized, along with some statistical software. Additionally, the study by (Bouchaker and Noui, 2022) examined four Algerian banks, relying on estimating fixed effects Panel Data models during the period of 2000-2019 using the feasible generalized least squares (FGLS) method, with the assistance of the statistical software Eviews and STATA.

In terms of results, the study by (Kurdi Hammoud, 2019) concluded that there is an increase in risk management indicators such as capital adequacy risk and liquidity risk, which are proportional to the profitability of Iraqi banks. The study by (Bouaziz, Bouamra, and Hosseini, 2022) found a slight positive impact of credit risks on the profitability of operating commercial banks in Algeria. The study by (Hada, Zerguoun, and Ben Saha, 2018) revealed a statistically significant relationship between liquidity risk measurement indicators and the return on assets, as well as a statistically significant inverse relationship between the return on equity and the cash coverage ratio. However, the employment ratio and legal liquidity ratio as indicators of liquidity risk measurement did not exhibit statistical significance. Furthermore, the study by (Bouchaker and Noui, 2022) found a statistically significant positive impact of liquidity risks on the profitability of operating commercial banks in Algeria in terms of the return on assets.

The current study aims at identifying indicators of financial risk management, as well as key ratios expressing the profitability of operating commercial banks in Algeria. Additionally, it seeks to determine the impact of capital adequacy risk, liquidity risk, and credit risk on the return on equity and return on total assets indicators for commercial banks during the period of 2010-2019. The study relies on cross-sectional time series data and employs Panel Data analysis using Eviews 12 software.

Theoretical Framework of the Study

1- Profitability of commercial banks:

The efficiency of commercial banks can be measured through profitability ratios, which represent the difference between interest earned on deposits and interest paid on loans, and are considered among the most important objectives that banks seek to achieve. (Al-Naoui, 2022,

p. 268). Profitability ratios can also reflect the bank's ability to generate profits through its operational activities, making them an accurate indicator of the bank's goal achievement and sustainability. These ratios take various forms, including the following (Sarhan and Najjar, 2020, p. 691):

- Net Profit Margin: This ratio calculates the net profit as a percentage of total assets.
- Return on Equity: This ratio measures the net profit as a percentage of shareholders' equity.
- Return on Capital: This ratio evaluates the net profit in relation to working capital.
- Return on Total Revenue: This ratio determines the net profit as a percentage of total revenue.

Analyzing these ratios helps evaluate the bank's performance and its ability to achieve desired profitability. It can also aid in assessing the efficiency of financial risk management and its impact on profitability. These ratios can be used to compare different banks and understand the factors influencing profitability and its development.

1-1   Return on Equity (ROE): is an indicator that represents the financial returns achieved by each unit of shareholders' equity. A higher ROE indicates that the bank has achieved efficiency (Ammari and Bin Thabet, 2018, p. 405). This indicator has been widely used for a long time to measure and describe the relationship between return and risk in banking activities (Qureshi, 2005, p. 91).

1-2   Return on Assets (ROA): is an indicator that measures the bank's ability to generate profits from invested assets (Hesham, 2022). It provides an idea of the bank management's ability to utilize assets for profit generation. It represents the ratio of profit earned by each monetary unit of fixed and current assets. The focus is not on the size of assets used, but rather on the profitability of these assets. So the rise in value of this index indicates the optimal management of assets and efficient recruitment of financial sources (Nakaa and Boalkur, 2023, p. 218).

By monitoring the development of profitability indicators such as Return on Equity (ROE) and Return on Assets (ROA), which reflect the extent of profit achievement relative to the scale of utilization, considering the level of return and risk, commercial banks can assess their financial performance. However, commercial banks may face challenges if they heavily rely on leverage to increase the return on equity by bearing the costs of debt. Depositors, who cannot participate in the bank's profits, may be at risk. Conversely, increasing financing through stock issuance leads to an increase in the number of shareholders, resulting in a decrease in the value of each share of distributed profits. Debt financing implies a decrease in the equity-to-total-assets ratio, increasing capital risk. Additionally, the inability to fully utilize deposits exposes the bank to the cost of paying interest on the unused funds (Amaireh, 2005, p. 57).

2- Financial risks:

Financial risks are defined as the degree of uncertainty regarding the realization of future profits resulting from a specific investment (Francisco Javier, 2017, p. 4). They

represent the effects of expected or unexpected future events that impact the profitability and capital of a bank, putting its existence and continuity at risk. Financial risks refer to the possibility of the bank incurring unplanned losses (Jawani and Maryamt, 2022, p. 519). Thus, financial risks can be defined as losses or impacts that financial institutions may experience as a result of investing in uncertain conditions.

3- Financial risk management:

The term "risk management" first appeared in November 1955 when Professor Wayne Snider delivered a lecture titled "Risk Manager," proposing the establishment of a department responsible for risk mitigation in the insurance industry. In 1956, Gallagher published an article defining the key principles of risk management. The position of a full-time risk manager in large institutions was proposed, and for a long time, risk management was closely associated with insurance management in both practical and theoretical aspects (Roncalli, 2020, p. 1).

Financial risk management is known as a series of steps that help the team understand the risks and make plans and arrangements to reduce their occurrence or minimize their impacts (Skendry and Ali Ben Yahya, 2023, p. 316). It is also considered as the process of dealing with uncertainty arising from financial markets (Karen, 2005, p. 3). It involves controlling or mitigating risk by reducing its occurrence frequency and minimizing potential losses at the lowest possible cost (Ben Zid, 2018, p. 16). Through effective risk management, financial institutions can gain a competitive advantage. Financial risk management aims to prevent and mitigate losses by using appropriate tools to minimize potential losses, while also targeting the maximization of expected returns and profits in the presence of accompanying financial risks. It enables the institution to evolve and achieve its objectives more effectively. Risk management can be accomplished by following the stages represented in the following diagram (Belabed and Ghafouri, 2022, p. 175):

Fig (1): Financial risk management steps.
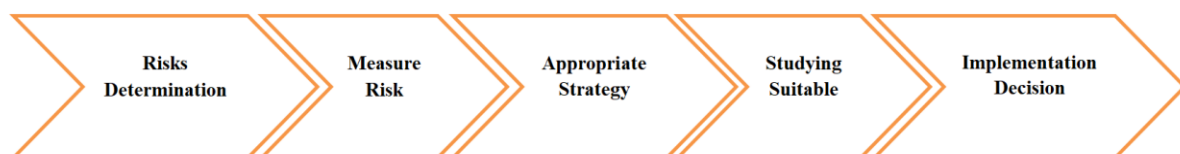
Source: Belabed Manal and Ghafouri Laila, Managing Financial Risks in Islamic Financial Theory: A Comparative Study of a Sample of Malaysian Companies, Economics of Finance and Business Journal, Volume 07, Issue 02, 2022, p: 175

According to the figure, the process of financial risk management begins with identifying and measuring the risk through risk diagnosis and exploration. This is followed by the stage of developing appropriate policies and studying available alternatives to address the risk. This includes prioritizing risks and implementing measures to mitigate their severity, known as preventive actions. The next stage is execution and monitoring, which involves assigning responsibilities, reviewing procedures, and monitoring and verifying the results to ensure that such risks are not repeated.

4- Types of financial risks:

There are several risks associated with financial institutions, including the following (Muhammad Ahmed Jamaan, 2017):

4-1 Operational risks: These risks arise from changes in operational expenses that deviate significantly from expectations, resulting in a decrease in net profits. The Basel Committee defined operational risks as losses arising from inefficiency, internal operational failures, individuals, weak information systems, or external events.

4-2 Capital risk: These risks refer to the extent to which the bank's owned capital can withstand the risk of insolvency. It represents the ratio of equity to total assets and is measured by dividing equity by total assets.

4-3 Interest rate risk: These risks indicate the fundamental change in the bank's net interest income and the market value of equity compared to the changes in market interest rates.

4-4 Credit risks: These risks are associated with the quality of assets and the likelihood of default. As banks acquire assets that generate profits, there may be risks associated with non-payment. Therefore, credit risks represent the losses that the bank may incur due to the customer's inability to repay. (Al-Zawbaa, 2017, p. 64).

4-5 Liquidity risk: These are the potential risks of the bank's inability to meet financial obligations by selling assets, obtaining new loans or deposits, or by repaying them at a higher cost. It refers to the bank's ability to handle withdrawals from deposits (Hada, Zerguoun, and Ben Saha, 2018, p. 523).

5- Method and tools:

The study population consists of operating banks in Algeria, totaling 20 banks, including 6 public banks and 14 private banks. The study sample included 6 public banks and 9 private banks, making a total of 15 active banks in Algeria. The following table presents the data related to the study sample.

Table (1): Data related to the study sample.

The label	Commercial Registration N°	Property kind
SPA BANQUE EXTERIEURE D'ALGERIE	00B0011452	Public Bank
SPA BANQUE DE L'AGRICULTURE ET DUDEVELOPPEMENT RURAL	00B0011640	Public Bank
SPA BANQUE NATIONALE D ALGERIE	00B0012904	Public Bank
CNEP BANQUE	00B0013829	Public Bank
SPA BANQUE DE DEVELOPPEMENT LOCAL	00B0014054	Public Bank
SPA CREDIT POPULAIRE D'ALGERIE	99B0009292	Public Bank
BANQUE AL BARAKA D'ALGERIE	00B0014294	Private Bank
SUC ARAB BANK PLC ALGERIA	00B0014944	Private Bank
SPA BNP PARIBAS EL DJAZAIR	01B0015609	Private Bank
SPA TRUST BANK ALGERIE	02B0018917	Private Bank

GULF BANK ALGERIE	03B0021041	Private Bank
SPA FRANSABANK EL DJAZAIR	06B0970765	Private Bank
SPA ARAB BANKING CORPORATION ALGERIA	98B0003628	Private Bank
NATIXIS ALGERIE	99B0007947	Private Bank
SPA SOCIETE GENERALE ALGERIE	99B0009025	Private Bank

Source: Prepared by researchers based on (sidjilcom) platform

The data for the studied sample was collected from the annual financial reports issued by the commercial banks under study and published on their official websites. The electronic platform "sidjilcom," which is affiliated with the National Center for Trade Register, was also used to gather data. The data covered a period of ten (10) years, from 2010 to 2019, with a total of 150 observations (15 banks * 10 years = 150 observations).

6- Study variables: The current study selected its variables based on those used in previous research. The study variables and their measurement methods are as follows:

6-1 The dependent variable: The dependent variable represents the profitability of commercial bank assets and is measured by the following indicator:

▪ **Return on total assets (ROA):** Calculated by dividing the net income of the bank by its total assets using the following relationship: ROA = (Net Income / Total Assets).

6-2 Independent variables: The main indicators representing financial risk management are:

▪ **Capital Adequacy Risk (RCA)** = Total Equity / Total Assets.
▪ **Liquidity Risk Management (RLM)** = Total Cash at the bank / Total Assets.
▪ **Credit Risk Management (RCR)** = Non-performing Loans and Accrued Interest / Total Loans.

7- Description of the variables: After obtaining the data for 150 observations, the variables will be analyzed and described using the software "Eviews 12" to obtain measures of central tendency and the distribution shape, as shown in the following table.

Table (2): The measures expressing the form of distribution of the variables.

	RCA	RCR	RLM	ROA
Mean	18.366	2.47	24.531	1.89
Median	13.533	2.02	22.857	1.81
Maximum	63.587	12.16	53.893	6.58
Minimum	4.923	0.04	5.087	0.02
Std. Dev.	12.315	2.48	10.663	1.15
Skewness	1.541	2.22	0.632	0.96
Kurtosis	4.686	7.93	2.982	4.66
Jarque-Bera	77.099	274.77	9.992	40.40

Probability	0.000	0.000	0.007	0.000

Source: Prepared by researchers based on the outputs of the 12 Eviews program.

8- Estimating the study model: By describing the variables and calculating the measures of the shape of their distribution, it is noted that the study variables do not follow the normal distribution, so the logarithm will be entered on the variables to mitigate the spread of the data.

9- Estimating the return on total assets model: The model is estimated through the following relationship formula:

$$LROA_{it} = \beta_0 + \beta_1 LRCA_{it} + \beta_2 LRCR_{it} + \beta_3 LRLM_{it} + \varepsilon_{it}$$

After processing the data related to the study sample, the basic models represented in the aggregate regression model and the fixed and random individual effects model were estimated. The results of the estimation were as shown in the following table:

Table (3): Results of estimating the return on total assets model.

Variable	Combined regression		fixed effects		random effects	
	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob
C	-2.638568	0.0000	-2.353682	0.0001	-2.306029	0.0000
LRCA	1.011790	0.0000	1.111427	0.0000	1.064665	0.0000
LRLM	0.094094	0.3962	-0.087424	0.4092	-0.061887	0.5460
LRCR	-0.069461	0.1938	-0.057773	0.2258	-0.055825	0.2265
R-squared	0.488223		0.768599		0.281179	
F-statistic	46.42679		25.79053		19.03679	
Prob(F-statistic)	0.000000		0.000000		0.000000	
Durbin-Watson	0.561692		1.277958		1.162451	

Source: Prepared by researchers based on the outputs of the 12 Eviews program.

9-1 Lagrangian's multiple test LM: It is the test that is used to compare between the aggregate regression model and the individual effects model. This test is based on testing the following hypotheses:

- **The null hypothesis (H0):** The combination regression model is appropriate.
- **Alternative Hypothesis (H1):** A single fixed or random effects model is appropriate

The following table shows the results of this test.

Table (4): Lagrangian multiple (LM) test results for the ROA model

Test	Statistical value	probability value
Lagrange's multiple test (LM)	158.9645	0.0000

Source: Prepared by researchers based on the outputs of the 12 Eviews program.

It is clear from Table No. (04) that the value of Breusch-Pagan LM = 158.9645, and that the probability value is equal to 0.0000, which is completely smaller than the significance level of 0.05, and therefore we reject the null hypothesis, and accept the alternative hypothesis, that is, the single fixed or random effects model is appropriate form.

9-2 Hausman test: The Haussmann test is used to differentiate between the fixed effects model and the random effects model. This test is based on testing the following two hypotheses:

- **The null hypothesis (H0):** The random effects model is appropriate.
- **Alternative Hypothesis (H1):** The fixed effects model is appropriate.

The following table shows the results of this test.

Table (4): Hausman test results for the ROA model

Prob.	Chi-Sq. d.f.	Chi-Sq. Statistic	Test Summary
0.8019	3	0.997455	Cross-section random

Source: Prepared by researchers based on the outputs of Eviews 12

It is clear from the results obtained in Table No. (05) that the probability value of the Haussmann test is 0.8019, which is greater than the significance level of 0.05, and accordingly we accept the null hypothesis, meaning that the random effects model is the appropriate model. Therefore, the regression equation for the return on total assets model is as follows:

$$LROA_{it} = -2.306 + 1.065LRCA_{it} - 0.062LRLM_{it} - 0.056LRCR_{it} + \varepsilon_{it}$$

10- Analyzing and discussing the results:

10 -1 Statistical results: The results of Table No. (02) showed that the largest value of the return on total assets (ROA) variable was 6.58, and the smallest value was 0.02. The mean value was 1.89 and the standard deviation was 1.15, the value of the median was 1.81, and in terms of distribution measures, the value of skewness was 0.96 and kurtosis 4.66, while the value of (Jarque-Bera) was 40.40 with a probability value of 0.000 which is smaller than 0.05, meaning that the distribution of return on total assets (ROA) data does not follow a normal distribution.

As for the capital adequacy risk management (RCA) variable, the largest value was 63.587, and the smallest value was 4.923. The value of the arithmetic mean is 18.366, the standard deviation is 12.315, and the median is 13.533, as for the distribution measures, the value of skewness was 1.541 and kurtosis 4.686, while the value of (Jarque-Bera) was 77.099 with a probability value of 0.000 which is less than 0.05, meaning that the distribution of the RCA data does not follow the normal distribution.

As for the credit risk management (RCR) variable, its largest value was 12.16, and the smallest value was 0.04. The arithmetic mean value was 2.47 with a standard deviation of 2.48, and the median value was 2.02, in terms of distribution measures, the value of skewness

reached 2.22 and kurtosis 7.93, while the value of (Jarque-Bera) amounted to 274.77 with a probability value of 0.000 which is smaller than 0.05, that is, the distribution of RCR data does not follow a normal distribution.

While the largest value of the liquidity risk management (RLM) variable was 53.893, and the smallest value was 5.087, and the arithmetic mean value was 24.531 with a standard deviation of 10.663 and the median 22.857, in terms of distribution measures, the value of skewness is 0.632 and kurtosis is 2.982, while the value of (Jarque-Bera) was 9.992 with a probability value of 0.007 which is smaller than 0.05, meaning that the distribution of the liquidity risk management (RLM) variable data does not follow the normal distribution.

10 -1 Standard results: It is clear from the results of the estimation of the Panel models in Table No. (03) that the random effects model had a value of the coefficient of determination (R-squared) 0.2812, that is, the change in the return on equity is explained by the change in the independent variables used by 28.12%, and the rest is explained by the random error limit, and the calculated Fisher (F) value amounted to 19.0368 with a probability value of 0.0000, which is less than the significance level of 05%. That is, the model is moral and acceptable. From the mathematical relationship of the random effects model, the following can be concluded:

▪ There is a positive and statistically significant effect of the capital adequacy indicator on the rate of return on total assets at a significant level of 5%. Therefore, whenever the capital adequacy rate increases by one percentage, the rate of return on total assets increases by 1.065. This indicates that there is an impact of capital adequacy management on commercial banks operating in Algeria in terms of the return on total assets model. In this regard, the study agreed with the study of (Kurdi Hammoud, 2019), meaning that the profitability of total assets increases the amount of money deposited with the bank.

▪ There is no statistically significant effect of the liquidity risk indicator on the rate of return on total assets at the level of significance of 5%, because the probability value of this indicator amounted to 0.5460, which is greater than the level of significance of 5%, and therefore there is no significant effect of liquidity risk management on operating commercial banks In Algeria in terms of the return on total assets model. The study differed in this aspect with the study of (Bouchaker and Noui, 2022) and the study of (Hada, Zerguoun, and Ben Saha, 2018).

▪ There is no statistically significant effect of the credit risk indicator on the rate of return on total assets at the 5% significance level, because the probability value of this indicator amounted to 0.2265, which is greater than the 5% significance level, thus, there is no significant effect of credit risk management on commercial banks operating in Algeria in terms of the return on total assets model, and the study differed in this aspect with the study of (Bouaziz, Bouamra, and Hosseini, 2022).

Conclusion:

This study aimed at examining the impact of financial risk management on commercial banks operating in Algeria, with the objective of maximizing profits through optimal resource utilization and effective deposit management. The profitability of commercial bank assets was

expressed using the return on total assets indicator, while financial risk management was assessed using indicators such as capital adequacy, liquidity risk, and credit risk. The study yielded several key findings:

▪ There is a significant impact of the capital adequacy management indicator on the profitability of commercial bank assets in Algeria, contradicting the first hypothesis. This suggests that an increase in deposit size helps generate more profits for the bank.

▪ There is no significant impact of the liquidity risk management indicator on the profitability of commercial bank assets in Algeria, confirming the second hypothesis. This can be attributed to the availability of cash coverage within the bank, which is not utilized to generate profits but rather focuses on short-term obligations with imminent due dates.

▪ There is no significant impact of the credit risk management indicator on the profitability of commercial bank assets in Algeria, supporting the third hypothesis. This can be explained by the fact that loan loss provisions are not utilized to generate profits but rather to mitigate the risk of insolvency and sudden deposit withdrawals.

Based on the results of this study, several recommendations can be formulated, including:

▪ Algerian commercial banks should focus on capital adequacy management indicators and optimize resource utilization to improve profitability levels, while adhering to the Basel Committee standards.

▪ It is crucial for Algerian commercial banks to develop appropriate strategies for liquidity risk management and maintain a certain level of readily available cash liquidity based on short-term obligations.

▪ Algerian commercial banks should exercise caution when granting loans to customers and allocate a portion of funds as provisions for doubtful loan losses based on asset quality.

▪ It is essential for Algerian commercial banks to adopt scientific approaches in managing financial risks to avoid insolvency and ensure business continuity.

Bibliography:
- Al-Naoui, b. s. (2022). The role of the CAMEL model in evaluating the performance of conventional and Islamic banks - a comparative study between the Algerian People's Loan and Al Salam Bank during the period 2016_2020. Journal of Human and Social Sciences, 264-286.
- Al-Zawabaa, p. (2017). Measuring the impact of bank liquidity on return and risk in commercial banks "A survey study on commercial banks operating in Syria". Faculty of Economics, University of Damascus, Syria.
- Amayreh, K. p. (2005). The impact of banks' performance and market structure on banking: An analytical study of commercial banks operating in Jordan (1994-2003). Arab Academy for Banking and Financial Sciences Amman-Jordan.

- Ammari, S., & Bin Thabet, P. (2018). The financial evaluation of banks using the indicators of the American banking evaluation system (CAMELS), a case study of the Gulf Bank of Algeria. Journal of Humanities, 399-421.

- Belabed, M., & Ghafouri, L. (2022, 09 30). Financial risk management in Islamic financial theory: a comparative study of a sample of Malaysian companies. Financial and Business Economics Journal, 07(02), 173-188.

- Ben Zid, F. (2018). Lectures on risk management scale. Setif: University of Mohamed El Amine Debaghine - Faculty of Law and Political Science - Department of Law.

- Bouaziz, A., Bouamra, H., & Hosseini, W. (2022, 03 31). The impact of credit risks on the profitability of commercial banks (an econometric study on commercial banks operating in Algeria during the period 2010-2018). Journal of Academic Studies, 4(1), 184-201.

- Bouchaker, Z., & Noui, N. (2022). An econometric study of the impact of liquidity risk on the profitability of commercial banks - a study of a sample of Algerian banks during the period 2000-2019. Journal of Studies in Economics and Business Administration, 482-501.

- Francisco Javier, P. (2017). Financial Risk Management Identification, Measurement and Management. Switzerland: Springer Nature.

- Hadda, F., Zerguoun, A., & Ben Saha, A. (2018). Liquidity risk management and its role in evaluating the profitability of commercial banks - an econometric study of a sample of commercial banks in Algeria during the period (2011-2016). Researcher Journal, 18, 521-534.

- Hesham, f. (2022, mars 20). The rate of return on assets ROA- 52. Consulté le (2023, avril30) sur linked in : https://ae.linkedin.com/pulse/-roa-52-hesham-assal

- Jawani, P., & Maryamt, P. (2022, June). The impact of financial risks on capital adequacy in banks using the ARDL methodology, a case study of the National Commercial Bank of Saudi Arabia during the period 2011-2019. Journal of Financial, Accounting and Administrative Studies, 09(01), 514 - 533.

- Karen, A. (2005). ESSENTIALS of Financial Risk Management. Canada: John Wiley & Sons, Inc. Hoboken, New Jersey.

- Kurdi Hammoud, a. (2019, June). Measuring financial risks as an indicator for banks - an analytical study of a number of selected Iraqi private banks. Business and Economics Journal, 03(02), 548-558.

- Muhammad Ahmed Jamaan, n. (2017). A model for measuring the relationship between risk and return in financial institutions by applying it to Yemeni banks. Scientific Journal of the Faculties of Commerce Sector - Al-Azhar University, 162-242.

- Nekaa rayane, boualkour Noureddine, Evaluate the financial performance of commercial banks using the ratios of liquidity and profitability -A case study of Fransabank and Bnp Paribas operating in Algeria during the period (2015-2020)- Journal of Economic Integration, 11 (04), 207-226

- Qureshi, M. c. (2005). Evaluating the performance of banking institutions - a case study of a group of Algerian banks during the period 1994-2000. Researcher Journal, 89-95.

- Roncalli, T. (2020). Handbook of Financial Risk Management. Broken Sound Parkway NW: Taylor & Francis Group.

- Sarhan, S., & Najjar, H. (2020). The impact of financial innovation determinants on banking - an econometric study of a sample of Jordanian commercial banks using PANEL models. Researcher Journal, 685-699.

- Skandri Fatima zohra, ali ben yahia abdekader, The impact of risk management on the financial performance of the economic institution – An applied study of the Port of Tennis Corporation in the state of chlef during the period (2018-2020). Journal of Economic Integration, 11 (03), pp, 313-331

-Appendices

Dependent Variable: LROA
Method: Panel EGLS (Cross-section random effects)
Date: 05/15/23   Time: 19:52
Sample: 2010 2019
Periods included: 10
Cross-sections included: 15
Total panel (balanced) observations: 150
Swamy and Arora estimator of component variances

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0000	-4.448200	0.518419	-2.306029	C
0.0000	7.442976	0.143043	1.064665	LRCA
0.5460	-0.605130	0.102271	-0.061887	LRLM
0.2265	-1.214639	0.045961	-0.055825	LRCR

Effects Specification

Rho	S.D.			
0.5633	0.496070	Cross-section random		
0.4367	0.436748	Idiosyncratic random		

Weighted Statistics

0.281179	R-squared	0.427920	Root MSE
0.266409	Adjusted R-squared	0.102913	Mean dependent var
0.433742	S.E. of regression	0.506413	S.D. dependent var
19.03679	F-statistic	27.46733	Sum squared resid
0.000000	Prob(F-statistic)	1.162451	Durbin-Watson stat

Unweighted Statistics

0.383701	Mean dependent var	0.478982	R-squared
0.563206	Durbin-Watson stat	56.69221	Sum squared resid

Dependent Variable: LROA
Method: Panel Least Squares
Date: 05/15/23   Time: 19:33
Sample: 2010 2019
Periods included: 10
Cross-sections included: 15
Total panel (balanced) observations: 150

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0000	-5.763781	0.457784	-2.638568	C
0.0000	11.07572	0.091352	1.011790	LRCA
0.3962	0.850955	0.110575	0.094094	LRLM
0.1938	-1.305346	0.053213	-0.069461	LRCR

0.488223	R-squared	0.609299	Root MSE
0.477707	Adjusted R-squared	0.383701	Mean dependent var
0.617589	S.E. of regression	0.854559	S.D. dependent var
55.68674	Sum squared resid	1.900317	Akaike info criterion
-138.5238	Log likelihood	1.980601	Schwarz criterion
46.42679	F-statistic	1.932934	Hannan-Quinn criter.
0.000000	Prob(F-statistic)	0.561692	Durbin-Watson stat

Dependent Variable: LROA
Method: Panel Least Squares
Date: 05/15/23   Time: 19:51
Sample: 2010 2019
Periods included: 10
Cross-sections included: 15
Total panel (balanced) observations: 150

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0001	-4.148892	0.567304	-2.353682	C
0.0000	6.270976	0.177233	1.111427	LRCA
0.4092	-0.827865	0.105602	-0.087424	LRLM
0.2258	-1.216830	0.047479	-0.057773	LRCR

Effects Specification

Cross-section fixed (dummy variables)

0.768599	R-squared	0.409706	Root MSE
0.738798	Adjusted R-squared	0.383701	Mean dependent var
0.436748	S.E. of regression	0.854559	S.D. dependent var
25.17883	Sum squared resid	1.293245	Akaike info criterion
-78.99341	Log likelihood	1.654522	Schwarz criterion
25.79053	F-statistic	1.440021	Hannan-Quinn criter.
0.000000	Prob(F-statistic)	1.277958	Durbin-Watson stat

Lagrange Multiplier Tests for Random Effects
Null hypotheses: No effects
Alternative hypotheses: Two-sided (Breusch-Pagan) and one
   -sided (all others) alternatives

	Test Hypothesis		
Both	Time	Cross-section	
160.1927	1.228220	158.9645	Breusch-Pagan
(0.0000)	(0.2678)	(0.0000)	
8.131629	-1.108251	12.60811	Honda
(0.0000)	(0.8661)	(0.0000)	
7.022273	-1.108251	12.60811	King-Wu
(0.0000)	(0.8661)	(0.0000)	
5.500679	-0.929543	14.33865	Standardized Honda
(0.0000)	(0.8237)	(0.0000)	
4.290193	-0.929543	14.33865	Standardized King-Wu
(0.0000)	(0.8237)	(0.0000)	
158.9645	--	--	Gourieroux, et al.
(0.0000)			

The Data related to variables of the study.

	T	ROA	RCA	RLM	RCR
BEA	2010	0.810	7.963	6.110	7.324
BEA	2011	1.148	9.694	5.087	5.667
BEA	2012	1.541	12.126	9.879	6.021
BEA	2013	0.991	13.279	18.930	0.160
BEA	2014	1.155	12.054	22.005	0.721
BEA	2015	1.284	12.927	17.917	0.424
BEA	2016	1.343	14.037	23.038	1.474
BEA	2017	1.837	11.220	27.962	1.431
BEA	2018	2.328	12.383	17.840	1.002
BEA	2019	1.917	13.529	14.591	1.038
BNA	2010	2.293	13.986	8.844	2.771
BNA	2011	2.148	13.150	21.183	1.232
BNA	2012	1.319	10.935	22.974	1.463
BNA	2013	1.384	12.224	24.128	2.427
BNA	2014	1.137	10.775	20.942	3.935
BNA	2015	1.086	12.130	20.624	2.935
BNA	2016	1.105	12.250	38.469	3.604
BNA	2017	1.060	19.842	19.936	2.185
BNA	2018	1.163	19.607	23.257	2.045
BNA	2019	0.546	17.948	23.980	3.522
CPA	2010	1.582	11.234	25.135	8.030
CPA	2011	1.339	10.431	21.824	0.151
CPA	2012	1.340	10.141	24.042	0.820
CPA	2013	1.226	9.618	22.453	0.832
CPA	2014	1.290	9.264	27.284	0.718
CPA	2015	1.718	9.808	26.319	0.644
CPA	2016	1.541	11.335	22.429	1.537
CPA	2017	1.713	11.765	28.961	1.073
CPA	2018	1.814	11.368	20.326	0.511
CPA	2019	0.874	10.307	16.935	1.815
BDL	2010	0.192	9.212	11.306	11.051
BDL	2011	0.437	8.408	16.595	10.376
BDL	2012	0.458	8.722	25.276	12.159
BDL	2013	0.387	7.461	18.713	2.123
BDL	2014	0.252	6.625	23.234	2.516
BDL	2015	0.865	9.796	22.803	2.947
BDL	2016	1.978	11.914	16.677	3.241
BDL	2017	1.530	11.810	10.191	2.486
BDL	2018	1.555	11.445	15.155	2.024
BDL	2019	0.150	10.604	11.243	2.653
BADR	2010	1.338	7.399	26.234	10.906
BADR	2011	1.099	7.762	28.555	2.414
BADR	2012	0.573	7.933	34.034	2.569
BADR	2013	0.460	7.149	28.740	2.480
BADR	2014	0.445	6.033	26.390	3.502
BADR	2015	0.435	6.519	31.960	3.008
BADR	2016	0.767	9.836	22.304	3.116

BADR	2017	0.501	9.383	21.038	3.724
BADR	2018	0.924	9.633	21.834	2.127
BADR	2019	0.307	8.914	19.238	2.920
CNEP	2010	0.116	6.007	39.770	1.993
CNEP	2011	0.131	5.586	33.842	2.096
CNEP	2012	0.126	5.214	45.871	1.158
CNEP	2013	0.022	4.923	38.781	1.366
CNEP	2014	0.193	5.019	35.849	2.576
CNEP	2015	0.422	7.815	31.956	0.670
CNEP	2016	0.508	7.841	27.408	1.460
CNEP	2017	0.615	8.056	16.322	1.538
CNEP	2018	0.604	8.411	15.363	1.344
CNEP	2019	0.435	8.343	17.439	2.176
ALBARAKA	2010	2.691	15.636	46.976	10.535
ALBARAKA	2011	2.841	15.453	50.987	10.901
ALBARAKA	2012	2.779	14.257	53.893	11.305
ALBARAKA	2013	2.605	14.621	53.786	0.323
ALBARAKA	2014	2.646	14.628	45.863	0.569
ALBARAKA	2015	2.122	11.802	46.474	0.557
ALBARAKA	2016	2.384	11.849	43.021	0.740
ALBARAKA	2017	1.427	9.566	40.065	0.789
ALBARAKA	2018	1.906	9.845	38.754	0.902
ALBARAKA	2019	2.421	11.411	36.605	0.794
ABC	2010	2.510	30.758	10.754	0.327
ABC	2011	2.202	33.414	11.834	0.216
ABC	2012	2.824	34.428	10.950	0.185
ABC	2013	2.651	35.353	12.906	0.414
ABC	2014	2.716	34.110	14.033	1.189
ABC	2015	1.963	27.213	19.784	0.668
ABC	2016	2.076	24.836	18.897	0.430
ABC	2017	1.905	20.070	21.156	0.386
ABC	2018	2.446	25.360	17.906	0.337
ABC	2019	1.835	26.203	12.990	0.279
Arab Bank	2010	3.975	39.456	7.175	0.924
Arab Bank	2011	3.162	30.802	7.201	0.797
Arab Bank	2012	5.099	31.741	51.276	1.126
Arab Bank	2013	4.973	28.046	42.675	2.280
Arab Bank	2014	4.341	32.145	16.257	0.377
Arab Bank	2015	3.716	23.800	18.432	0.642
Arab Bank	2016	3.852	31.409	18.898	0.043
Arab Bank	2017	2.414	23.374	33.120	0.626
Arab Bank	2018	2.303	21.674	16.244	0.701
Arab Bank	2019	2.853	23.794	19.006	0.273
GBA	2010	3.544	22.839	45.031	3.692
GBA	2011	3.446	19.141	27.946	3.394
GBA	2012	3.800	16.277	30.143	4.211
GBA	2013	3.623	14.493	33.660	1.275

GBA	2014	2.268	12.317	34.063	0.892
GBA	2015	2.045	13.727	27.819	0.439
GBA	2016	1.390	13.863	15.600	0.729
GBA	2017	1.416	11.658	23.922	0.663
GBA	2018	1.766	12.946	12.390	2.506
GBA	2019	2.341	14.440	15.095	2.717
NATIXIS	2010	5.532	55.461	40.163	2.114
NATIXIS	2011	1.810	22.010	25.595	3.144
NATIXIS	2012	2.916	19.740	27.854	2.012
NATIXIS	2013	2.034	17.077	22.258	1.899
NATIXIS	2014	2.202	14.001	24.883	1.066
NATIXIS	2015	0.889	15.880	27.859	3.337
NATIXIS	2016	0.727	15.426	43.507	3.535
NATIXIS	2017	0.739	14.167	30.447	1.965
NATIXIS	2018	1.915	16.120	15.574	2.964
NATIXIS	2019	1.560	15.361	39.869	3.811
SG	2010	2.163	13.809	16.774	2.245
SG	2011	2.612	14.578	21.123	2.747
SG	2012	2.553	13.393	26.133	3.327
SG	2013	1.806	12.456	31.590	3.618
SG	2014	2.111	12.600	35.515	3.066
SG	2015	1.775	14.816	22.328	2.820
SG	2016	1.883	14.084	28.875	2.543
SG	2017	1.488	12.967	29.779	3.278
SG	2018	2.181	13.873	28.163	2.528
SG	2019	1.427	13.768	32.392	5.810
BNP_P	2010	2.417	10.716	12.427	1.158
BNP_P	2011	2.866	12.023	15.608	1.132
BNP_P	2012	2.204	10.997	26.065	2.214
BNP_P	2013	1.636	12.010	16.951	2.209
BNP_P	2014	1.706	11.626	16.145	2.267
BNP_P	2015	1.474	11.131	20.880	2.041
BNP_P	2016	1.468	12.230	26.521	2.423
BNP_P	2017	0.899	12.419	26.087	3.420
BNP_P	2018	2.006	13.548	30.415	4.230
BNP_P	2019	1.793	13.537	33.295	4.288
TRUST	2010	3.125	48.647	13.930	9.330
TRUST	2011	6.584	41.889	18.994	1.990
TRUST	2012	3.101	49.092	22.910	2.312
TRUST	2013	3.435	44.591	13.552	1.953
TRUST	2014	3.602	41.665	12.574	1.216
TRUST	2015	3.532	40.383	14.099	0.438
TRUST	2016	2.049	40.361	10.118	0.973
TRUST	2017	1.812	31.346	8.949	0.809
TRUST	2018	2.183	26.409	9.746	0.899
TRUST	2019	2.717	27.674	8.913	1.745
FRANSABANK	2010	1.736	50.616	31.109	2.606
FRANSABANK	2011	3.471	63.587	27.053	3.331
FRANSABANK	2012	4.436	53.421	35.841	1.643
FRANSABANK	2013	2.817	49.971	41.827	2.617

FRANSABANK	2014	1.099	50.907	28.103	8.308
FRANSABANK	2015	1.539	45.821	33.221	2.384
FRANSABANK	2016	2.079	36.498	20.672	0.495
FRANSABANK	2017	1.943	29.298	33.214	0.537
FRANSABANK	2018	2.018	24.097	17.365	0.621
FRANSABANK	2019	2.683	26.914	21.306	0.706