INTERNAL DETERMINANTS OF PROFITABILITY IN PUBLIC ALGERIAN BANKS

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Abstract

This research attempts to identify the internal factors that determine public banks' profitability in Algeria, by investigating the effect of each one of them on profitability over the period 2011 – 2019, using the system-generalized method of moments. The findings indicate that the bank-specific determinants, with the exception of capitalization and leverage, are positively related to bank performance. These results have important implications for banks' survival and growth. It is expected that this study will guide the policy makers and bank management in the formulation and implementation of better policies and strategies which may lead to better performance of banks in Algeria.

Introduction

A healthy banking system plays a key role in resource allocation, economic growth, and financial performance. In addition, better financial performance contributes to increased investment, which is useful for shareholders and the economy as a whole (Ben Ahmed Daho, 2022). On the other hand, the creation of value by companies implies the mobilization of different resources. As such, resources are one of the components of the firm's productive mix (Benmansour, Bezzar, & Bensaoula, 2020).

Commercial banks, as one of the most important financial institutions, seek, in the first place, to maximize their profitability and manage their risks, like any other institution whose owners aim to maximize their wealth and increase the value of their shares, commercial banks achieve their objectives by maximizing revenues, or minimizing costs or both together, this being reflected in the achievement of good financial performance

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and the attainment of continuous growth rates in its performance indicators. According to Ben Slama, et al. (2018) the continuous concern for profitability leads banks to consider purely financial profitability as the main objective of the bank to the determinant of other performance indicators such as risk management.

To achieve their objectives, banks are confronted with many factors whose impact on their profitability varies, both external factors related to the environment and internal factors related to the banks themselves. In this context, it is crucial to raise the factors that explain the financial performance of Islamic banks. Indeed, there is abundant literature that theoretically and empirically studies the performance of conventional banks compared to studies on the performance of Islamic banks. The existing literature groups the determinants of bank financial performance into two types, namely internal factors, which are indicators specific to the banking activity, and external factors, which are sectorial, macroeconomic, and regulatory indicators (Oubdi, L , & Elouali, J, 2020).

The study of the impact of certain indicators on banking results has occupied for a long time an important place in the economic and financial literature. It is necessary to know those factors that influence the development of the banking sector. (Alihodžić, et al., 2020) a number of studies used internal and external factors for instance Batten & Vo (2019), Utomo & Anggono (2020), Abate & Mesfin (2019), Dang & Vong (2020), Adelopo, et al. (2018) but we believe that different groups of factors (internal and external) should be analyzed separately. Hence, the current study aims at investigating the impact of internal factors on performance of Algerian public banks. The research question is "what internal factors affect bank profitability, and how these factors influence bank profitability in Algeria?"

This paper uses the system-generalized method of moments GMM with two equations framework which ROA and ROE are separately used as the profitability indicators to test the effect of bank-specific determinants on bank profitability. We utilize data from the Algerian-banking sector over the period 2011 – 2019. Bank-specific determinants of profit involve capital ratio, bank loans, diversification and leverage.

The finding suggests that bank loans and diversification are significantly positively correlated with bank profitability; we also find that capital ratio and leverage are significantly negatively related with bank profits. The remainder of the paper is structured as follows. Section 2 reviews the most significant empirical studies on internal determinants of bank profitability. The data, variables and methodology are presented in the Section 3. Section 4 presents the results of our empirical analysis and section 5 concludes the paper and gives policy recommendations.

1. Review of the scientific literature

Several theoretical and empirical studies have focused on identifying the determinants of bank profitability. In this context, a battery of internal explanatory variables is proposed in the literature to explain the variability of certain aggregates of bank profitability:

- Capitalization

Capital remains the insurance available to monetary authorities to ensure a certain degree of stability for financial institutions. Empirical work by Berger (1995), Koehn & Santomero, (1980), Horobet, et al. (2021), Bennaceur & Goaied (2008), Pasiouras & Kosmidou(2007) and García-Herrero, et al. (2009) have shown a consensus around the positivity of the correlation between capitalization and profitability of the banks. This means that banks with higher capital ratios can ensure more banking stability. This finding is explained by the idea that prudential regulation increases the need for funds, which is likely to decrease risk. Thus, banks with high capital ratios could be considered relatively safer in the event of a loss or liquidation. This has a positive impact on the profitability of banks. In addition, banks with a high level of equity often benefit from a low refinancing rate in the markets as they give a positive signal about their solvency.

Ilanga Lembow (2019) applied the panel model on a sample of 8 Congolese banks between 2012 and 2017 to determine the profitability of commercial banks, this study indicates that capitalization is a factor that influences the profitability of commercial banks in the DRC, contrary to Djemaa & Bouguettaya, (2020) who found that the level of equity does not impact the results of these banks.

H1: The level of capitalization has a positive impact on bank profitability

- The level of diversification

Diversification is another variable that can explain bank profitability. Several empirical works have found a positive relationship between diversification and profitability (Alper & Anbar, 2011) justified by the idea that financial institutions that generate a higher proportion of revenues from non-traditional activities tend to report a higher level of profitability.

Similarly, on a sample of 82 banks listed between 2005 and 2013 using panel data Habba (2016) found a highly significant influence of the quality of the bank's loan book on bank profitability.

However, Goddard, Et Al. (2004), DeYoung & Rice (2004) and Stiroh & Rumble (2006) founds that some banks that diversified rapidly had troubles in maintaining profitability.

H2: Diversification has a positive impact on bank profitability

- Bank loans

There is almost unanimous agreement among economists on the positive impact of bank lending on profitability. Indeed, the strengthening of the credit policy increases bank profits. In other words, the more loans the bank grants, the more its income increases (Bennaceur & Goaied, 2008). Nevertheless, credit policy can sometimes hinder bank profitability when an expansionary credit policy is incompatible with the strategy pursued in terms of financial resources collection (Bashir, 2003).

Therefore, the strengthening of credit policy should be conducted in symbiosis with an efficient strategy for raising additional resources. Consequently, the control of the deposit policy should normally help the bank to increase its profits (Molyneux & Thornton, 1992).

Based on a sample of seven Moroccan banks observed over the period 2006-2018 Chayoua & Moussaten (2022) show the existence of a positive relationship between the profitability of Moroccan banks and the variable of bank loans. In the same context, Agoraki & Tsamis (2017) confirmed the positive relationship between the ratio of bank loans and profitability. On the other hand, Mela et al. (2022) found that bank credits have a positive but insignificant effect on bank profitability (Return on Assets).

> H3: The bank loans has a positive impact on bank profitability

- The leverage ratio

It is used to study the behavior of banks' capital about their profitability. Saeed, Gull, & Rasheed (2013) found a positive relationship between bank profitability and the level of debt, however Awunyo-Vitor & Badu (2012) found that a high level of debt leads to a decrease in bank profitability. In the same framework, the empirical analysis carried out by Bouchelghoum (2021) on a sample of panel data, composed of 14 banks, observed over the period 2010-2011, that the leverage effect, measured by the ratio between debts and equity, has a significant and negative impact on the profitability of domestic banks and not significant for foreign banks because each time the debts of the banks increase, their profitability decreases. This result can be explained by the negative effect of interest and commissions to be paid by customers, on the other hand the results of the study of Charles, et al. (2014) find the existence of a non-significant relationship between bank profitability and leverage.

> H4: Leverage ratio has a negative impact on bank profitability.

- Bank size

Vera-Gilces, et al. (2020) have considered size as an important factor that helps explain bank profitability. Smirlock (2020), Bikker & Haaf (2022) and Pasiouras & Kosmidou (2007) found that the size of the bank has a significant and positive impact on profitability because a larger bank could benefit from an economy of scale and thus reduce its costs. This implies higher profitability, which is not evident for smaller banks.

In the same context and using econometric models, Dongmo Tsobjio, et al. (2019) studied the profitability of commercial banks in Cameroon. The results of this study confirm that bank profitability (ROE) is positively influenced by the size of the bankThese results were questioned by Bennaceur & Goaied (2008), Stiroh & Rumble (2006), their results suggesting a significantly negative relationship; similarly the study of Rouabah (2006) finds that large size is not necessarily a source of cost savings.

On the other hand, Athanasoglou et al. (2006) find no significant relationship between size and bank profitability in their empirical study.

- Liquidity level

The liquidity ratio can be calculated as the ratio of liquid assets to total assets. Sufficient liquidity reduces liquidity risk and the risk of a financial crisis. It allows the bank to absorb any unexpected shocks (Wagner, 2007). In addition, when the bank holds liquid assets, its performance will improve (Goetz, 2017). Most studies in this area have focused on liquidity as a determinant of profitability. Little empirical studies have focused directly on the specific relationship between liquidity and bank profit. The results of these researches are mixed Bourke (1989), Lartey et al. (2013), Staikouras & Wood (2004) and Al Nimer et al.(2015) have confirmed the existence of a positive relationship between liquidity and profitability of banks. This was explained by the fact that banks holding more liquid assets enjoy a better perception in funding markets, reducing their funding costs and increasing profitability. We expect a negative effect on bank profitability. Similarly, Machrafi & Dembélé (2021) opted for an empirical study using panel data on the Ivorian context during the 2012-2018 period. The results obtained reveal a statistically significant relationship between bank profitability and the level of liquidity.

However Dongmo Tsobjio et al. (2019), Molyneux & Thornton (1992), Goddard et al. (2004), Bennaceur & Goaied (2008), Béjaoui & Bouzgarrou (2014) and Assienin & Ouattara (2020) have shown an inverse link between liquidity and bank profitability. According to these researchers, this result is expected since holding liquidity (especially that imposed by the authorities) represents a cost for the bank. Indeed, to hedge against liquidity shortages, banks are obliged to hold liquid assets on a routine basis. However, these liquid assets are always associated with low rates of return. Therefore, high liquidity is associated with low profitability. On the other hand, the study developed by Tumin & Mohd-Said (2011) on commercial banks in China and Malaysia during the period 2001-2007 shows that there is no relationship between the level of liquidity of banks and their profitability.

Similarly, Alper & Anbar (2011) examined the specific and macroeconomic determinants of profitability of 10 Turkish banks during the period 2002-2010 using panel data. The results show that liquidity measured by the ratio of liquid assets to total assets does not affect bank profitability.

2. **Research methodology**

- Sample and data sources

The data were retrieved from the Annual Reports and official websites of the sampled banks used in the study. We relied on the balance sheets, income statements and financial ratios of 6 public banks in Algeria for the period 2011-2019. The study sample included all public banks in Algeria, respectively:

- External Bank of Algeria BEA;

- National Bank of Algeria BNA ;

- Agriculture and Rural Development Bank BADR;

- Algerian Popular Credit CPA;

- Local Development Bank BDL;

- National Fund for Saving and Reserve CNEP.

These banks dominate the banking sector in Algeria more than 70 % of the market share, and the public banks in this study represent more than 90 % of total assets of banks in Algeria.

- **Research model.**

The researcher used the following two equations to examine the banks' profitability determinants, as follows:

The 1st equation examines the determinants of the banks' profitability by using ROA as a measure of banks' profitability.

The 2nd equation examines the determinants of the banks' profitability by using ROE as a measure of banks' profitability.

$$ROA_{it} = \beta_0 + \beta_1 CAP_{it} + \beta_2 DIV_{it} + \beta_3 CB_{it} + \beta_4 LEV_{it} + \beta_5 TB_{it} + \beta_5 LB_{it} + \varepsilon_{it} \quad (1)$$

$$ROE_{it} = \beta_0 + \beta_1 CAP_{it} + \beta_2 DIV_{it} + \beta_3 CB_{it} + \beta_4 LEV_{it} + \beta_5 TB_{it} + \beta_5 LB_{it} + \varepsilon_{it} \quad (2)$$

Where:

ROA -Return on Assets;

ROE - Return on Equity;

CAP - the capitalization;

DIV - the diversification;

CB- the bank loans;

LEV- the Leverage

TB - the size of the bank;

LB- the bank liquidity.

$\beta_0 \rightarrow \beta_5$: - parameters to be estimated;

ε_{it}: -Error term.

- **Research variables**

– Dependent variables

Return on Equity (ROE): It allows the evaluation of the return on funds invested by shareholders in the bank, the ratio of net profits to total equity (Daoud & Kammoun, 2017) . It informs the shareholders of the bank of the returns on their investments (Briki, 2017).

It is defined as the possibility of a company to remunerate, from its operation and adequately and permanently the equity, while ensuring its financial stability (Alami et al., 2021).

Return on Assets (ROA): it indicates how well the assets are managed to generate profits (Benslimane & Bensahla Tani, 2017). A quantitative variable is explained by the rate of net income of total assets (Mamoghli & Dhouibi, 2009).

    –   Independent variables

Capitalization: This is the measure of the bank's risk, since the lower this ratio is, the less resources the bank has in case of loss of value of assets, it is measured by the equity capital compared to total assets (Elmorchid & Baali, 2020).

Diversification: This ratio is measured by the ratio of non-interest income (commissions and portfolio income) to total assets. Banks generate considerable gains from non-traditional activities (other than deposit-taking and lending). Diversification allows the bank to offer a wider range of products and improve its services, which helps it to attract more customers and generate more profits (Moruff & Udosen, 2019).

Financial leverage: is a factor that can affect bank profitability, it is measured by the ratio of Total debts to equity (Bouchelghoum, 2021).

Bank loans: loans are the most important and obvious source of credit risk. However, for most banks, constitute the main income of banks (Benilles, 2018).

    –   Controle variables

Liquidity: is a ratio that aims to measure a company's ability to meet its short-term obligations, it is measured by the ratio of loans to deposits (Reschiwati et al., 2020).

Size: The size of the bank is another important factor that helps to explain the financial performance of banks. Indeed, large banks can benefit economies of scale allowing them to produce services at lower cost, offer a diversified portfolio of products and services and have the means necessary for effective risk management. (Oubdi, L, & Elouali, J, 2020)

Table no. 1. Research variables definition

Variables	Symbol used	Way of measuring	Source
Dependent variables			
Return on Assets	ROA	Net Profit divided by total Assets	official banks websites

Return on Equity	ROE	Net income divided by total equity	official banks websites
Independent variables			
Capital ratio	CAP	Total equity over total assets	Annual Reports
diversification	DIV	ratio between other income to operating income	Annual Reports
Bank loans	CB	ratio between total loans to total assets	Annual Reports
Leverage ratio	LEV	Total debt/ Total Equity	Annual Reports
Control variables			
Bank size	TB	TB= {ln(Total Bank Assets)}	Annual Reports
Bank liquidity	LB	Total Loans/ Total Deposit	Annual Reports

Source: Own elaboration

- **Multivariate analysis**

Before starting the analyses, the researcher applies some preliminary tests to test out the validity and the credibility of the data, the used tests are illustrated as follows:

− Verification of the absence of multi-colinearity problems between the explanatory variables: Correlation matrix and the VIF test.

Table (1) presents the correlation matrix between the dependent variables and the independent variables taken two by two. The purpose of this matrix is to check the absence of a multi-collinearity problem between the variables introduced in model 1 and 2.

The multi-collinearity problem can be declared when the bi-variate correlation coefficients between the independent variables exceed 0.8 (Gujarati & Porter, 2009)

Table no. 2. Linear correlation test between the different variables (model 1)

Corrélation	ROA	TB	LB	CB	DIV	LEV	CAP
ROA	1.000						

TB	- 0.0866	1.000					
	0.5334	---					

LB	0.4447	0.1378	1.000				
	0.0008	0.3205	---				
CB	-0.2934	0.9108	-0.1721	1.000			
	0.0313	0.0000	0.2134	---			
DIV	0.1678	-0.0401	0.3181	-0.1330	1.000		
	0.2253	0.7736	0.0191	0.3377	---		
LEV	-0.4397	-0.0252	-0.5746	0.1695	-0.2486	1.000	
	0.0009	0.8562	0.0000	0.2204	0.0699	---	
CAP	0.2642	-0.9323	-0.0227	-0.8980	0.1628	-0.1418	1.000
	0.0535	0.0000	0.8707	0.0000	0.2394	0.3063	---

Source: Own elaboration, based on STATA V.15 output

Table no. 3. Linear correlation test between the different variables (model 2)

Corrélation	ROE	TB	LB	CB	DIV	LEV	CAP
ROE	1.000						

TB	-0.1891	1.000					
	0.1708	---					
LB	0.3310	0.1378	1.000				
	0.0145	0.3205	---				
CB	-0.3541	0.9108	-0.1721	1.000			
	0.0086	0.0000	0.2134	---			
DIV	0.0545	-0.0401	0.3181	-0.1330	1.000		
	0.6956	0.7736	0.0191	0.3377	---		
LEV	-0.2796	-0.0252	-0.5746	0.1695	-0.2486	1.000	
	0.0406	0.8562	0.0000	0.2204	0.0699	---	
CAP	0.3084	-0.9323	-0.0227	-0.8980	0.1628	-0.1418	1.000
	0.0233	0.0000	0.8707	0.0000	0.2394	0.3063	---

Source: Own elaboration, based on STATA V.15 output

In these results, the probability values for the correlation between return on assets and the other variables are all above the 5% significance level, except for the probability values for the correlation between diversification and return on assets and between bank size and return on assets and between capitalization and all other variables are all below the 5% significance level indicating that it is not possible to state that there is a significant relationship between the variables.

For multi-variate multi-colinearity, we use the tolerance index and variance inflation factors. The VIF values, presented in Table below, are far from the critical zone. All the variance inflation factors (VIF) are below 18.62, a value below 10, which corresponds to the limit drawn by (Myers, 1990). This leads us to conclude that there is no multi-collinearity problem.

Table no. 4. VIF Test

	TB	CB	CAP	LB	LEV	DIV
VIF	18.62	12.89	10.71	2.69	1.74	1.22

Source: Own elaboration, based on STATA V.15 output

Another way of capturing individual effects, which is equivalent to adding dichotomous variables, is to use a within estimator, which is easily implemented in STATA. This estimator measures the variation of each observation for the individual's mean. Indeed, we will check the following hypotheses:

$$
\begin{cases}
\text{H0:} & \text{no fixed effect} \\
\text{H1:} & \text{presence of fixed effect}
\end{cases}
$$

Table no. 5. Summary table of the fixed effect test (model 1)

Fixed effect statistics = 3.9519858
The Fisher probability of the fixed effect test is: 0.0808882

Source: Own elaboration, based on STATA V.15 output

Table no. 6. Summary table of the fixed effect test (model 2)

Fixed effect statistics = 4.0415457
The Fisher probability of the fixed effect test is: 0.0719835

Source: Own elaboration, based on STATA V.15 output

The Fisher probability of the fixed effect test is zero. Therefore, the null hypothesis of no fixed effect is rejected. Hence, the model has a fixed effect (see Appendix for more details).

– The random effect test

More specifically, we are trying to test:

H0:   no random effect

H1:   presence of random effect

Indeed, concerning table (6), the probability is lower than 5%. Therefore, the null hypothesis in favor of the presence of a random effect in the model is rejected.

Table no. 7. Summary table of the random effect test (model 1)

chibar2(01) =   1.000
Prob > chibar2 =   0.000

Source: Own elaboration, based on STATA V.15 output

Table no. 8. Summary table of the random effect test of (model 2)

chibar2(01) =   1.000
Prob > chibar2 =   0.000

Source: Own elaboration, based on STATA V.15 output

– The Hausman test

In the two previous tests, we have shown that our model has a double effect: fixed and random. Therefore, it is essential to decide between the two using the Hausman test. In this test, we propose the following two hypotheses:

H0:   presence of random effect

H1:   presence of fixed effect

Table no. 9. Summary table of the Hausman Test (model 1)

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B) =   15.22
Prob > chi2 =   0.0095

Source: Own elaboration, based on STATA V.15 output

Table no. 10. Summary table of the Hausman test (model 2)

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B) =   13.56
Prob > chi2 =   0.0187

Source: Own elaboration, based on STATA V.15 output

In fact, according to this table, the probability is lower than 5%. So, we reject H0. Hence, the model has a fixed effect.

－ Heteroscedasticity test

The Breusch Pagan test was introduced by Trevor Breusch and Adrian Pagan in 1979. It is used to test for heteroscedasticity in a linear regression model. It tests whether the error variance of a regression depends on the values of an independent variable. If the Breusch-Pagan test shows that there is conditional heteroscedasticity, one can either use weighted least squares (if the source of the heteroscedasticity is known) or use standard errors consistent with the heteroscedasticity. Indeed, we will test the following hypotheses:

H0:   no heteroscedasticity problem

H1:   presence heteroscedasticity problem

The results of the Breusch-Pagan or modified Wald tests indicate a null probability. Therefore, we reject the null hypothesis of homoscedasticity. This affirms the presence of a strong inter-individual heteroscedasticity between the different banks of the model.

Table no. 11. Results of the heteroskedasticity test

F test that all u_i=0 F (14, 311) = 5.42 0.0000		Prob > F =
chi2 (15) = 24678.33	Prob>chi2 =	0.0000

Source: Own elaboration, based on STATA V.15 output

－ Autocorrelation test

We preferred to use the Breusch-Godefroy LM-Test. The latter allows us to test for an autocorrelation greater than 1 and is valid in the presence of lagged dependent variables as explanatory variables. If the probability associated with the F-LM statistic is greater than 0.05, this means that there is no autocorrelation. Thus, we propose to test the following hypotheses:

H0:   absence of the autocorrelation problem

H1:   presence of the autocorrelation problem

Table no. 12. Result of the autocorrelation test (model 1)

F test that all u_i=0: F(4, 509) =	**4.02**	**Prob > F = 0.0045**
chi2(105) = 32.432		**Prob = 0.0056**

Source: Own elaboration, based on STATA V.15 output

Table no. 13. Result of the autocorrelation test (model 2)

F test that all u_i=0: F(4, 509) =	**3.41**	**Prob > F = 0.0113**
chi2(105) = 26.497		**Prob = 0.0331**

Source: Own elaboration, based on STATA V.15 output

The Breusch-Godefroy test result indicates probabilities of less than 5%. Therefore, we reject the null hypothesis of no serial autocorrelation in the estimated model. This asserts the presence of the serial autocorrelation problem.

To properly study the effect of the size of the bank, capitalization, diversification, bank liquidity, bank credit, and leverage in the profitability of banks, it is necessary to test the validity of our model.

The results of the simple regression of model 1 and model 2 (table 10 and 11) present the following indication, the Fisher statistic (F) measures the overall significance of the model which is equal to (2.46 and 8.94) confirming the good quality of the model and also we have the probability of the Fisher statistic is at 5% which leads us to reject the null hypothesis of the overall insignificance of the models, therefore, our models are globally significant.

Table no. 14. Overall quality (model 1)

Statistique F	**P**
2.46	**0.000**

Source: Own elaboration, based on STATA V.15 output

Table no. 15. Overall quality (model 2)

Statistique F	**P**
8.94	**0.000**

Source: Own elaboration, based on STATA V.15 output

3. Results and discussions

Testing the research hypotheses: analysis of the effect of the size of the bank, capitalization, diversification, bank liquidity, bank credit, and leverage on the profitability of banks.

In our study, we developed six hypotheses regarding the relationship between the size of the bank, capitalization, diversification, bank liquidity, bank credit, and leverage in the profitability of banks.

Following the estimation of our model, we will, interpret the results found at this stage. The objective is to confirm or reject the different hypotheses already developed to find an answer to our research problem.

Table no. 16. Result (model 1)

Return on asset	Coefficients	Probabilities
Size	-4.59e-08 ***	0.000
Capitalisation	-1.06e-09***	0.001
Diversification	1.42e-09***	0.005
Bank liquidity	6.88e-08***	0.000
Bank loans	3.57e-08***	0.000
Leverage	-8.97e-10***	0.001
Constante	4.48e-07***	0.000

Source: Own elaboration, based on STATA V.15 output

*** Significant at 1%,** significant at 5%,* significant at 10%

Table no. 17. Result (model 2)

Return on equity	Coefficients	probabilities
Size	-8.39e-08***	0.000
Capitalisation	-1.74e-09***	0.000
Diversification	2.19e-09**	0.016

Bank liquidity	-1.55e-09***	0.000
Bank loans	7.45e-08***	0.000
Leverage	-1.55e-09***	0.002
Constante	7.92e-07***	0.000

Source: Own elaboration, based on STATA V.15 output

*** Significant at 1%,** significant at 5%,* significant at 10%

The profitability of Algerian banks is negatively correlated with the **size** of the sector banking, a 1% increase in size (assets) leads to a decrease in bank profits (ROE and ROA decrease by -8.39e-08% and -4.59e-08%), which confirms our hypothesis. The increase in the size of the banking sector results in competition and a search for efficiency sizes, which affects negatively the profitability of banks. This result contrasts with economic theory, which suggests a positive relationship between the size of the banking sector and the profitability of banks. However, many empirical studies came to the same result. This outcome also stands in line with the result of Elsiefy (2013), Eltabakh, et al. (2014), Trad, et al. (2017) in contrary with Tai & Lie (2014) and Miah & Sharmeen (2015) who prove that bank size has a positive impact on the profitability.

Capital ratio has a negative and significant effect at the 1% threshold, thus invalidating our hypothesis mentioned above. Thus, if the capitalization of banks increases by 1%, then we can notice a decrease in the financial profitability of banks (ROA and ROE decrease by -1.06e-09 and -1.74e-09 respectively). This estimation result contradicts the findings of Zawadi (2014), Demirgüç-Kunt & Huizinga (1999) and Gyamerah & Amoah (2015) who found a significant positive relationship between capital ratio and bank profits. It however agrees with the findings of Nagaraju & Boateng (2018), this relationship can be traced back to the nature (public) of the banks under study .The latter has a great confidence of depositors, where the depositor is not afraid of bankruptcy, because the public treasury of the state to compensate potential losses.

Regarding the diversification of the bank's activity, it has a positive and significant effect. Indeed, if it increases by 1%, it introduces a positive variation in financial profitability of 1.42e-09 and 2.19e-09% (Models 1 and 2) . This result is consistent with the conclusions of the study conducted by Chiorazzo, et al. (2008) that the more the banks diversify their activities, the more they are profitable.

Our empirical results demonstrated a significant negative effect of **liquidity level** on the financial profitability of banks (ROE), a 1% increase in leverage leads to a -1.55e-09% decrease in return on equity. This finding is consistent with our prediction and agrees with that of Molyneux & Thornton (1992), Goddard, et al. (2004), Mansouri & Afroukh (2009) and Bahyaoui (2017). This means that high liquidity represents a loss of earnings for the bank and, consequently, would negatively effect its performance, while a significant

positive impact is found between liquidity level and bank profits measured by (ROA), where a 1% increase in leverage leads to a 6.88e-08% increase in return on assets which is identical with the results of Ongore & Kusa (2013), Nkegbe & Ustarz (2015) because they found that liquidity significantly and positively impacts performance. The latter justify this result by the fact that sufficient liquidity helps banks to minimize the effects of liquidity risk and financial crises by absorbing any unexpected shock.

Our results corroborate our predictions and show the existence of a positive relationship between the profitability of Algerian banks and **bank loans**. A 1% increase in leverage leads to a 3.57e-08% increase in return on assets and a 7.45e-08% increase in return on equity. This result was also found in the studies of Pasiouras & Kosmidou (2007). The positive sign found indicates that the volume of loans granted is favorable to the profitability of banks in the short and medium term. However, these loans are sources of credit risk, so banks must maximize their rates of return by keeping exposure to this risk within acceptable parameters.

Leverage has a negative and significant effect on banks profitability. A 1% increase in leverage leads to a decrease in return on assets of -8.97e-10 and -1.55e-09% return on equity. The finding agrees with that of Benilles (2018), indicating that the higher the bank's debts relative to its equity, the more the profitability decreases because the debts have a certain cost, which influences the profitability.

- Summary table of results

The following table summarizes all the empirical results that we were able to identify following the analysis of our model using the multi-variate regression method.

Table no. 18. Summary of results

Hypothesis	The variables	Expected sign	The results of the regression (ROA)	The results of the regression (ROE)
H1	Capitalisation	(+) S	Rejected	Rejected
H2	Diversification	(+) S	Confirmed	confirmed
H3	Leverage	(-) S	Confirmed	Confirmed
H4	Bank loans	(+) S	Confirmed	Confirmed

Source: Own elaboration

Conclusions

The research objective is to empirically investigate the factors that determine the banks' profitability in Algeria from 2011 to 2019 (to avoid biased result of the 2008 financial crisis) using systemGMM, considering the internal variables (capital ratio, diversification, bank loans and leverage) .The researcher reviewed a number of theoretical and previous empirical studies related to the determinants of banks' profitability. In general, research on these relationships is far from being unanimous. Empirical results are mixed. Some studies confirm the positive association, while others validate the negative relationship. However, some studies find no significant link between a few determinants and bank profitability. The results obtained are consistent with the assumptions made and the literature regarding the effect of diversification, leverage and bank loans on bank performance. On the other hand, the effects of capitalization is specific to Algerian banks. Our findings have some international side. Primarily, these outcomes would be to help states bankers and bank managers to better understand the different determinants of bank profitability. Our results can also help better examine the effect of each factor on banks' profit. This study has certainly allowed obtaining satisfactory results for finance and particularly for the Algerian banking system, but it has limits in terms of the explanatory factors of performance. Indeed, we were unable to integrate certain variables (credit quality) found in the literature as being significant for performance because we had trouble getting the data. Thus, other works would be welcome to integrate more variables considered relevant by the literature. In addition, Algeria evolving in an economic and monetary union, it would be interesting to conduct such a study on all the banks in Algeria and over a much longer period.

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