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# Analysis of the Capital Structure of Banks with Islamic Branches in Algeria. The Case Study of Gulf Bank Algeria (AGB)

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## Abstract

**Aim:** This study aims to analyze the impact of Islamic banking services on the capital structure of Gulf Bank Algeria (AGB), the first traditional bank in Algeria to offer Islamic financial products since 2008.

**Methodology:** A multiple linear regression model is applied to examine the relationship between Islamic banking windows and key capital structure ratios, including debt-to-equity (DTE) and equity-to-total--assets (ETA). Additionally, the study assesses the influence of profitability metrics (ROA, ROE) and credit risk (CR) on these ratios.

**Findings:** The findings indicate that Islamic windows have a positive impact on the DTE and ETA ratios of AGB. However, no significant relationship is found between profitability indicators (ROA, ROE) or credit risk (CR) and the bank's capital structure.

**Implications:** The study suggests that Islamic financial products can enhance financial inclusion in Algeria while maintaining manageable risk levels. For instance, *murabaha* can facilitate credit access for lower--income households, while *mudaraba* can support SME financing. Further diversification of Islamic financial products is recommended to align with international best practices.

**Originality/value:** This research provides a unique insight into the capital structure of an Algerian bank offering Islamic banking services. Given the limited availability of data in this field, the study contributes valuable empirical evidence to the discourse on Islamic finance and its role in financial inclusion.

**Keywords:** Islamic windows, capital structure, return, risk, Gulf Bank Algeria

## 1. Introduction

In recent years, Algeria has witnessed the creation of numerous Islamic windows within traditional banks. It is essential to note that public banks lagged behind and were absent during the initial launch of Islamic products and services. Private banks, particularly Gulf Bank Algeria (AGB), were the first to take the initiative and position themselves as leaders in this field. Consequently, this experience is not new, and these banks have adopted a range of Islamic products and services that they offered to the public before the introduction of Law No. 20-02 of 15 March 2020, which governs participatory finance operations and regulates Islamic banking activities in Algeria.

The Islamic Financial Services Board (IFSB) defines Islamic window operations using the term 'window.' According to this definition, Islamic window operations are part of the activities of a traditional financial institution, whether it is a branch or a specific unit within that institution. However, these windows are not separate legal entities as they offer both financial management and investment services that comply with Sharia principles. It is also possible for these windows to operate independently in terms of Islamic financial intermediation. In this case, the funds managed by these windows would be invested in Sharia-compliant assets, and the assets would be properly "segregated with distinct accounting for profits and losses" between the Islamic window and the parent institution (IFSB, 2015, p. 61).

According to Algerian legislation, an Islamic bank window is a structure within a bank or financial institution that is exclusively dedicated to Islamic banking services and products. To comply with regulations, this window must be financially independent from other structures of the bank or financial institution. A complete separation must be established between the accounting of the Islamic bank window and that of other structures, thus allowing the preparation of financial data exclusively related to the activities of the Islamic window. Additionally, the accounts of the clients of the Islamic bank window must be independent of other client accounts (Regulation N° 2020-02).

With the adoption of Islamic windows within traditional banks, it is necessary to separate the capital, uses of the windows, and their accounts distinctly from the parent institution's funds. In this context, the following issue emerges: How does the financing offered by the Islamic windows impact the capital structure of Gulf Bank Algeria (AGB)?

This study investigated the impact of Islamic windows on the capital structure of Gulf Bank Algeria, specifically focusing on the bank's reliance on debt versus equity. Additionally, it addressed broader motivations such as contributing to the development of Islamic finance both locally and globally, and examining how these windows align with regulatory requirements.

## 2. Literature Review

Many previous studies examined various aspects of this research, particularly those concerning Islamic windows, as well as other studies related to capital structure, profitability, and risk in banks. However, studies that encompass all these variables are rare, therefore the authors selected the most important ones.

The study by Ramu and Satyanarayana (2019) "Financial Performance Analysis of HDFC Using DuPont Analysis," highlighted the role of housing finance companies (HFC) in the mortgage loan sector in India. These specialist companies were established for housing finance, among which HDFC, the first and largest private sector housing finance company in India, was founded in 1977. This study attempted to analyse the financial performance of HDFC over the period from 2009 to 2018 using DuPont analysis, a financial method that divides the return on equity model into three components: Net Profit Margin (NPM), Total Assets (TOA), and Equity Multiplier (EM). Additionally, to evaluate performance, the compound annual growth rate, coefficient of variation, and correlation between return on equity (ROE), net profit margin (NPM), total assets (TOA), and equity multiplier (EM) were calculated. The results showed that HDFC's financial performance was relatively stable with minimal fluctuations in return on equity. The net profit margin significantly increased over the ten years, while total assets decreased, as did the equity multiplier between 2008-2009 and 2017-2018. It was also found that HDFC had less financial leverage in recent years, meaning it relied less on debt to finance its assets.

A study by Toumi (2011) examined the differences between conventional and Islamic banks in terms of capital structure, profitability, and risk. To do so, it used standard models such as binary logistic regression, panel data, and discriminant analysis. The sample included 113 banks, of which 44 were Islamic banks and 69 were conventional banks, over the period 2010-2015. The findings revealed disparities between the two types of banks regarding capital structure (measured by the equity ratio) as well as profitability (expressed by return on equity ratios and net interest margin). The study also looked into transferable business risk, finally proposing an internal model to measure it.

A study by Kyriazopoulos and Hadjimanolis (2011), "Dupont analysis of a bank merger and acquisition between Laiki Bank from Cyprus and Marfin Investment Group from Greece: Is there an increase in profitability of the new bank?," assessed the impact of the merger between Laiki Bank from Cyprus and Marfin Investment Group from Greece on the profitability of the new banking entity formed after the merger. The researchers studied the financial data of the two banks over a four-year period before the merger and four years after it, and measured return on equity (ROE) and return on assets (ROA) ratios and applied DuPont analysis, graphically illustrated to highlight periodic changes. The results showed significant development in the performance of the new Marfin Laiki Bank from the first year following the merger, with continued growth in rates year by year.

Despite these contributions, gaps remain in addressing the combined impact of profitability, risk, and Islamic financing on a bank's capital structure. The authors of this study sought to bridge these gaps by offering a focused analysis on Gulf Bank Algeria.

## 3. Methodology

### 3.1. The Evolution of Islamic Financing Volume at AGB Bank Algeria

Gulf Bank Algeria (AGB) was the first traditional banking institution to introduce Islamic services and products in Algeria, starting in 2008 through its Islamic window located at its branch in Algiers. Over the years, their product offer gradually expanded to its other branches across the country. Table 1 presents the evolution of the volume of Islamic financing relative to the total financing volume of the bank from 2008 to 2020.

Table 1. Evolution of the volume of Islamic financing at AGB Bank Algeria

| Year | Bank size (in million Algerian dinars) | Total financing size | Islamic financing size | Percentage (%) |
|---|---|---|---|---|
| 2008 | 27,500 | 17,849 | 3,213 | 18.01 |
| 2009 | 46,214 | 22,745 | 5,459 | 24.01 |
| 2010 | 57,309 | 26,425 | 5,603 | 21.20 |
| 2011 | 75,195 | 44,628 | 5,181 | 11.60 |
| 2012 | 105,239 | 64,968 | 8,344 | 12.85 |
| 2013 | 138,962 | 81,241 | 14,901 | 18.34 |
| 2014 | 176,819 | 101,163 | 17,897 | 17.69 |
| 2015 | 177,377 | 104,834 | 23,604 | 22.51 |
| 2016 | 189,382 | 117,872 | 24,680 | 20.93 |
| 2017 | 256,860 | 153,826 | 30,766 | 20.00 |
| 2018 | 263,015 | 169,329 | 38,946 | 23.00 |
| 2019 | 257,068 | 153,664 | 44,563 | 29.00 |
| 2020 | 270,119 | 169,136 | 40,000 | 23.64 |
| Total | 1,946,349 | 1,227,680 | 263,157 | 21.43 |

Source: Financial reports of Gulf Bank Algeria from 2008 to 2020.

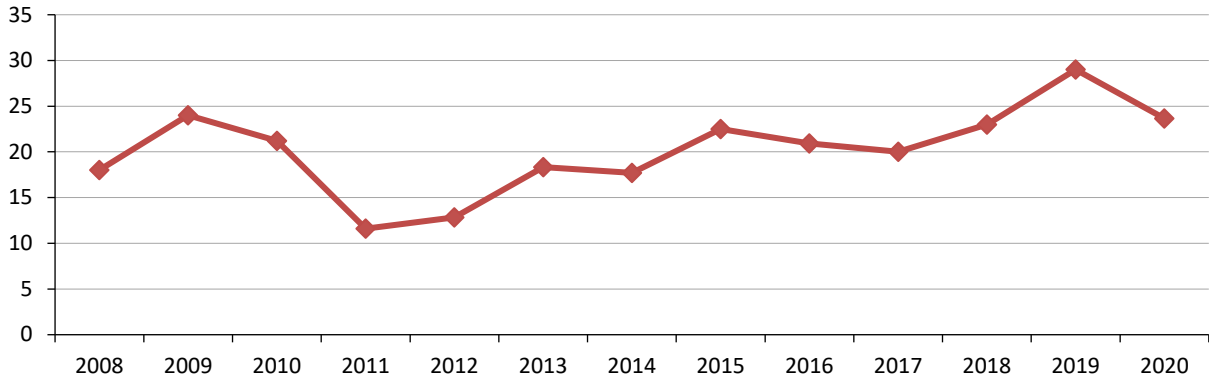



Fig. 1. Evolution (%) of Islamic financing relative to total financing at AGB Bank Algeria (2008-2020)

Source: Financial reports of Gulf Bank Algeria from 2008 to 2020.

Figure 1 shows that the total financing volume of AGB Bank Algeria experienced continuous growth over the years, and increased from 17,894 million Algerian dinars in 2008 to a peak of 169,329 million Algerian dinars in 2018. However, a decline was recorded in 2019, bringing the volume to 169,136 million Algerian dinars in 2020, a decrease of 9.25%. Meanwhile, the volume of Islamic financing at AGB Bank Algeria increased steadily, from 3,213 million Algerian dinars in 2008 to a peak of 44,563 million Algerian dinars in 2019. In 2020, this volume slightly decreased by 10.23%, probably due to the impact of the COVID-19 crisis.

It is also interesting to note that the percentage of Islamic financing relative to total financing varied during the study period. However, the average percentage over the period (2008-2020) was 21.43%. This suggests that the adoption of Islamic finance products and services has had a significant impact on the overall performance of AGB Bank Algeria.

## 3.2. Application of the Multiple Regression Model to Analyse the Capital Structure of Gulf Bank Algeria (AGB)

A quantitative approach using multiple regression analysis was adopted to explore the relation between Islamic financing and the capital structure of Gulf Bank Algeria (AGB). Data spanning from 2008 to 2020 provides a longitudinal perspective, offering insights into the evolution of Islamic finance

within the bank's operations. Dependent variables include the debt-to-equity (DTE) and equity-to--total-assets (ETA) ratios, while independent variables encompass Islamic financing volume, return on assets (ROA), return on equity (ROE), credit risk (CR), and solvency. Logarithmic transformations were applied to address non-normal distributions.

While the methodology is robust, future research could incorporate additional variables, such as market conditions and customer behaviour, to enhance the model's predictive accuracy. Further elaboration on data preprocessing steps and statistical assumptions would also strengthen the transparency and replicability of the study.

Table 2 presents the main ratios for analysing capital structure, profitability, and risk for Gulf Bank Algeria (AGB) from 2008, the year the bank began offering Islamic banking services and products, until the end of 2020. This information was based on the latest available data in the bank's annual reports and on the online portal of the National Center of Commerce Register (CNRC). Using a multiple linear regression model, the authors examined the impact of the independent variables on the dependent variable.

Table 2. Presenting the key ratios for analysing capital structure, profitability, and risk of Gulf Bank Algeria for the period (2008-2020)

| Year | Capital structure (DTE) | Capital structure (ETA) | Profitability (ROA) | Profitability (ROE) | Risk (CR) | Risk (LR) | Solvency |
|---|---|---|---|---|---|---|---|
| 2008 | 3.3 | 16.2 | 3.9 | 24 | 4.2 | 133.88 | 25 |
| 2009 | 2.4 | 18 | 3.1 | 27 | 5.2 | 91.59 | 37 |
| 2010 | 3.5 | 19 | 3.6 | 18 | 2.7 | 69.43 | 32 |
| 2011 | 4.1 | 16 | 3.4 | 22 | 4.3 | 89.27 | 26 |
| 2012 | 4.2 | 12 | 3.8 | 30 | 3.2 | 85.59 | 20 |
| 2013 | 5.9 | 11 | 3.6 | 33 | 2.5 | 77.78 | 19 |
| 2014 | 7.6 | 10 | 2.6 | 22 | 2.5 | 74.48 | 17.6 |
| 2015 | 6.6 | 11.7 | 2.2 | 17.2 | 2.6 | 76.36 | 19.8 |
| 2016 | 6.2 | 11.5 | 1.5 | 11.1 | 2.5 | 79.73 | 20 |
| 2017 | 7.8 | 10.2 | 1.4 | 12.1 | 2.8 | 73.07 | 17.1 |
| 2018 | 6.9 | 10 | 1.8 | 18 | 3.6 | 80.84 | 17.7 |
| 2019 | 6.5 | 11.7 | 2.3 | 19.9 | 4.4 | 77.4 | 19.6 |
| 2020 | 6.9 | 11.5 | 1.7 | 12.9 | 6.3 | 77.89 | 18.4 |
| Average | 5.53 | 12.98 | 2.68 | 20.55 | 3.6 | 85.25 | 22.24 |

Source: Financial Reports of Gulf Bank Algeria from 2008 to 2020.

## Dependent Variables

**Capital Structure:** As mentioned in various previous studies on the determinants of the capital structure of banks, several measures were used based on three elements: debts, equity, and total assets. Therefore, the following two measures were applied:

- **The Debt to Equity Ratio (DTE)** is an essential measure of the financial leverage used by financial institutions to finance their activities outside of their own funds. The higher this ratio, the more banks borrow capital to lend to their clients. However, a high level of debt financing results in higher interest payments and exposes creditors and investors to increased risk. The ratio is calculated by dividing the total amount of debt by the amount of equity. For example, a debt to equity ratio of 2.5 means that the debts are 2.5 times higher than the institution's equity. (OECD, 2014, p. 110).

*Debt to Equity Ratio (DTE) = Total Liabilities / Total Equity*

- **The Equity to Total Assets Ratio (ETA)** is an indicator that reflects the shareholders' contribution to financing the bank's various investment activities. It also helps to assess the share that ordinary shareholders would hold relative to the total assets in case of the bank's liquidation.

*Equity to Total Assets Ratio (ETA) = Total Equity / Total Assets*

## Independent Variables

**Total Islamic Financing:** This represents the overall value of financing offered to clients through various forms of Islamic financing, such as *mudarabah*, *salam*, and leasing, adopted by the bank. This variable may influence the capital structure in terms of debt and equity. Data related to this variable were extracted from the bank's annual reports.

**Profitability:** Numerous studies have explored the relationship between profitability and capital structure, yielding varied results. However, the majority has identified a statistically significant inverse correlation between these two variables. The relation between profitability and financial leverage is central to capital structure theories. Profitability serves as a key source of funding for banks, allowing them to retain profits rather than distribute them and thereby reduce their need for external debt financing. The following two measures were applied:

- **Return on Assets (ROA):** ROA is a widely used criterion for evaluating bank profitability. It measures the return on the company's investments in a way that is easily comparable to other institutions. Specifically, ROA is the ratio of net income to total assets during a given period. This ratio assesses the bank's efficiency in managing its assets to generate profits. Investors often favour banks with a high ROA, as it indicates effective asset utilisation for generating returns (Puspitasari et al., 2021, p. 728).

*ROA = net income / Total assets*

- **Return on Equity (ROE):** ROE is a crucial indicator for evaluating a bank's profitability. It measures the contribution of shareholders in terms of invested capital relative to the bank's total assets. However, interpreting ROE requires caution. Sometimes an increase in this ratio may reflect insufficient equity rather than satisfactory profitability. Additionally, the net income used in this calculation depends heavily on the bank's estimation policies and may not always represent an accurate picture of actual profits.

*ROE= Net Income / Total Equity*

**Risks:** When a bank faces an increase in risk levels, it becomes less attractive to external investors (creditors). Consequently, accessing debt financing becomes more challenging for the bank. Paradoxically, a positive impact of risk degree on capital is expected. In this research, it was assumed that higher-risk assets of a bank lead to increased equity. Two measures were used for risk:

***Credit Risk =*** *provisions for loan losses / total loans granted*

***Solvency Ratio*** *= equity capital / total loans.*

## Formulation of Research Models

As is well-known in regression analysis, variables should follow a normal distribution to achieve optimal results. However, numerical variables, especially financial data, often exhibit non-normal (Gaussian) distributions due to outliers and other factors (Tamil Selven, 2020). Therefore, data transformation is necessary. Consequently, regression models in logarithmic form (Ln) were used for both independent and dependent variables to homogenise the variables and facilitate analysis. As a result, if the independent variable changes by 1%, the dependent variable will change by $\beta_i$% assuming other variable conditions remain constant (Nguyen et al., 2020, p. 181).

Thus, the research model was constructed based on Equations (1) and (2) as follows:

$$\ln DTE = P\,\beta_{(1)} + f\beta_{(2)} ln\, IF + f\beta_{(3)} \ln ROA + f\beta_{(4)} \ln ROE + f\beta_{(5)} \ln SOLVENCY + f\beta_{(6)} \ln CR + \propto$$

$$\ln ETA = P\,\beta_{(1)} + f\beta_{(2)} ln\, IF + f\beta_{(3)} \ln ROA + f\beta_{(4)} \ln ROE + f\beta_{(5)} \ln SOLVENCY + f\beta_{(6)} \ln CR + \propto$$

# 4. Results

## 4.1. Regression Results for the First Model

### Impact of Independent Variables on Debt-to-Equity Ratio (DTE)

After applying Ordinary Least Squares using EVIEWS 12 software, the following results were obtained:

Table 3. Results of multiple regression estimation using the indicator (DTE)

| Dependent Variable: DTE<br>Method: Least Squares<br>Date: 04/02/23 Time: 15:40<br>Sample: 2008 2020<br>Included observations: 13 | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Std. Error | *t*-Statistic | Prob. |
| C | 4.615497 | 0.894106 | 5.162137 | 0.0013 |
| IF | 0.198042 | 0.081634 | 2.425982 | 0.0457 |
| ROA | 0.230918 | 0.272870 | 0.846257 | 0.4254 |
| ROE | -0.280081 | 0.205500 | -1.362926 | 0.2151 |
| SOLVENCY | -0.873769 | 0.209096 | -4.178798 | 0.0041 |
| CR | -0.155901 | 0.101232 | -1.540029 | 0.1674 |
| *R*-squared | 0.958125 | Mean dependent var | | 1.651686 |
| Adjusted *R*-squared | 0.928214 | S.D. dependent var | | 0.374753 |
| S.E. of regression | 0.100407 | Akaike info criterion | | -1.455131 |
| Sum squared resid | 0.070571 | Schwarz criterion | | -1.194385 |
| Log likelihood | 15.45835 | Hannan-Quinn criter. | | -1.508726 |
| *F*-statistic | 32.03289 | Durbin-Watson stat | | 2.613960 |
| Prob(*F*-statistic) | 0.000111 | | | |

Source: EVIEWS 12 Software outputs.

### Significance Test for Model Coefficients

To test the statistical significance of the model coefficients, a significance test was performed by comparing the Student's *t*-test values obtained $t\beta_{i\ cal}$ with the tabulated value $t_{n-K-1}^{\alpha/2}$ at a confidence level of $\alpha$ = 5%. Given $K$ = 5 and $n$ = 13, where:

- Null hypothesis: $H_0: \beta_i$
- Alternative hypothesis: $H_1: \beta_i$ for $i$ = 0,1,2,3,4,5,6.

**Coefficient $P\boldsymbol{\beta}(1)$: $P\boldsymbol{\beta}(1)$**

When $t\beta_{1\ cal} = 5.162 > t_7^{0.025} = 2.365$, the null hypothesis is accepted, and coefficient $\beta_1$ is statistically significant at a confidence level of $\alpha$ = 5%, where: Prob = 0.0013 < 0.05.

**Coefficient $P\boldsymbol{\beta}(2)$:**

When $t\beta_{2\ cal} = 2.425 > t_7^{0.025} = 2.365$, the null hypothesis is accepted, and coefficient $\beta_2$ is statistically significant at a confidence level of $\alpha$ = 5%, where: Prob = 0.0457 < 0.05.

**Coefficient $P\boldsymbol{\beta}(3)$:**

When $t\beta_{3\ cal} = 0.846 < t_7^{0.025} = 2.365$, the alternative hypothesis is accepted, and coefficient $\beta_3$ is not statistically significant at a confidence level of $\alpha$ = 5%, where : Prob = 0.4254 > 0.05.

**Coefficient $P\boldsymbol{\beta}(4)$:**

When $t\beta_{4\ cal}$ = 1.362 (ignoring the negative sign) < $t_7^{0.025} = 2.365$, the alternative hypothesis is accepted, and coefficient $\beta_4$ is not statistically significant at a confidence level of $\alpha$ = 5%, where: Prob = 0.2151 > 0.05.

**Coefficient $P\beta(5)$:**

When $t\beta_{5\,cal}$ = 4.178 (ignoring the negative sign) > $t_7^{0.025}$ = 2.365, the null hypothesis is accepted, and coefficient $\beta_5$ is statistically significant at a confidence level of $\alpha$ = 5%, where Prob = 0.0041< 0.05.

**Coefficient $P\beta(6)$:**

When: $t\beta_{6\,cal}$ = 1.540 (ignoring the negative sign) < $t_7^{0.025}$ = 2.365, the alternative hypothesis is accepted, and coefficient $\beta_6$ is not statistically significant at a confidence level of $\alpha$ = 5%, where: Prob = 0.40167 > 0.05.

## Overall Significance of the Model and Goodness of Fit

By observing the outputs from the EVIEWS 12 software, it was noted that the value of the coefficient of determination $R^2$ was very high, indicating a high interpretative capacity of the model as a whole. Since the study examined a multiple regression model, the authors relied on the value of the adjusted coefficient of determination $R^2{}_{-ADJUSTED}$. Thus, 92% of the variations in the DTE ratio were explained by the variations in the independent variables.

To test the overall significance of the model, the Fisher *F*-test was used to evaluate the significance of the linear relationship between the independent variables and the dependent variable. Considering the following hypotheses:

- Null hypothesis : $H_0: \beta 2 = \beta 3 = \beta 4 = \beta 5 = \beta 6 = 0$
- Alternative hypothesis : $H_1: \beta 2 \neq \beta 3 \neq \beta 4 \neq \beta 5 \neq \beta 6 \neq 0$

The formula for this test is as follows:

$$F_{cal} > F_{n-K-1}^{\alpha}$$

$$F_{cal} = 32.032 > F_7^{0.05} = 3.97$$

$$Prob_{F-STATISTIC=} 0.000111 < 0.05$$

Thus, the authors rejected the null hypothesis $H_0$ and accepted the alternative hypothesis $H_1$, indicating an adequate overall significance of the regression model under study.

## Test of the Normal Distribution of Residuals

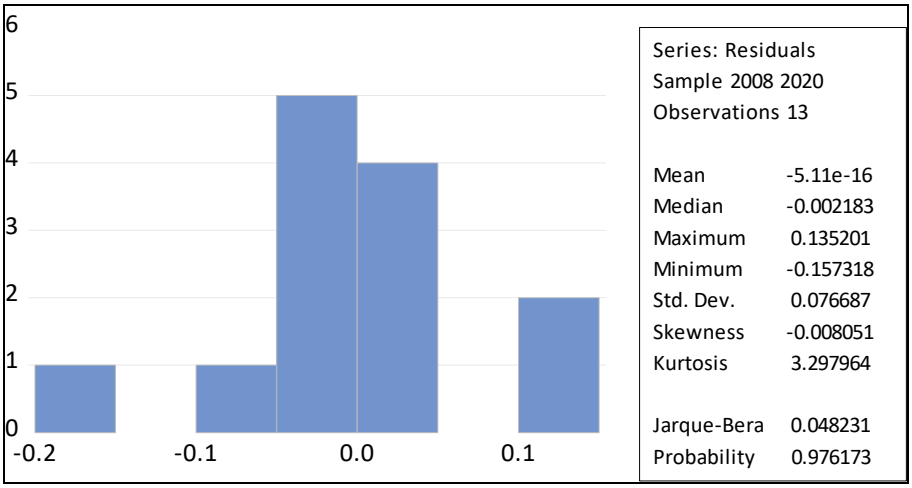



Fig. 2. Test of the normal distribution of the model's residuals

Source : EVIEWS 12 Software outputs.

Based on Figure 2, which showed the normality of the residuals (normality test), it was observed that the probability exceeded 0.05 in this model (0.97). Therefore, the hypothesis was accepted that the residuals of the model follow a normal distribution.

### Test for Serial Correlation of Errors

Table 4. Test for serial correlation of the model's errors

| Breusch-Godfrey Serial Correlation LM Test: | | | |
|---|---|---|---|
| *F*-statistic | 1.561239 | Prob. *F*(2.5) | 0.2973 |
| Obs**R*-squared | 4.997516 | Prob. Chi-Square(2) | 0.0822 |

Source: EVIEWS 12 Software outputs.

Table 4 shows that the statistical probability for the LM test, equal to 0.2973, was higher than the 5% significance level, and this indicates the absence of serial correlation of errors.

### Heteroskedasticity Test (Test for Non-Constant Variance)

Table 5. Heteroskedasticity Test

| Heteroskedasticity Test: Breusch-Pagan-Godfrey | | | |
|---|---|---|---|
| Null hypothesis: Homoskedasticity | | | |
| *F*-statistic | 0.755643 | Prob. *F*(5,7) | 0.6082 |
| Obs**R*-squared | 4.557042 | Prob. Chi-Square(5) | 0.4723 |
| Scaled explained SS | 1.518118 | Prob. Chi-Square(5) | 0.9110 |

Source: EVIEWS 12 Software outputs.

Table 5 indicates that the statistical probability for the chi-square test (Prob. Chi-Square) according to the Breusch-Pagan-Godfrey test was equal to 0.4723, which is higher than the 5% signi-ficance level, and this indicates that the model was free from heteroscedasticity, meaning there was no non-constancy of the error variance.

## 4.2. Analysis of Regression Results for the Second Model

### Impact of Independent Variables on the Equity-to-Total Assets Ratio (ETA)

After applying the Ordinary Least Squares (OLS) method using the EVIEWS 12 software, the following results were obtained:

Table 6. Results of the multiple regression estimation using the (ETA) indicator

| Dependent Variable: ETA<br>Method: Least Squares<br>Date: 05/03/23 Time: 15:36<br>Sample: 2008 2020<br>Included observations: 13 | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Std. Error | *t*-Statistic | Prob. |
| C | 5.372461 | 1.240650 | 4.330359 | 0.0034 |
| IF | -0.226430 | 0.084874 | -2.667840 | 0.0321 |
| ROA | 0.259671 | 0.299715 | 0.866395 | 0.4150 |
| ROE | -0.335066 | 0.221773 | -1.510850 | 0.1746 |
| CR | 0.279786 | 0.108727 | 2.573280 | 0.0368 |
| LIQUIDITY_RISK | -0.411592 | 0.273361 | -1.505669 | 0.1759 |
| *R*-squared | 0.876068 | Mean dependent var | | 2.538972 |
| Adjusted *R*-squared | 0.787546 | S.D. dependent var | | 0.226525 |
| S.E. of regression | 0.104412 | Akaike info criterion | | -1.376909 |
| Sum squared resid | 0.076313 | Schwarz criterion | | -1.116163 |

| | | | |
|---|---|---|---|
| Log likelihood | 14.94991 | Hannan-Quinn criter. | -1.430504 |
| *F*-statistic | 9.896539 | Durbin-Watson stat | 2.083306 |
| Prob(*F*-statistic) | 0.004468 | | |

Source: EVIEWS 12 Software outputs.

## Test of the Significance of the Model Coefficients

The test of the significance of the model coefficients was performed by comparing the values of the obtained *t*-statistics (*t*-Test) $t\beta_{i\,cal}$ with the critical value of the *t*-test (*t*-tabulated) $t_{n-K-1}^{\alpha/2}$ at the confidence level $\alpha$ = 5% . Given that (*K* = 5 ) and (*n* = 13), where:

- Null hypothesis: $H_0: \beta_i$
- Alternative hypothesis: $H_1: \beta_i$ for *i* = 0,1,2,3,4,5,6.

**Parameter $P\boldsymbol{\beta}(\mathbf{1})$:**

When $t\beta_{1\,cal}$ = 4.330 > $t_7^{0.025}$= 2.365 the null hypothesis is accepted and parameter $\beta_1$ is statistically significant at a confidence level of $\alpha$ = 5%, with Prob = 0.0034 < 0.05.

**Parameter $P\boldsymbol{\beta}(\mathbf{2})$:**

When $t\beta_{2\,cal}$ = 2.667 *(ignoring the negative sign)* > $t_7^{0.025}$ = 2.365 the null hypothesis is accepted and parameter $\beta_2$ is statistically significant at a confidence level of $\alpha$ = 5%, with Prob = 0.0321 < 0.05.

**Parameter $P\boldsymbol{\beta}(\mathbf{3})$:**

When $t\beta_{3\,cal}$ = 0.866 < $t_7^{0.025}$= 2.365 the alternative hypothesis is accepted and parameter $\beta_3$ is not statistically significant at a confidence level of $\alpha$ = 5%, with Prob = 0.4150 > 0.05.

**Parameter $P\boldsymbol{\beta}(\mathbf{4})$:**

When $t\beta_{4\,cal}$ = 1.510 *(ignoring the negative sign)* < $t_7^{0.025}$= 2.365 the alternative hypothesis is accepted and parameter $\beta_4$ is not statistically significant at a confidence level of $\alpha$ = 5%, with Prob = 0.1464 > 0.05.

**Parameter $P\boldsymbol{\beta}(\mathbf{5})$:**

When $t\beta_{5\,cal}$ = 2.573 > $t_7^{0.025}$= 2.365 the null hypothesis is accepted and parameter $\beta_5$ is statistically significant at a confidence level of $\alpha$ = 5%, with Prob = 0.0368 < 0.05.

**Parameter $P\boldsymbol{\beta}(\mathbf{6})$:**

When $t\beta_{6\,cal}$ = 1.505 *(ignoring the negative sign)* < $t_7^{0.025}$ = 2.365 the alternative hypothesis is accepted and parameter $\beta_6$ is not statistically significant at a confidence level $\alpha$ = 5%, with Prob = 0.1759 > 0.05.

## Overall Significance of the Model and Goodness of Fit

By observing the outputs from the EVIEWS 12 software, it was noted that the value of the coefficient of determination $R^2$ was high, indicating a high interpretative capacity of the model as a whole. Since a multiple regression model was studied, the authors relied on the value of the adjusted coefficient of determination $R^2{}_{-ADJUSTED}$. Thus, 78% of the variations in the ETA ratio were explained by the variations in the independent variables.

To perform the overall significance test of the model, the authors used the Fisher *F*-test, which determined the degree of significance of the linear relationship between the independent variables and the dependent variable, using the following hypotheses:

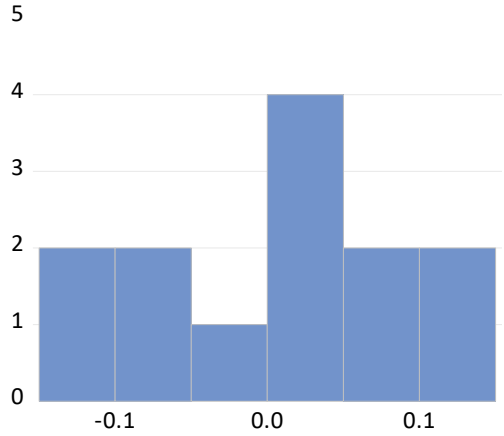
- Null hypothesis : $H_0: \beta 2 = \beta 3 = \ \beta 4 = \beta 5 = \beta 6 = 0$
- Alternative hypothesis : $H_1: \beta 2 \neq \beta 3 \neq \ \beta 4 \neq \beta 5 \neq \beta 6 \neq 0$

The formula for this test was as follows:

$$F_{cal} > F^{\alpha}_{n-K-1}$$
$$F_{cal} = 9.896 > F^{0.05}_{7} = 3.97$$
$$Prob_{F-STATISTIC} = 0.004468 < 0.05.$$

Therefore, the authors rejected the null hypothesis $H_0$ and accepted the alternative hypothesis $H_1$, indicating a significant overall significance for the regression model under study.

## Test of Normality of Residuals




| | |
|---|---|
| Series: Residuals | |
| Sample 2008 2020 | |
| Observations 13 | |
| Mean | 8.75e-17 |
| Median | 0.011716 |
| Maximum | 0.110775 |
| Minimum | -0.111310 |
| Std. Dev. | 0.079746 |
| Skewness | -0.120974 |
| Kurtosis | 1.658105 |
| Jarque-Bera | 1.007078 |
| Probability | 0.604388 |

Fig. 3. Test of normality of residuals for model (2)

Source: EVIEWS 12 Software outputs.

Through Figure 3, testing the normality of residuals (normality test), it was noted that the probability exceeded 0.05 in this model (0.60), which means accepting the hypothesis that the residuals of the model follow a normal distribution.

## Serial Error Correlation Test

Table 7. Serial error correlation test for model (2)

| Breusch-Godfrey Serial Correlation LM Test: | | | |
|---|---|---|---|
| *F*-statistic | 1.010597 | Prob. *F*(2.5) | 0.4280 |
| Obs**R*-squared | 3.742315 | Prob. Chi-Square(2) | 0.1539 |

Source: EVIEWS 12 Software outputs.

Table 7 showed that the statistical probability (*p*-value) for the LM test was 0.4280, which was higher than the 5% significance level, therefore the presence of serial correlation of errors could not be concluded.

## Heteroskedasticity test

Table 8. Heteroskedasticity Test of errors for model (2)

| Heteroskedasticity Test: Breusch-Pagan-Godfrey | | | |
|---|---|---|---|
| Null hypothesis: Homoskedasticity | | | |
| *F*-statistic | 0.974395 | Prob. *F*(5,7) | 0.4933 |
| Obs**R*-squared | 5.334888 | Prob. Chi-Square(5) | 0.3764 |
| Scaled explained SS | 0.508979 | Prob. Chi-Square(5) | 0.9918 |

Source: EVIEWS 12 Software outputs.

As evident from Table 8, where the statistical probability or the Chi-Square according to the Breusch-Pagan-Godfrey test, was 0.9918, which was higher than the 5% significance level, this model does not exhibit heteroscedasticity, meaning there is no systematic variance of the errors.

The regression analysis revealed that Islamic financing positively influences the DTE ratio while negatively affecting the ETA ratio. These findings suggest that Gulf Bank Algeria relies more on debt than equity to finance its operations through Islamic products. The solvency ratio shows a negative relationship with the DTE ratio, indicating increased investments in risky assets.

Key statistical measures, including adjusted *R*-squared values of 92% for the DTE model and 78% for the ETA model, affirm the models' robustness. Diagnostic tests for heteroscedasticity and serial correlation confirmed the reliability of the regression results.

## 5. Discussion

The results align with earlier research, such as Toumi (2011), which found that Islamic banks tended to adopt lower-risk financing modes. Gulf Bank Algeria's reliance on products like *murabaha* and *salam*, which prioritise debt over equity, underlines the commercial nature of its Islamic product offer. However, this approach raises concerns about long-term sustainability and the potential for over-reliance on debt.

Practical implications suggest that Algerian banks could diversify their Islamic finance portfolios to include investment-oriented modes like Mudaraba and Musharaka. Such diversification would not only mitigate risk but also align more closely with Sharia principles. Additionally, policymakers should enhance regulatory oversight to ensure the financial independence of Islamic windows within conventional banks, as stipulated by Law No. 20-02.

### 5.1. First Model

- The results of the analysis of the first random model highlighted two significant variables having a statistically significant impact on the capital structure of Gulf Bank Algeria (AGB), represented by the debt-to-equity ratio (DTE). These variables are total Islamic financing and the solvency ratio. Together, these independent variables explain 92.8% of the variation in the dependent variable (the debt-to-equity ratio). In contrast, there is no significant relationship between return on assets, return on equity, and credit risk ratio and the dependent variable (the debt-to-equity ratio). therefore hypotheses 2, 3, and 5 were rejected.
- The analysis results indicated a statistically significant positive effect of Islamic financing on the debt-to-equity ratio (DTE) at the significance level ($\alpha \geq 5\%$). Specifically, a 1% increase in Islamic financing leads to a 0.19% increase in the debt-to-equity ratio at Gulf Bank Algeria (AGB). This relationship is explained by the increased use of debt to finance loans, which constitute the predominant part of the bank's activity, particularly Islamic financing products such as *mudaraba*, *salam*, and *qard al-hasan*.
- There was a statistically significant negative effect of the solvency ratio on the debt-to-equity ratio at the significance level ($\alpha \geq 5\%$), meaning that a 1% increase in the solvency ratio leads to a 0.87% decrease in the debt-to-equity ratio at Gulf Bank Algeria (AGB). This indicates an increase in the bank's investments in risky assets.

### 5.2. Second Model

- The results of the analysis of the second random model showed that two significant variables affect the capital structure of Gulf Bank Algeria (AGB), represented by the equity-to-total assets ratio (ETA), namely: the volume of Islamic financing and the credit risk ratio. These independent variables

explain their impact on the dependent variable (the equity-to-total assets ratio) to the extent of 78.7%. Additionally, there was no significant relationship between return on assets, return on equity, and liquidity risk ratio, and the dependent variable (the equity-to-total assets ratio), leading to the rejection of hypotheses 2, 3, and 5.

- There was a statistically significant negative effect of Islamic financing on the equity-to-total assets ratio at the significance level ($\alpha \geq 5\%$), where the significance value was 0.0321. This means that a 1% increase in Islamic financing leads to a 0.22% decrease in the equity-to-total assets ratio at Gulf Bank Algeria (AGB), which once again confirms the bank's reliance on debt to finance loans, representing the largest part of its usage, including Islamic financing provided to its clients (*musharaka*, *salam*, *qard hasan*).
- There was a statistically significant positive effect of the loan risk ratio on the equity-to-total assets ratio at the significance level ($\alpha \geq 5\%$), where the significance value was 0.0368. This means that a 1% increase in the credit risk ratio leads to a 0.27% increase in the equity-to-total assets ratio at Gulf Bank Algeria (AGB), indicating that as the loan risk increases, the bank increases its minimum capital adequacy ratio to cover potential risks that Gulf Bank Algeria might face.

## 6. Conclusion

The study concluded that Islamic windows have significantly shifted Gulf Bank Algeria's capital structure towards greater reliance on debt. This shift, while enabling the bank to expand its Islamic finance offerings, has not substantially impacted profitability or risk levels. To build on these findings, future research could explore the broader implications for Algeria's financial system and investigate the role of customer preferences in shaping Islamic banking strategies.

The profitability of this bank was not significantly affected as it is linked to other factors than Islamic finance, notably the volume of foreign trade transactions. As for the risk levels in this bank, they did not change greatly, which can be explained by the introduction of Islamic financing modes with a commercial nature, such as *murabaha* and *salam*, which do not present high risk compared to other investment-oriented modes, e.g. Mudaraba and Musharaka.

Following the conclusion of this study and based on the results obtained, the authors propose a few suggestions related to this research topic, namely:

- Drawing inspiration from leading international experiences in Islamic finance to develop the most suitable framework for the Islamic banking environment in Algeria.
- The monetary authorities in Algeria should ensure that public and private banks comply with the provisions of Article 17 of Regulation 2020-02, which stipulates that the Islamic window has to be financially and accounting-wise independent from other bank structures, allowing it to prepare its own financial statements.
- Algerian banks should move towards adopting other Islamic banking products and services to finance real investment projects in various sectors, such as agriculture and industry, rather than focusing solely on commercial financing modes.
- Activating the financial market in Algeria would provide banks with another source to finance their operations, thus reducing dependence on debt and external funds, which would increase the bank's ability to service its debts.

## References

Achi, A. (2023). Efficiency and its Determinants in the Algerian Banks: Network Data Envelopment Analysis and Partial Least Squares Regression. *International Journal of Productivity and Performance Management*, *72*(5), 1479-1508.

Ahmed, F., & Hussainey, K. (2015). Conversion into Islamic Banks: Jurisprudence Economic and AAOIFI Requirements. *European Journal of Islamic Finance*, *3*.

Anitha, A., (2020). A Theoretical Framework on EBIT-EPS Analysis. *International Journal of Psychosocial Rehabilitation*, *24*(8).

Bahadji, K., & Cheikh, S. (2021). Measurement of the Productivity of Algerian Banks: Using DEA-Based Malmquist Productivity Index Approach. *Journal of Economic Integration*, *9*(2), 607-620.

Baker, M., & Wurgler, J. (2002). Market Timing and Capital Structure. *Journal of Finance*, *57*(1), 1-32.

Bensaad, A. (2013). Le Leasing En Algerie: Realite Et Perspectives De Developpement*. Revue d'économie et de statistique appliquée*, *11*(2), 311-323.

Bensaad, A., & Azzazi, S. (2023). The Impact of Monetary Policy Tools in Achieving Monetary Stability in Algeria: Approach by the ARDL model. *Financial Market Institutions and Risks*, *7*(2), 28-45.

Benthami, A., & Cherkaoui, K. (2018). La liquidité des banques : Quel impact sur leur rentabilité? Cas de deux banques marocaines. *Revue du Contrôle de la Comptabilité et de l'Audit*, *2*(2).

Boone, C., & Özcan, S. (2020). Oppositional Logics and the Antecedents of Hybridization: A Country-level Study of the Diffusion of Islamic Banking Windows 1975-2017. *Organization Science*, *31*(4), 797-1051.

Chauhan, S., Verma, A., & Kumar, C. V. (2024). Effect of Capital Structure on the Financial and Social Performance of Indian Microfinance Institutions. *FIIB Business Review*, *13*(2), 243-256.

Farah, I., Amin, C., & Pramudianto, P. (2021). The Effect of Debt To Asset Ratio, Long Term Debt To Equity Ratio and Time Interest Earned Ratio on Profitability. *Bina Bangsa International Journal of Business and Management*, *1*(1), 68–78. https://doi.org/10.46306/bbijbm.v1i1.8

Financial Reports of Gulf Bank Algeria for the Years 2008-2020. https://www.agb.dz/index.php#doc

Hajar, B., & Tawfik, B. T. (2017). Analyse et mesure de la rentabilité bancaire : étude comparative entre une banque publique et une banque privée en Algérie*. Revue des politiques economiques*, *5*(1), 58-73. https://asjp.cerist.dz/en/article/132651

Halawa, J., Nasution, F. N., & Fachrudin, K. A. (2024). Analysis The Effect of Company Size, Profitability, Capital Structure and Risk Profile on Firm Value with Dividend Policy as a Moderating in Banking on the Indonesia Stock Exchange (2013-2022). *International Journal of Current Science Research and Review*, *7*(04), 2230-2244.

Hossain, A. A. (2014). Inflation and Monetary Policy in an Islamic Financial System: Empirical Relationships among Money, Output, and Consumer Prices in Nine Muslim-majority Countries. *Journal of Asian Economics*, *31*.

IFSB. (2015). *Core Principles for Islamic Finance Regulation, Banking Segment*. Islamic Financial Services Board.

Joo, B. A., & Hussanie, I. (2017). Selecting the Right Variable as a Proxy for Profitability – A Propitious Beginning for Researchers. *International Refereed Research Journal*, *8*(4-2).

Khan, S., Bashir, U., & Islam, M. S. (2021). Determinants of Capital Structure of Banks: Evidence from the Kingdom of Saudi Arabia. *International Journal of Islamic and Middle Eastern Finance and Management*, *14*(2), 268-285.

Kyriazopoulos, G., & Hadjimanolis, G. (2011). *Dupont Analysis of a Bank Merger and Acquisition Between Laiki Bank from Cyprus and Marfin Investment Group from Greece: Is There an Increase of Profitability of the New Bank?* MIBES Conference Proceedings, 157-176.

Le, T. N. L., Nasir, M. A., & Huynh, T. L. D. (2023). Capital Requirements and Banks Performance under Basel-III: A Comparative Analysis of Australian and British banks. *The Quarterly Review of Economics and Finance*, *87*, 146-157.

Mbatchou Ntchabet, A. Y., Bandela Menyeng, C., & Youmto, E. (2020). Les déterminants de la performance financière des banques commerciales au Cameroun : Une étude en panel. *Revue Internationale des Sciences de Gestion*, *3*(3).

Mokhtar, H. S. A. (2007). Technical and Cost Efficiency of Islamic Banking in Malaysia. *Review of Islamic Economics*, *11*(1).

Muhammed, S., Desalegn, G., & Emese, P. (2024). Effect of Capital Structure on the Financial Performance of Ethiopian Commercial Banks. *Risks*, *12*(4), 69.

Ngatno, Apriatni, E. P., & Youlianto, A. (2021). Moderating Effects of Corporate Governance Mechanism on the Relation Between Capital Structure and Firm Performance. *Cogent Business & Management*, *8*(1), 1866822.

Nguyen, A. H., Nguyen, H. T., & Pham H. T. (2020). Applying the CAMEL Model to Assess Performance of Commercial Banks: Empirical Evidence from Vietnam. *Banks and Bank Systems*, *15*(2), 177-186. https://doi.org/10.21511/bbs.15(2).2020.16

OECD. (2014). Debt to Equity Ratio in Financial Corporations. In *National Accounts at a Glance*. OECD Publishing.

Puspitasari, E., Sudiyatno, B., Aini, N. & Anindiansyah, G. (2021), The Relationship Between Net Interest Margin and Return on Asset: Empirical Study of Conventional Banking in Indonesia. *Academic Journal of Interdisciplinary Studies*, *10*(3), 362. https://doi.org/10.36941/ajis-2021-0090

Puspitasari, E., Sudiyatno, B., Hartoto, W. E., & Widati, L. W. (2021). Net Interest Margin and Return on Assets: A Case Study in Indonesia. *The Journal of Asian Finance, Economics and Business*, *8*(4), 727–734. https://doi.org/10.13106/JAFEB.2021.VOL8.NO4.0727

Ramu, S., & Satyanarayana, V. S. (2019). Financial Performance Analysis of HDFC Using DuPont analysis. *Inspira-Journal of Commerce, Economics & Computer Science (JCECS)*, *5*(2), 46-52.

Regulation No. 2020-02 of March 15, 2020 Defining the Operations of Bank Relating to Islamic Finance and the Conditions of their Exercise by Banks and Financial Establishments.

Sahoo, D., & Mishra, P. (2012). Structure, Conduct, and Performance of the Indian Banking Sector. *Review of Economic Perspectives*, *12*(4). 235-264.

Sakunasingha, B., Anekwasinchai, P., & Wiriyawit, V. (2018). Capital Structure Determinants for Local Commercial Banks: Thailand Evidence. *Catalyst, 18*, 18-29.

Sobhani, F.A., Murtaz, M., & Omar, N. (2016). Critical Analysis of the Role, Challenges, and Shariah Compliance of Islamic Windows by Conventional Banks in Bangladesh. *International Journal of Economics and Management*, *10*(2). 391-407.

Staikouras, C. K., & Wood, G. E. (2004). The Determinants of European Bank Profitability. *International Business & Economics Research Journal*, *3*(6).

Tamara, D., Heraini, N. & Ivan, D. (2022). Determinants of bank capital structure: Evidence from Indonesia. *Ultima Accounting, 14*(1), 2-17.

Tamil Selven, S. (2020). *Types of Transformation for Better Normal Distribution*. https://medium.com/data-science/types-of-transformations-for-better-normal-distribution-61c22668d3b9

Toumi, K. (2011). *Structure de capital, profitabilité et risques des banques islamiques. Économie et f inance quantitative [q-fin]*. Université Montpellier 1- France; Université de Sfax-Tunisie.

Umoh, E. (2024). *Impact of Capital Structure on the Income Performance of Publicly Rated Traded Deposit Money Banks in Nigeria (2003-2022)*.

Vasileiou, E. (2017). Value at Risk Historical Approach: Could it Be More Historical and Representative of the Real Financial Risk Environment? *Theoretical Economics Letters*, *7*, 951-974.

## Analiza struktury kapitałowej banków z oddziałami islamskimi w Algierii. Studium przypadku Gulf Bank Algeria (AGB)

### Streszczenie

**Cel:** Celem artykułu jest zbadanie wpływu usług bankowości islamskiej na strukturę kapitałową Gulf Bank Algeria (AGB), który był pierwszym tradycyjnym bankiem oferującym usługi i produkty bankowości islamskiej w Algierii od 2008 roku.

**Metodyka:** Analiza struktury kapitałowej banku została przeprowadzona przy modelu regresji liniowej wielokrotnej.

**Wyniki:** Badanie wykazuje, że okna islamskie mają pozytywny wpływ na wskaźniki struktury kapitałowej, takie jak stosunek zadłużenia do kapitału własnego (DTE) oraz stosunek kapitału własnego do całkowitych aktywów (ETA) w Gulf Bank Algeria (AGB). Jednak nie znaleziono istotnej zależności między wskaźnikami rentowności (ROA, ROE) a ryzykiem kredytowym (CR) i zmiennymi zależnymi.

**Implikacje:** Choć badanie podkreśla te zależności, implikacje praktyczne sugerują, że produkty finansowe islamskie mogą umożliwić algierskim bankom rozszerzenie działań na rzecz włączenia finansowego, zachowując jednocześnie zarządzalne poziomy ryzyka. Na przykład produkty takie jak *murabaha* mogą zwiększyć dostępność kredytów dla gospodarstw domowych o niższych dochodach, a m*udaraba* może wspierać małe i średnie przedsiębiorstwa. Zaleca się dalszą dywersyfikację produktów finansowych islamskich, aby dostosować je do najlepszych praktyk międzynarodowych.

**Oryginalność/wartość:** Przedstawione badania dają unikatowy wgląd w strukturę algierskiego banku oferującego usługi i produkty bankowości islamskiej.

**Słowa kluczowe:** okna islamskie, struktura kapitałowa, zwrot, ryzyko, Gulf Bank Algeria