

## **An Examination of the Influence of Macroeconomic Variables on the Profitability of Islamic Banks in Algeria: Using Autoregressive Distributed Lag Model (ARDL) for the Period (1992/2022)**

**Dahhou Mohammed<sup>1</sup>, Ben Abderrahmane Abdessamed<sup>2</sup>**

<sup>1</sup>University of Ahmed DRAIA - ADRAR, ALGERIA, daho.med@univ-adrar.edu.dz

<sup>2</sup>University of Djillali Liabès, Sidi Bel-Abbès, ALGERIA, Abdessamed. Benabderrahmane@ univ-sba.dz

Received: 08/2023, Published: 09/2023

### **Abstract:**

The primary aim of this study is to explore the effects of macroeconomic variables on the profitability of Islamic banks in Algeria. The sample comprises Al-Baraka Bank of Algeria and Al-Salam Bank-Algeria, covering the period from 1992 to 2022. Profitability was assessed using the return on assets (ROA). The macroeconomic variables encompassed in this study comprised the GDP growth rate, inflation rate, and money supply growth. The necessary data was extracted from the annual reports of Algerian Islamic banks as well as the annual reports of the Bank of Algeria.

To gauge the impact of each variable on the profitability of Islamic banks, the ARDL (AutoRegressive Distributed Lag) model was employed. This analysis was conducted using EVIEWS 12 software.

The findings revealed the existence of a long-term equilibrium relationship between the independent variables and the dependent variable (return on assets in Islamic banks). However, it is worth noting that the effect of the examined independent variables on the dependent variable was notably subdued throughout the study period. This can be attributed to the dependency of the dependent variable on the fluctuations of global oil prices. Additionally, the absence of issues related to self-correlation of error sequences, coupled with the stability of capabilities over time, indicated the stability of the return on assets equation.

**Key Words:** Algeria, ARDL model, Return on assets, Islamic banks, macroeconomic variables

### **1. Introduction**

Commercial banks assume a pivotal role within the framework of economic growth and development (Ongore, 2013). Their significance extends beyond being mere financial intermediaries; they serve as crucial sources of funding for businesses, exerting a substantial influence on economic progress. An additional facet of their function lies in ensuring the effective allocation of resources (Mai Ahmed, 2022). In this capacity, they amass funds for diverse productive endeavors, facilitating the movement of resources from surplus holders to those in need of capital for productive ventures. This dynamic process not only stimulates investments but also contributes to the enhancement of economic growth and development. Conversely, the failure of banks to fulfill their financial intermediation mandate can yield adverse outcomes, including a decline in economic growth and development. Ineffectual banking performance may culminate in bank failures, thereby engendering financial crises akin to the upheaval witnessed during the global financial crisis of 2007, as noted (Marshall, 2009). This serves as a rationale for the stringent regulations governing the banking sector prevalent in contemporary times. The monumental role that banks undertake in an economy, as articulated by Saunders (1994), underscores that the collapse of a major bank would bear graver consequences than the demise of any other institution within the economic fabric (Olokoyo & Chika Yinka, 2021).

Nonetheless, it is imperative to emphasize that the efficacy of banks' performance is contingent upon a multitude of factors. Specifically, the performance of the banking system is susceptible to the interplay of internal and external factors. Internally, a critical aspect pertains to the competition prevailing among banks, whereas externally, the financial and macroeconomic conditions enveloping a nation exert significant influence. Broadly speaking, the competitiveness of individual banks hinges predominantly on their adeptness at innovation. Consequently, disparities in competitiveness are to be anticipated, mirroring the distinctive attributes and advantages possessed by each bank.

In contrast, the financial and macroeconomic conditions confronting all banks remain uniform. On one hand, propitious macroeconomic circumstances act as catalysts for the advancement of the banking system. Conversely, adverse financial and macroeconomic conditions bear the potential to jeopardize banking

performance. Succinctly put, an environment characterized by macroeconomic instability and uncertainty can engender ramifications on banks' credit and market risk, culminating in lackluster performance.

Moreover, the reverberations of financial crises, particularly those originating in well-developed financial markets of other countries worldwide, possess the capacity to impede the domestic performance of banks. This underscores the interconnectedness of global financial systems and the potential for external shocks to disrupt the functioning of domestic banks. (Olokoyo & Chika Yinka, 2021).

The Islamic banking system has witnessed significant growth, marked by notable milestones. A pivotal advancement was the establishment of the Islamic and Training Institute by the Islamic Development Bank in Jeddah, aimed at both practical and theoretical research. Countries such as Bahrain and Malaysia stand out as exemplars, actively fostering the growth of Islamic banking. Noteworthy transformations occurred in the banking systems of Iran, Pakistan, and Sudan, where a shift towards non-interest banking models was executed. Moreover, Western commercial banks also entered the arena, offering Islamic financial products through designated channels known as Islamic windows (Wayne & MacIntosh, 1998.July).

Likewise, the Algerian banking sector has solidified its position as a cornerstone of the services sector and the overall economy since gaining independence. However, during the period spanning 2019 to 2020, both this sector and the broader economy encountered a succession of disruptive events, which had far-reaching implications.

Furthermore, Islamic banking operations were initiated in Algeria during the early 1990s. Since their inception, these banks have assumed a crucial function in financing various economic endeavors and societal domains within the nation, guided by the tenets of Islamic law. This substantiates the escalating influence of Islamic banks in Algeria. The existing body of literature concerning these banks has expanded, with a substantial focus on risk management and risk assessment within the context of Islamic banks.

However, it is worth noting that while substantial research has been conducted on the subject of risk management and risks inherent to Islamic banks, the discourse surrounding financial stability has predominantly remained at a theoretical level. Moreover, this discussion has typically addressed the broader financial system as a whole, rather than delving into the specifics of individual financial institutions, including banks themselves.

Consequently, the objective of this paper is to investigate the influence of macroeconomic variables—namely economic growth, inflation rate, and money supply growth—on the performance of Islamic banks in Algeria over the period 1992-2022. This inquiry is pursued through the application of a normative approach employing the ARDL (AutoRegressive Distributed Lag) model. The research delves into examining the connection between the performance of these banks, as assessed by the return on assets (ROA), and several pertinent macroeconomic variables.

To achieve this aim, the primary query that the researcher seeks to address is as follows:

Questions;” What is the influence of macroeconomic variables on the performance of Islamic banks in Algeria?

## 2. LITERATURE REVIEW

Numerous studies have demonstrated that macroeconomic factors exert a notable influence on the overall banking sector's performance, with specific relevance to Islamic banks. These impacts can be outlined as follows:

Bashir (2000) conducted a study to assess the performance of Islamic banking across eight Middle Eastern countries. His investigation encompassed the analysis of influential bank characteristics that impact the profitability of Islamic banks, while controlling for economic and financial structural measures. The study evaluated the performance of fourteen Islamic banks spanning Egypt, Jordan, Kuwait, Malaysia, Qatar, Sudan, Turkey, and the U.A.E., during the period from 1993 to 1998. Performance was evaluated through several indicators, including return on assets (ROA), return on equity (ROE), non-interest margin (NIM), and profit before tax (PBT). Both internal and external variables were considered in the analysis.

Regarding internal variables, bank size, loans, ownership, leverage, advances, and overheads were utilized in regression models. Meanwhile, external variables encompassed regulations, financial market conditions, and macroeconomic factors. The outcomes of the study affirmed the conclusions drawn from prior research, indicating a direct relationship between Islamic banks' profitability and their equity and loan portfolios. Consequently, Islamic banking's profitability stands to benefit from higher levels of loans and equity, with a corresponding increase in loan-to-asset ratios when leverage is elevated.

Furthermore, the findings underscored that advantageous macroeconomic circumstances correlate positively with the profitability of Islamic banks. This suggests that a supportive macroeconomic environment contributes to the enhanced profitability of these institutions (Muhammad & Zaheer, 2012).

Alkassim (2005) conducted a study pertaining to the Gulf Cooperation Council (GCC) countries, which encompass Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. The findings of this research indicate distinctive patterns with respect to the impact of certain factors on the profitability of Islamic and conventional banks.

Specifically, the study reveals that a higher capital ratio has a supportive effect on the profitability of Islamic banks. In the case of conventional banks, the relationship with deposits is positive, implying that higher deposits are associated with increased profitability. However, for Islamic banks, the relationship with deposits is negative, indicating that a greater level of deposits is linked to decreased profitability.

Interestingly, the study underscores a common trend for both Islamic and conventional banks, whereby advances exhibit a positive correlation with bank profitability. This implies that increased advances are associated with enhanced profitability for both types of banks.

These findings contribute to a more nuanced understanding of the varying dynamics that influence the profitability of Islamic and conventional banks within the context of the GCC countries (Muhammad & Zaheer, 2012).

Sufian (2006) conducted an inquiry into the efficiency of 15 Malaysian banks that provide Islamic banking products and services. The study spanned the years 2001 to 2004. The outcomes of the research indicate distinct efficiency patterns between domestic and foreign Islamic banks.

Specifically, the study reveals that domestic Islamic banks demonstrated greater technical efficiency in comparison to their foreign counterparts. However, the results also suggest that foreign Islamic banks exhibited a relatively higher degree of efficiency in managing and controlling their operating costs.

These findings offer valuable insights into the nuanced efficiency dynamics among different categories of Islamic banks operating in Malaysia during the specified period (Sufian, 2006).

In their study, Fotios and Kyriaki (2007) conducted an examination of how distinct factors, encompassing bank-specific attributes, macroeconomic conditions, and financial structure, could potentially influence the profitability of 584 commercial banks, both domestic and foreign, operating in the 15 European Union (EU) countries throughout the period spanning 1995 to 2001. (Fotios & Kyriaki, 2007)

In their scholarly work, Sufian and Zulkhibri (2011) embarked on an examination aimed at gauging the interplay between economic and market conditions and the performance of Islamic banks. The researchers employed variables encompassing LNGDP (logarithm of gross domestic product), INFL (inflation rate), CR3 (concentration ratio of the three largest banks), and Z-SCORE to assess this relationship.

Among these variables, gross domestic product (GDP) emerges as a preeminent macroeconomic indicator widely utilized to quantify the overall economic activity within a given economy. The GDP serves as a pivotal determinant expected to exert influence on multiple facets concerning the demand for and supply of loans and deposits. Favorable economic circumstances are poised to generate positive ramifications on the demand and supply dynamics of banking services. However, the influence of these economic conditions on bank profitability levels can be either affirmative or adverse in nature, contributing to a nuanced impact on the profitability of the banks in question (Sufian & Zulkhibri, 2011).

Akbas et al. (2012) elucidated the intricate nexus between macroeconomic and industry factors and their subsequent impact on banks' profitability. The study's sample encompassed 26 commercial banks situated in Turkey over the period from 2005 to 2010. Within this framework, the study variables comprised two distinct categories: dependent variables that quantify performance through metrics such as return on assets (ROA) and return on equity (ROE), and independent variables that gauge profitability encompassing indicators like the proportion of equity to total assets, the ratio of loan loss allowance to total loans, the ratio of liquid assets to short-term liabilities, and the ratio of total costs to total income (logarithm of total assets).

The research findings unveiled the following significant insights:

- Profitability exerts a positive influence on the ratio of equity to anticipated capital.
- Profitability wields a negative impact on the ratio of loan loss provisions to total loans.
- Profitability yields an adverse effect on the cost-efficiency ratio relative to total income.
- The dimension of size proves to be pivotal in defining a bank's profitability. While an augmenting magnitude typically bears a constructive psychological effect, larger banks often contend with decreased profitability due to bureaucratic inefficiencies.

- Elevated inflation percentages frequently correlate with heightened interest rates, thereby leading to augmented earnings. Conversely, delayed interest adjustments by banks may culminate in rapid cost escalation, thereby detrimentally affecting profitability.
- Gross domestic product (GDP) exercises a substantial sway on numerous variables directly impacting supply and demand dynamics, such as loans and deposits. Consequently, an inverse relationship is discerned in instances marked by escalating default rates and the ensuing decline in profitability (Akbaş, Aysan, & Ceyhan, 2012) :

Rachmadita et al. (2013) conducted a comprehensive study that aimed to assess the impact of key variables—namely deposits, equity, Non-Performing Financing (NPF), and the outcomes of financing—on Islamic banks in Indonesia. The investigation focused on the years spanning from 2007 to 2010. Through a series of partial regression tests, the researchers discerned significant implications of three out of the four examined independent variables: Savings, NPF, and Profit Sharing, on the financing activities of Islamic banks.

Within the stipulated time frame, Savings exhibited a substantial and negative influence on financing. This outcome indicates that Islamic banks curtail the volume of financing disbursed, opting to prioritize the mitigation of the NPF ratio and the containment of expansion in financing endeavors. Contrarily, Equity was identified as lacking a significant effect on the financing activities of Islamic banks during the same period.

The study culminated in the inference that NPF wields a pronounced positive impact on financing. As underscored in Business Indonesia, an escalated distribution of funds coupled with an augmented ratio of financing-related issues (Non-Performing Financing / NPF) can be attributed to a steady income level juxtaposed with an escalating demand for financing, particularly concerning working capital requirement (Rachmadita, Nindito, & and Hasanah, 2013).

hang and Daly (2015) conducted a comprehensive examination to ascertain the influence of a spectrum of factors—ranging from bank-specific attributes and macroeconomic indicators to financial variables and the forces of globalization—on the performance of Chinese banks. The study spanned the years 2004 to 2010.

The research findings yield significant insights. Banks characterized by lower credit risk and robust capitalization demonstrate an inclination towards heightened profitability. In the realm of macroeconomic indicators, it becomes evident that the trajectory of China's financial services aligns with the broader economic progression. Notably, the results further elucidate that amplified economic integration, facilitated by escalated trade and capital inflows, correlates with augmented bank profitability. In addition, social and political globalization exhibit positive effects, contributing to the enhanced profitability of Chinese banks (Zhang & Daly, 2015).

Yousafi (2016) proposed an insightful framework for characterizing the profitability variable, which comprises two distinct methodologies: the ratio of profits to assets, denoted as return on assets (ROA), and the ratio of profits to equity, referred to as return on equity (ROE). While ROA offers insights into a bank's proficiency in generating profits from its assets, ROE signifies the returns conferred to shareholders based on their equity investments, effectively representing the product of ROA and the total assets of the bank.

In delineating the determinants of bank-specific profitability, two primary categories of variables come to the fore: micro variables and macro variables. Micro variables encompass attributes intrinsic to the bank, including dimensions like bank size, capitalization, liquidity, asset quality, capital ratios, and the presence of collateral security. These micro variables can be controlled by the bank to varying extents.

In contrast, macro variables transcend the sphere of direct control exercised by financial institutions. These encompass broader economic indicators such as Gross Domestic Product (GDP), interest rates, inflation rates, exchange rates, money supply, competition levels, and the pricing of hydrocarbons. These macro variables are regarded as being shaped by external economic forces and are perceived to be beyond the immediate control of financial institutions (Yousfi, 2016).

Chouikh and Blagui (2017) conducted an investigation to assess the impact of two distinct categories of variables on banks' performance. The first category pertains to internal factors, encompassing attributes like bank size, privatization status, board size, capital-asset ratio, and cost efficiency. The second category pertains to external factors, including inflation and the growth rate of Gross Domestic Product (GDP). Employing a panel data methodology, the study focused on banks within Tunisia.

The findings of their research yielded the following notable conclusions (Chouikh & Blagui, 2017):

- Bank profitability, board of directors' size, and other variables exert a significant impact on bank performance.

- Privatization yields a positive influence on bank performance.
- Bank volume is associated with a positive impact on bank performance.
  - Profitability of the bank, the size of the board of directors, and other variables have a significant effect
  - Privatization positively influences bank performance
  - Volume positively influences bank performance.

Hassan and Ahmed (2019) conducted a study to analyze the impact of distinct attributes specific to Islamic banks in Bangladesh on their profitability during the period from 2010 to 2017. Their research employed the Hausman test as well as a selection of variables, including return on assets (ROA), nonperforming investment, bank size, cost-to-income ratio, capital-to-risk ratio, assets, and investment-to-deposit ratio.

The study findings are as follows (Hassan & Ahmed, 2019) :

- A negative correlation was observed between the capital-to-risk ratio and the cost-to-income ratio, indicating a potential adverse connection between these variables and profitability.
- A negative correlation was identified between liquidity and profitability, suggesting that higher liquidity might not necessarily correlate with enhanced profitability.
- Bank size displayed a negative correlation with profitability, indicating that larger banks might encounter challenges in maintaining robust profitability levels.
- A positive correlation emerged between nonperforming investment and the rate of return on assets (ROA), implying that nonperforming investments could influence the ROA positively.

AlSharif (2021) conducted a study aimed at estimating the implications of the 000 rate and real rate of interest on the performance metrics of Islamic Banks, specifically return on assets, return on equity, and return for shareholders. The research methodology employed multiple linear regression to comprehensively examine the associations between these variables, using annual panel data encompassing Jordanian Islamic Banks over the period from 2005 to 2019.

The outcomes of the study unveiled noteworthy insights. Notably, the performance of Islamic banks demonstrated a negative response to real interest rates and real exchange rates as indicated in the models. This inverse relationship can be attributed to the following explanation drawn from the study findings: an escalation in real exchange rates prompts an increase in imports coupled with a decrease in exports. This, in turn, leads to a contraction in domestic investment, a decline in deposits and facilities within Islamic banks, ultimately culminating in diminished returns on assets, equity, and shares (AlSharif, 2021).

The findings of the aforementioned studies collectively underscore the presence of a statistically significant relationship between economic variables—encompassing factors such as growth rate, gross domestic product (GDP), inflation rate, interest rate, and money supply—and the profitability of Islamic banks. This relationship is well-demonstrated across various geographical contexts.

For instance, Al-Bashir's (2000) study, focused on the performance of Islamic banking in eight Middle Eastern nations, accentuates the intimate connection between macroeconomic conditions and the profitability of Islamic banks. Likewise, Zhang and Daly (2015) emphasize that enhanced economic integration, as facilitated by heightened trade and capital inflows, coincides with improved bank profitability in China. Yousefi's investigation (2016) posits the hypothesis that variables including GDP, interest rate, inflation, exchange rates, and money supply exert a discernible influence on banks' performance, an assertion that resonates with the research conducted by Chouikh and Blagui (2019) in Tunisia. Moreover, studies by Hassan and Ahmed (2019) in Bangladesh and Al-Sharif (2021) on Jordanian Islamic banks contribute to the growing body of evidence reinforcing the significance of economic variables in influencing bank profitability.

### 3. Data and Methodology :

#### 3.1 Data

Taking into account the insights derived from the economic literature and the findings of various studies, we conducted an examination aimed at evaluating the influence of three key macroeconomic variables—specifically, the economic growth rate, inflation rate, and money supply growth—on the profitability of Islamic banks in Algeria, gauged by the rate of return on assets. This investigation spanned the extensive period from 1992 to 2022.

To substantiate our analysis, we collected pertinent data from multiple reliable sources, including the annual reports furnished by the Bank of Algeria, the annual reports of Algerian Islamic banks, and international financial statistics. This comprehensive dataset serves as the foundation for our endeavor to ascertain the

intricate relationship between the selected macroeconomic variables and the profitability of Islamic banks in Algeria over the specified temporal horizon.

### 3.2 Gross Domestic Product (GDP)

Gross Domestic Product (GDP) represents the aggregate market value of all final goods and services generated within a nation's borders over a specified time frame, typically a year. The expansion of GDP is indicative of a country's advancement and is computed by summing private and public consumption alongside private and public investment, if utilizing the expenditure approach. In developing nations, a sluggish growth rate denotes an inert economy, signifying a state of recession where the equilibrium of prices, output, and employment remains below the desired threshold. Market-based GDP figures serve as a surrogate in these discussions.

A study by MUNIB & ATIYA (2013) delves into this phenomenon, revealing that the growth of GDP is positively intertwined with the profitability of Islamic banks. Specifically, the study adopts the growth rate of GDP as a metric and examines data spanning the years 1992 through 2022. This exploration further underscores the pivotal role that GDP growth plays in shaping the profitability dynamics of Islamic banks. (MUNIB & ATIYA, 2013).

### 3.3 Inflation

Inflation refers to the upward movement of the general price level of goods and services within an economy, leading to a reduction in the purchasing power of a unit of currency. This phenomenon continues until a certain threshold is reached, resulting in a situation where the same amount of currency can purchase fewer goods and services.

Certain economists characterize inflation as the consequence of an increase in the quantity of money circulating within an economy. This perspective suggests that inflation arises when the amount of money in circulation surpasses a certain level.

Inflation is typically quantified by calculating the annualized percentage change in the Consumer Price Index (CPI). This index gauges the average price changes experienced by a predefined basket of goods and services commonly consumed by households. The formula used to measure inflation involves assessing the percentage change in the CPI over a specified time period (MUNIB & ATIYA, 2013):

$$INF = \left\{ \frac{P_t - P_{t-1}}{P_{t-1}} \right\} \times 100$$

$P_t$ : Price level for the year of comparison;       $P_{t-1}$ : The price level for the base year

### 3.4 Money Supply

Money supply refers to the aggregate stock of money present within an economy over a specified time period. Various methods exist for measuring money supply, and it is generally categorized into three forms: Reserve Money ( $M_0$ ), Narrow Money ( $M_1$ ), and Broad Money ( $M_2$ ).

In our study, we opted to utilize  $M_2$  as a representative proxy for money supply. This decision was based on the fact that  $M_2$  provides the most comprehensive and descriptive representation of money since it encompasses both Reserve Money and Narrow Money.

Reserve Money embodies the entirety of money available in tangible or physical form. On the other hand, Narrow Money encompasses Reserve Money as well as all demand and time deposits maintained by scheduled banks.  $M_2$ , in turn, encompasses Narrow Money and includes all resident foreign currency deposits.

(MUNIB & ATIYA, 2013). suggests that money supply, specifically represented by  $M_2$ , exhibits a positive correlation with the credit capacity of banks, thus influencing their profitability. This underscores the significance of money supply in shaping the credit dynamics and overall profitability of banks.

### 3.5 The return on assets ratio (ROA)

The ratio referred to is defined as the quotient of after-tax profit divided by the total assets. This particular ratio, denoted as return on assets (ROA), holds considerable prominence as it serves as a widely utilized measure for assessing and comparing the profitability of banks. ROA offers insights into the income generated by the assets financed by the bank. As the ROA escalates, it signifies an enhancement in the financial performance of the bank, highlighting an augmented ability to generate income from its asset base (Mkadmi, 2020).

## 4. Methodology

The study aims to assess the influence of macroeconomic variables on the profitability of Islamic banks in Algeria. This investigation employs the Autoregressive Distributed Lag (ARDL) model, which accommodates the presence of a lag structure, allowing the explanatory variables to span over distinct time

periods. The model encompasses multiple lag terms that align with the range of specified parameters associated with the independent variables.

In the pursuit of this research, annual data spanning the years 1992 to 2022 is utilized. The data is sourced from the World Bank database, the annual reports of the participating banks, and the National Bureau of Statistics. The study hinges upon the analysis of four independent economic variables in conjunction with the ongoing profitability index of Islamic banks.

### 5. Measuring the impact of macroeconomic variables on the profitability of Algerian Islamic banks using the ARDL model:

To measure the impact of macroeconomic variables on the performance of Islamic banks in Algeria, we will adopt (ARDL), which takes into account the time lag for the slowing of the gap where the explanatory variables are distributed over time periods, the model integrates them into a number of slowdowns distributed within the limits (parameters) corresponding to the number of explanatory variables. The explained economic variables under study take a period of time to affect the dependent variable, distributed between the short and long term, and this model is adopted in the case of stability of time series at both levels (I 1) or (I 0), provided that the variables of the study are not of the second degree(I 2)

In the research, we relied on annual data during the time period (1992/2022). Obtained from the database of the World Bank and the National Bureau of Statistics; In the study, We relied on four variables, namely: Return on assets in Algerian Islamic banks (Al Baraka Bank and Al Salam Bank) (ROA), GDP growth rate (GDP), inflation rate (INF), money supply growth rate (M2), The considered model takes the following formula:

In the research, we relied on annual data during the time period (1992/2022). Obtained from the database of the World Bank and the National Bureau of Statistics; In the study, We relied on four variables, namely: Return on assets in Algerian Islamic banks (Al Baraka Bank and Al Salam Bank) (ROA), GDP growth rate (GDP), inflation rate (INF), money supply growth rate (M2), The considered model takes the following formula:

“ $ROA = (GDP, INFL, M2)$ ”

- The Banque Al Baraka d'Algérie was established on May 20, 1991, with a capital of 500,000,000 DA, which entered its active bancaires interests during the month of September 1991 (al baraka bank algeria website, 2023).
- Al Salam Bank Algeria, a bank that operates in accordance with Algerian laws, and in accordance with the provisions of Islamic Sharia in all its dealings; The bank was accredited by the Bank of Algeria in September 2008, to start its activities, aiming to provide innovative banking services (Al Salam Bank website - Algeria, 2023).

### 1. Study of time series stability

The study will assess the time series stability of the variables through the Augmented Dickey-Fuller test. The outcomes of this stability assessment will be presented in Table 01.

**Table No. 01: Results of the time-series stability test schedule**

Study the stability of time series at level						
Variables	ADFC <sub>al</sub>	ADFTab			Prob	Decision
		%1	%5	%10		
GDP	-4.05	-3.67	-2.96	-2.62	0.0039	Stable(Intercept)
INFL	-2.51	-2.64	-1.95	-1.61	0.0138	Stable(No Intercept and trend)
ROA	-5.57	-3.67	-2.96	-2.62	0.0001	Stable(Intercept)
M2	-4.36	-3.67	-2.96	-2.62	0.0018	Stable(Intercept)
Study the stability of time series at the first difference						
Variables	ADFC <sub>al</sub>	ADFTab			Prob	Decision
		%1	%5	%10		
GDP	-9.16	-3.67	-2.96	-2.62	0.0000	stable(Intercept)
INFL	-3.46	-3.69	-2.97	-2.62	0.0171	Stable (Intercept)
ROA	-5.76	-3.69	-2.97	-2.62	0.0001	Stable(Intercept)

M2	-6.20	-3.68	-2.97	-2.62	0.0000	Stable(Intercept)
----	-------	-------	-------	-------	--------	-------------------

**Source:** Prepared by researchers based on the outputs of (EViews 12) program  
 Upon analyzing the results presented in the time series stability test table, it is evident that the variables (INFL, M2, GDP, ROA) exhibit stability at the initial level. Additionally, the stability persists after applying the first differencing transformation. This is substantiated by the computed absolute values, which surpass the critical values at a notable significance level of 5%. Furthermore, the variables exhibit stability not only at the 5% significance level but also at the more stringent levels of significance, namely 1% and 10%. Consequently, the time series stability requirement for employing the ARDL model is met.

**2. Cointegration test using ARDL methodology**

**2.1. Determining the optimum degree of delay:**

In order to ascertain the appropriate distributed lag length, two criteria are employed: Akaike Information Criterion (AIC) and Schwarz Criterion (SC). These criteria aid in selecting the lag length configuration that yields the lowest value for either AIC or SC.

As illustrated in Figure 06, the lag length selection process is based on the decline in values for both AIC and SC. The graph indicates that the optimal lag length configuration is (1.4.2.3) for the ARDL model, as per the AIC criterion. This configuration suggests that both the dependent variable and independent variables exhibit lags spanning up to the first and fourth orders. Consequently, the model is estimated using this specific lag length configuration

**2.2. Test of cointegration using Bounds Test**

The table provided below presents the outcomes of the bound test. The findings underscore that the computed F-statistic value (9.32) surpasses the critical values of both the lower and upper bounds across significance levels of 10%, 5%, and 1%. Consequently, the null hypothesis, which posits the absence of a complementary relationship or commonality between the dependent variable and the explained variables, is rejected. This signifies the existence of a long-term equilibrium relationship between return on assets in Islamic banks and the variables under study.

**Table No. 02: Results of cointegration test using Bounds Test method**

F-Bounds Test		Null Hypothesis: No levels relationship			
Test Statistic	Value	Signif.	I(0)	I(1)	
F-statistic K	9.329780 3	10%	2.37	3.2	
		5%	2.79	3.67	
		2.5%	3.15	4.08	
		1%	3.65	4.66	
Actual Sample Size	27	Asymptotic: n=1000			
		10%	2.618	3.532	
		5%	3.164	4.194	
		1%	4.428	5.816	
			Finite Sample: n=30		
			10%	2.676	3.586
			5%	3.272	4.306
			1%	4.614	5.966

**Source:** EViews 12 Program Outputs

**2.3. Estimating the model in the long term**



The evaluation of the long-term relationship aimed to assess the significance of the parameters pertaining to the study variables in the extended time horizon. The outcomes, as presented in Table 03, highlight the meaningfulness of the association between the GDP growth rate, inflation rate, money supply growth rate, and the return on assets in Islamic banks, albeit in an inverse manner.

Moreover, the results underscore a highly pronounced negative impact of inflation on the return on assets in Islamic banks. Specifically, a 1% increase in inflation corresponds to a substantial 2.76% reduction in the return on assets. This phenomenon can be attributed to the economic principle of an inverse connection between inflation and the return on assets in Islamic banks. The pronounced nature of this effect can be attributed to the elevated inflation rates observed within the Algerian economy over the study duration.

Additionally, the results reveal an inverse correlation between the growth rate of money supply, domestic product, and the return on assets in Islamic banks. This observation may appear contrary to conventional economic theory. However, this seemingly anomalous relationship can be rationalized by the incongruence between the operational strategies of Algerian Islamic banks and the macroeconomic policies of the country. Moreover, the Algerian economy, characterized by its rentier nature and public sector dominance, predominantly engages with traditional banks instead of Islamic banks. Consequently, the relatively minimal market share occupied by Islamic banks in Algeria's banking landscape diverges their relationship with macroeconomic variables from what is expected by economic theory.

#### Estimation of the ECM for the short-term relationship

The outcomes of estimating the short-term relationship through the error correction model are depicted in Table No. 04. Notably, the error correction factor emerges as significant (0.0000) and bears a negative coefficient (-1.19). This coefficient signifies that approximately 119% of the short-term deviations or discrepancies observed in the explanatory variables during the preceding period (t-1) are rectified during the current period (t). This factor also illustrates the velocity at which the equilibrium state is reestablished following shocks that perturb the equilibrium position of the Algerian economy.

Conversely, the independent variables in the model exhibit a lack of influence on the dependent variable. This absence of significance in the relationship contradicts the expectations of economic theory.

The corrected determination coefficient, computed at 80.56%, underscores the explanatory potency of the model. This coefficient illustrates the impact of the independent variables and their role in elucidating and comprehending the alterations witnessed in foreign direct investment throughout the study timeframe. The remaining 2.07% pertains to variables not encompassed within the model, owing to their stochastic nature.

#### Diagnostic tests:

To ensure the reliability and validity of the used model for analysis and to mitigate the possibility of common issues, several tests were conducted, as outlined below:

- a. **The factorial test for the serial correlation between residues:** The Lagrange Multiplier (LM) test for serial correlation among residuals was performed. The obtained critical probability value, denoted as "Prob," was found to be non-significant, with a value of 0.6290. This result signifies that the model did not exhibit the issue of serial correlation..

**Table No. 05: Breusch-Godfrey Serial Correlation LM Test**

**Breusch-Godfrey Serial Correlation LM Test:**

**Null hypothesis: No serial correlation at up to 2 lags**

<b>F-statistic</b>	<b>0.483761</b>	<b>Prob. F(2,11)</b>	<b>0.6290</b>
<b>Obs*R-squared</b>	<b>2.182834</b>	<b>Prob. Chi-Square(2)</b>	<b>0.3357</b>

**Source:** (EViews 12) program outputs

- b. **Normality test of resedual:** The outcomes of the test for the distribution of random errors are depicted in Figure 07. The observed probabilities associated with the test were found to exceed the various levels of significance at 1%, 5%, and 10%. This observation indicates that the residuals conform to a normal distribution for the majority of the regression estimation. As a result, the statistical acceptance of the model is warranted.
- c. **Stability Test Boundary Error Contrast (ARCH):** The outcomes of the Autoregressive Conditional Heteroskedasticity (ARCH) test are displayed in Table 06. The calculated probability value (0.3762) surpasses the threshold of 1%. This observation indicates that the model is statistically significant, acceptable, and unaffected by the issue of heterogeneity of variance.

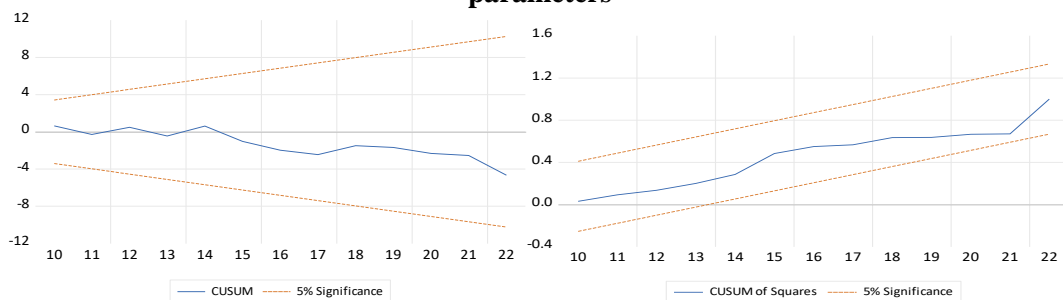
**Table No. 06: Results of ARCH Test  
 Heteroskedasticity Test: ARCH**

<b>F-statistic</b>	<b>0.813045</b>	<b>Prob. F(1,24)</b>	<b>0.3762</b>
<b>Obs*R-squared</b>	<b>0.851937</b>	<b>Prob. Chi-Square(1)</b>	<b>0.3560</b>

Source: (EViews 12) program outputs

**d. Structural stability test for model parameters:** The structural stability of the error correction model was assessed through the utilization of the CUSUM and CUSUM of Squares tests. The outcomes of these tests indicated that the estimated coefficients within the model remain stable. These coefficients consistently fall within the critical boundary region at a significance level of 5%. This outcome underscores the structural stability of the results pertaining to the return on assets equation within Algerian Islamic banks.

**Figure 08: Results of the structural stability test for CUSUM and CUSUM of Squares model parameters**



Source: (EViews 12) program outputs

**Conclusion:**

Through this study, an analysis was conducted to investigate the influence of certain macroeconomic variables on the return on assets in Algerian Islamic banks throughout the period spanning 1992 to 2022. The study has yielded the subsequent findings:

1. The return on assets exhibited a trajectory of growth but encountered fluctuations during the examined duration, particularly in more recent times. These fluctuations can be attributed to the heightened attention from Algerian regulatory authorities towards the Islamic banking sector, as evidenced by the enactment of Regulation No. 18-02. The expansion of Islamic banks' presence within the banking market was facilitated through the establishment of new branches. However, it remains notable that the Islamic banking sector's penetration of the Algerian banking market remains limited.
2. The outcomes derived from the long-term analysis unveiled that the coefficients associated with the model's variables are statistically significant. This observation underscores a robust relationship between the scrutinized variables and the return on assets over the study's duration from 1992 to 2022. Importantly, this relationship is characterized by an inverse association. This inverse connection can be attributed to the heightened sensitivity of the return on assets to fluctuations in global oil prices, which, in turn, exert an influence on the country's overall economic growth.

The macroeconomic variables under consideration are characterized by attributes of liberalization, adaptability, stability, and effectiveness. These variables are responsive to shifts and transformations that transpire at both national and global levels, thereby contributing to their impact on the return on assets within the context of Algerian Islamic banks.

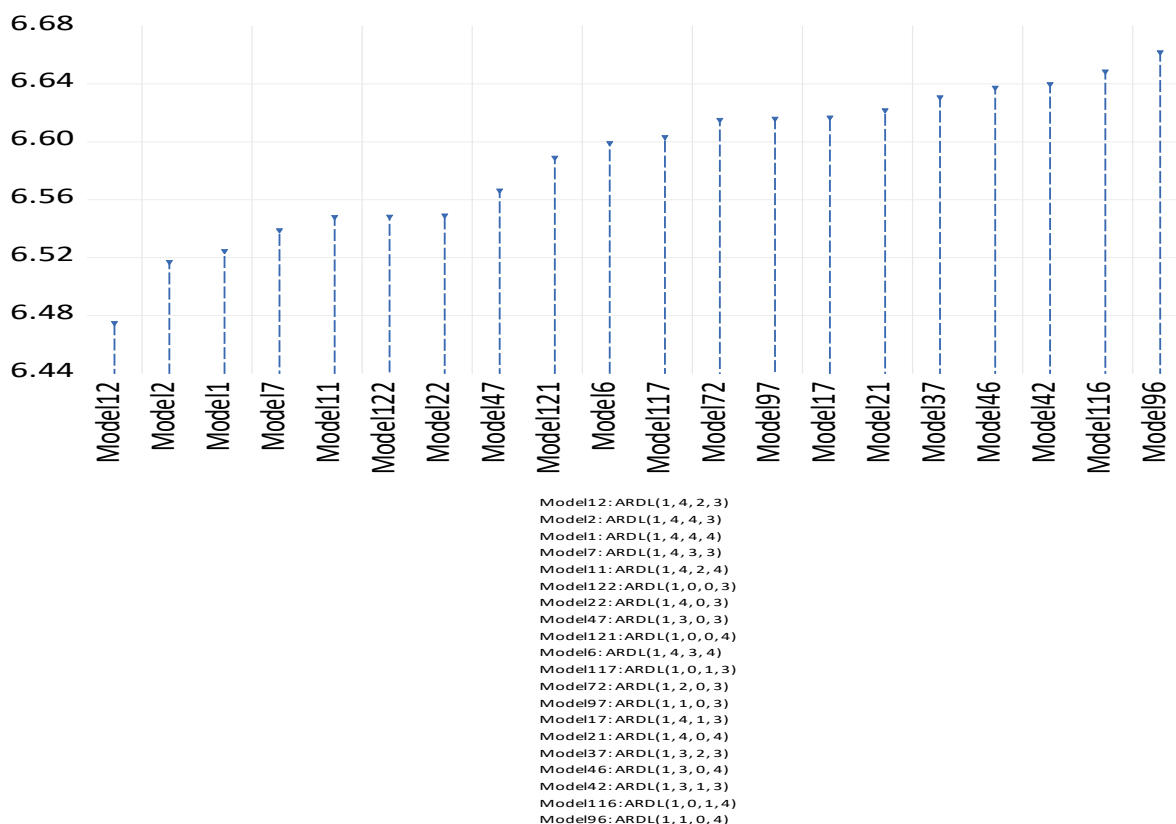
**Bibliography:**

1. Akbaş, H., Aysan, A., & Ceyhan, S. (2012). Determinants of bank profitability: An investigation on Turkish banking sector. *Öneri Dergisi*, Türkiye, 10 (37), 103-110.
2. Al baraka bank algeria website. (2023/07/ 31). From <https://www.albaraka-bank.dz/?lang=ar>.
3. Al Salam Bank website - Algeria. (2023/07/ 31). From <https://www.alsalamalgeria.com/>.
4. AlSharif, B. M. (2021). Impact of exchange rate and interest rate on Islamic bank's performance. *Indian Journal of Economics and Business*, India, 20 (2), 445-460.

5. Chouikh, A., & Blagui, Y. (2017). The determinants of bank performance: The case of Tunisian listed banks. *Journal of Finance and Accounting*, Tunisia, 5 (2), 53-60.
6. Fotios, P., & Kyriaki, K. (2007). Factors Influencing the Profitability of Domestic and Foreign Commercial Banks in the European Union. *International Business and Finance* (21), 222-237.
7. Hassan, S., & Ahmed, R. (2019). Internal determinants of Islamic bank profitability: Evidence from Bangladesh. *International Journal of Economics and Financial Research*, Bangladesh, 5 (7), 171-176.
8. Mai Ahmed, A. (2022). The Impact of Macroeconomic and Specific Factors of Commercial and Islamic Banks on Profitability Evidence from Egyptian Market. *International Journal of Economics and Financial Issues*, Egypt, 12 (2), 16-17.
9. Marshall, J. (2009). *The financial crisis in the US: key events, causes and responses*. House of Commons Library, United States of America, 9,34.
10. Mkadmi, J. e. (2020). The Determinants of Financial Performance: A Comparative Analysis Between Conventional and Islamic Malaysian Banks. *JOURNAL OF SMART ECONOMIC GROWTH*, Malaysia, 5 (1), 22.
11. Muhammad, A. S., & Zaheer, A. (2012). Financial stability of Islamic banking in Pakistan: An empirical study. *African Journal of Business Management*, Pakistan, 6 (10), 6-14.
12. MUNIB, B., & ATIYA, Y. J. (2013). Impact of Macroeconomic Forces on Nonperforming Loans: An Empirical Study of Commercial Banks in Pakistan. *WSEAS TRANSACTIONS on BUSINESS and ECONOMICS*, Pakistan, 10 (1), 43-44.
13. Olokoyo, F. O., & Chika Yinka, B. (2021). THE IMPACT OF MACROECONOMIC VARIABLES ON BANK PERFORMANCE IN NIGERIA. *Savings and Development, Nigeria*, (43), 31-47.
14. Ongore, V. (2013). Determinants of Financial Performance of Commercial Banks in Kenya. *International Journal of Economics and Financial Issues, Kenya*, 3 (1), 237- 252.
15. Rachmadita, D., Nindito, M., & and Hasanah, N. (2013). The Influence of Savings, Equity, Non Performing Financing and Profit Sharing on The Financing of Islamic Banks in Indonesia. *Bangkok: International Conference on Business, Economics, and Accounting. Bangkok.04/02/2013,12*.
16. Sufian, F. (2006). Size and Returns to Scale of the Islamic Banking Industry in Malaysia: Foreign Versus Domestic Banks. *Journal of Economics and Management*, Malaysia, 14 (2), 147-175.
17. Sufian, F., & Zulkhibri, M. (2011). The Nexus between Economic Freedom and Islamic Bank Performance: Empirical Evidence from the MENA Banking Sectors. *8th International Conference on Islamic Economics and Finance*. <https://ireview.com/8th-international-conference-on-islamic-economics-and-finance/29/07/2023>.
18. Wayne, A., & MacIntosh, A. (1998.July). *History of Usury Prohibition, Accounting, Business & Financial History*. London: Routledge. <https://www.routledge.com/The-Routledge-Companion-to-Business-History/Wilson-Toms-Jong-Buchnea/p/book/9781032242309,30/07/2023>.
19. Yousfi, I. (2016). The impact of macroeconomic, structural variables and banks' characteristics on Islamic banks performance: Panel evidence from Jordanian banks, Jordan ,(2000-2014). *El-Bahith Review*. <https://www.asjp.cerist.dz/en/downArticle/7/16/16/2808,25/06/2023>.
20. Zhang, X., & Daly, K. (2015). The impact of bank-specific and macroeconomic factors on China's bank performance. *Chinese Economy, China*, 47 (5), 5-28.

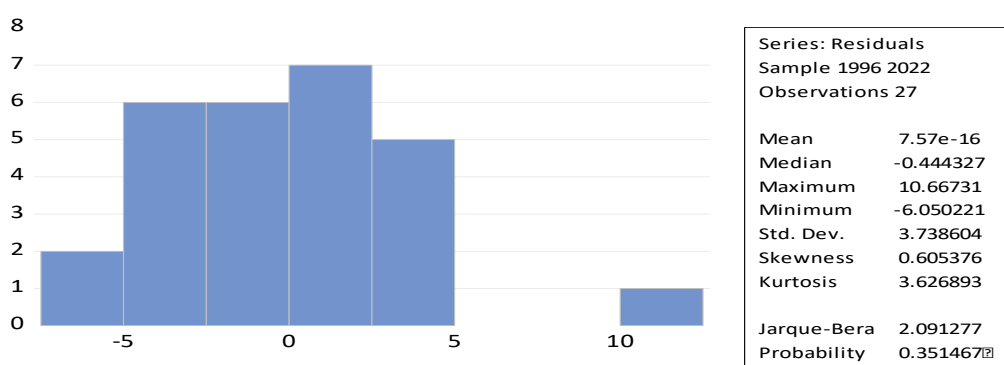
### Appendix 07: Akaike information criteria

Akaike Information Criteria (top 20 models)



Source: (EViews 12) program outputs

### Appendix 08: Results of Normality test



Source: (EViews 12) program outputs

### Appendix 09: Estimating the model in the long term

Levels Equation  
 Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	-0.977489	0.925139	-1.056586	0.3099
INFL	-0.027591	0.350518	-0.078716	0.9385

M2	-0.353929	0.293962	-1.203997	0.2501
C	14.78163	4.693731	3.149228	0.0077

$$EC = ROA - (-0.9775 * GDP - 0.0276 * INFL - 0.3539 * M2 + 14.7816)$$

Source: (EViews 12) program outputs

**Appendix 10: Estimation of the ECM error correction model for the shortterm relationship**

ECM Regression

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP)	-0.308404	0.380403	-0.810731	0.4321
D(GDP(-1))	1.292450	0.450847	2.866719	0.0132
D(GDP(-2))	2.766094	0.581551	4.756410	0.0004
D(GDP(-3))	1.471082	0.550156	2.673937	0.0191
D(INFL)	0.123767	0.223803	0.553018	0.5896
D(INFL(-1))	0.484731	0.223775	2.166157	0.0495
D(M2)	-0.046259	0.171139	-0.270298	0.7912
D(M2(-1))	0.587681	0.138155	4.253763	0.0009
D(M2(-2))	0.759741	0.133085	5.708706	0.0001
CointEq(-1)*	-1.193288	0.152782	-7.810404	0.0000
R-squared	0.872928	Mean dependent var		0.161481
Adjusted R-squared	0.805655	S.D. dependent var		10.48781
S.E. of regression	4.623509	Akaike info criterion		6.178302
Sum squared resid	363.4062	Schwarz criterion		6.658242
Log likelihood	-73.40708	Hannan-Quinn criter.		6.321013
Durbin-Watson stat	2.070001			

Source: (EViews 12) program outputs