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Research Article

Determining The Long-Term Relationship Between Financial Inclusion And Economic Growth In Algeria For The Period 2004-2019: An Econometric Study Using The ARDL Approach

Derbal Soumeia[1*], Benbordi Hanane[2]

[1*]Univesity of El Oued, Algeria, derbal-soumeia@univ-eloued.dz
[2]Univesity of El Oued, Algeria, hanan.benbordi@gmail.com,

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ABSTRACT

This study aimed to determine the long-term relationship between financial inclusion and economic growth in Algeria for the period 2004-2019. Financial inclusion was measured using two indicators: the first is the banking penetration index (number of commercial bank branches per 100,000 adults), and the second is the financial services index (number of borrowers from commercial banks per 1,000 adults). Economic growth was measured by GDP at constant US dollar prices. Using a set of econometric approaches and tools and relying on the Autoregressive Distributed Lag (ARDL) methodology, we found a long-term equilibrium relationship between financial inclusion and economic growth. We also concluded that changes in the number of bank branches and the number of borrowers are accompanied by changes in economic growth in the same direction.

Keywords: Financial Inclusion, Economic Growth, ARDL Model

Introduction:

The financial system of any country is the primary and most crucial pillar of economic activity, due to its effective role in linking various aspects of economic activity by creating an environment that gathers savings and capital for economic projects. In this context, many researchers emphasize that to achieve a developed financial system, it must be based on a popular foundation, meaning providing opportunities for all individuals and institutions to access financial services, known as "financial inclusion." This term became prominent in 1993, with economic policies striving to achieve it to attain economic stability, primarily growth, and increased economic and social welfare. This research, titled "Determining the Long-Term Relationship Between Financial Inclusion and Economic Growth in Algeria for the Period 2004-2019," adds a new dimension to this context, illustrating the extent to which financial inclusion contributes to enhancing economic growth.

Main Problem:

The main problem revolves around the following question: To what extent does financial inclusion contribute to increasing economic growth in Algeria for the period 2004-2019?

Sub-Questions:

From the main question, several sub-questions arise:

- What is meant by financial inclusion?
- Does financial inclusion have a positive impact on economic growth in Algeria for the period 2004-2019?
- What is the nature of the relationship between financial inclusion and economic growth?

Study Hypotheses:

The study starts from the hypothesis that financial inclusion has a long-term equilibrium relationship with economic growth, meaning any change in financial inclusion is accompanied by a change in economic growth in the same direction. From this main hypothesis, several sub-hypotheses emerge:

- Financial inclusion means providing high-quality financial services at affordable prices to all segments of society, including low-income individuals.
- Financial inclusion is positively and statistically significantly related to economic growth in Algeria.
- Financial inclusion stimulates the economic cycle, thereby enhancing economic growth.

Study Objective:
The objective of the study is to determine the relationship between financial inclusion and economic growth by answering the following question: To what extent does financial inclusion contribute to increasing economic growth in Algeria, based on data from the period (2004-2019)?

Study Methodology:
To address this study, we followed the descriptive method using the statistical and econometric analysis approach. This involved describing the phenomenon under study and the variables constituting the model.

1. Theoretical Framework of the Study:

1.1. Definition of Financial Inclusion:

The Arab Monetary Fund, in its 2017 joint report with the Consultative Group to Assist the Poor, defines financial inclusion as "the access of all individuals, including those with low incomes, and all businesses, whether large or small, to formal financial services at affordable prices and high quality, provided through formal means and sustainably by a variety of financial service providers within a suitable legal and regulatory framework" (Hassan Amin Mohamed, 2020, p. 299).
Financial inclusion is also defined as "the availability and equality of opportunities to access financial services" (Kajole & Mandeep, 2016, pp. 127-153).
To reach a universally accepted definition of financial inclusion, the Financial Inclusion Data Working Group, part of the Alliance for Financial Inclusion, proposed the following essential criteria for financial inclusion indicators (Data Working Group, 2011, p. 2):

- **Utility and Relevance:** Selecting indicators that aid in developing national financial inclusion policies.
- **Consistency:** Ensuring measurement consistency and comparability over time and space.
- **Balance:** Addressing both supply (access to financial services) and demand (usage of these services) sides of financial inclusion.
- **Pragmatism:** Relying as much as possible on available and accessible data to reduce cost and effort.
- **Flexibility:** Recognizing that financial inclusion is related to a country's economic, geographical, social, and cultural context, varying according to conditions and resources between countries. Thus, the proposed criteria for calculating the financial inclusion index allow countries sufficient flexibility in choosing definitions or using alternative indicators.
- **Ambition:** Accurate measurement of financial inclusion may require additional efforts and resources to meet the fundamental criteria as specified. Nevertheless, based on flexibility and pragmatism, alternative indicators can be adopted if it is impossible to obtain the primary indicators, with improvements made to these indicators later on, adhering to the principle of ambition based on the dynamism of the fundamental criteria.

1.2. Objectives of Financial Inclusion:

The Consultative Group to Assist the Poor believes that building an inclusive financial system is the only way to reach the poor and low-income individuals, aiming to achieve the following financial inclusion goals (Shenbi and Ben Lakhdar, 2019, pp. 108-109):

- Enhancing access to financial services and products for all segments of society, educating citizens about the importance of financial services, and how to access and benefit from them to improve their economic and social conditions.
- Facilitating access to funding sources to improve citizens' living conditions, especially the poor.
- Promoting entrepreneurship and economic growth.
- Enabling very small and medium-sized enterprises to invest and expand.
- Reducing poverty levels and achieving economic prosperity and welfare.

1.3. Dimensions of Financial Inclusion:

According to the World Bank's methodology, the dimensions of financial inclusion are divided into five dimensions, as presented in the following table (Ben Rajab, 2018, p. 5):

Table No. (1) Dimensions of Financial Inclusion

Dimension	Measurement Indicators
Dimension 1: Use of Bank Accounts	• Percentage of adults with financial accounts at formal institutions such as banks, post offices, and microfinance institutions. • Purpose of the accounts (personal, business) • Number of transactions (deposits, withdrawals) • Method of accessing bank accounts (e.g., ATMs, bank branches).
Dimension 2: Savings	• Percentage of adults who have saved in the past 12 months using formal financial institutions such as banks, post offices, etc. • Percentage of adults who have saved in the past 12 months using informal savings institutions or any person outside the household. • Percentage of adults who have saved otherwise (e.g., at home) in the past 12 months.
Dimension 3: Borrowing	• Percentage of adults who borrowed in the past 12 months from a formal financial institution. • Percentage of adults who borrowed in the past 12 months from traditional informal sources, including borrowing from family and friends.
Dimension 4: Payments	• Percentage of adults who used a formal account to receive wages or government payments in the past 12 months. • Percentage of adults who used a formal account to receive or send money to family members living elsewhere in the past 12 months. • Percentage of adults who used a mobile phone to pay bills or send or receive money in the past 12 months.
Dimension 5: Insurance	• Percentage of adults who have insurance. • Percentage of adults working in agriculture, forestry, or fishing who insure their activities (crops and livestock) against natural disasters (rainfall, storms).

Source: Prepared by the researchers

2. Previous Studies:

Several studies have addressed the topic of financial inclusion and its impact on macroeconomic variables, such as increased consumption, higher propensity to save, poverty reduction, economic growth, and inflation control. For instance, the study by Abiola A. Babajide and others (2015) examined the determinants of financial inclusion and its impact on economic growth in Nigeria (Abiola A, Folasade B, & Alexander E, 2015, pp. 629-637). The study by Bara and Calvin (2016) focused on the impact of financial inclusion on economic growth in Zimbabwe (Bara & Mudzingiri, 2016, pp. 65-75). The study by Nasir Ali and others (2019) investigated the impact of financial inclusion on economic growth in Pakistan (Nasir, Kaneez, & Jmeel, 2019, pp. 166-174). The study by Angga Erlando and others (2020) explored the relationship between financial inclusion, economic growth, and poverty alleviation in East Indonesia (Angga, Feri, & Someya, 2020, pp. 2-13).

2.1. Study by Hassan Amin Mohamed Mahmoud (2020):

Titled "The Impact of Financial Inclusion on Economic Growth in Egypt," this study attempted to answer two questions regarding the impact of financial transactions on banks and the relationship between financial depth and poverty reduction in Egypt for the period 1995-2018. The study used two econometric models to examine the relationship between financial inclusion and economic growth, and financial depth and poverty reduction in Egypt, employing the ARDL methodology. The study found a long-term equilibrium relationship between financial inclusion and economic growth, with a positive long-term relationship between financial inclusion (household sector loans from commercial banks, household sector deposits in banks) and economic growth. Additionally, it found a statistically significant positive relationship between financial depth (private sector credit, number of ATMs) and poverty reduction as represented by GDP per capita (Hassan Amin Mohamed, 2020, pp. 297-342).

2.2. Study by Asmaa Dardour and Saeeda Harakat (2020):

Titled "Measuring the Impact of Financial Inclusion on Economic Growth in Algeria for the Period 1980-2017," this study aimed to measure the impact of financial inclusion using three variables (loans, deposits, number of bank branches) on GDP as an indicator of economic growth, using the ARDL methodology. The study concluded that there is a long-term equilibrium relationship between the study variables, except for the deposit variable, which is inversely related to growth (Dardour & Harakat, 2020, pp. 71-90).

2.3. Study by Abeer Rashdan and Noura Eissa (2020):

Titled "The Determinants of Financial Inclusion in Egypt," this study analyzed the determinants of financial inclusion in Egypt. It found no significant relationship between gender and financial inclusion in Egypt, concluding that wealthier, older, and more educated individuals are more integrated into the financial system. The study identified the main barrier to financial inclusion as a lack of funds, hindering the opening of formal accounts (savings or credit accounts). It also emphasized the need for a financial literacy approach to enhance the positive role of financial inclusion in economic growth in Egypt (Rashdan & Eissa, 2020, pp. 123-136).

2.4. Study by Mohamed and others (2020):

Titled "The Impact of Financial Inclusion on GDP Growth in Egypt," the study aimed to measure the impact of financial inclusion on GDP growth in Egypt using quarterly data from 2007-2018. It found a positive relationship between GDP and the number of ATMs as an indicator of financial inclusion in Egypt, and an inverse relationship between GDP and total deposits in Egypt (Noureldin Sayed, Abbas, & Abdelaziz Touny, 2020, pp. 379-400).

2.5. Study by Hamad Omar Bakar and Masoud Mohammed Albiman (2021):

Titled "The Role of Financial Inclusion on Economic Growth in the Sub-Saharan African (SSA) Region," this study aimed to determine the impact of financial inclusion on economic growth in Sub-Saharan Africa using a set of approaches and tools, based on data from 45 countries in Africa for the period 2004-2017, and employing the Generalized Method of Moments (GMM) to examine whether financial inclusion through improved access positively contributed to economic growth. The study concluded that financial inclusion significantly and positively contributed to economic growth, thereby enhancing economic growth (Mohammed Albiman & Omar Bakar, 2021, pp. 1-21).

3. Results and Discussion:

To estimate the relationship between financial inclusion, represented by banking penetration (number of commercial bank branches), financial services (number of borrowers from commercial banks), and economic growth, we used annual data for the period 2004-2019, relying on World Bank data. The study variables were selected based on economic theory and previous studies. We used the logarithm method to homogenize the time series data of the variables. We will estimate the following model:

LRGDP = f (LCBB + LLCB) ..... (01)

where:

- LRGDP: Logarithm of GDP
- LCBB: Logarithm of commercial bank branches per 100,000 adults
- LLCB: Logarithm of number of borrowers from commercial banks per 1,000 adults

We will use the Autoregressive Distributed Lag (ARDL) approach to estimate the impact of financial inclusion on GDP as an indicator of economic growth in Algeria. The final model will be as follows:

$$\Delta LRGDP_t = \beta_0 + \sum_{t=1}^{p} \beta_{1t} \Delta LRGDP_{t-i} + \sum_{t=1}^{q1} \beta_{2t} \Delta LCBB_{t-i} + \sum_{t=1}^{q2} \beta_{3t} \Delta LLCB_{t-i} + \alpha_1 LRGDP_{t-1} + \alpha_2 LCBB_{t-1} + \alpha_3 LLCB_{t-1} + + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots (02)$$

1.3. Study Variables:

Table No. (2) Study Variables

Variable	Symbol	Meaning	Data Source
Real GDP	RGDP	Represents the value of goods and services produced within the geographical area of the country (originated within the country regardless of the nationality of the person or institution producing it).	World Bank Data
Commercial Bank Branches	CBB	Number of commercial bank branches per 100,000 adults, used as an indicator of banking penetration in Algeria.	World Bank Data
Borrowers from Commercial Banks	LCB	Focuses on the number of borrowers from commercial banks per 1,000 adults, used as an indicator of financial services in Algeria.	World Bank Data

Source: Prepared by the researchers

2.3. Stability Analysis of Time Series

As a first step, we will conduct a stability test of the time series, which is a prerequisite for cointegration. The unit root test is the most important method for determining the stability of time series and understanding their statistical properties. The Augmented Dickey-Fuller (ADF) unit root test has been used for this purpose. The following table presents the results:

Table 3: ADF Time Series Stability Test

1 st difference			Level			Variabl
None	Trend and intercept	Intercept	None	Trend and intercept	Intercept	
-2.023**	-3.7582 *	-3.717**	2.8757	-2.502	-0.927	LRGDP
-1.340	-3.8476**	-3.895**	1.7940	-1.672	-0.585	LLCB
/	/	/	1.3588	-4.109 **	-4.620***	LCCB
Test critical values			Test critical values			
-2.740	-4.800	-4.004	-2.7406	-4.9922	-4.004	%1
-1.968	-3.791	-3.098	-1.9684	-3.8753	-3.098	%5
-1.604	-3.342	-2.690	-1.6043	-3.3888	-2.690	%10

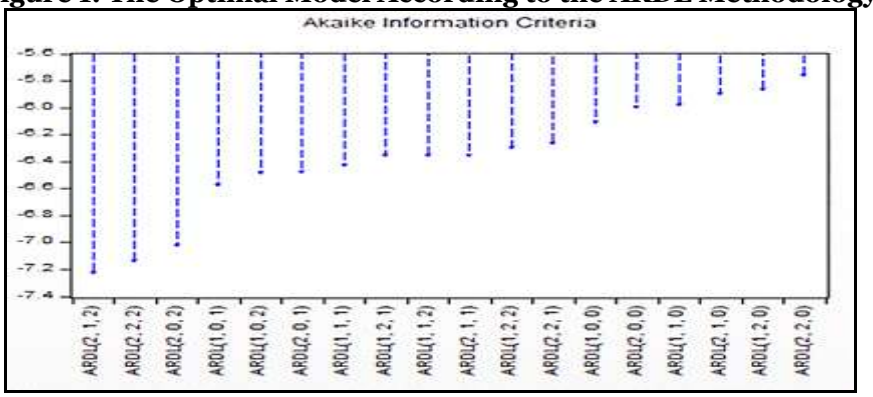
*, **, *** significant at 1%, 5%, 10% level of significant respectively.
Source: Prepared by the researchers based on the outputs of EViews 10

(* ** ***) Indicate the acceptance of the alternative hypothesis H1H_1H1, meaning that the series are stable at significance levels of (10%, 5%, 1%), respectively. The results in the table show that all the variables in the study are unstable at their original level, except for the variable of commercial bank branches LCCB, because the calculated ttt value is greater than the critical ttt value at the significance levels of (10%, 5%, 1%). This indicates the rejection of the null hypothesis H0=B=0H_0 = B = 0H0=B=0, which suggests the presence of a unit root in the time series data, and the acceptance of the alternative hypothesis. When taking the first difference, all variables (LRGDP,LLCB) stabilized at different significance levels, as the calculated ttt value is greater than the critical ttt value at the significance levels of (10%, 5%), indicating acceptance of the alternative hypothesis 0≠B≠H00 \neq B \neq H_00□=B□=H0. From this, we conclude that the time series of the study variables are a mix of level and first difference, i.e., integrated of order I(0) and I(1). Therefore, the Autoregressive Distributed Lag (ARDL) model (Pesaran, Smith, & Shin, pp. 289-326) is the most suitable for measuring and analyzing the relationship.

3.3. Determining the Optimal Lag Lengths:

Before estimating the relationship in the short and long term according to the ARDL model, it is necessary to determine the optimal number of lags based on the best model according to the Akaike Information Criteria (AIC). The optimal model was determined to be (22,1). The following figure illustrates this:

Figure 1: The Optimal Model According to the ARDL Methodology



Source: Prepared by the researchers based on the outputs of EViews 10.

4.3. Model Validity Tests:

After estimating the selected ARDL model according to the (AIC) criterion, the model must undergo a series of residual diagnostics tests, including:

a. Serial Correlation Test for Residuals (Serial Correlation LM Test)
b. Heteroskedasticity Test
c. Normality Test

The following table presents the model validity tests based on the residual diagnostics tests.

Table No. (4): Residual Diagnostics Tests

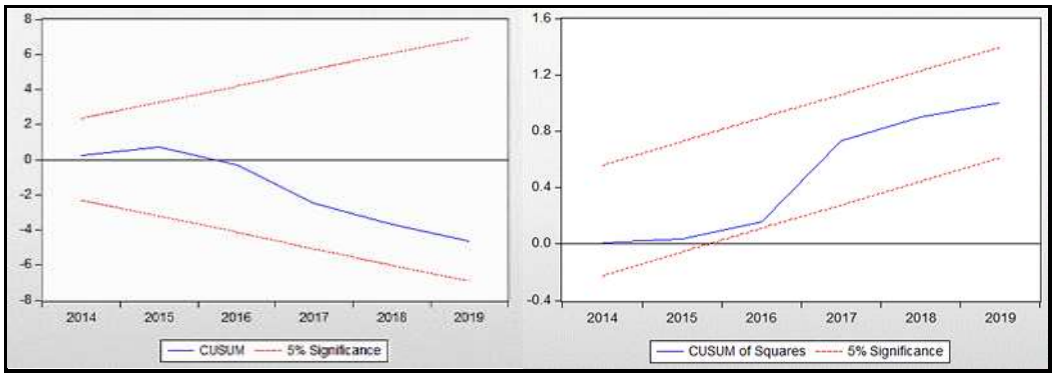
Breusch- Godfrey serial correlation LM test			
F-Statistic	0.989794	Prob. F(1,5)	**0.3655**
Obs*R-Square	2.313454	Prob. Chi-Square(1)	**0.1283**
Heteroskedasticity Test ARCH			
F-Statistic	0.480371	Prob. F(1,14)	**0.5026**
Obs*R-Square	0.543956	Prob. Chi-Square(1)	**0.4608**
Normality test Jarque Bera			
Jarque-Bera			**0.29296**
Probability			**0.86374**

Source: Prepared by the researchers based on the outputs of EViews 10.

From the table above regarding residual diagnostics tests, it is clear that the model is free from statistical issues. This is evidenced by the results of the Breusch-Godfrey serial correlation LM test, where the Fisher statistic p-value is 0.3655, which is greater than the 5% significance level. Thus, we reject the alternative hypothesis and accept the null hypothesis, which states that there is no issue of serial correlation in the residuals.
The second residual diagnostic test, the Heteroskedasticity Test ARCH, indicates that there is no problem with heteroskedasticity since the p-value for the ARCH test statistic is 0.5026, which is greater than the 5% significance level. This leads us to accept the null hypothesis, which asserts that the variance of the random error term in the estimated model is constant.
Additionally, the Normality Test (Jarque-Bera test) assesses whether the residuals of the model are normally distributed. The results show that the Jarque-Bera p-value is 0.8647, which is not significant at the 5% level, thus we accept the null hypothesis that the residuals are normally distributed.
From the three results above, it is evident that the model does not suffer from statistical issues and is therefore valid for the study.

5.3. Testing for Structural Stability of the Model:

Using tests such as the Cumulative Sum of Residuals (CUSUM) and the Cumulative Sum of Squares of Residuals (CUSUM of Squares), as well as the Ramsey RESET Test for model specification, we can confirm that the data used in the study does not ex



Source: Prepared by the researchers based on the outputs of EViews 10.

From **Figure No. (2)**, we observe that the CUSUM and CUSUM of Squares tests show that the CUSUM statistic, which is a cumulative sum of residuals, lies within the critical bounds (upper and lower limits) at the 5% significance level. Similarly, the CUSUM of Squares test also falls within the critical bounds at the 5% significance level. This confirms that the model is stable and its parameters are consistent.

Table No. (5): Results of the Ramsey RESET Test

Ramsey RESET Test			
Test	Value	df	Probability
t-statistic	0.747476	5	**0.4884**
F-statistic	0.558720	(1.5)	**0.4884**

Source: Prepared by the researchers based on EViews 10.

From the above table concerning the model's mathematical specification, we also observe that the F-statistic value is 0.4884, which is greater than the 5% significance level. Thus, the model does not suffer from the problem of model mis-specification.

6.3. Methodology of the Bounds Test:

This test is used to determine the presence of a long-term equilibrium relationship by using the F-statistic, which has a non-standard distribution and does not rely on factors such as sample size or the inclusion of a trend variable in the estimation. The following table presents the results of the Bounds Test.

Table No. (6): Results of the Cointegration Bounds Test

ARDL Bounds Test Sample: 2004 - 2019 Included observation: 20		
Test Statistic	Value	**K**
F-Statistic	8.832557	**2**
Critical Value Bounds		
Significance	Lower Bound	Upper Bound
%10	2.63	**3.35**
%5	3.1	**3.87**
%2.5	3.55	**4.38**
%1	4.13	**5**

Source: Prepared by the researchers based on EViews 10.

From the results in the above table, we observe that the F-statistic value (F-statistic = 8.832557) is greater than the upper critical value, which is 5 at the 1% significance level. This indicates the rejection of the null hypothesis that there is no cointegration among the study variables, and acceptance of the alternative hypothesis which suggests the presence of cointegration among the study variables. In other words, there is a long-term equilibrium relationship where the explanatory variables jointly affect the dependent variable, real GDP, as an indicator of economic growth.

Table No. (7): Results of the Short-Term Error Correction Model (ECM-ARDL)

Variable	**Coefficient**	**Std. Error**	**t-statistic**	**Prob**
C	0.471235	0.221194	2.130413	**0.0772**
LGDPC (-1)*	-0.245810	0.046330	-5.305614	**0.0018**
LCBB(-1)	0.342108	0.164117	2.084541	**0.0822**
LLCB (-1)	0.082061	0.021390	3.836355	**0.0086**
D(LGDPC(-1))	-1.098050	0.337477	-3.253704	**0.0174**
D(LCBB)	0.564710	0.215795	2.616886	**0.0398**
D(LLCB)	-0.101122	0.031139	-3.247412	**0.0175**
D(LLCB(-1))	-0.116175	0.035673	-3.256687	**0.0173**

Source: Prepared by the researchers based on EViews 10.

The above table shows the results of the error correction model, which reflects the speed of adjustment of short-term deviations to reach long-term equilibrium. For this, the error correction term should be negative and statistically significant. The table indicates that the error correction term is estimated at -0.245810, with a significance level of less than 1%. This suggests that 24% of short-term errors can be corrected within a time unit of one year.

Table No. (8): Results of Estimating the Long-Term Relationship Between the Model Variables

Variable	**Coefficient**	**Std. Error**	**t-statistic**	**Prob**
LCBB	**1.391761**	0.607687	2.290258	**0.0619**
LLCB	**0.333838**	0.057949	5.760898	**0.0012**
C	**1.917074**	0.844569	2.269884	**0.0637**
EC = LRGDP - (1.391761 *LCBB + 0.333838*LLCB +3.648609)				

Source: Prepared by the researchers based on EViews 10.

The above table illustrates the results of estimating the long-term relationship. It is evident that all independent variables are statistically significantly related to the dependent variable, economic growth.

The number of commercial bank branches (LCBB) is positively and statistically significantly related to GDP, which represents economic growth. The coefficient is estimated at 1.391761, meaning that a 10% increase in the number of bank branches per 100,000 adults will result in a 13% increase in real GDP in the same direction. The variable of borrowers from commercial banks (LLCB) is positively and statistically significantly related to GDP, representing economic growth. The coefficient is estimated at 0.333838, indicating that a 10% change in the number of borrowers from commercial banks per 1,000 adults will be accompanied by a 3% change in real GDP in the same direction.

Conclusion: This study aimed to answer the following main question: To what extent does financial inclusion contribute to boosting economic growth in Algeria during the period 2004-2019? By employing various approaches, methods, tests, and economic measurement tools, the following results were obtained:

- The study results, using the distributed lag approach and the Bounds Test, indicated the existence of a long-term equilibrium relationship from the explanatory variables to the dependent variable.
- There is a positive relationship between financial inclusion and economic growth that is statistically significant and consistent with economic theory. An increase in the number of commercial bank branches per 100,000 adults is associated with increased economic growth. This is because more bank branches bring services closer to citizens, leading to higher demand for services such as deposits, withdrawals, and loans. These financial transactions contribute to increased consumption or investment, which boosts overall demand for goods and services and changes inventory, leading to higher income and growth.
- An increase in the number of borrowers from commercial banks per 1,000 adults will contribute to growth. This is due to the fact that borrowed funds lead to increased investments, thus supporting businesses and real economic sectors, resulting in higher GDP.
- The model used in the study is free from statistical problems.
- Short-term results showed that the error correction coefficient, which is required to be negative and statistically significant, is estimated at -0.245810. This indicates that 24% of short-term errors are automatically corrected to reach long-term equilibrium at a 1% significance level, meaning 24% of short-term errors are corrected within one year.

Recommendations: Based on the results, we recommend the following:

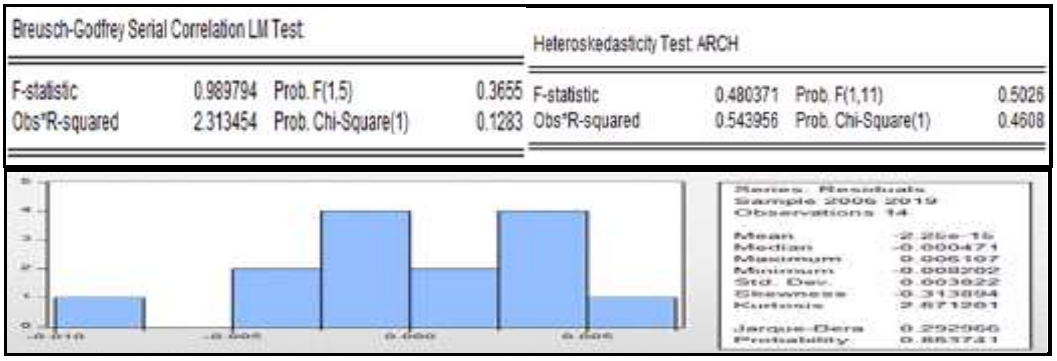
- Work to increase financial inclusion in Algeria by expanding the number of bank branches and providing opportunities for more borrowers.
- Enhance banking awareness and strive to eradicate financial illiteracy.

References:

1. Noureldin Sayed, M., Abbas, N., & Abdelaziz Touny, M. (2020). The Impact of Financial Inclusion on GDP Growth in Egypt. *Scientific Journal of Economic & Commerce*.
2. Abiola, A. B., Folasade, B. A., & Alexander, E. O. (2015). Financial Inclusion and Economic Growth in Nigeria. *International Journal of Economic and Financial*, 5(3).
3. Angga, E., Feri, D., & Someya, M. (2020). Financial Inclusion, Economic Growth, and Poverty Alleviation: Evidence from Eastern Indonesia. *Journal Heliyon*, 6, pp. 2-13.
4. Bara, A., & Mudzingiri, C. (2016). Financial Innovation and Economic Growth: Evidence from Zimbabwe. *Investment Management and Financial Innovations*, 13(2), pp. 65-75.
5. Data Working Group, F. (2011). Measuring Financial Inclusion: Core Set of Financial Inclusion Indicators. *Alliance of Financial Inclusion*.
6. Kajole, N., & Mandeep, K. (2016). Financial Inclusion and Labour Human Development: Cross-Country Evidence. *Management and Labour Studies*, 41(2), pp. 127-153.
7. Mohammed Albiman, M., & Omar Bakar, H. (2021). Role of Financial Inclusion on Economic Growth in Sub-Saharan Africa (SSA) Region. *Athens Journal of Business & Economics*, pp. 1-21.
8. Nasir, A., Kaneez, F., & Jmeel, A. (2019). Impact of Financial Inclusion on Economic Growth in Pakistan. *Journal of Managerial Sciences*, No. 3, pp. 166-174.
9. Pesaran, H., Smith, R., & Shin, Y. (n.d.). Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, 16(3), pp. 289-326.
10. Rashdan, A., & Eissa, N. (2020). The Determinants of Financial Inclusion in Egypt. *International Journal of Financial Research*, 11(1).
11. Darfour, A., & Kharrat, S. (2020). Measuring the Impact of Financial Inclusion on Economic Growth in Algeria for the Period 1980-2017. *Journal of Strategy and Development*, 10(4).
12. Ben Rajab, J. (2018). Calculating the Financial Inclusion Index and Estimating the Relationship Between Financial Inclusion and GDP in Arab Countries. *Arab Monetary Fund*.
13. Chambi, S., & Ben Lakhdar, S. (2019). The Importance of Financial Inclusion in Achieving Development: Enhancing Financial Inclusion in the Arab Republic of Egypt. *Journal of Financial and Accounting Research*, 04(01).

14. Mohamed Hassan Amin Mohamed. (2020). The Impact of Financial Inclusion on Economic Growth in Egypt. *Scientific Journal of Business and Environmental Studies*, 11(1), Issue 2.

Appendix



Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.989794	Prob. F(1,5)	0.3655
Obs*R-squared	2.313454	Prob. Chi-Square(1)	0.1283

Heteroskedasticity Test: ARCH

F-statistic	0.480371	Prob. F(1,11)	0.5026
Obs*R-squared	0.543956	Prob. Chi-Square(1)	0.4608

Series: Residuals
Sample 2006 2019
Observations 14

Mean	-2.25e-15
Median	-0.000471
Maximum	0.006107
Minimum	-0.008202
Std. Dev.	0.003622
Skewness	-0.313884
Kurtosis	2.871261
Jarque-Bera	0.292966
Probability	0.863741

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LCBB	1.391761	0.607687	2.290258	0.0619
LLCB	0.333838	0.057949	5.760898	0.0012
C	1.917074	0.844569	2.269884	0.0637

EC = LGDDP - (1.3918*LCBB + 0.3338*LLCB + 1.9171)

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LCBB	1.391761	0.607687	2.290258	0.0619
LLCB	0.333838	0.057949	5.760898	0.0012
C	1.917074	0.844569	2.269884	0.0637

EC = LGDDP - (1.3918*LCBB + 0.3338*LLCB + 1.9171)

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LRGDP)
Selected Model: ARDL(2, 1, 2)
Case 2: Restricted Constant and No Trend
Date: 08/24/21 Time: 02:12
Sample: 2004 2019
Included observations: 14

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.471235	0.221194	2.130413	0.0772
LRGDP(-1)*	-0.245810	0.046330	-5.305614	0.0018
LCBB(-1)	0.342108	0.164117	2.084541	0.0822
LLCB(-1)	0.082061	0.021990	3.836355	0.0086
D(LRGDP(-1))	-1.098050	0.337477	-3.253704	0.0174
D(LCBB)	0.564710	0.215795	2.616886	0.0398
D(LLCB)	-0.101122	0.031139	-3.247412	0.0175
D(LLCB(-1))	-0.116175	0.035673	-3.256687	0.0173

Ramsey RESET Test
Equation: UNTITLED
Specification: LRGDP LRGDP(-1) LRGDP(-2) LCBB LCBB(-1) LLCB LLCB(-1) LLCB(-2) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.747476	5	0.4884
F-statistic	0.558720	(1, 5)	0.4884

Dependent Variable: LRGDP
Method: ARDL
Date: 08/24/21 Time: 02:15
Sample (adjusted): 2006 2019
Included observations: 14 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): LCBB LLCB
Fixed regressors: C
Number of models evaluated: 18
Selected Model: ARDL(2, 1, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LRGDP(-1)	-0.343860	0.372037	-0.924261	0.3910
LRGDP(-2)	1.098050	0.337477	3.253704	0.0174
LCBB	0.564710	0.215795	2.616886	0.0398
LCBB(-1)	-0.222602	0.140554	-1.583750	0.1543
LLCB	-0.101122	0.031139	-3.247412	0.0175
LLCB(-1)	0.067008	0.026395	2.538688	0.0442
LLCB(-2)	0.116175	0.035673	3.256687	0.0173
C	0.471235	0.221194	2.130413	0.0772

R-squared	0.999939	Mean dependent var	5.157389
Adjusted R-squared	0.997701	S.D. dependent var	0.117344
S.E. of regression	0.005626	Akaike info criterion	-7.227217
Sum squared resid	0.000190	Schwarz criterion	-6.862041
Log likelihood	58.59052	Hannan-Quinn criter.	-7.261020
F-statistic	807.0090	Durbin-Watson stat	2.526634
Prob(F-statistic)	0.000000		

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	8.032557	10%	2.63	3.35
k	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5
Actual Sample Size	14	Finite Sample: n=35		
		10%	2.845	3.623
		5%	3.478	4.335
		1%	4.948	6.028
		Finite Sample: n=30		
		10%	2.915	3.695
		5%	3.538	4.428
		1%	5.155	6.265