Journal of Economic Growth and Entrepreneurship JEGE
Spatial and entrepreneurial development studies laboratory
Year : 2023 Vol.6 No.4 pp:27-37

Measuring The Impact of Financial Inclusion And Digital Financial Services on The Level of Economic Activity in Algeria In Light of the Corona Pandemic

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ARTICLE INFO

Article history:
Received:03/04/2023
Accepted:19/06/2023
Online: 05/01/2024

Keywords:
financial inclusionn;
financial technology;
digital financial services:
economic recovery:
Corona pandemic:
JEL Code: E62; G21; O3

ABSTRACT

the research aims to study the impact of some indicators of financial inclusion and digital financial services, represented in the commercial banks per 100,000 adults, the number of commercial bank borrowers per 1,000 adults, the number of ATMs per 100,000 adults, The number of credit card holders, on the size of the activity of the Algerian economy represented by the growth rate of the gross domestic product in light of the Corona pandemic, and using the ARDL model for the period (2011-2021), the study found: the existence of a long-term equilibrium relationship in addition to the short-term relationship (error correction model) between the variables of financial inclusion and economic growth, with a positive relationship between the number of bank branches, the number of borrowers and the number of credit card holders on the one hand, and economic growth, and the presence of a negative impact on the number of ATMs and GDP, which requires more attention to provide a sufficient number of ATMs In order to contribute to the promotion of economic activity

1. Introduction

The Covid 19 pandemic showed the extent of the low level of digital financial inclusion, and the extent of digital underdevelopment of financial services in Algeria, as a result of the difficulties that faced various segments of society in carrying out various financial transactions due to the quarantine measures and social divergence necessary to limit the spread of the Covid 19 virus.

With the spread of the epidemic at the beginning of the year 2020, the importance of digital financial services became more evident as a result of the need for fast and secure financial services, and the severity of this need increased with the emergence and aggravation of the liquidity crisis in the summer of 2020.

1.1. Study problem

Algeria, like other countries in the world, has awakened to the role of financial inclusion, the importance of expanding access to digital financial services, and the consequent positive effects in reviving the national economy and the banking sector, especially in light of the repercussions of the Corona pandemic on the level of economic activity, which was evident in a major effort The Republic, through its program, aims to support and stimulate the use of digital means and electronic operations in payment. In this context, the research problem is represented in the following question:

What is the impact of financial inclusion and digital financial services on the level of economic activity in Algeria in light of the Corona pandemic?

1.2. Study hypotheses

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- Financial inclusion indicators have a positive impact on the GDP growth rate during the study period

- There is a long-term equilibrium relationship between financial inclusion indicators and the GDP growth rate

2. Theoretical literature

2.1. The concept of financial inclusion

Financial inclusion is defined according to the Organization for Economic Co-operation and Development (OCDE): "the process by which access to a wide range of regulated financial services and products is sufficiently enhanced at the right time and at the right price and the use of these services and products is expanded by different segments of society; through Applying innovative curricula that include quality and financial education, with the aim of promoting financial well-being and social and economic inclusion" (Asmaa and Harakat, 2017, p.6)

The World Bank defines financial inclusion in its 2014 report as "the percentage of people or firms that use financial services" (The World Bank, 2014).

The Group of Twenty (G20) and the Global Alliance for Financial Inclusion (AFI) defined it as "promoting the access and use of all segments of society, including marginalized and poor groups, to financial services and products that are commensurate with their needs so that they are provided to them in a fair and transparent manner and at reasonable costs" (Abdul Halim, Ammar Gharbi, 2020, p. 11)

The Union of Arab Banks defines inclusion as "a concept that aims to generalize financial and banking products and services to the largest number of individuals and institutions, especially marginalized groups of society with limited income, through official channels, and to create appropriate financial services at appropriate costs to avoid resorting to these groups." to expensive and unmonitored informal channels and means are high in costs and are not subject to supervision and control" (Union of Arab Banks, March 2017).

2.2. The concept of digital financial services

Digital financial services mean enabling every citizen to obtain financial services through modern technology. Likewise, the McKinsey report defined digital finance as financial services provided through mobile phones, personal computers, the Internet, or cards linked to a reliable digital payment system. (Manyika and Singer, M., White, O, September 2016, p. 04)

Digital financial services are also defined as "a system that allows the customer to access his accounts or any information he wants, and to obtain various banking services and products through an information network connected to his computer or electronic or digital means, or other mechanism (Masoudi, 2015, p. 21).)

Digital finance includes a wealth of new financial products, financial businesses and finance-related programmes, and new forms of customer communication and interaction - from innovative financial technology companies and financial service providers. (Gomber, 2017, p537)

Digital finance includes all products, services, technology and/or infrastructure that enable individuals and companies to access payments, savings, and credit facilities via the Internet without the need to visit a bank branch or without dealing directly with a financial service provider. (Department for the Middle East and Central Asia, October 2017, p. 50)

3. Previous literature

3-1 Study (Baqbak Asmahan, 2022): The main objective of this study is to analyze and measure the impact of banking financial inclusion on economic growth, unemployment and poverty in Algeria during the period (2004-2022), using the error correction model: financial inclusion, the independent variable (Measured by: the number of commercial bank branches per 100,000 adults, the number of deposit accounts with commercial banks per 1,000 adults, the number of commercial bank borrowers per 1,000 adults, the number of ATMs per 100,000 adults, Credit to the private sector and expanded money supply. GDP growth, private domestic saving, private fixed capital formation, per capita income growth and total unemployment were used as dependent variables.

The study concluded that the number of commercial bank branches, the number of automatic teller machines, the number of deposit accounts and the wide money supply have a positive effect on economic growth and a negative impact on poverty and unemployment.

3.2 Study (Nasser Salah El-Din Gharbi, 2022): The study aimed to test the existing relationship between financial inclusion and economic growth in the Maghreb countries (Algeria, Tunisia and Morocco), during the period (1990-2019)

using the basket data and the ARDL model, where then the use of Access to financial services index, financial development index, gross domestic product, total investment index The study concluded that there is no significant relationship between the indicator of financial inclusion and economic growth, neither in the long term nor in the short term, and this means that the level of inclusion achieved in the sample countries still has not reached a level that can positively affect the economic growth of these countries, and that there is no relationship Significant difference between financial development and financial inclusion, which indicates that financial inclusion achieved in the sample countries did not lead to an improvement in the level of financial development.

3.3 Study (Nahla Abu Al-Ezz, 2021): The study attempted to test the impact of the application of financial digitization technology represented in ATMs, credit cards, electronic debts, and mobile money on financial inclusion in a number of African countries during the period 2014-2018, the study sample included 15 countries Africa and Panel Data cross-sectional time series analysis was applied. The study concluded that there is a positive significant effect of the use of ATMs and portable cash on financial inclusion, while on the other hand, the study found that the use of electronic debt and credit cards does not have a significant effect on financial inclusion.

The results indicated that there was the same positive significant effect of using automatic teller machines and mobile money on financial inclusion, and the inflation rate also had a positive significant effect on financial inclusion, while it turned out that there was a negative significant effect of workers' remittances on financial inclusion.

3.4 Study (Mashamba, T., & Chinoda, T, 2021): The study aimed to examine the interactive relationship between financial inclusion, competitiveness of banks and economic growth in Africa based on the data of 24 countries, and using the ARDL autoregressive distributed time gap model for the panel data during During the period 2008-2014, the study found a positive and significant relationship between financial inclusion and economic growth in the long term, while in the short term economic growth significantly reduces the level of financial inclusion.

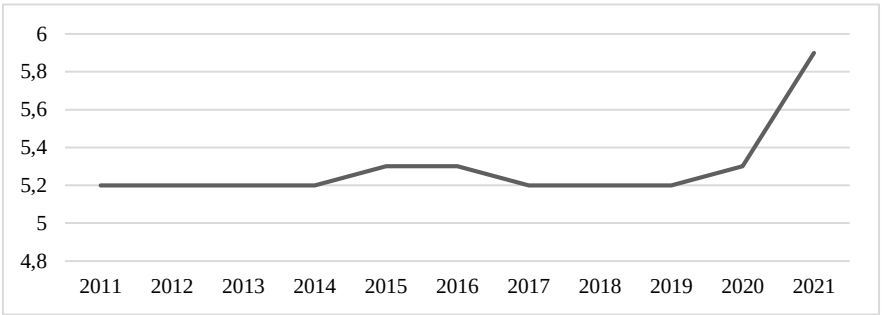
3.5 Study (Okoye, L., Adetiloye, K., & Erin, O., 2020): The main objective of this research paper is to determine the impact of financial inclusion on economic growth and development in Nigeria, using data on selected variables during the period (1986-2015).). The regression estimate was based on ordinary least squares. The main findings of the study were that the provision of credit to the private sector did not significantly support economic growth in Nigeria, while financial inclusion promoted poverty alleviation in Nigeria through loans to rural areas.

4. The evolution of financial inclusion indicators under study in Algeria

To encourage the use of digital products, the Bank of Algeria has taken several regulations aimed at enhancing and deepening financial inclusion to target all categories of customers and dealers.

This is an incentive for customers to use non-cash payment methods, on the one hand, and to push banks operating to innovate and provide new products in line with modern technological developments, on the other hand (Bank of Algeria, 2020)

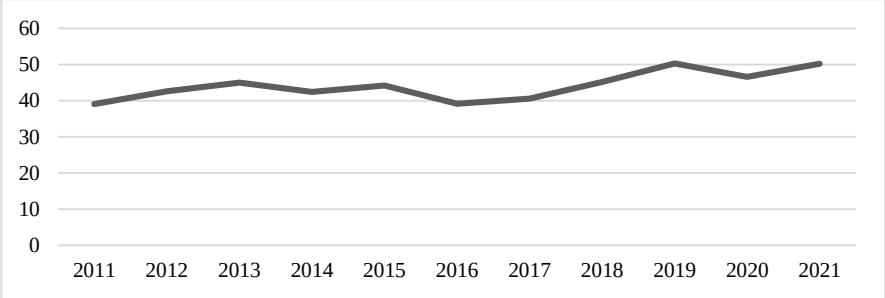
4.1. Commercial bank branches index per 100,000 adults During the period 2011-2021



***Source**: https://data.albankaldawli.org/indicator/FB.CBK.BRCH.P5?locations=DZ*

Through the figure, we notice a relative increase, at a weak and stable rate, in the number of commercial bank branches in Algeria per 100,000 adults, from 5.2 in 2011 to 5.3 in 2020. However, in the year 2021 this indicator witnessed a significant increase, due to the measures taken within the framework of mitigating the repercussions of the Corona pandemic. on economic activity.

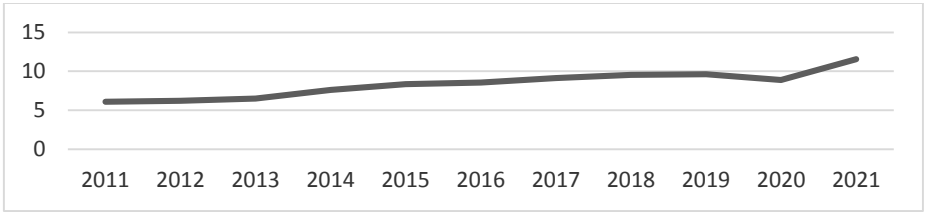
4.2. Commercial bank borrowers per 100,000 adults During the period 2011-2021



***Source**: https://data.albankaldawli.org/indicator/FB.CBK.BRCH.P5?locations=DZ*

The figure clearly shows the fluctuation in the indicator of the number of borrowers from commercial banks per 1,000 adults, rising at a very weak rate from 39.10 in 2011 to 45.2 in 2018, to rise to 50.20 in 2021, which is a relatively high average compared to previous years, but it remains very weak compared to neighboring countries. In Tunisia, this indicator witnessed an upward and regular development, from 74.4 in 2004 to about 246 in 2020

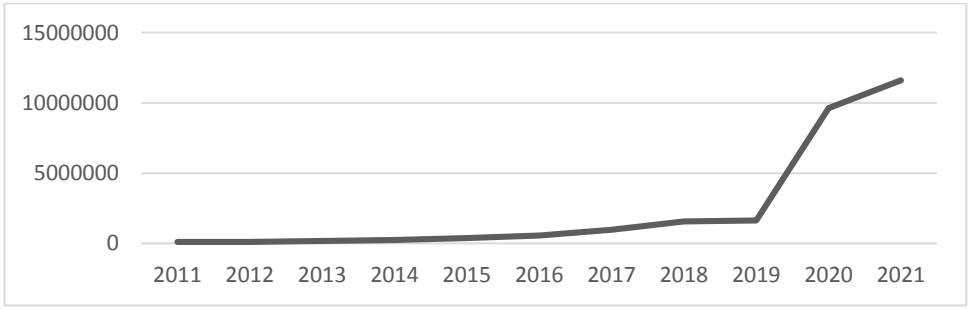
4.3. Automated teller machines per 100,000 adults During the period 2011-2021



***Source**: https://data.albankaldawli.org/indicator/FB.CBK.BRCH.P5?locations=DZ*

Through the figure, we notice a significant increase in the number of ATMs per 100,000 adults from 6.10 in 2011 to 9.60 in 2019, and from 8.90 in 2020 to 11.5 in 2021. However, this indicator remains weak compared to neighboring countries, as this indicator reached 2020 in Tunisia 30

4.4. The number of credit card holders During the period 2011-2021



***Source**: Prepared by the researchers based on documents provided by the Automated Cash Collective and Automatic Relationships between Banks (SATIM).*

The number of bank cards issued until 2021 witnessed a significant increase, with an average of 1,988,607 additional cards compared to 2020, i.e. by 20.67 percent. This number increased from 9,621,017 cards in 2020 to 11,609,624 cards of all kinds, in circulation until the end of 2021. These cards are distributed among the banks, which amount to 2,768,285 cards, or 24 percent of the total number of cards in circulation, compared to 8,841,339 gold cards issued by Algiers Post, an average of 76 percent of the existing barn. All cards in circulation represent 40 percent of the number of current accounts opened with banks and Algeria Post, which, according to the complex, number 29,127,921 accounts. In the same toll, the assembly indicated that 10,248,097 of the cards in circulation benefited from the online payment service.

5. econometric study

5.1. Study variables and model

Through this study, we will try to measure the impact of indicators of financial inclusion and digital financial services on economic growth in Algeria during the period (2011-2021), and based on economic theory and previous empirical studies, we will rely on the following variables.

Table 1: Definition of the variables included in the study form

		variable symbol	Definition of variable
dependent variable	level of economic activity	GDP	which represents the GDP growth rate, is a dependent variable;
independent variables	Indicators of financial inclusion and digital financial services	ATM	automated teller machines per 100,000 adults;
		BORROWERS	commercial bank borrowers per 1,000 adults;
		BANK	commercial bank branches per 100,000 adults;
		CARD	The number of credit card holders.

Source: prepared by the researchers

Thus, we will estimate the study model according to the following mathematical formula:

GDP =f(ATM, BORROWERS, BANK, CARD) ..... (01) t= 2011-2021

The standard study relied on the use of the Autoregressive Distributed Time Delay (ARDL) model, based on a series of annual data in Algeria during the period from 2011 to 2021, derived from the database of statistics of the International Monetary Fund and the World Bank, in addition to documents provided by the Monetary Pool. Automated and Automated Relationships Between Banks (SATIM)

5.2. Cointegration Methodology Using ARDL Model

Pesaran (1997), Shinand and Sun (1998), Pesaran et al (2001) developed the ARDL approach. This approach is characterized by the fact that it does not require that the time series be stable of the same degree. Pesaran considers that the Bound test Tests) in the framework of (ARDL) can be applied regardless of the properties of the time series, that is, if they are stable at the level i.e. integral of zero degree I (0) or integral of the first degree I (1) or a combination of the two, and the only condition for the application of this test It is that the time series are not integrated of the second degree,. of form I (2), and the (Pesaran) method has better characteristics in the case of short time series compared to the other method in the cointegration test, such as the two-step method of "Angel Granger" (1987) (Engel Granger To Stepmethod) or cointegration test by (Johansen) methodology within the framework of the autoregressive (VAR) model. (Manaqer Noureddine, 2016)

Also, the (ARDL) model takes a sufficient number of time lag periods to obtain the best set of data for the general framework model, and the (ARDL) model gives the best results for the parameters in the long run and that the diagnostic tests are highly reliable, and enables us to separate the long-term effects The short term over the long term, where through this methodology we can determine the complementary relationship of the dependent variable and the independent variables in the long and short term in the same equation, in addition to determining the size of the effect of each of the independent variables on the dependent variable. Also, in this methodology, we can estimate the parameters of the independent variables in the long and short term. Its estimated parameters in the short and long run are more consistent than those of other methods such as Engel-Granger (1987), Johansen (1988) method.and "Johansen-Jcels" (1990). (Zedoun Jamal, 2015)

To determine the impact of financial inclusion on economic growth during the period (2011-2021); The Autoregressive Distributed Delay (ARDL) method will be used according to the following mathematical formula

$$\Delta LGDP_t = \beta_0 + \sum_{t=1}^{p} \beta_{1t} \Delta LGDP_{t-i} + \sum_{t=1}^{q1} \beta_{2t} \Delta LATM_{t-i} + \sum_{t=1}^{q2} \beta_{3t} \Delta LBORROWERS_{t-i} + \sum_{t=1}^{q3} \beta_{4t} \Delta LBANK_{t-i} + \sum_{t=1}^{q4} \beta_{4t} \Delta LCARD_{t-i} + \alpha_1 LGDP_{t-1} + \alpha_2 LATM_{t-1} + \alpha_3 LBORROWERS_{t-1} + \alpha_4 LBANK_{t-1} + \alpha_5 LCARD_{t-1} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots (02)$$

Δ : first-order differences; β_0: constant term ;
p,qi: denotes the upper limit of the intervals of temporal deceleration; t: time
βi: short-term relationship coefficients;
α: long-term relationship coefficients;

ε_t : random error limit;

5.3. Unit root tests for the study variables

Time series stability testing is a necessary condition for the ARDL model to be applied correctly. All study variables must be integrated of the order I(0) or I(1), that is, there are no integrated variables of the order of I(2) or above, and to study the stability of the time series of the study variables and determine the degree of their integration; We will rely on the Augmented Dickey Fuller test (ADF), and the results are shown in the following table:

Table 2: Results of the unit root test for the study variables using (ADF)

UNIT ROOT TEST RESULTS TABLE (ADF)

Null Hypothesis: the variable has a unit root

At Level

		LGDP	LATM	LBORRO...	LBANK	LCARD
With Constant	t-Statistic	-2.1243	-5.4720	-3.9132	0.3679	-3.3759
	Prob.	***0.2369***	***0.0001***	***0.0051***	***0.9782***	***0.0192***
		n0	***	***	n0	**
With Constant & Trend	t-Statistic	-0.7829	-1.6763	-4.6654	-4.6643	-5.4701
	Prob.	***0.9569***	***0.7392***	***0.0037***	***0.0037***	***0.0005***
		n0	n0	***	***	***
Without Constant & Trend	t-Statistic	-2.1200	-1.0322	-0.4035	1.4013	-1.2874
	Prob.	***0.0346***	***0.2657***	***0.5305***	***0.9565***	***0.1784***
		**	n0	n0	n0	n0

At First Difference

		d(LGDP)	d(LATM)	d(LBORR...	d(LBANK)	d(LCARD)
With Constant	t-Statistic	-2.8528	-1.9570	-2.1877	-3.7681	-4.1956
	Prob.	***0.0623***	***0.3032***	***0.2143***	***0.0079***	***0.0025***
		*	n0	n0	***	***
With Constant & Trend	t-Statistic	-4.1772	-5.5471	-1.0456	-3.5252	-3.1257
	Prob.	***0.0132***	***0.0005***	***0.9232***	***0.0546***	***0.1172***
		**	***	n0	*	n0
Without Constant & Trend	t-Statistic	-1.8489	-3.2067	-2.5772	-3.1383	-4.4192
	Prob.	***0.0621***	***0.0023***	***0.0116***	***0.0028***	***0.0001***
		*	***	**	***	***

Notes:

a: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant

b: Lag Length based on SIC

c: Probability based on MacKinnon (1996) one-sided p-values.

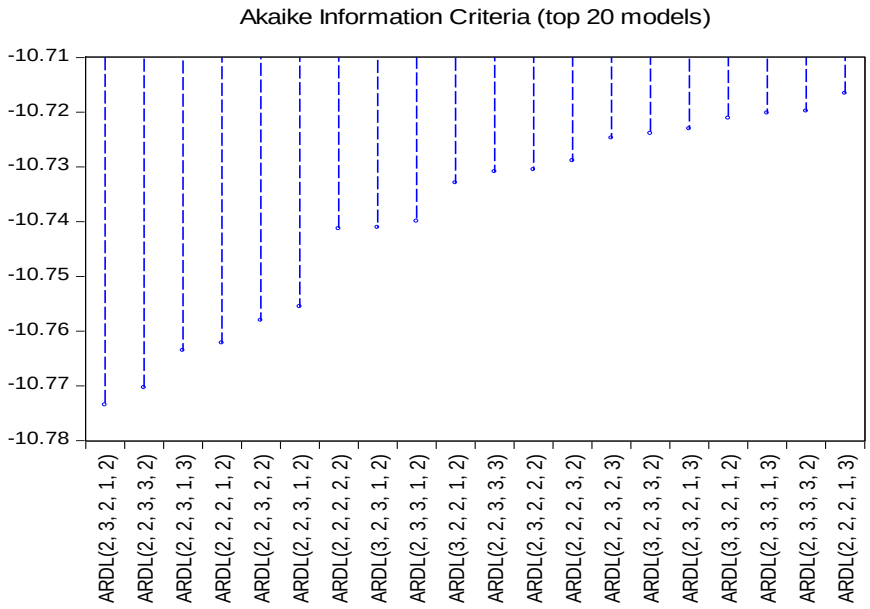
Source: Outputs of (Eviews.9) Program

comparing the calculated values with the tabulated values at the significant levels 1% = α, 5% = α, 10% = α, it is clear to us that the variable of the logarithm of the GDP growth rate is stable at the level (That is, it is integrated of order I (0)), while the rest of the variables under study are unstable at the level; After conducting the first-degree differences (1st Difference) on these variables and re-running the ADF test, they all became stable, and therefore all study variables (LATM, LBORROWERS, LBANK, LCARD) are integrated of order I (1), and as a result, in the next step Conducting the co-integration test using the Bounding Test method, and then estimating the Autoregressive Distributed Lag model (ARDL)

5.4. Cointegration test using Bounds Test method

In order to test the co-integration relationship between the variables of the study, the (ARDL) model must be estimated, and the (AIC) criterion has been relied upon to determine the optimal time delays, so that the appropriate model is the one through which the lowest value of this criterion is obtained, and the chosen model In this study, according to Figure No. (01), it is from Figure ARDL (2,3,2,1,2).

Figure 1: Determining the number of delays in the (ARDL) model



Source: Outputs of (Eviews.9) Program

The cointegration relationship between the variables of the study is tested within the framework of the Unrestricted Error Correction Model (UECM) by estimating the following model:

$$\Delta LGDP_t = \beta_0 + \sum_{t=1}^{p} \beta_{1t}\Delta LGDP_{t-i} + \sum_{t=1}^{q1} \beta_{2t}\Delta LATM_{t-i} + \sum_{t=1}^{q2} \beta_{3t}\Delta LBORROWERS_{t-i} + \sum_{t=1}^{q3} \beta_{4t}\Delta LBANK_{t-i} + \sum_{t=1}^{q4} \beta_{4t}\Delta LCARD_{t-i} + \alpha_1 LGDP_{t-1} + \alpha_2 LATM_{t-1} + \alpha_3 LBORROWERS_{t-1} + \alpha_4 LBANK_{t-1} + \alpha_5 LCARD_{t-1} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots (03)$$

The null hypothesis that there is no cointegration (a long-run equilibrium relationship) between the variables will be tested as follows:

$H_0: \alpha_1 = \alpha_2 = \alpha_3 = 0$

As opposed to the alternative hypothesis that there is a cointegration relationship in the long run:

$H_1: \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq 0$

Table 3: Results of the ARDL Bounds Test

ARDL Bounds Test
Date: 02/09/23 Time: 11:54
Sample: 2011Q4 2021Q1
Included observations: 38
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	286.8691	4

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	1.9	3.01
5%	2.26	3.48
2.5%	2.62	3.9
1%	3.07	4.44

Source: Outputs of (Eviews.9) Program

Through Table No. (03) that shows the results of the ARDL Bounds Test, it is clear that the statistical value (F-statistic) is equal to 286.8691, which is greater than the critical value of the upper limit at the level of significance of 1%, 5%, 10%, and as a result , the alternative hypothesis will be accepted that there is a long-term equilibrium relationship between the GDP growth rate and indicators of financial inclusion in Algeria during the period (2011-2021)

5.5. Diagnostic tests of the form test

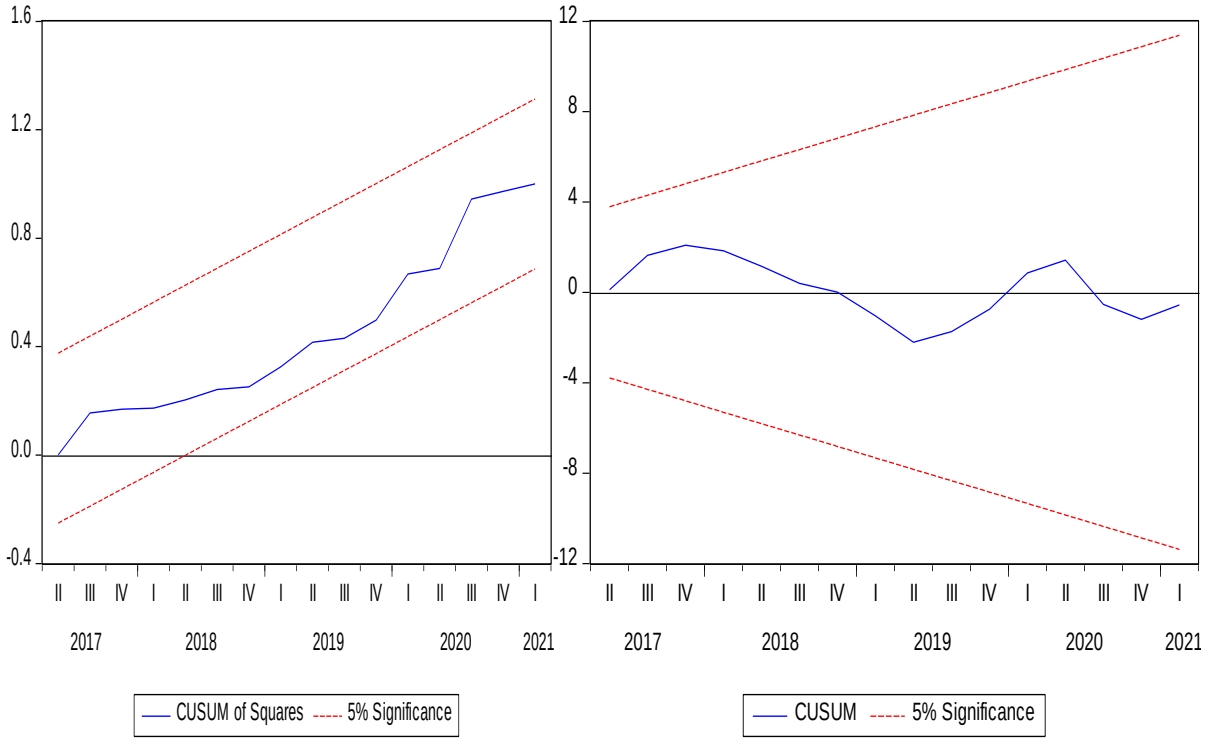
After estimating the model; It is necessary to perform a set of diagnostic tests in order to verify the existence of some standard problems that affect the strength and validity of the estimated model, and the following table shows the results of the diagnostic tests:

Table 4: Results of diagnostic tests

the statistical test	the calculated value	The probability value	the decision
Serial Correlation (LM test)	0.1612	0.6880	Acceptance of hypothesis H0: no autocorrelation problem
Heteroskedasticity (Breusch-Pagan-Godfrey)	20.0912	0.1273	H0: hypothesis accepted: no variance problem exists
Normality (Jarque-Bera)	0.3178	0.8530	H0: hypothesis is accepted: the residuals are normally distributed
Ramsey RESET Test	0.8353	0.3702	H0 Hypothesis Acceptance: The model does not suffer from the problem of indeterminacy

Source: Outputs of (Eviews.9) Program

and to test the structural stability of the estimated model parameters; The cumulative sum of residuals test (CUSUM) and the cumulative sum of squares test (CUSUMSQ) were used, and it is clear from the graph below that the model falls within the critical limits in both tests at a significant level of 5%, and thus accepting the null hypothesis and judging the structural stability of the model



5.6. Evaluation of the error correction formula for the model (ARDL-ECM):

The short-term relationship is represented in the estimation of the error correction model, and Table No. (05) shows the results of the estimation of the study model in the short term.

Table 5: The results of estimating a short-term relationship

ARDL Cointegrating And Long Run Form
Dependent Variable: LGDP
Selected Model: ARDL(2, 3, 2, 1, 2)
Date: 02/08/23 Time: 11:23
Sample: 2011Q1 2021Q1
Included observations: 38

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGDP(-1))	0.768946	0.019280	39.883690	0.0000
D(LATM)	-1.002526	0.248980	-4.026531	0.0005
D(LATM(-1))	0.091563	0.671268	0.136403	0.8926
D(LATM(-2))	0.328302	0.260809	1.258783	0.2202
D(LBORROWERS)	60.493608	2.763544	21.889863	0.0000
D(LBORROWERS(-1))	-21.977663	3.546115	-6.197674	0.0000
D(LBANK)	-0.628729	0.094574	-6.648002	0.0000
D(LCARD)	0.275991	0.034363	8.031518	0.0000
D(LCARD(-1))	-0.248609	0.032861	-7.565491	0.0000
CointEq(-1)	-0.241171	0.010833	-22.262226	0.0000

Cointeq = LGDP - (-0.5715*LATM + 6.9637*LBORROWERS + 0.3924 *LBANK + 0.0670*LCARD)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LATM	-0.571487	0.013854	-41.249179	0.0000
LBORROWERS	6.963729	0.236531	29.441060	0.0000
LBANK	0.392407	0.167925	2.336797	0.0281
LCARD	0.067014	0.023143	2.895655	0.0079

Source: Outputs of (Eviews.9) Program

We note from the above table that the error correction limit CointEq (-1) was negative and significant, with a value of (-0.248609), which confirms the existence of a long-term equilibrium relationship between the GDP growth rate and indicators of financial inclusion, and shows the value of the limit parameter Correcting the error that about 24% of the short-term imbalance in the GDP growth rate in the previous period can be corrected in the current period towards the long-term relationship when any change or shock occurs in the explanatory variables (indicators of financial inclusion), as evidenced by the results of estimating the relationship short term that the GDP growth rate in the short term is positively affected at a significant level of 5% by an increase in each of the ATMs per 100,000 adults; borrowers from commercial banks per 1,000 adults;The number of credit card holders, and therefore most financial inclusion indicators have a positive impact on the GDP growth rate in the short term.

5.7. Estimating the cointegration relationship in the long term

The following table shows the results of estimating the long-term equilibrium relationship of the model

Table 6: The results of estimating long-term coefficients

Long Run Coefficients				
Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
LATM	*-0.571487*	*0.013854*	*-41.249179*	*0.0000*
LBORROWERS	*6.963729*	*0.236531*	*29.441060*	*0.0000*
LBANK	*0.392407*	*0.167925*	*2.336797*	*0.0281*
LCARD	*0.067014*	*0.023143*	*2.895655*	*0.0079*

Source: Outputs of (Eviews.9) Program (See Table 5)

The results shown in the above table indicate that there is a statistically significant inverse relationship between the number of automated teller machines (LATM) and the GDP growth rate at a significant level of 5%, as an increase in the number of ATMs by 1% leads to a decrease in the GDP growth rate. Total by 0.57%,

The results of the estimation shown in the table above show that there is a direct and statistically significant relationship between the ratio of borrowers from commercial banks per 1000 adults (LBORROWERS) and the growth rate of GDP at a significant level of 5%, as an increase in the proportion of borrowers from commercial banks by 1% leads to Increasing the GDP growth rate by 6.96%,

The results of the estimation shown in the above table show that there is a direct and statistically significant relationship between the ratio of commercial bank branches per 100,000 adults (LBANK) and the GDP growth rate at a significant level of 5%, as an increase in the proportion of commercial bank branches by 1% leads to an increase in GDP growth rate of 0.39%,

The results also indicated that there is a direct and statistically significant relationship between the number of credit card holders (LCARD) and the GDP growth rate at a significant level of 5%, so that when the number of credit card holders increased by 1%, it leads to an increase in the GDP growth rate by 0.06%.

6. Conclusion

This study aimed to study the impact of financial inclusion and digital financial services on the volume of economic activity in Algeria represented by the growth rate of gross domestic product during the period (2011-2021), by relying on the methodology of autoregressive time-distributed delay (ARDL). The results can be summarized as follows:

- The results of the Bounds Test indicated that there is a long-term equilibrium relationship between the GDP growth rate and indicators of financial inclusion in Algeria during the period (2011-2021);
- The results of the estimation indicated that the growth rate of the gross domestic product in the short term is positively affected at a significant level of 5% by the increase in each of the ATMs per 100,000 adults; borrowers from commercial banks per 1,000 adults; the number of credit card holders;
- The results indicated in the long term that there is a direct and statistically significant relationship in the long term, the growth rate of GDP and each of the percentage of borrowers from commercial banks; the proportion of commercial bank branches; the number of credit card holders;
- The long-term estimation results showed a negative impact of the number of ATMs on the GDP growth rate, which is a result that is not consistent with most of the results of previous studies. Automated teller machines that provide some safety conditions, but their number was not sufficient to show its impact on economic activity, Which requires more attention to provide a sufficient number of ATMs in order to have an impact on economic activity.

Based on the results obtained through this study, a set of recommendations can be given in order to improve the level of financial inclusion and digital financial services in Algeria:

- Investing in financial education and eradicating financial illiteracy, with the need for banks, financial institutions and monetary authorities to cooperate in this field.
- Work to simplify administrative and legal procedures while reducing costs of obtaining financial services.
- Developing the financial and banking infrastructure, especially in rural areas, in order to facilitate access to financial services in these areas.
- Enacting laws that protect customers of banks and financial institutions in their financial dealings in order to raise their confidence in the financial sector.
- Work on developing the activity of Islamic banks because they are able to contribute to enhancing financial inclusion in Algeria, given the religious background of its citizens, whereby a large part prefers financial exclusion to dealing with financial products that are not compatible with its religious beliefs.

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