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Determinants of financial inclusion in Algeria: An ARDL Bounds Test approach

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Abstract

Our study aims to afford an empirical insight on the factors that have a great impact on financial inclusion levels in Algeria during the period $Q_1$2004-$Q_4$2019, using ARDL approach. Using the dataset provided by the World Bank, our empirical results found that the composite index of financial inclusion (FII) based on three dimensions following Sarma (2008) approach is bounded from 0.08 to 0.51, which is proportionally small. Farther, the estimation findings revealed a positive relationship between financial inclusion index and GDP per capita as a proxy of incomes, population, oil rent, interest rate, while, money supply is not significant factor. However, the strong positive relationship is found between FII and corruption, fixed phone subscriptions as a measure of internet access, which means there are the most important determinant of FII in Algeria.

1. Introduction

In recent years, a rapidly growing of literature continues to devote the critical role of financial access through reducing extreme poverty, boosting shared prosperity and reducing income inequality (World Bank, 2020). Financial inclusion from the process of providing access to financial products and services to individuals and small businesses, it could serve not only as a tool to support economic growth, but also as a means to boost social development through the reduction of poverty and inequality .Besides, financial inclusion as the proportion of individuals and firms that use financial services has increasingly become a policy priority at international and national levels, especially after the 2008 global financial crisis. Currently, financial inclusion has received much attention from policymakers, researchers, and international financial institutions as a promising source of benefits to the economy (IMF, 2020).

Moreover, Financial inclusion has become an attractive topic at the global level with governments, financial institutions, and policymakers, developing interest in understanding it more deeply (Amoah, A., Korle, K. and Asiama, R.K, 2020), The existence of high level financial exclusion has been acknowledged by many developed and developing nations as one of the socio-economic challenges on the agenda (Sarma, M., & Pais, J., 2011); (WentzeL, J. P., Diatha, K. S. & Yadavalli, V. S. S., 2016). The World Bank in its 2020 targets placed universal financial access as one of its objective (Demirguç-kant & al, 2018), (WBG,W,B,G, 2018), which indicates how financial inclusion has become an attractive topic globally and more than 50 countries made headline financial inclusion commitments as of the end of 2014 (Louis, L. & Chartier, F, 2017.) (Demirguç-kant & al, 2018). In 2017, the World Bank Group (WBG) clearly highlighted that many countries are developing National Financial

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Inclusion Strategies (NFIS) to ensure that resources and actions are put in place to achieve financial inclusion commitments. (WBG, . 2017.)

In Algeria, the Central Bank of Algeria has defined financial inclusion as the availability and use of all financial services by different segments of society including institutions and individuals through official channels, including current and savings accounts, payment and transfer services, insurance services, financing and credit services with competitive and reasonable prices. It also targets to protect the rights of consumers of financial services so that they can properly manage their funds and savings and prevent some consumers from using informal channels, which are not subjected to any supervision and which charge relatively high prices, inducing the non-satisfaction of the needs for financial and banking services (CBA, 2015)

In February 2018, the governor of the Algerian central bank, Mohamed Loukal, has emphasize the importance of encouraging role of Algerian banks to do more in order to boost financial inclusion, while recalling efforts undertaken by the authorities to tackle the problem in recent years. Notably, he pointed out to the 2012 declaration that all citizens had the right to a bank account and to Article 43 of the 2015 Finance Law, which permitted new actors to enter the financial sector. He went on to suggest that the arbitrary application of procedures by the banks to tackle money laundering and the financing of terrorism was undermining financial inclusion. He called on banks henceforward to halt requiring documentary proof of, for example, a source of funds beyond the regulatory requirement for proof of identity. In June 2018 the governor followed up with a similar direction to the banks, urging them not to require additional documentation from clients setting up or making transactions with foreign currency accounts beyond what is explicitly required by law.

The general objective of our research paper is to investigate most important determinants factors that affect financial inclusion level in Algeria during the period $Q_1$2004-$Q_4$2019 using the ARDL model. More specifically, our paper constructs a composite index of financial inclusion based on four variables following Sarma (2008) approach.

Based on the above, the remainder of the paper is structured as follows: Section 2 provides a special focus on the factors determine the financial inclusion in the literature review. Section 3 describes our data and methodology. Meanwhile, Section 4 discusses empirical results. Finally, Section 5 concludes this paper and provide some recommendations for future directions.

2. Literature Review

Number of studies have examined the determinants of financial inclusion (Sarma and Pais, 2008, 2011; Evans And Adeoye (2016); Oshora, Betgilu, Goshu Desalegn, Eva Gorgenyi-Hegyes, Maria Fekete-Farkas,And Zoltan Zeman. (2021); David MHLANGA; Varaidzo Denhere(2020); Dar Et Al., (2020) ; Gebrehiwot Et Al, (2019); Rakhrour Youssef , Daham Said Redouane 2021; Sanderson Abel1, Learnmore Mutandwa, Pierre Le Roux(2019); Vicroria Wanjiku Wokabi, Olanrewaju Isola Fatoki (2019); Kaur Et Al., (2020)), where they are found different results.

- Sarma and Pais (2008, 2011) examined country-specific factors associated with the level of financial inclusion by using a classical OLS method for the sample year of 2004. Among possible variables, income measured by per capita GDP, adult literacy, rural population, income inequality, physical connectivity indicated by road network, electronic connectivity indicated by phone subscriptions, information availability indicated by internet usage, bank soundness measured by non-performing assets and capital asset ratio, and foreign ownership in the banking sector were significantly associated with the level of financial inclusion (Sarma, 2008); (Sarma, M., & Pais, J., 2011).

- Evans and Adeoye (2016) evaluated the determinants of financial inclusion in Africa by using a dynamic panel data approach for 15 countries over the period of 2005–2014. The results show that lagged financial inclusion (implies a "catch-up effect"), GDP per capita, money supply as a percentage of GDP, adult literacy rate, internet access, and Islamic banking activities have great significance in explaining the level of financial inclusion in Africa (Adeoye & Evans, 2016).

- The study of **(**Oshora, Desalegn, Gorgenyi-Hegyes, Fekete-Farkas, & Zeman, 2021) examines the determinant factors that influence financial inclusion among small and medium enterprises (SMEs) in Ethiopia. The study uses an explanatory research design and a mixed research approach with both primary and secondary sources of data. More specifically, the study adopts a multiple linear regression model. The finding of the study reveals that; supply-side factors, demand-side factors, market opportunity, and collateral requirements have a positive effect on the firm's access to finance. On the other hand, institutional framework factors, and the costs of borrowing negatively affect the firm's access to finance. This study suggests concerned bodies sustain rapid and inclusive economic growth and hence eradicate extreme poverty and hunger, the policymakers must build an efficient, strong, and

well-functioning financial market system that provides affordable and sustainable financial service to SMEs.

- Mhlanga & Denhere (2020), The study sought to establish the drivers of financial inclusion in Southern Africa with a specific focus on South Africa. Financial inclusion has been a topic of global interest due to the negative impact of financial exclusion in addressing socio-economic issues like poverty. Using the logit model, the study discovered that financial inclusion is driven by age, education level, the total salary proxy of income, race, gender, and marital status. The variable gender was the only factor with a negative influence on financial inclusion all other significant variables had a positive influence on financial inclusion (MHLANGA, D. ;DENHERE, V., 2020)

- Dar et al., (2020) also sought to investigate the determinants and barriers of financial inclusion in India. Using the Global Findex Database (Findex) of 2017, the study found out that gender, age, education and income influence financial inclusion with a significant influence on the informal saving and borrowing (Dar, A.B.; Ahmed, F., 2020).

- Gebrehiwot & Makina (2019) also examined the determinants of financial inclusion across 27 Africa countries using the GMM dynamic panel data analysis. The study discovered that the lagged value of GDP per capita and mobile infrastructure positively influences financial inclusion while government borrowing had a negative influence on financial inclusion. (Gebrehiwot, K.G. and Makina, D, 2019)

- Rakhrour& Redouane (2021), conducted a study in which the importance of financial inclusion and the evolution of its main indicators in Algeria are analyzed. Their study concluded that an improvement in financial inclusion allows people to make many financial transactions more efficiently and to help the poor people to out of poverty by promoting education, health and business. The analysis of financial inclusion in Algeria showed that there are colossal efforts to be deployed: only 43% of adults have a current account with a gender gap of 27% which remains higher compared to the world average (7%), just 5% of account owners used the internet to pay bills or to buy something online. Moreover, family and friends remain the main source of borrowing money or to come up with emergency funds. (Rakhrour, Y.; Redouane, D. S., 2021)

- Sanderson Abel1, Learnmore Mutandwa, Pierre Le Roux (2019) **;** where the objective of their study is to evaluate determinants of financial inclusion in Zimbabwe. Their findings showed that age, education, financial literacy, income, and internet connectivity are positively related to financial inclusion. On the other hand, the documentation required to open bank accounts and the distance to the nearest access point are negatively related to financial inclusion. (Sanderson Abel, Learnmore Mutandwa, Pierre Le Roux, 2018)

- In the study of Wokabi & Fatok (2019) which sought to analyze the determinants of financial inclusion among five East African countries- Kenya, Uganda, Tanzania, Rwanda and Burundi over the period of 2000-2016. In order to determine the factors affected financial inclusion in East Africa, the authors used rural population, unemployment rates, income level and interest rates as independent variables, while domestic credit to private sector by banks used as a measure of financial inclusion. The empirical results of fixed effect model found that rural population and income are significant determinants of financial inclusion with rural population being negatively related with financial inclusion. This means that the higher the rural population of a country, the less inclusive their financial system is. Unemployment though statistically insignificant had a negative relationship with financial inclusion. Interest rates had a positive but insignificant relationship with financial inclusion. Finally, the authors recommended that focused financial literacy efforts be increased in the rural areas within East Africa to promote inclusion efforts, where Interest rates can be a powerful policy tool to encourage both savings and credit facility sourcing from the banking sector. (Wokabi, V. W.; Fatok, O. I., 2019)

- Kaur & Kapuria (2020) also examined the determinants of accessing institutional and non-institutional finance across male and female-headed households in rural India. Using the multinomial logistic regression, the study also discovered that education level is one of the important factors influencing financial inclusion. Other factors that were discovered were monthly household consumption expenditure, land size holding, access to irrigation land and the levels of scheduled penetration of commercial banks influenced financial inclusion (Kaur, S. ; Kapuria, C., 2020; Kaur, S. ; Kapuria, C., 2020)

3. Data and Methodology

3.1. Financial inclusion index in Algeria

For financial inclusion, dimension such as automated teller machines (ATMs) per 100,000 adult, commercial bank branches per 100, 000 adults, borrowers from commercial banks per 1,000 adults, domestic credit to GDP ratio, and depositors of commercial banks per 1,000 adults were used. The first two measurement criteria relate to accessibility of banking products/services and the last three relates to usage of banking services, as dimensions of financial inclusion. These financial inclusion dimensions were then used to construct the financial inclusion index as postulated by Sarma (2008),

Table 1: dementions of financial inclusion

Dimensions	Indices	Average
Availability of banking	automated teller machines (ATMs) per 100,000 adult	50%
	commercial bank branches per 100, 000 adults	50%
Penetration	Deposit Accounts with Commercial Banks Per 1000 Adults	100%
Usage	depositors of commercial banks (% GDP)	50%
	borowerrs of commercial banks (% GDP	50%

Source: (Sarma, 2008, p. 2)

3.2. Methodology for the computation of IFI :

Based on the financial inclusion indicators presented in the Financial Access Survey of the International World Bank (IWB), the Index of Financial Inclusion (IFI) has been computed for the present purpose. The indicators have been further classified into three categories viz., Banking Penetration (d1), Availability of Banking Services (d2) and Usage of Banking Services (d3) that have been used as dimensions for the computation of IFI (Sarma, 2008). In order to determine the Index of Financial Inclusion (IFI) for Algeria for period during 2004-2019, first, the respective dimension indices have been calculated using the UNDP's methodology of index computation (equation 1). Such computed values for each dimension have subsequently been multiplied by the respective dimension weights to arrive at the final dimension score. The final Index of Financial Inclusion (equation 2) has been arrived at by averaging the normalized inverse nuclide a distance from the ideal dimension points, and the normalized worst point distance in a three dimensional Cartesian space (Sarma, 2008)

$$Di = \mathrm{W}i\,\frac{\mathrm{A}i-\mathrm{m}i}{\mathrm{M}i-\mathrm{m}i} \qquad (1)$$

$$\mathrm{FII} = 1 - \frac{\sqrt{(1-\mathrm{P}i)^2+(1-\mathrm{A}i)^2+(1-\mathrm{U}i)^2}}{3} \qquad (2)$$

Where: *Di* is the dimension index; w_i: is the dimension weight; *Mi* is the maximum dimension value; m_i is the minimum dimension value; *Pi*, *Ai*, *Ui* represent the dimension indices on penetration, availability and usage; In the three dimensional Cartesian space, the point (0,0,0) will indicate the worst situation (complete financial exclusion) and the point (1,1,1) will indicate the best or ideal situation (complete financial inclusion) (Sarma, 2008). In addition, the countries are listed into three categories depending on the value of IFI, as follow:

- ✓ 1. $0.5 < \mathrm{IFI} \leq 1$: high financial inclusion.
- ✓ 2. $0.3 \leq \mathrm{IFI} < 0.5$: medium financial inclusion.
- ✓ 3. $0 \leq \mathrm{IFI} < 0.3$: low financial inclusión.

For financial (banking) penetration dimension, we have used the data on "Bank Deposit Accounts with Commercial Banks Per 1000 Adults. For the availability dimension, we have taken the data on automated teller machines (ATMs) per 100,000 adult and commercial bank branches per 100, 000 adults; For the usage dimension, we have used just the data on borrowers of commercial banks (% GDP) because we haven't data on depositors of commercial banks (% GDP); However, since the third dimension had a weight of 50%, we will divide by 2.5 instead of 3.

As a result, the IFI values computed for Algeria during the period 2004-2019 are presented in figure1 (3-dimensional IFI):

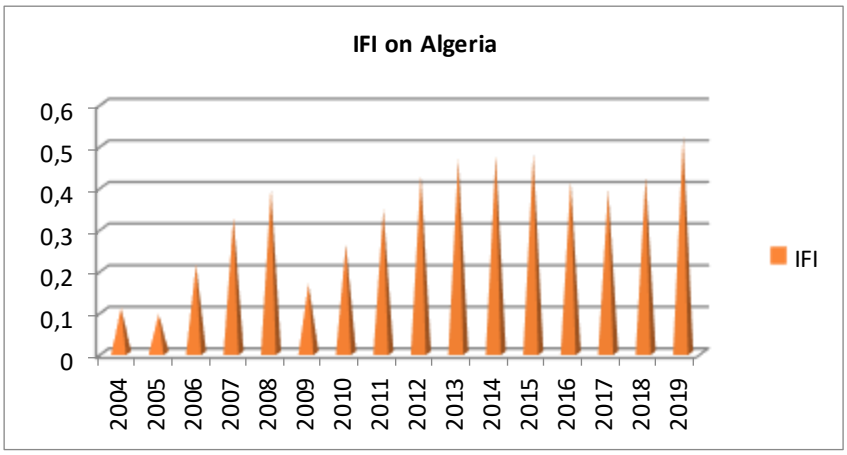

Figure 1. The trend of Financial Inclusion Index in Algeria (2004-2019)

Source: Author's calculations using Excel

Figure (1) shows that the values of the financial inclusion index that was compute in Algeria range between 0.08 and 0.5, and based on Table No. 2, it can be said that it is an average indicator as it did not exceed the threshold of 0.5, and this corresponds to the report of the World Bank Group, which classified Algeria in the region Medium Financial Inclusion (Demirguç-kant & al, 2018, p. 17).

We note that the Algerian government's is making great efforts to promoting financial inclusion during the study period, as the financial inclusion index reached its highest level in 2019 (0.51).

4. Materials & Methods

4.1. Data

The main series in our study are : IFI is financial inclusion index ;GDPC is GDP per capita; M2GDP is money supply (% of GDP) and ITNACC is the number of fixed phone subscriptions, and POPGRO is the percentage of population; CORUPTION; oil rent(% of GDP); Deposite Interest Rates (DIR%). For This reason , we used quietly data with 64 observations for each variable from Q12004 to Q42019 .

Data for the analysis is collected from the International World Bank (IWB). The IWB is the most appropriate source of macro-economic data of Algeria. Also, IWB was chosen because it provides an extensive range of information on the variables, better than what is obtainable in the Global Financial The main series in our study are index database on financial inclusion

Consistent with the literature, the proxy for financial inclusion is the Index of Financial Inclusion (IFI) (sarma2008) , As well, the selected determinants of financial inclusion, consistent with the literature ((Osei-Assibey, E., 2009); (Sarma, M., & Pais, J., 2011); (Clamara, N., X. Pena, and D. Tuesta, . 2014.); (Adeoye & Evans, 2016) (Bakari & Ibrahim, 2018), (Adil & Jalil, 2020); (Esmail Abdo, mohammed Adem, 2021), which are :GDPC is GDP per capita; M2GDP is money supply (% of GDP) and ITNACC is the number of fixed phone subscriptions as a proxy of internet access, and POPGRO is the growth of population; Corruption; Oil Rent(% of GDP); Deposite Interest Rates (DIR%),

4.2. Model specification

The study applied a well-known approach by (Pesaran, M. H;Shin, Y. ;Smith, R., 2001) called the autoregressive distributed lag (ARDL) approach. For determine the determinants of financial inclusion in Algeria. The ARDL model is considered as the best econometric method compared to others in a case when the variables are stationary at I(0) or integrated of order I(1). Based on the study objectives, it is a better model than others to capture the short-run and long-run impact of independent variables on financial inclusion index.

The ARDL approach is appropriate for generating short-run and long-run elasticities for a small sample size at the same time and follow the ordinary least square (OLS) approach for cointegration between variables (Jarita Duasa, 2007). ARDL affords flexibility about the order of integration of the variables. ARDL is suitable for the

independent variable in the model which is I(0), I(1), or mutually cointegrated (Frimpong, J.M. Oteng-Abayie, E.F, (2006)), but it fails in the presence I(2) in any variables.

4.3. Co-integration: ARDL and Bounds Testing Approach

On the basis of unit root test, we test for cointegration using ARDL bounds test approach modeled by (Pesaran, M. H;Shin, Y. ;Smith, R., 2001). ARDL bound test is widely used because it addresses issues that may arise because of autocorrelation and endogeneity; As a results, the ARDL model can be specified as:

$$\Delta FII_t = \beta 0 + \sum_{i=1}^{\rho} \alpha_1 \Delta FII_{t-i} + \sum_{i=1}^{m} \alpha_2 \Delta LCORRUPTION_{t-i} + \sum_{i=1}^{n} \alpha_3 \Delta DIR_{t=i} + \sum_{i=1}^{n} \alpha_4 \Delta GDPC_{t=i} + \sum_{i=1}^{n} \alpha_5 \Delta M2GDP_{t=i} + \sum_{i=1}^{n} \alpha_6 \Delta LOILRENT_{t=i} + \sum_{i=1}^{n} \alpha_7 \Delta LPOPGRO_{t=i} + \sum_{i=1}^{q} \alpha_8 \Delta LITNACC_{t-i} + \lambda_1 FII_{t-1} + \lambda_2 CORRUPTION_{t-1} + \lambda_3 DIR_{t-1} + \lambda_4 GDPC_{t-1} + \lambda_5 M2GDP_{t-1} + \lambda_6 RENT_{t-1} + \lambda_7 POPGRO_{t-1} + \lambda_8 ITNACC + \mu_t$$

.

(3)

Where Δ is lag operator, β_0 is the intercept, $\mu_t$is thedisturbance term, while t is the time period and L shows that the variable has been transferred in its natural log. The first part of the Equation 3 with α_i correspond the short-run parameters and the rest with λ_1 to the long-run parameters. In this ARDL framework, the H0 of no co-integration is that all long run coefficients are simultaneously zero .The number of lags is chosen utilizing Akaike's Information Criteria and Schwarz- Bayesian criterion. Whenever bound testing approach shows the cointegrating relationship, at that point we get the short run dynamic parameters by evaluating an error correction model (ECM) with the long run approximations. Thus, the Error Correction Model can be specified as:

$$\Delta FII_t = \beta 0 + \sum_{i=1}^{\rho} \alpha_i \Delta FII_{t-i} + \sum_{i=1}^{m} \alpha_2 \Delta LCORRUPTION_{t-i} + \sum_{i=1}^{n} \alpha_3 \Delta DIR_{t=i} + \sum_{i=1}^{n} \alpha_4 \Delta GDPC_{t=i} + \sum_{i=1}^{n} \alpha_5 \Delta M2GDP_{t=i} + \sum_{i=1}^{n} \alpha_6 \Delta LOILRENT_{t=i} + \sum_{i=1}^{n} \alpha_7 \Delta LPOPGRO_{t=i} + \sum_{i=1}^{q} \alpha_8 \Delta \text{LITNACC}_{,t-i} + \theta ECTt - 1 + \mu t$$

(4)

$\theta ECTt - 1$ represents the error correction term which specifies the adjustment speed to the equilibrium after a short run shock.

5. Empirical Results and Discussion:

5.1. ARDL Estimation

5.1.1. Unit Root Test Results

We tested for stationarity of variables by unit root tests. We used ADF (Dickey & Fuller, 1979) unit root test. The unit root tests show that DIR and M2gdp are stationary at order I(0) while FII, CORUPTION, ITNACC, OILRENT, POPGRO and GDPC are stationary at I(1). As the considered variables are combination of order zero integration and order one integration, the ARDL model is used.

Table 1. Unit Root Test Results

Variables	**ADF**	**Decision**	
	Statistic	**probability**	
D(FII)	-3.385159	0.0158	I(1)
D(logcorr)	-2.916566	0.0039	I(1)
DIR	-3.493692	0.0001	I(0)
M2gdp	-3.493692	0.0016	I(0)

D(logoilrent)	-3.495295	0.0292	I(1)
D(logpopgr)	-3.495295	0.0038	I(1)
d(log ITNACC)	-3.495295	0.0059	I(1)
D(gdpc)	-4.638329	0.0025	I(1)

Source: Author's calculations using Eviews10

5.1.2. Co-integration Analysis

Since all the variables are I(1) and I(0) series, we can run co-integration tests. This model is the most suitable with the sample size used in this study of 64 views and the co-integration . Before we can estimate short and long run effects, we need to run a bounds test to see if there is a long-term relationship between the variables in the model.

Co-integrated variables imply that they observe long run relationship. The result of the ARDL bounds test of co-integration is reported in Table 2. According to the F-statistics (28.9409) we reject the H0 of no co-integration at 1% significance level as it is greater than the critical value of upper bound, I(1) of 3.9 at 1% level of significance. Thus, the co-integration test confirms the long run association between FII and independent variables.

Table 2. Bounds Test Results

Test statistic	**Model**		
	Significance	**I(0)**	**I(1)**
28.9409	10%	1.92	2.89
	5%	2.17	3.21
	1%	2.73	3.9

Source: Author's calculations using Eviews 10

5.1.3. Long Run Estimation

Once cointegration is confirmed, we estimated the ARDL model given equation 3 to obtain the long run coefficients. Estimation results are reported in Tables 3., The coefficient of $M2GDP$ is negative which is contrary to the economic theory however, these coefficients are not statistically significant (P-values are very high, i.e0.32), i.e. changes in $M2GDP$ does not stimulate financial inclusion in Algeria in the long run. Thus monetary authorities should clarify policies in order to stimulate transactions in the monetary bloc in its broad sense by relying on digitization.

- The $GDPC$ are significant in the 0.05 level and has a positive relationship with financial inclusion , i.e. changes in $GDPC$ does with 1point stimulate financial inclusion with 3.4202% in Algeria in the long run , this may support the result obtained by (Demirguç-kant & al, 2018); (Ndanshau, Michal O.A., 2021.); (Bassam Al- Own, Tariq Bani Khalid, 2021); (J Kebede, A Naranpanawa, S Selvanathan, 2021)
- The $ITNACC$ are significant in the 0.05 level and has a positives relationship with financial inclusion , i.e. changes in $USERS$ with 1point does stimulate financial inclusion with 51.3390% in Algeria in the long run , we can say that this variable is the main importants determinant of financial inclusion and that is confirmed by (Adeoye & Evans, 2016)
- The $POPGRO$ are significant in the 0.05 level and has a positives relation ship with financial inclusion , i.e. changes in $POPGRO$ with 1point does stimulate financial inclusion with 13.8208% in Algeria in the long run.

- The DIR are significant in the 0.05 level and has a positives relation ship with financial inclusion , i.e. changes in DIR with 1point does stimulate financial inclusion with 4.9402% in Algeria in the long run, so that increased rates deposits will encourage saving and this reflect financial inclusion.
- The $OIL\ RENT$ are significant in the 0.10 level and has a positives relation ship with financial inclusion , i.e. changes in $OIL\ RENT$ with 1 point does stimulate financial inclusion with 3.4202% in Algeria in the long run
- The $CORRUPTION$ are significant in the 0.05 level and has a positives relation ship with financial inclusion , i.e. changes in $CORRUPTION$ with 1 point does stimulate financial inclusion with 47.8406% in Algeria in the long run.

Table 3. Long Run Estimation Results

Model			
Variables	**Coefficients**	**t- statistic**	**Probability**
Log(corruption1)	0.478406*	9.997380	0.0000
M2GDP1	-1.47E-06	-0.995953	0.3259
GDPC1	0.035066*	10.11992	0.0000
DIR	0.049402*	2.763260	0.0090
LOG(OILRENT1)	0.034202**	1.756770	0.0875
LOG(POPGRO1)	0.138208*	9.307809	0.0000
LOG(ITNACC)	0.513390*	12.00839	0.0000
c	-8.163458*	-13.04725	0.0000

Source: Author's calculations using Eviews 10.

** represents the significance at the 10% level, * represents the significance at the 5% level

5.1.4. Short Run Estimation:

After the long-run estimation we get short-run estimation using ECM as given result in Table 3. It is found that the independent variables are significantly affects IFI with lag of one year. The error correction term is also statistically significant with expected negative sign. The coefficient of ECT(t-1) is -0.2376 (P-value is 0.00). This shows the speed of adjustment towards the long-run equilibrium is very low. The diversion from short run in IFI is corrected by 23.76% within a year.

Table 4. Short Run Estimation Results

Model 1			
Variables	**Coefficients**	**t- statistic**	**Probability**
D(IFI1(-1))	0.895656	104.7075	0.0000
DLOG(corruption1)	0.335206	19.30370	0.0000
DLOG(corruption1(-1))	-0.208688	-12.08945	0.0000
D(M2GDP1)	5.58E-06	7.441285	0.0000

D(M2GDP1(-1))	-1.26E-05	-17.99361	0.0000
D(GDPC1)	0.001601	2.163608	0.0372
D(GDPC1(-1))	0.006212	10.76208	0.0000
D(DIR1)	-0.0101207	-10.31429	0.0000
D(DIR1(-1))	0.199299	20.64690	0.0000
DLOG(POPGRO1)	0.375241	16.19944	0.0000
DLOG(POPGRO1(-1))	-0.557550	-22.76813	0.0000
DLOG(ITNACC1)	0.661690	31..39122	0.0000
DLOG(ITNACC1(-1))	-0.824681	-33.68293	0.0000
ECT	-0.237658	-50.18317	0.0000

Source: Author's calculations using Eviews 10

5.1.5. Quality Tests.

To verify the appropriateness and validity of abovementioned results, we run some diagnostic tests like serial correlation test, Heteroscedasticity and Normality tests. The diagnostics show that there is no issue of serial correlation and heteroskedasticity in the model and residuals are normally distributed. The results are reported in table 5

Table 5: Diagnostic Tests Results

Tests	**Normality Test JarqueBera**	**Heteroskedasticity :Breusch-Pagan-Godfrey**	**Breusch-Godfrey Serial-correlation LM Test**
Model	0.891	1.177	17.047
	(0.640)	(0.324)	(0.000)

Notes: p-values are given in parenthesis for each test

To confirm that the model met the stability test, the cumulative sum of recursive residuals (CUSUM) and CUSUM of squares (CUSUMSQ) test proposed by (R. L. Brown et al., 1975)is used. Plotsof both CUSUM and CUSUMSQ test statistics that fall inside the critical bounds of 5% significance. This means that the estimated parameters are stable over the study period.

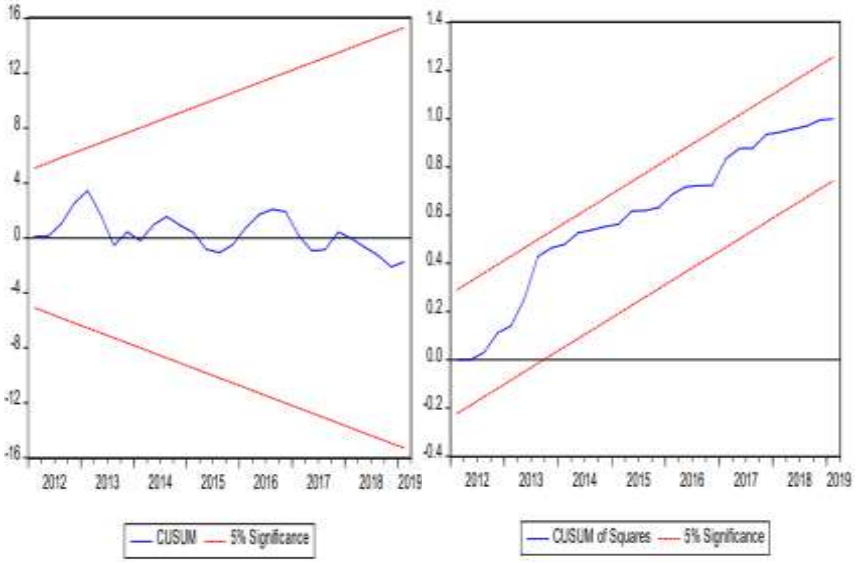

Figure 2. CUSUM and CUSUMSQ Graphs

Source: Author's calculations using Eviews 10

The results show that the graph of CUSUM and CUSUMQ statistics remains within the range of critical values at the 5% threshold, which implies that the coefficients of the model are stable.

6. Conclusion

The main aim of this study is to examine the determinant factors that influence the financial inclusion index in Algeria; for the period Q12004- Q42019 , when we measured FI index by Sarma, 2008 approach .we used ARDL Bounds test approach to find cointegration ,as IFI and indepandant variable ere cointegrate we employed ECM .

The results affirm the significant influence of a few factors to IFI .Particulary , GDP per capita; internet access, the growth of population; corruption; Oil Rent(% of GDP); Deposite Interest Rates (DIR%) have direct effect on financial inclusion , while the coefficient of $M2GDP$ is negative and not significant on financial inclusion (P-values are very high, i.e0.32), i.e. changes in $M2GDP$ does not stimulate financial inclusion in Algeria in the long run. which is contrary to the economic theory however, Thus the monetary authorities must develop policies in order to stimulate transactions in the monetary mass in its expanded concept M3, and that is by relying on digitization and this is consistent with the approved hypothesis in research.

Hence, based on the study finding, it is possible to conclude that factors like ; corruption; number of internet users have a high impact on determining financial inclusion index, where Confirming the validity of the hypothesis that indicated that the most important determinant is the use of the Internet; and we can be explained economically hight positive effect of corruption factor that is contributes to an increase in the number of loans obtained through bribery and favoritism, while increasing the number of accounts The deposit is due to money laundering operations.

Recommendations:

- The authorities should invest in rent income and direct part of it to develop the infrastructure for financial inclusion.

- Rebuilding trust in the financial system: by providing financial protection to customers who demand transparency, quality, advice, cost reduction, information and clarity regarding the opportunities and risks associated with each product or service, not to mention maintaining confidentiality, protecting data and accounts, and responding to the preferences and tastes of financial consumers.

- Expanding the scope of the use of electronic money, with the extensive use of financial technology, which is one of the most important aspects of progress in the provision of banking services, which Algerian banks must keep pace with, in order to achieve speed in the performance of services and reduce bureaucratic burdens.

- Increasing the spread of various banking branches in various regions, especially rural ones;

- Adopting financial and digital technology that helps to easily deliver financial services and

products to all individuals and in all regions;

- Spreading financial literacy among the Algerian public;

- Speeding up the launch of Islamic financial products to suit the religious belief of the

Algerian Muslim individual

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