

**Nexus Between Financial Inclusion And The Economic Development:
An Empirical Study Evidence From Algeria.**

العلاقة بين الشمول المالي و التطور الإقتصادي: دراسة قياسية حول الجزائر

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naima.bentouir@univ-temouchent.edu.dz**Received:** 17/11/2022**Accepted:** 31/12/2022**Published:** 15/03/2023**Abstract:**

In the emerging governments, the share of the population with access to basic financial services tends to the lag significantly behind the developed economies. This can be chalked up to the relatively smaller size and sophistication of the banking sector, lower incomes and a higher degree of informal employment and patchy identification records prevalent in less developed countries. The aim of the present paper is to examine the relationship between the financial inclusion and the economic growth in Algeria. The Johansen cointegration test was carried out to achieve our objective using annual data covering the period from 2004 to 2020. The main findings concluded that there is a long-run relationship among the variables, while the VECM outputs highlighted a positive impact of usage of the financial services and borrowing from the commercial banks on economic growth and a negative impact conducted by outstanding deposits indicator.

Keywords: financial inclusion; Economic growth; financial services; cointegration test; VECM model.

JEL Classification Codes: C51, D04, D14, D33

ملخص:

تميل نسبة السكان الذين يمكنهم الوصول إلى الخدمات المالية الأساسية في الإقتصادات النامية إلى التخلف بشكل كبير بالمقارنة بالدول المتقدمة. يمكن إرجاع السبب إلى ضعف حجم القطاع المالي و المصرفي، انخفاض الدخل، ودرجة أعلى من العمالة غير الرسمية بالإضافة إلى سجلات الهوية غير المكتملة السائدة في البلدان الأقل تقدماً. تُهدف من خلال هذه الدراسة إلى اختبار العلاقة بين الشمول المالي و النمو الإقتصادي في الجزائر بالإعتماد على بيانات سنوية تغطي الفترة الممتدة من 2004 إلى 2020 و اختبار التكامل المشترك. خلصت الدراسة إلى وجود علاقة موجبة بين استخدام الخدمات المالية و القروض المتحصل عليها من البنوك التجارية و النمو الإقتصادي و أن المتغيرات لها علاقة في المدى الطويل، كما خلصنا أن الودائع ارتبطت بعلاقة سلبية مع النمو الإقتصادي.

الكلمات المفتاحية: الشمول المالي، النمو الإقتصادي، الخدمات البنكية، التكامل المشترك، نموذج *VECM*.

تصنيفات JEL : C51, D04, D14, D33

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INTRODUCTION:

Financial inclusion is a concept that allows individuals and enterprises to get an access to financial products and services (Park & Mercado Jr, 2018, p 04) in order to meet their needs and conduct financial transactions, payments, savings, credit, and insurance in a responsible and sustainable manner. In other word FI enable the countries to reduce poverty and inequality by encouraging people to invest for the future. (Debuque-Gonzales & Corpus, 2021, p 06).

Access to a transaction account, which allows people to store money, send and receive payments, is the first step toward greater financial inclusion. A transaction account remains a priority for the World Bank Group (WBG) priorities ensuring that people worldwide have access to a transaction account. (Van, Vo, Nguyen, & Vo, 2021, p 05) It was, for example, the focal point of the World Bank Group's Universal Financial Access 2020 initiative, which concluded at the end of 2020. Though much progress has been made as a result of this campaign, it is an indication of the magnitude of the task that much more work has to be done.

According to the world bank financial access improves daily life and assists families and businesses in planning for everything from long-term goals to unexpected emergencies (Emara & El Said, 2021, p10). People who have accounts are more likely to use other financial services, such as credit and insurance, to start and expand enterprises, invest in education or health, manage risk, and weather financial shocks, all of which can improve their overall quality of life.

The ongoing COVID-19 situation has also highlighted the importance of greater digital financial inclusion (Singh & Stakic, 2021, p 03) such as mobile money innovation (Debuque-Gonzales & Corpus, 2021, p 02) which is using cost-effective digital means to reach currently financially excluded and underserved populations with a variety of formal financial services tailored to their needs that are responsibly delivered at a cost that is affordable to customers and sustainable for providers. Between 2011 and 2017, 1.2 billion adults globally gained access to a bank account, representing significant progress toward financial inclusion. Between 2011 and 2017, 1.2 billion adults globally gained access to a bank account, representing significant progress toward financial inclusion. In 2017, 69 percent of the world's adults have a Facebook account.

More than 80 nations have now started digital financial services, including some requiring the use of mobile phones, with some reaching major size. (Ali, Hashmi, Nazir, Bilal, & Nazir, 2021, p 02) As a result, millions of previously excluded and neglected poor clients are transitioning from solely cash-based transactions to formal financial services via mobile phone or other digital technologies. Moving from account access to account usage is the next phase for nations where at least 80% of the population has an account (China, Kenya, India, Thailand, p 07). These nations depended on reforms, private-sector innovation, and a drive to create low-cost accounts, which included mobile and digital payments. Building to previous overview of the financial inclusion revolution we will answer to main problematic.

Problematic:

- Does the financial inclusion aspect take a place in Algeria for economic growth?

Hypotheses:

- The dependent and independent variables have a significant correlation.
- A long-run relationship exists between the variables.

Objectives:

- The financial inclusion transition became a crucial solution for most of nations especially for the developing countries which give us the inspiration to enrich the academic area and helping the decision makers by proposing solutions and strategies.
- Highlight the importance of the financial inclusion for Algeria for diversification purposes.
- Collaboration with the university and the economic agents in order to move from the theoretical to the practical area.

Importance:

- Helping decision makers to take on consideration the solutions proposed by the researchers and academics.
- Take a place in the big revolution toward the SDGs by achieving the economic growth objectives.
- Highlight the big experiences of the leader countries on the financial inclusion prospects.

1- Literature review:

Finance can catalyze financial inclusion methods in low-economic countries in order to achieve the economic development goals. For these purposes the researchers and academics are taking a place on enriching the background of this topic.

(Sulong & Bakar, 2018) aims to examine the effect of financial inclusion on the economic growth and whether it has a positive or negative transmission channels and the existence of the causality effect. The authors conclude that the negative results or the negative relationships between the financial inclusion indicators and the economic growth can be explain by the weak financial systems especially in the developing countries, in addition to the ignore of the multidimensional variables which can give a good result. (Babajide, Adegboye, & Omarkhanlen, 2015) the study shows the role of financial inclusion on economic progress in Nigeria, the authors aim to show the impact of the financial inclusion determinants on the economic growth. The main finding concluded that there is a significant between FI determinants and the economic growth indicators such as the production factor and the capital per workers.(Sharma, 2016) this investigation aims to assess the linkage between the financial inclusion and the economic growth evidence from India's economy. The main finding highlighted a positive relationship between the financial inclusion variables and the economic growth in India, that means a favour social banking experience in the selected country with a deepening the financial firms. (Ozili, 2021) this paper tries to introduce the a background review about the recent evidence on financial inclusion in the worldwide, it also identifies the some literature about financial inclusion in the emerging area. The paper sorts out that the financial innovation level has an impact on the financial inclusion indicators such as the poverty, stability/instability of the financial services, the economic situation and many

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other indicators.(Park & Mercado, 2018) This paper aims to present a new index for financial inclusion purposes using a sample of 151 country in order to testing the impact of the financial inclusion on the inequality, income and the poverty level. The results show that the economies with high and middle high income have a small level of poverty. (Demir, Pesqué-Cela, Altunbas, & Murinde, 2022) the authors present the role of the financial technologies (FinTech) on performing the financial inclusion level evidence from 141 countries. They conclude that financial technology is the key solution to reducing the financial exclusion in other word FinTech can reduce the poverty and the income inequality. (Kabakova & Plaksenkov, 2018) the study focuses on the factors that can achieve the financial inclusion in the developing 43 countries. The findings highlighted that there are three variables influence the financial inclusion such as the economic factors while there are two variables affecting the financial exclusion which are the lack of the economic and social indicators. (Mader, 2018) this paper assesses the effect of the microfinance on the financial inclusion, it concludes that the FI can facilitate the development incomes, and the poor people can reduce them poverty level within the financial inclusion integrating.(Koomson, Villano, & Hadley, 2020) the authors empirically examine the impact of the financial inclusion on the poverty level in Ghanaian economy, the main findings of this investigation show that the FI inclusion reduce both of the poverty and the vulnerability to poverty specifically in the rural areas.

2- Data and Methodology

The present paper makes use of some econometrics methods to carry out the empirical analysis. We used the following methodology for our empirical study:

Firstly; we will represent descriptive statistics and the stationary test for all the variables in case of the time series data using Philip perron test. For testing the relationship between the variables, we will use the Cointegration test under Johansen test and Vector Error correction model. Our data downloaded from the world bank database by specifying the Findex indicators, the selected sample cover the period of 2004 to 2020 with annual data.

3-1 Econometric model

- Unit Root Test

The co-integration test among the study variables requires a previous test for the existence of a unit root for each variable, using the Augmented Dickey–Fuller (ADF) (1979) test on the following regression:

The ADF regression tests for the existence of unit root of, namely in all model variables at time t . The variable expresses the first differences with lags, and is a variable that adjusts the errors of autocorrelation. The coefficients are to be estimated. The null and the alternative hypothesis for the existence of a unit root in variable is: $H_0 = 0$ vs $H_1 < 0$

- Co-integration and Johansen test

(Granger & Newbold, 1974, p. 254) have highlighted that, in terms of time series, if the variables are non-stationary in their levels, they can be integrated with integration order 1, when their first differences are stationary. These variables can be co-integrated as well, if there are one or more linear combinations among the variables that are stationary. If these

variables are co-integrated, then there is a constant long-run linear relationship among them. There are two important ways to test for co-integration. The Engle and Granger methodology (1987) seeks to determine whether the residuals of the equilibrium relationship are stationary. The Johansen (1988) and Stock-Watson (1988) methodologies determine the rank of (π) which equals the number of co-integration vectors.

(Enders, 2004, p. 150) explained the Engle-Granger testing procedure; he began with the type of problem likely to be encountered in applied studies. Suppose that two variables are believed to be $I(1)$ and we want to determine whether there exists an equilibrium relationship between these two variables. Therefore, we need to estimate the long-run equilibrium relationship. If the variables are co-integrated, the residual from the equilibrium regression can be used to estimate the error correction model (ECM).

Additionally, according to (Johansen, 1988, p. 310), the Johansen test can be seen as a multivariate generalization of the augmented Dickey-Fuller test. The generalization is the examination of linear combinations of variables for unit roots. The Johansen test and estimation strategy – maximum likelihood – makes it possible to estimate all co-integrating vectors when there are more than two variables. If there are three variables each with unit roots, there are at most two v vectors. For example, let r be the rank of (π) which equals the number of co-integrating vectors. There are two tests: 1. the maximum Eigen value test, and 2. the trace test. For both test statistics, the initial Johansen test is a test of the null hypothesis of no co-integration against the alternative of co-integration. The maximum Eigen value test examines whether the rank of the matrix (π) is zero. The null hypothesis is that $\text{rank}(\pi) = 0$ and the alternative hypothesis is that $\text{rank}(\pi) = 1$. If the rank of the matrix is zero, the largest Eigen value (λ) is zero, there is no co-integration and tests are done. If the largest Eigen value (λ) is nonzero, the rank of the matrix is at least one and there might be more co-integrating vectors. The test of the maximum (remaining) Eigen value is a likelihood ratio test. The test statistic is:

Where is the likelihood ratio test statistic for testing whether $\text{rank}(\pi) = r$ versus the alternative hypothesis that $\text{rank}(\pi) = r+1$.

Moreover, Johansen (1988) explained the trace test. It is a test whether the rank of the matrix (π) is r . The null hypothesis is that $\text{rank}(\pi) = r$. The alternative hypothesis is that $\text{rank}(\pi) < r$, where n is the maximum number of possible co-integrating vectors. For the succeeding test if this null hypothesis is rejected, the next null hypothesis is that $\text{rank}(\pi) = r+1$, and the alternative hypothesis is that $\text{rank}(\pi) < r+1$. The test statistic is:

Where is the likelihood ratio statistic for testing whether $\text{rank}(\pi) = r$ versus the alternative hypothesis that $\text{rank}(\pi) < r$. This paper will utilize the Johansen methodology to test for co-integration.

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3- Results and discussion

Table (1): Data description

Financial Inclusion Indicators	Abbreviation
Dependent variable	
Gross domestic product per capita	GDPPC
Independent variables	
Borrower from commercial banks	BORRC
Usage the financial services	UFS
Outstanding deposits	OUTSDEP

Source: Author

4-1 Results

In order to know the characteristics of our variables the descriptive statistics was carried out.

Table (2): Descriptive statistics

	BORRC	GDPPC	UFS	OUTSDEP
Mean	37.25524	0.581418	16.52498	45.98589
Std. Dev.	8.690202	2.352885	0.109229	3.779547
Skewness	-0.382178	-1.677053	-1.044278	0.113547
Kurtosis	1.836181	7.118193	4.690542	2.527677
Jarque-Bera	1.373256	19.98176	5.114165	0.194552
Probability	0.503270	0.000046	0.077531	0.907306

Source: Author.

The table above shows the descriptive statistics of the variables according to the standard deviation the borrowers from commercial bank has a large volatility than the other variables with a deviation of 8.69 from his mean, followed by the outstanding deposits, the GDP per capita and usage of the financial services with lower volatility, 3.77, 2.35 and 0.10 of variation respectively. According to Jarque-Bera criteria the variables are normally distributed. Next step is testing the unit root existence for the variables.

Table (3): The stationary test

UNIT ROOT TEST RESULTS TABLE (ADF)					
Null Hypothesis: the variable has a unit root					
At Level					
		GDPPC	OUTSDEP	BORRC	UFS
With Constant	t-Statistic	-0.4421	-1.2015	-0.9570	-2.9235
	Prob.	0.8792	0.6464	0.7417	0.0646
		n0	n0	n0	*
With Constant & Trend	t-Statistic	-1.6913	-2.9480	-1.8775	-2.7914
	Prob.	0.7073	0.1749	0.6191	0.2195
		n0	n0	n0	n0
Without Constant & Trend	t-Statistic	-1.0752	0.6677	1.2371	-0.0236
	Prob.	0.2429	0.8497	0.9372	0.6599
		n0	n0	n0	n0

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At First Difference					
With Constant		d(GDPPC)	d(OUTSDEP)	d(BORRC)	d(UFS)
	t-Statistic	-4.8743	-4.2044	-3.9776	-4.4692
	Prob.	0.0019	0.0063	0.0097	0.0039
		***	***	***	***
With Constant & Trend	t-Statistic	-4.8219	-4.0452	-3.8057	-4.3067
	Prob.	0.0086	0.0313	0.0464	0.0202
		***	**	**	**
Without Constant & Trend	t-Statistic	-4.2796	-4.0208	-3.3185	-4.6437
	Prob.	0.0003	0.0006	0.0027	0.0002
		***	***	***	***
Notes:					
a: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant					

Source: Author.

The table 03 shows the result of the stationary test under Augmented Dickey fuller (ADF) and SIC criteria, the variables have a unit root at level according the P value which is greater than 5% of significance, so we moved to the first difference when all the variables are stationary regarding the P value which is lower that 5% and 1%. Building on the stationary test results we can run the Johansen Cointegration test.

Table (4): The optimal lag selection

VAR Lag Order Selection Criteria						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-113.5674	NA	28.36248	14.69592	14.88907	14.70581
1	-87.17115	36.29482*	8.426606*	13.39639*	14.36213*	13.44585*

Source: Author.

Before running the Johansen cointegration test we have to determine the optimal lags for our sample, all the criteria of the table above showed that the optimal lag is 02.

Table (5): The Johansen cointegration test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.968099	83.44181	47.85613	0.0000
At most 1	0.729071	28.76481	29.79707	0.1293
At most 2	0.550722	12.17634	15.49471	0.1487
At most 3	0.011575	0.174639	3.841466	0.6760
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
Normalized cointegrating coefficients (standard error in parentheses)				
GDPPC	UFS	OUTSDEP	BORRC	
1.000000	-0.693483	0.455264	-0.019622	
	(0.30400)	(0.02296)	(0.00792)	

Source: Author.

The table 03 represents the cointegration test; according the trace statistic there is a cointegration among the variables according to the P value which is lower than 5% of

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significance; so, we reject the null hypothesis that indicate there is no cointegration between the variables.

The cointegration equation

$$GDPPC = -0.69UFS + 0.45OUTSDEP - 3.37BORRC$$

The equation above represents the Normalized cointegrating coefficients. Both of the variables UFS and BORRC have a positive relationship with gross domestic product per capita except the access to outstanding deposits which has a negative coefficient. By dividing the coefficient on the T-statistics we can find that the coefficients are statistically significant at the 1% level. The next estimation technique after the long-run relationship is the Vector error correction model which will be the next step.

Table (6): Vector error correction model

Cointegrating Eq:	CointEq1			
GDPPC(-1)	1.000000			
UFS(-1)	-0.693483			
	(0.60400)			
	[-1.14815]			
OUTSDEP(-1)	0.455264			
	(0.02296)			
	[19.8279]			
BORRC(-1)	-0.019622			
	(0.00792)			
	[-2.47655]			
C	-9.476499			
Error Correction:	D(GDPPC)	D(UFS)	D(OUTSDEP)	D(BORRC)
CointEq1	-0.151686	-0.035596	-2.200044	-0.974667
	(0.03653)	(0.04762)	(0.03758)	(0.04000)
	[-0.22757]	[-0.61775]	[-2.62666]	[-0.74975]
D(GDPPC(-1))	-0.370589	0.033894	0.534117	-0.009256
	(0.55609)	(0.04808)	(0.69880)	(1.08460)
	[-0.66642]	[0.70503]	[0.76433]	[-0.00853]
D(UFS(-1))	-2.164639	-0.314059	0.322152	3.459622
	(4.41888)	(0.38202)	(5.55287)	(8.61851)
	[-0.48986]	[-0.82210]	[0.05802]	[0.40142]
D(OUTSDEP(-1))	0.310123	0.012563	0.258132	0.140785
	(0.21059)	(0.01821)	(0.26463)	(0.41073)
	[1.47264]	[0.69004]	[0.97543]	[0.34277]
D(BORRC(-1))	-0.035136	-0.006854	-0.551123	-0.257426
	(0.22172)	(0.01917)	(0.27862)	(0.43245)
	[-0.15847]	[-0.35759]	[-1.97802]	[-0.59528]
C	-0.863831	0.015052	1.943119	1.919670
	(0.05236)	(0.05726)	(0.83233)	(1.29185)
	[-1.30418]	[0.26286]	[2.33455]	[1.48599]
R-squared	0.419103	0.114544	0.588616	0.181702
Adj. R-squared	0.096383	-0.377375	0.360069	-0.272908

Source: Author.

The first equation represents the cointegration equation and long-run model

$$ECT = 1.000GDPPC_{t-1} - 0.6934UFS_{t-1} + 0.4552 OUTSDEP_{t-1} - 1.634309 BORRC_{t-1} - 9.4764$$

We can see that only the Outstanding deposits variable has a negative relationship on the gross domestic product while the other variables have a long-run association with the dependent variable according to coefficient sign.

Short-run coefficient

$$\Delta GDPPC_t = -0.15\Delta ECT_{t-1} - 0.37 \Delta GDPPC_{t-1} - 2.16 \Delta UFS_{t-1} + 0.31 \Delta OUTSDEP_{t-1} - 0.03\Delta BRN_{t-1} - 0.86$$

Regarding to the short run coefficient we can say the previous periods deviation from long-rung equilibriums is corrected in the current period as an adjustment speed of 15%. For the percentage changes in UFS and BORRC are associated with 2.16% and 3% respectively increase on GDPPC on average ceteris paribus in the sort-run, while the Outstanding deposit is associated with 0.31 decrease on GDPPC on average ceteris paribus in the sort-run. According to the R-square our variables explain our results by 41% while the test of changes can be caused by other indicators.

The rest of tables is to perform some diagnostics to see how seriously our results can be taken. We will start by the autocorrelation test.

Table (7): The residual normality test

VEC Residual Normality Tests			
Component	Jarque-Bera	df	Prob.
1	13.22161	2	0.0013
2	49.47763	2	0.0000
3	11.00455	2	0.0041
4	2.535599	2	0.2815
Joint	76.23939	8	0.0000
*Approximate p-values do not account for coefficient estimation			

Source: Author.

The table shows that the residuals are not normally distributed for the independent variables except one residual for the independent variables is normally distributed. On overall for the entire model the residuals are not normally distributed, that means we have to check the Residual Heteroskedasticity test in our model.

Table (8): VEC Residual Heteroskedasticity Tests

VEC Residual Heteroskedasticity Tests (Levels and Squares)		
Joint test:		
Chi-sq	df	Prob.
98.57986	100	0.5214

Source: Author.

The P value is greater than 5% that means the residuals are not heteroskedastic.

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Table 08: The serial correlation of residuals

VEC Residual Serial Correlation LM Tests						
Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	16.10803	16	0.4454	0.939381	(16, 6.7)	0.5728

Source: Author.

The table 08 represents a good result where the P value greater than 5% that means there is no serial correlation in the model.

4-2 Discussion

In the long-run, the Usage of financial services and borrowing from commercial banks variables have a positive impact on the economic growth measured by the Gross Domestic product per capita, while the outstanding deposits indicator has a negative impact on the dependent variable. This means that all five variables move together in the long-run association, and the coefficients are significant at the 1% level according to the cointegration test outputs. Then we can say the null hypothesis of no cointegration is rejected against the alternative hypothesis of long-run relationship among the variables. The vector error correction model (VECM) results revealed that past movements from long-run equilibriums are corrected in the short run by 15% of adjustment speed. This result can be explained by the new challenges in the financial inclusion prospect in Algeria, Algeria's economy highly relies on the hydrocarbon revenues with 97 percent, this situation pushed the Algerian policy makers to move toward the alternative solutions and the financial inclusion one of these ways to make a transition from a renting economy to a diversification of revenues resources, which means Algeria's government recognised the significance of these transitions toward achieving the Sustainable Development Goals (SDGs). We can explain our results for the positive relationship between the usage of the financial services, the borrowing and the GDP by the progress of the number of Algeria adults who have an account access which increased during the period 2011 to 2014, also the number of adults have a debit card augmented from 13.5% to 21.6% according to the world bank statistics, but this progress still weak in compare with the upper-middle income countries. The growing cash circulating in the informal market still pose a big problem for Algeria government which riches 29% in 2017 this state can explain the negative relationship between the deposits and the GDP that means the problem of confidence on the Algerian financial system still make difference for individuals in addition to the miss culture on using the financial services and product.

4- Conclusion

A policy of financial inclusion is a focus of the World Bank, as demonstrated by its Universal Financial Access initiative. The initiative aims to provide at least one billion people worldwide with at least basic access to financial services, such as maintaining a bank account or other financial account from which they can send and receive payments and store their money. Our empirical study tried to show the financial inclusion state in Algeria. The results obtained showed that there is an impressive progress but it still far that the results

obtained in the other countries which became leader in microfinance polices and financial services. Based on our results it is highly recommend for Algerian authorities to change and develop the financial services and take it as challenge for a new revolution.

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