

**Re-exploring the Financial Development–Economic Growth Nexus in Algeria:
New Insights from a Structural Break Cointegration Approach (1980–2023)****YOUSFI Elhousseyn ^{1♦}, HAMRIT Abdelatif ²**¹ University of M'sila (Algeria), el-housseyn.yousfi@univ-msila.dz² University of M'sila (Algeria), abdelatif.hamrit@univ-msila.dz**Received:** 11/09/2025**Accepted:** 04/11/2025**Published:** 25/11/2025**Abstract:**

This paper reassesses the long-run nexus between financial development and economic growth in Algeria over the period 1980–2023. Economic growth is proxied by per capita GDP, while financial development is measured by broad money supply and credit provided to the private sector, with investment included as a control variable. The analysis employs econometric techniques, notably stationarity and cointegration tests that account for structural breaks. The Gregory–Hansen test confirms the existence of a long-run equilibrium relationship with a structural break among the variables. Furthermore, long-run estimates based on the fully modified ordinary least squares (FMOLS) method indicate that broad money supply and investment exert positive and significant effects on economic growth, whereas credit provided to the private sector has a negative impact. These findings highlight the fragility of Algeria's financial sector and underscore the need to reconsider its role in supporting economic policy objectives, particularly sustainable growth.

Keywords: Financial Development, Economic Growth, Algeria, Gregory–Hansen Test, FMOLS**JEL Classification:** C32, E44, O16, O55.

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1. Introduction:

The financial sector, with its various institutions, is one of the fundamental pillars supporting economic growth, which represents the ultimate goal of any economic policy. This is due to the vital role these institutions play in mobilizing financial resources and directing them toward productive investment through effective financial channels, thereby contributing to enhancing the efficiency of resource allocation and stimulating economic activity, in line with economic and social development priorities. Despite this pivotal role, the relationship between financial development and economic growth particularly in developing countries such as Algeria remains widely debated in both theoretical and empirical literature. This disparity reflects the complexity of the relationship and the differences in structural and institutional contexts from one country to another.

In the Algerian economy, the financial sector has undergone numerous structural reforms since the early 1990s, paving the way for the liberalization and expansion of banking activities, including opening the market to private and foreign investment and granting banks broader powers to provide financial and credit services. However, the results achieved in terms of financial performance and economic growth remain below expectations, especially given the persistence of numerous structural and institutional challenges that limit the effectiveness of these policies. This renders the question of the financial sector's ability to support the economic growth trajectory once again open for debate.

Although numerous studies have examined this relationship in the Algerian context, most have relied on traditional econometric methods and tools that fail to account for the possibility of structural breaks or shifts in the structure of time series. Many researchers have pointed out that ignoring these breaks may bias the results, particularly with regard to unit root and cointegration tests, limiting the accuracy of estimating the long-run relationship between variables. Accordingly, this study seeks to fill this research gap by adopting a dual methodology that combines the application of a set of traditional tests that do not account for the possibility of structural breaks, with the use of modern tests that do take this possibility into consideration especially in relation to unit root and cointegration tests. The aim is to determine whether the relationship between financial development and economic growth in Algeria is characterized by a unit root or a structural break. This adds particular importance to re-examining the relationship between financial development and economic growth in Algeria.

1.1 Problematic:

Given the current state of the Algerian economy and its ongoing efforts to mobilize and secure sufficient funding sources to achieve sustainable economic development, the development of the financial sector emerges as a crucial factor, particularly in stimulating economic growth through increased investment and productivity. Accordingly, the main problematic of this study becomes clear, as it revolves around examining the impact of

financial sector development on economic growth in Algeria, leading to the following question:

To what extent does financial sector development contribute to supporting economic growth in Algeria during the period 1980–2023?

1.2 Sub-questions:

We can divide the research problematic into several sub-questions, as follows:

- ❖ What is the nature of the relationship between financial sector indicators—measured by credit provided to the private sector (% of GDP) and broad money supply (% of GDP)—and economic growth in the long-run?
- ❖ Does the relationship between financial sector indicators and economic growth in Algeria exhibit unit root behavior or structural breaks?
- ❖ To what extent and in which direction do broad money supply and credit provided to the private sector influence economic growth in Algeria in the long run?

1.3 Hypothesis:

As a preliminary attempt to address the research questions, this study is based on the following hypotheses:

- ❖ There exists a long-run relationship between financial development indicators and economic growth in Algeria, with a structural break.
- ❖ Broad money supply has a positive and statistically significant impact on economic growth in Algeria.
- ❖ Credit provided to the private sector has a positive and statistically significant impact on economic growth in Algeria.

1.4 Study Objectives:

In line with Algeria's future aspirations and its ongoing pursuit of economic growth and sustainable development, this study aims to:

- ❖ Re-examine the relationship between financial development and economic growth in the Algerian context, while accounting for the impact of structural breaks.
- ❖ Assess the effectiveness of financial sector reforms in Algeria and their contribution to sustaining long-run economic growth.
- ❖ Clarify the ambiguity that continues to surround the impact of financial development indicators on the economies of developing countries, particularly Algeria.

1.5 Research methodology:

This study adopts a dual methodology that combines the descriptive–analytical approach, used to review previous studies relevant to the research topic, with the applied quantitative approach, which employs various econometric techniques to address the empirical aspect of the study.

2. Theoretical Background and Literature Review:

Economic growth and financial development nexus has been extensively discussed in the economic literature. The contributions of Bagehot (1873), Hicks (1969), and Schumpeter (1934) are considered among the pioneering works that examined the vital role of banks, credit, and financial structures in driving economic growth. Building on these foundational contributions, numerous studies have emerged focusing on the relationship between financial development and economic growth.

Gerschenkron (1962) was the first to propose the intellectual foundation of what later became known as the Financial Structuralists Hypothesis. This hypothesis focused on explaining the role of banks in the capital formation process during the early stages of industrialization in Europe. It argues that the structure and comprehensiveness of the financial sector are critical factors in this relationship. The hypothesis assumes that the presence of a broad and diverse network of financial institutions, along with a wide range of financial instruments and the expansion of these institutions' activities, enhances the efficiency of channeling savings into investment, thereby contributing to the stimulation of long-term economic growth (Al-Tamimi, H. A. H., Al Awad, M., & Charif, H, 2001, pp. 04-05).

The theory of financial repression and liberalization, also known as the McKinnon and Shaw (1973) hypothesis, is considered one of the most prominent contributions addressing the relationship between the financial system and economic growth, particularly in the context of developing countries. The core of this theory is based on the necessity of reducing restrictions imposed on the financial system by allowing market forces to determine real interest rates and by easing controls on credit. According to McKinnon (1973) and Shaw (1973), interest rate liberalization in developing countries leads to an increase in the real interest rate, which in turn contributes to higher savings, stimulates investment, and ultimately supports economic growth (Orji, Jonathan , & Onyinye, 2015, p. 664).

Since the early 1990s, the emergence of endogenous growth theories introduced a new perspective in understanding the determinants of economic growth and provided renewed momentum for analyzing the relationship between financial development and economic growth. Paul Romer (1986, 1990) and Robert Lucas (1988) are considered among the first to lay the theoretical foundations of this school of thought, which is based on the premise that growth is not solely driven by external factors, but can also result from internal mechanisms within the economy. This theoretical shift opened the door to incorporating new elements that stimulate growth—among them, financial intermediation. In this context, the study by (Greenwood & Jovanovic, 1990) stands out as a pioneering contribution that developed a dynamic model linking economic growth to financial sector development, while accounting for income inequality and differences in access to financial services. Similarly, (Bencivenga & Smith, 1991) provided key insights by showing how the

availability of effective financial intermediaries plays a crucial role in fostering sustained long-term endogenous economic growth.

In light of the theoretical debate surrounding the impact of the financial sector on economic growth, numerous empirical studies have emerged that have examined and this relationship, relying on different indicators to measure the financial development. (Ekanayake & Ranjini, 2021) analyzed a sample of 138 developing countries over the period 1980–2018, employing domestic credit to the private sector, domestic credit to the private sector by banks, broad money, and gross domestic savings as indicators of financial development, while real GDP per capita growth was used as a proxy for economic growth. Their results provided strong evidence of a long-run positive relationship between financial development and economic growth in most developing countries. This finding is consistent with (Yakubu, Nanthakumar, Narayan , & Asan , 2021), who examined the case of Egypt over the period 1977–2018 using bounds test, Maki cointegration test and the ARDL-ECM model. Their results indicated that financial development—measured by domestic credit provided by banks (% of GDP)—stimulates economic growth in Egypt.

More recently, (Prem , Ganesh , & Arjun , 2024) investigated the finance–growth nexus in six countries that are members of SAARC and BIMSTEC during the period 1990–2021. Using descriptive analysis, a correlation matrix and both FMOLS and DOLS estimations. The key findings provide strong support for the validity of the finance-led growth theory, emphasizing that the development of both financial institutions and financial markets contributes positively to economic growth.

In another study, (Zakaria & Basah, 2021) examined the Malaysian economy during the period 1990–2016. The researchers used The FTSE Kuala Lumpur Composite Index (FBMKLCI) and domestic credit (% of GDP) as indicators of financial development, while economic growth was measured by GDP per capita and Industrial Production Index (IPI). Using the Johansen cointegration approach along with VAR and VECM models, the study found a significant and significant relationship between financial development and economic growth in both the long and short term.

In another study, (Mlambo, 2024) examined the impact of financial development on economic growth in SADC countries during the period 2000–2022. The study used a set of indicators to measure financial development, including the financial development index (WDI), Broad Money and Remittances. Using panel dynamic Common correlated effects (DCCE) Estimator and Dumitrescu and Hurlin causality Test, the findings revealed that there is a positive and statistically significant impact of financial development on economic growth in SADC countries.

In contrast to these findings, (Okuyan, 2022) in a study of 19 developing countries using the bounds testing approach and the Toda–Yamamoto causality test, concluded that the relationship between financial development—measured by domestic credit to the private sector—and economic growth—measured by GDP per capita—is unstable and inconclusive. In line with these findings, (Fengju & Wubishet, 2024) who examined 18 East African

countries over the period 1995–2021 using a dynamic panel GMM approach, found that the effect of financial development—captured by financial development index developed by Svirydzenka (2016)—on economic growth is complex and multidimensional.

Similarly, (Gizaw, Getachew, & Mancha, 2024) in their analysis of 22 emerging African and Asian countries during 1981–2021 using the Panel Dynamic Common Correlated Effects (DCCE) methodology, demonstrated that financial development—captured by the IMF Financial Development Index—exerts a positive impact on economic growth; however, this effect remains weak.

3. Methodology:

3.1 Data and Model:

This research aims to examine the interaction between financial development and economic growth in the Algerian economy. To achieve this objective, we employ a simple model built upon theoretical considerations and previous empirical studies, while also taking into account the structural characteristics of the Algerian economy. The model incorporates a set of key variables, including gross domestic product per capita as a measure of economic growth. Credit provided to the private sector is used as an indicator of financial intermediation and the efficiency of the financial system. This variable has been widely adopted in the literature to assess the impact of financial development on economic growth, including the studies by (Khom , Omkar , Yadav , & Pramshu , 2024), (Osei & Kim, 2020) and (Le & Binh, 2018). Furthermore, broad money supply (M2) is employed as a proxy for financial depth and liquidity availability in the economy. It has also been frequently used in the literature to explain the role of the financial sector in supporting growth, as seen in the studies by (Song, Chang, & Gong, 2021) and (Okafor, Onwumere, & Ezeaku , 2016). Investment, expressed as gross fixed capital formation as a percentage of GDP, is included as a control variable. It reflects the level of real economic activity and contributes to explaining the long-term behavior of economic growth. The initial form of the model can be presented as follows:

$$GDPC = f(PQ, M2, INV) \dots (01)$$

To improve the statistical properties of the model, reduce variance, and achieve variable homogeneity, many studies resort to using the natural logarithm of the variables a common practice that has also been adopted in this study. Accordingly, equation (01) can be rewritten in the form of a multiple linear regression model as follows:

$$LGDPC_t = \beta_0 + \beta_1 PQ_t + \beta_2 LM2_t + \beta_3 LINV_t + \varepsilon_t \dots (02)$$

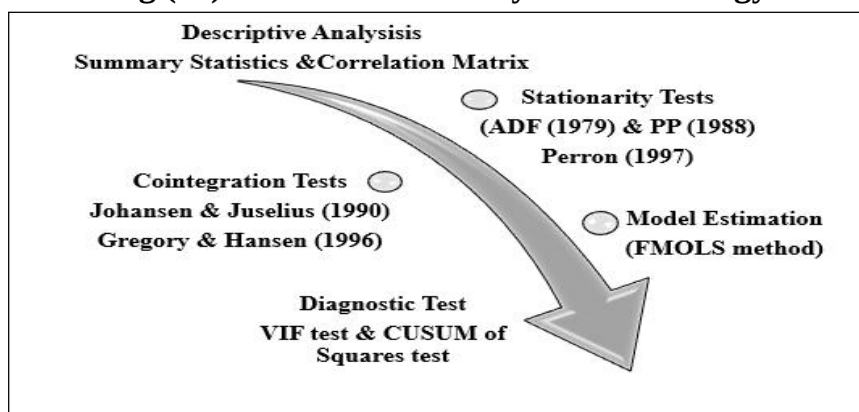
Where LGDPC refers to the natural logarithm of gross domestic product per capita, which is the dependent variable in the model; LPQ represents the natural logarithm of credit provided to the private sector (% of GDP); LM2 denotes the natural logarithm of broad money supply (% of GDP); while LINVLINV refers to the natural logarithm of investment (% of GDP). The coefficients from β_0 to β_3 represent the estimated model parameters,

whereas ε_t denotes the stochastic error term. The data were obtained from the World Development Indicators (WDI) and cover the period from 1980 to 2023.

3.2 Econometric Procedures:

To determine the most appropriate estimation method, the study employs a set of econometric techniques. First, a descriptive analysis is carried out, presenting key statistical indicators and estimating the correlation matrix between the variables under investigation. Given that the data are time series, verifying the stationarity of the variables is an essential preliminary step. In most cases, studies rely on classical unit root tests, such as the (Dickey & Fuller, 1979) and (Phillips & Perron, 1988) tests, to determine the order of integration. However, a key drawback of this type of test is its disregard for the possibility of structural changes or breaks that could fundamentally affect the results of unit root tests. In this regard, many researchers—most notably Perron—have pointed out that structural changes or breaks can significantly affect the properties of time series and may consequently lead to misleading results. To address this issue, the present study adopts a relatively recent approach, namely the unit root test proposed by (Perron, 1997), which detects the presence of a unit root while allowing for an endogenous structural break within the time series. This is followed by the application of a cointegration test to verify the existence of a long-run relationship. In line with the stationarity testing methodology, two different tests are employed to analyze long-run relationships, namely the (Johansen & Juselius, 1990) test and the (Gregory & Hansen, 1996) test. Although both require that all variables included in the model be integrated of the first order, there is a fundamental difference between them: the (Johansen & Juselius, 1990) test does not take into account the presence of structural breaks in the data, whereas the (Gregory & Hansen, 1996) test assumes the existence of an unknown structural break within the data. If cointegration is confirmed, the next step is to estimate the model parameters. In this context, the Fully Modified Ordinary Least Squares (FMOLS) method, developed by (Phillips, & Hansen, 1990), is considered appropriate for estimating the long-run relationships between variables integrated of order one. Finally, the estimation results are subjected to a set of standard diagnostic tests to assess the robustness of the findings. Figure 1 summarizes the steps of the econometric analysis methodology adopted in this study.

Fig (01): Econometric Analysis Methodology

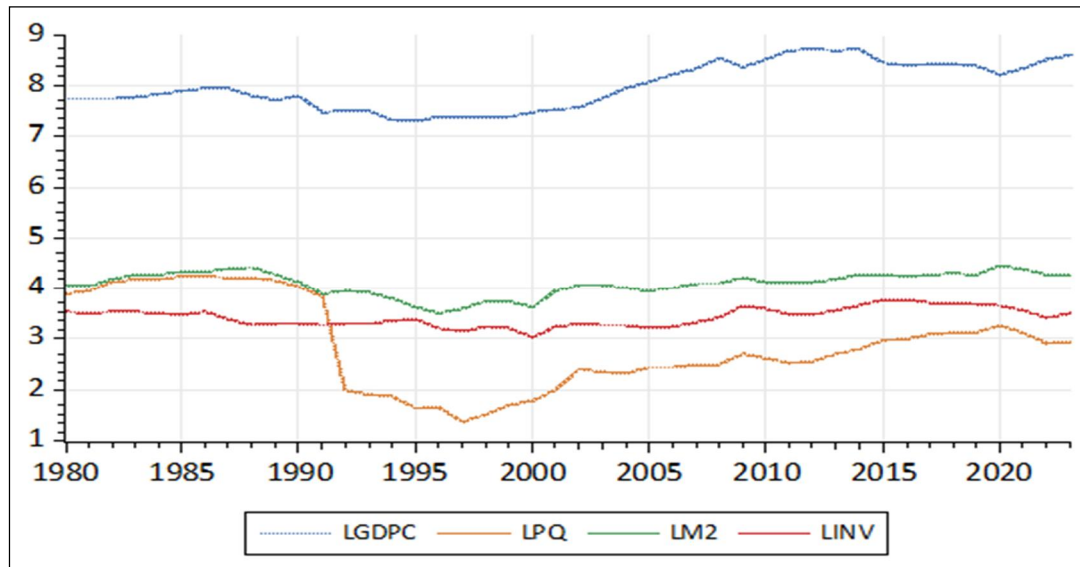


Source: Personal Building

4. Results and Discussion:

Studying the descriptive statistical properties of the study variables constitutes a fundamental preliminary step prior to the modeling or estimation process, as it provides essential insights into the nature and statistical structure of the data. Figure 1 presents a graphical representation of the study variables in logarithmic form, illustrating their variations over the period 1980-2023.

Fig (02): Trends of the Study Variables in logarithmic form (1980–2023)



Source: Author processing based on World Development Indicators (WDI)

Table 01 presents a summary of the key descriptive statistics. Homogeneity was observed in the data, reflected by the relative closeness of the minimum and maximum values to the arithmetic mean. The standard deviation values further support this conclusion, confirming that the data exhibit relatively low dispersion, with the LPQ variable showing the highest level of dispersion compared to the other variables. Additionally, the results of the Jarque-Bera test indicate that the null hypothesis that the data follow a normal distribution cannot be rejected, based on the p-value associated with the test statistic, which was greater than 5% for all variables.

Table (01): Summary of Descriptive Statistics

Variables	LGDPC	LPQ	LM2	LINV
Mean	7.98	2.88	4.09	3.42
Median	7.90	2.75	4.13	3.40
Maximum	8.71	4.23	4.44	3.77
Minimum	7.29	1.36	3.49	3.02
Std. Dev.	0.45	0.88	0.23	0.18
Skewness	0.11	0.17	-0.80	0.12
Kurtosis	1.63	1.88	2.88	2.09
Jarque-Bera	3.51	2.49	4.74	1.61
Prob	0.17	0.28	0.09	0.44

Source: Author processing based on Eviews outputs.

The table 02 displays the correlation matrix between the variables, where the results indicate a relatively strong positive correlation between GDP per capita (LGDPC) and both broad money supply (LM2) and investment (LINV), with correlation coefficients of (0.64) and (0.66). Respectively, suggesting that an increase in money supply or investment may contribute to raising per capita GDP. There is also a relatively weak positive correlation between GDP per capita and credit provided to the private sector (LPQ), with a coefficient of 0.19.

Furthermore, the results show a strong correlation of (0.74) between LPQ and LM2, while a moderate correlation of (0.41) was recorded between LPQ and LINV. Likewise, LM2 shows a relatively strong correlation with LINV at (0.68). These ratios necessitate caution when estimating the model later and emphasize the importance of verifying the absence of multicollinearity to ensure the validity and reliability of the results.

Table (02): Correlation Matrix

Variables	LGDPC	LPQ	LM2	LINV
LGDPC	1			
LPQ	0.19	1		
LM2	0.64	0.74	1	
LINV	0.66	0.41	0.68	1

Source: Author processing based on Eviews outputs.

Table 3 presents the results of the unit root tests without accounting for structural breaks, using both the (Dickey & Fuller, 1979) and (Phillips & Perron, 1988) tests. The tests were applied to the variables in their levels and first differences. The results of both tests are consistent, indicating that all variables are non-stationary at their levels but become stationary after first differencing. This confirms that they are integrated of order one I (1) which is in line with the behavior of most macroeconomic variables.

Table (03): ADF and PP Unit Root Test Results

Model	ADF Test				PP Test			
	Level		1 st diff		Level		1 st diff	
Variables	C	C/T	C	C/T	C	C/T	C	C/T
LGDPC	-0.44	-1.40	-5.52*	-5.53*	-0.76	-1.68	-5.66*	-5.66*
LPQ	-1.43	-1.16	-5.40*	-4.45*	-1.61	-1.40	-5.45*	-5.45
LM2	-1.32	-1.42	-5.21*	-5.16*	-1.48	-1.72	-5.15*	-5.09
LINV	-1.61	-1.98	-5.74*	-5.76	-1.61	-2.07	-5.71*	-5.65
Notes: The critical values are -3.59 and -4.19 at the 1% level, and -2.93 and -3.52 at the 5% level of significance (*, **) indicate statistical significance at the 1% and 5% levels respectively. C: denotes a model with an intercept. C/T: denotes a model with both an intercept & trend.								

Source: Author processing based on Eviews outputs.

We then re-examined the stationarity properties by considering the possibility of structural breaks. To this end, the (Perron, 1997) unit root test was employed. This test allows for the detection of a unit root in the series while accounting for an endogenous structural break, based on three models: Model A (break in the intercept), Model B (break in the trend), and Model C (break in both the intercept and the trend). The results are presented in Table 4.

Table (04): Perron Unit root tests results

Model	Level			1st diff		
	I	II	III	I	II	III
LGDP	-3.13	-2.99	-3.26	6.31*	-6.04*	-6.62*
break date	2003	1990	2003	2011	2006	2014
LPQ	10.33*	-3.01	-11.15*	-12.90*	-5.97*	-13.44*
break date	1991	1997	1991	1992	1992	1992
LM2	-4.12	-3.01	-4.07	-6.16*	5.81*	7.07*
break date	1989	1997	1989	1996	1990	1996
LINV	-3.70	-2.50	-3.06	-6.52*	-6.63*	6.60*
break date	2006	1996	2007	2000	2015	2000
The critical values are -5.92 and -5.45 at the 1% level, and -5.23 and -5.59 at the 5% level of significance (*, **) indicate statistical significance at the 1% and 5% levels.						

Source: Author processing based on Eviews outputs.

With the exception of the LPQ series, which showed mixed results (it was found to be stationary at the level in some models, specifically models A and C, while it was not in trend model B. However, it became clearly stationary at the first difference in all models, which suggests that it is generally considered to be first-order integrated), the remaining results are largely consistent with the results of traditional single-root tests. These findings support the fact that the variables under study are integrated of order one with endogenous structural breaks, which subsequently justifies the use of cointegration approach with structural breaks. The results further indicate the emergence of several years as potential structural breakpoints, most of which correspond to important junctures in the evolution of the Algerian economy, such as the economic reform programs and the transition toward a free market economy in the early 1990s (1990, 1991, 1992), the oil price shocks (1989 1997, 2014), and the fundamental shift in the course of economic policy since 2000.

These findings make it possible to proceed to the next step, which consists in examining the existence of a long-run relationship between financial development indicators and economic growth. As previously highlighted, the present study employs both the (Johansen & Juselius, 1990) test and the (Gregory & Hansen, 1996) test. The results of these two tests are reported in Tables 5 and 6, respectively.

Table (05): Johansen & Juselius Cointegration Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace Stat	Critical Value (5%)
None	0.36	47.44	47.85
At most 1	0.30	49.86	29.79
At most 2	0.24	13.98	15.49
At most 3	0.05	2.25	3.34
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Stat	Critical Value (5%)
None	0.36	18.46	27.58
At most 1	0.30	15.00	21.13
At most 1	0.24	11.72	14.26
At most 1	0.05	2.25	3.84

Source: Author processing based on Eviews outputs.

Table (06): Gregory & Hansen Test results

Model	ADF	break date	Zt	break date	Za	break date
C	-4.25	2004	-4.36	2004	-27	2004
C/T	-4.89	2014	-5.09	2014	-32.56	2014
C/S	-3.57	2004	-5.99	2003	-41.25	2003
C/S/T	-6.78*	2004	-6.50*	2003	-43.92	2003
Asymptotic Critical Values in the model 4 (Change in Level and Trend) at 5% significance level: -6.32 -6.32 -78.87						
* Indicates that there is cointegration at the 5% significance level						

Source: Author processing based on Stata outputs.

The (Johansen & Juselius, 1990) cointegration test results reveal no evidence of a long-run equilibrium relationship among the variables, as both the trace and maximum eigenvalue statistics fall below their corresponding 5% critical values. In contrast, the (Gregory & Hansen, 1996) cointegration test, which accounts for a potential structural break, provides evidence in favor of cointegration, particularly under Model 4. This conclusion is supported by the ADF and Z_a statistics, which are lower than the 5% critical values, indicating the rejection of the null hypothesis of no cointegration between the variables, even in the presence of a potential structural break. The results also indicate that the structural break dates correspond to the years 2003–2004.

This evidence allows us to proceed with the estimation of the long-run coefficients. For this purpose, the fully modified ordinary least squares (FMOLS) methodology was employed, with results presented in Table 7. The results indicate that all coefficients are statistically significant. In particular, the impact of broad money supply (% of GDP) was consistent with expectations, showing a positive relationship with per capita GDP. Specifically, a one-unit increase in broad money supply leads to a 1.89-unit rise in per capita GDP. These findings highlight the long-run effectiveness of monetary policy and confirm the existence of a sustained positive relationship between financial development—measured by broad money supply (% of GDP)—and economic growth in the Algerian economy.

Table (07): Cointegration Regression Results (FMOLS)

Dependent Variable: LGDPC				
Variable	Coefficient	Std. Error	t-Statistic	Prob
LPQ	-0.32	0.08	-3.68	0.00
LM2	1.89	0.40	4.71	0.00
LINV	0.63	0.37	1.69	0.09
D2004	0.04	0.02	2.08	0.04
C	-1.01	1.18	-0.85	0.39
R-squared	0.66	Mean dependent var 7.99		
Adjusted R-squared	0.63	S.D. dependent var 0.45		
S.E. of regression	0.27	Sum squared resid 2.94		
Jarque-Bera	1.94	Prob 0.37		

Source: Author processing based on Eviews outputs

It is interesting to note that the impact of credit provided to the private sector (% of GDP) was negative, contrary to theoretical expectations, as each one-unit increase in total credit leads to a 0.32-unit decrease in per capita GDP. This result can be explained in the Algerian context by the weak structure of the banking system, despite the reforms introduced in the sector and the opening up to private and foreign investments, with the number of private banks with foreign capital reaching 13 banks by the end of 2023. However, the dominance of public banks over the banking sector remains, as confirmed by the figures recorded in 2023 according to the annual report of the Bank of Algeria, where public banks accounted for 78.4% of the increase in loans granted to the economy, compared to only 21.6% for private and foreign banks. This reflects the weak competition from private and foreign banks in the banking market, which has prevented the sector from fully playing its role in supporting economic growth, particularly with regard to the efficient management of available financial resources and their allocation to productive investment projects.

By contrast, the relationship between investment volume and per capita GDP, although trending in the right direction. The estimated investment parameter indicates that each one-unit increase in investment volume leads to a 0.63-unit increase in per capita GDP, was not strongly significant (significant only at the 10% level). This result reflects the weak contribution of investment to economic growth, despite its role as a key component of fiscal policy. This can be explained by the structure of investment in Algeria, which is frequently allocated to non-productive sectors with limited growth returns. Add to that the institutional framework weaknesses and follow-up of project implementation.

The effect of the dummy variable (representing the structural break in 2004) was positive on per capita GDP, as expected, and statistically significant at the 5% level. This result is consistent with the reality of the Algerian economy and reflects the structural transition that the economy experienced after this year. This period was associated with a number of reforms economic and institutional reforms that contributed to improving overall economic performance, which was clearly manifested in the noticeable improvement of

various economic indicators. This was mainly driven by the rise in global oil prices and the increase in oil revenues, which in turn allowed for an expansion in investment spending through the adoption of an expansionary fiscal policy with a purely Keynesian orientation. Consequently, this led to the reshaping of the long-run dynamics of economic growth.

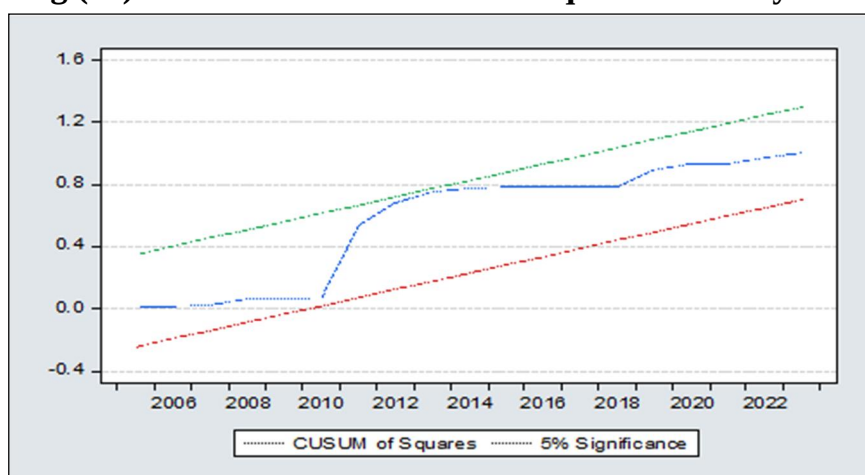
Table (08): Results of Variance Inflation Factors

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
LPQ	0.007	30.58	2.59
LM2	0.160	1158.27	3.99
LINV	0.139	719.39	2.10
D2004	0.000	1.34	1.14

Source: Author processing based on Eviews outputs

Finally, since ensuring the robustness of the results is a crucial step after the estimation process, the model was subsequently subjected to standard diagnostic tests, particularly the Variance Inflation Factor (VIF) test to detect multicollinearity, as well as the CUSUM of Squares test to verify the long-run stability of the model.

Fig (03): Results of the CUSUM of Squares Stability Test



Source: Author processing based on Eviews outputs

The results of the Variance Inflation Factor (VIF) test and the CUSUM of Squares test provide positive indications as shown in Table 8 and Figure 3, which enhances the reliability of the obtained estimates.

5. Conclusion:

This study aims to re-examine the long-run relationship between financial development and economic growth in Algeria over the period 1980–2023. It relies on two key indicators of financial development: broad money supply (% of GDP) and credit to the private sector (% of GDP). A set of econometric tools was employed, including conventional unit root tests (ADF and PP), the unit root test with structural breaks (Perron test), as well as two cointegration approaches, namely the Johansen test and the Gregory–Hansen test. In addition, the Fully Modified Ordinary Least Squares (FMOLS) method was applied to estimate the long-run relationship coefficients. The findings highlight important and contrasting insights into the impact of financial development indicators on economic

growth in Algeria. Specifically, the Gregory–Hansen cointegration test confirms the existence of a long-run equilibrium relationship with a structural break, thereby supporting the study's first hypothesis. Moreover, the long-run estimation results indicate that broad money supply (% of GDP) has a positive effect on economic growth, validating the second hypothesis. In contrast, credit to the private sector (% of GDP) has a negative long-run effect on economic growth, which does not support the third hypothesis. This outcome is attributed to the weak efficiency of the financial system and its limited capacity to channel financial resources toward productive sectors with higher added value, thus reducing its effectiveness as a driver of economic growth. Accordingly, the study recommends enhancing the role of the banking system, particularly by strengthening private banks through creating a favorable environment for their effective contribution to the overall economic system, in addition to directing financial resources toward their proper channels in line with the objectives of economic policy, particularly supporting economic growth.

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7. Appendices:

Appendix 1: Johansen & Juselius Test Results

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.** Critical Value
None	0.362577	47.44891	47.85613	0.0546
At most 1	0.306408	28.98574	29.79707	0.0618
At most 2	0.248785	13.98499	15.49471	0.0834
At most 3	0.053547	2.256412	3.841465	0.1331
Trace test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**Mackinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Max-eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.** Critical Value
None	0.362577	18.46317	27.58434	0.4571
At most 1	0.306408	15.00075	21.13162	0.2889
At most 2	0.248785	11.72858	14.26460	0.1213
At most 3	0.053547	2.256412	3.841465	0.1331
Max-eigenvalue test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**Mackinnon-Haug-Michelis (1999) p-values				

Appendix 2: Gregory & Hansen Test results

Gregory-Hansen Test for Cointegration with Regime Shifts						
Model: Change in Regime and Trend			Number of obs	=	44	
Lags = 1 chosen by downward t-statistics			Maximum Lags	=	2	
	Test	Breakpoint	Date	Asymptotic Critical Values		
	Statistic			1%	5%	10%
ADF	-6.78	25	2004	-6.89	-6.32	-6.16
Zt	-6.50	24	2003	-6.89	-6.32	-6.16
Za	-43.92	24	2003	-90.84	-78.87	-72.75

Appendix 3: Results (FMOLS) Cointegration Regression

Method: Fully Modified Least Squares (FMOLS)				
Dependent Variable: LGDPC				
Sample (adjusted): 1981 2023				
Included observations: 43 after adjustments				
Cointegrating equation deterministics: C				
Additional regressor deterministics: @TREND				
Long-run covariance estimate (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LPQ	-0.325139	0.088269	-3.683520	0.0007
LM2	1.891243	0.401235	4.713558	0.0000
LINV	0.632290	0.374033	1.690465	0.0991
D2004	0.046989	0.022521	2.086494	0.0437
C	-1.015589	1.188834	-0.854273	0.3983
R-squared	0.665902	Mean dependent var		7.992483
Adjusted R-squared	0.630733	S.D. dependent var		0.458307
S.E. of regression	0.278501	Sum squared resid		2.947385
Long-run variance	0.098266			

Appendix 4: Variance Inflation Factors test

Variance Inflation Factors			
Sample: 1980 2023			
Included observations: 43			
Variable	Coefficient Variance	Uncentered VIF	Centered VIF
LPQ	0.007791	30.58827	2.597773
LM2	0.160989	1185.279	3.994270
LINV	0.139901	719.3986	2.100439
D2004	0.000507	1.341933	1.149886
C	1.413325	618.4536	NA