

The impact of the agricultural and industrial sectors on economic growth in Algeria during the period 2000-2023

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Abstract---This paper investigates the impact of the agricultural and industrial sectors on economic growth in Algeria from 2000 to 2023. The study employs an Autoregressive Distributed Lag (ARDL) model for econometric analysis, using value added from the agricultural sector and value added from the industrial sector as independent variables, and gross domestic product (GDP) as the dependent variable. The results indicate that both the agricultural and industrial sectors play a significant role in the Algerian economy due to the enormous potential that Algeria possesses. The Bound Test results confirm a long-run cointegrating relationship between the variables in Algeria during the period 2000-2023. The results also indicated a positive and direct relationship between value added in both the agricultural and industrial sectors and GDP in Algeria during the period 2000-2023.

Keywords---Agricultural Sector, Industrial Sector, Economic Growth, Algeria, ARDL model.

Introduction

Economic growth is a critical determinant of comprehensive development globally, such as achieving social and economic goals, reducing inequality gaps, and raising living standards, which depends on the growth of total production in the economy (Moyo & Phiri, 2024). The concept of economic growth in its academic context refers to the annual increase in material production, expressed in value or the growth rate of Gross Domestic Product (GDP) or national income, and includes changes in material

How to Cite:

Ismail, B., Boualleg, N., Yahia, S. A., & Elfiki, M. S. (2025). The impact of the agricultural and industrial sectors on economic growth in Algeria during the period 2000-2023. *The International Tax Journal*, 52(5), 2834–2847. Retrieved from <https://internationaltaxjournal.online/index.php/itj/article/view/287>

The International tax journal ISSN: 0097-7314 E-ISSN: 3066-2370 © 2025

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Submitted: 26 February 2025 | Revised: 20 August 2025 | Accepted: 16 October 2025

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production over a short period, usually not exceeding one year (Mladen , 2015). The relationship between key economic sectors, namely agriculture, industry, and services, and economic growth has long been debated, particularly in resource-rich developing countries. Consequently, many researchers focus on studying the relationship between the agricultural and industrial sectors and economic growth. Although numerous studies have explored this impact, their findings remain mixed, underscoring the need for further context-specific research.

Agriculture is considered a crucial source for "providing the necessary capital for industrialization, often considered the second phase of economic development." However, the vital connection between the sectors of agriculture, industry, and services cannot be overlooked. This connection involves several aspects, such as creating a market for industrial products that depend on agricultural outputs, as well as a market for agricultural products driven by industrial demand. These sectors together also help boost exports, which improves the balance of payments. They also support strengthening local manufacturing and providing related services to the sector, which directly impacts the economic well-being of households. Because of this, these sectors are interconnected and play a key role, either individually or collectively, in driving economic growth. This connection requires understanding the depth of their impact on economic development, which is essential for shaping and implementing economic policies (Muyambiri, 2023). Agriculture is a highly important sector in economic development, especially in low-income countries where a large share of the population relies on it for their livelihoods. In this context, the link between agricultural exports and economic growth is a central focus in economic research. Agricultural exports can act as a major driver for growth, poverty reduction, and comprehensive economic transformation. Many studies emphasize that increasing agricultural exports can stimulate economic growth by generating foreign exchange earnings, creating jobs, and enhancing food security (EL Weriemmi & Bakari, 2024).

Manufacturing plays a vital role in the economic development of any country, as a robust industrial base is a fundamental condition for achieving sustained development. In developing countries, manufacturing is used as a tool to absorb surplus labor and meet the needs of market diversification in the advanced stages of economic development. Therefore, manufacturing, especially through the development of small and medium industries, is considered synonymous with economic development. Rapid manufacturing is preferred due to its ability to increase national income and enhance the potential for exporting industrial goods, which contributes to achieving self-sufficiency and self-reliance. Additionally, industrial development provides the necessary foundation for building the infrastructure required for comprehensive economic development (Singh & Singh, 2007). The balance and efficiency of the national economy, as well as achieving economic growth, largely depend on the development of the industrial society and its specialization within the international division of labor system. The specifics of implementing transformative changes in the global economy are determined by several conditions and factors, the most important of which are technical, technological, and institutional processes. Modern production chains are changing so that production is brought closer to end consumers, which helps reduce logistical and technological costs, changes the social component of enterprises, and thereby supports the development of local economic systems (Klevtsova, Vertakova, & Polozhentseva, 2021).

Algeria is a country rich in natural resources and has tremendous potential in both the agricultural and industrial sectors. In the context of ongoing government efforts to adopt developmental strategies and programs, Algeria seeks to achieve the best results in these two sectors by providing the necessary means and addressing areas of deficiency in order to reach the desired economic growth rates. Understanding the behavior of these two sectors and their impact on the economy is essential due to their importance in meeting basic needs, achieving social and economic development, enhancing inter-sectoral interactions, and benefiting from the advantages of international trade. This understanding is crucial for both advanced and developing economies alike. Based on the above, the research problem can be formulated as follows:

To what extent do the agricultural and industrial sectors affect economic growth in Algeria during the period 2000-2023?

This research paper aims to review the theoretical and empirical literature related to the subject under study. It also seeks to deepen the understanding of the role of the agricultural and industrial sectors and their impact on economic growth in Algeria during the specified study period, through building an econometric model that allows for analyzing the relationship and existing impact among the research variables.

1. The theoretical background of the agricultural and industrial sectors:

Both the agricultural and industrial sectors are considered fundamental drivers of economic growth.

1.1 Theoretical concepts about the agricultural sector:

1.1.1 Definition of agriculture: The English term 'agriculture' is derived from the Latin words *ager* (field) and *colo* (to cultivate), collectively meaning 'tilling the field.' However, the meaning of the word has expanded to include a broader range of activities integrated with agriculture, which fall under terms such as farming, domestication, and horticulture (Harris & Fuller, 2014).

Agriculture is also defined as the activity in which humans directly participate in managing the life cycles of certain plants. In other words, it can be considered a transformation from an extractive approach to a highly organized approach, involving seasonal scheduling of work to obtain storable products. Scientifically, agriculture includes the management of soil, water, and other components of the plant environment (Harris & Fuller, 2014). Agriculture is also defined as modern farming because it explicitly relies on production processes, technologies, and tools derived from scientific advancements and research and development results. This modern agriculture is not limited to large-scale agricultural production requiring intensive capital but aligns with rich intellectual traditions (Michel).

1.1.2 Importance of Agriculture: The agricultural sector is a strategic and vital component of the national economy, contributing a significant percentage of the GDP and export revenues. It also provides employment opportunities for millions of individuals, which is why it is often called the backbone of the economy. Therefore, governments give top priority to agriculture to ensure food security for their populations. Agriculture also indirectly contributes to economic growth by providing better income, stabilizing food prices, and alleviating poverty. Agriculture can reduce poverty and hunger in many developing countries through the impact of agricultural growth on employment and profitability. When agricultural production increases, it stimulates job creation in the agricultural sector in response to local demand, thereby enhancing the purchasing power of poor groups in developing countries, which often have a high proportion of employment in this sector (Afriyanti, et al., 2023).

1.1.3 The Role of Agriculture in Economic Development: According to (Aremu, 2014), the role of agriculture in economic development is as follows:

- **Providing food:** It helps meet the increasing food needs of the population.
- **Stimulating industrialization:** It increases demand for industrial products, which drives the expansion of production.
- **Generating foreign exchange:** It provides additional foreign exchange earnings through increased agricultural exports, which are used to import capital goods necessary for development.
- **Increasing income and capital accumulation:** It raises income in rural areas, contributing to capital accumulation.
- **Providing employment opportunities:** It creates productive job opportunities.
- **Social and economic progress:** Improved the welfare of rural populations.

1.1.4. Economic theories of the agricultural sector: There are several economic theories that explain the relationship between the agricultural sector and economic growth, most notably: (Idisi, et al., 2019):

- **The Lewis Theory of Development:** This theory consists of two main sectors: the traditional rural subsistence sector, characterized by surplus labor that does not effectively contribute to production, and the modern urban industrial sector with high productivity. The theory is based on the idea that surplus labor can be gradually transferred from the agricultural sector to the industrial sector without affecting agricultural production. According to this theory, if agricultural production increases, food prices decrease, providing more funds for capitalists to increase their investments in the economy.
- **The "Solow-Sam" Neoclassical Growth Theory:** This theory assumes the existence of a continuous production function linking GDP to capital and labor inputs, leading to a stable equilibrium state for the economy. This model is a common framework for analyzing economic growth, explaining the long-term output growth rate based on two exogenous variables: population growth rate and technological progress rate, independently of the savings rate.
- **The "Harrod-Domar" Growth Model:** This theory emphasizes the importance of saving and investment as key determinants of economic growth. For an economy to achieve growth, it must save a certain percentage of its national income to replace worn-out capital goods (such as buildings and equipment). To achieve actual growth, it is necessary to undertake new investments that represent a net addition to the capital stock.

1.2 Concepts of the Theory Regarding the Industrial Sector

1.2.1 Definition of the Industrial Sector: The industrial sector is considered the cornerstone of economic development for any country, as it has a great capacity to absorb unemployment and increase the value of GDP. Due to its importance, this sector requires an increase in the volume of investments. Industrial policy is one of the main tools used by the state to intervene in economic activities, and it effectively contributes to enhancing the competitiveness of various economic sectors. The industrial sector plays a pivotal role in developing the country's macroeconomy and directly affects macroeconomic variables, foremost among them GDP, through increasing added value, improving the structure of the balance of payments, achieving economic growth, and raising employment levels (Djemai & Billami, 2019).

1.2. 2. The Importance of Industry in the Economy: The industrial sector is considered a key driver in the economic cycle, and its importance is reflected in the following points (Djemai & Billami, 2019):

- **Enhancing Economic Resilience:** The presence of a strong and diverse industrial sector helps reduce the negative effects of economic instability in developing countries, making them more capable of facing crises.
- **Creating Job Opportunities:** Industry is characterized by its ability to generate new job opportunities, thereby alleviating the severity of unemployment, which is often apparent or disguised in most developing countries.
- **Increasing Productivity and National Income:** Continuous technological updates and labor specialization lead to increased productivity, contributing to the growth of national income through integrative relationships between industry and other sectors.
- **Improving the Trade Balance:** The industrial sector contributes to attracting foreign currency and addressing trade balance deficits by producing substitute goods for imports or exportable goods, leading to increased income and improved welfare levels.
- **Diversifying Income Sources:** Industry helps diversify sources of production, income, and exports in developing countries, thereby enhancing its contribution to the GDP. This diversification reduces dependence on raw material exports and protects the country from price and external demand fluctuations, especially as industries in developed countries shift towards technological and technical modernization, which may reduce their demand for raw materials.

2. The theoretical background of economic growth: Economic growth is considered one of the main objectives of macroeconomic policies because it reflects the internal state of the economy, and definitions have varied among researchers is more standard.

2.1. Definition of economic growth: Kharroubi et al., (2024) define the economic growth as the long-term increase in a country's ability to provide a variety of economic goods to its population. This increase is linked to technological development and the necessary institutional adjustments to achieve it. On the other hand, Heller (2012) sees economic growth in its narrow sense as an increase in per capita national income, focusing on the quantitative analysis of relationships between internal variables. In its broader sense, it includes an increase in GDP, GNP, and national income, leading to an increase in national wealth and the individual's productive capacity, in addition to structural adjustments in the economy. Therefore, economic growth can be considered a process aimed at increasing the macroeconomic indicators of the national economy, especially the per capita GDP in an upward direction. This process carries positive effects on both the economic and social sectors. In contrast, development shows how this growth affects society by improving the standard of living. In turn, Babajic et al., (2022) point out that economic growth is an increase in the quantitative indicators of the economy, specifically an increase in per capita output over a certain period. Economic development can be viewed as a process comprising successive stages of economic growth, and development has become synonymous with rapid overall economic growth.

2.2. Key Indicators for Measuring Economic Growth: Economic growth is considered a central issue in contemporary economics and represents a strategic goal for all countries. It is believed not only to lead to increased income levels but also to contribute to achieving the general welfare of society. However, economic growth is not considered a sufficient indicator to judge the development level of a country. Many countries may achieve effective economic growth but simultaneously face difficult challenges in social, political, economic, and environmental aspects. In the absence of these problems, economic growth can be measured, according to Cristea et al., (2021), using key indicators, the most prominent of which are:

- **Gross Domestic Product (GDP):** This indicator measures the monetary value of goods and services produced for final use during a specific period and within a specific geographic area.
- **Human Development Index (HDI):** This indicator takes into account the main dimensions of human development, which include healthy and long life, level of education, and a decent standard of living.

2.3. The Difference Between Economic Growth and Economic Development: Growth and economic development are interconnected but distinct concepts, with similarities appearing in several aspects (Heller, 2012):

- **Continuity:** Both processes are continuous and have stimulating effects on the economy.
- **Resource Efficiency:** Both involve increasingly efficient use of resources.
- **Common Goal:** The ultimate goal of growth and development lies in improving the level and quality of life.
- **Causal Relationship:** Each is both a cause and a result of the general trend, influencing the pace of progress and ensuring the transition from one economic level to another.

Despite the similarity, there are fundamental differences between the two concepts. Economic growth is characterized by its focus on the quantitative aspect of economic activity, such as increased production and volumes, whereas economic development has a broader scope that includes qualitative changes occurring in the economy and society. Development is considered a higher qualitative step in the evolution of the macroeconomy. For this reason, growth theories are often used when studying advanced economies, while development theories are used when addressing the economic problems of developing or less developed countries.

3. Empirical Literature

This section reviews the empirical literature related to the research topic, focusing on the impact of the agricultural and industrial sectors on economic growth. For example, Raynold & Simbarashe (2021)

found in a study on the impact of agriculture on economic growth in Zimbabwe during the period 1970-2018, using the ARDL model, that agricultural production has a positive effect on economic growth in the short term, while this effect is absent in the long term, indicating that the agricultural sector is considered a driver of economic growth only in the short term. Similarly, Koridjidi (2023) confirmed the existence of a positive relationship between agricultural production and GDP in Algeria for the period 1993-2022. His study relied on the value added of the agriculture, forestry, and fishing sector, in addition to the volume of exports and imports of agricultural raw materials as independent variables, and concluded that an increase in the value added of the agricultural sector leads to an increase in the level of GDP. Conversely, Susilastuti (2018) concluded in a study that analyzed the impact of factors on agricultural production and its effects on regional growth and poverty reduction during the period 2007-2016, using panel data models, that agricultural production does not have a significant effect on the gross national product rate, nor did it contribute to poverty reduction. In a study on Tanzania, Eliamoni et al., (2015) aimed in a descriptive analytical study to evaluate the broader role of agriculture in economic growth and poverty reduction in Tanzania. The study concluded that agriculture plays an important role in the Tanzanian economy and could support the country's goal of transforming into a middle-income state while maintaining growth and reducing poverty, due to its large share in employment.

Regarding the impact of the industrial sector on economic growth, for example, Qaiser (2020) conducted a study on the long-term relationship between manufacturing and economic growth in Pakistan, using annual data for the period between 1976 and 2015 and applying the ARDL model. The results of the bounds test revealed the existence of a long-term correlation between industrial output and GDP, indicating that an increase in industrial output leads to GDP growth in Pakistan. In a different context, Bakari et al., (2017) analyzed the relationship between domestic industrial investment and economic growth in Tunisia, relying on annual data from 1969 to 2015 and using Johansen cointegration analysis and Granger causality test. The study concluded that there is a negative long-term relationship between domestic industrial investment and economic growth. The results of the Granger causality test also indicated the existence of a unidirectional causal relationship from economic growth to domestic industrial investment in the short term. In another study, Yangailo (2023) aimed to evaluate the impact of manufacturing on economic growth in Tonga due to conflicting results regarding the nature of this relationship. Using multiple regression analysis, the results showed that manufacturing and exchange rate have a positive effect on economic growth in Tonga. In a related context, Yuni et al., (2023) analyzed the relationship between manufacturing and economic growth in Lesotho during the period between 1981 and 2020, using the NARDL model to test for asymmetry in the model. The results showed that industrial development had a significant impact on economic growth in both the short and long term. In a more comprehensive study, Regnerova et al., (2021) analyzed the importance of industrial economies in the globalized world during the twenty-first century, aiming to clarify the impact of globalization on production structures in the context of the global crisis. The study concluded that the redistribution of production capacities among countries is the only way to maintain sufficient industrial capacity to meet demand without some countries falling behind, which contributes to making the economic arena more balanced.

4. Presentation of the Empirical Study Results:

4.1. Study Variables and Data Source: To address the main issue raised by this research paper, which primarily revolves around the extent of the impact of both the agricultural and industrial sectors on economic growth in Algeria during the period 2000-2023, and by utilizing the variables below:

Table No. (1): Study Variables and Data Sources

Variables	Name	Abbreviation
Dependent variable	Gross Domestic Product	GDP
Independent variables	Agricultural value added	AVA
	value added from the industry sector	IVA
Sample	Algeria	
Source	https://data.albankaldawli.org/ http://www.ons.dz/	

Source: Prepared by the researchers

Based on Table 1 above, a prototype model can be constructed that expresses the relationship between the independent variables (agricultural value added, and value added from the industry sector) and the dependent variable (GDP) as a variable representing economic growth, as follows:

$$GDP_t = f(IVA_t, AVA_t)$$

Where:

GDP_t: Gross Domestic Product index, which is the dependent variable;

IVA_t: Value Added index from the industrial sector (% of total GDP), which is the first independent variable representing the industrial sector;

AVA_t: Value Added index in the agricultural sector (% of total GDP), which is the second independent variable representing the agricultural sector.

Thus, the linear model is specified as follows:

$$GDP_t = \beta_0 + \beta_1 IVA_t + \beta_2 AVA_t + \varepsilon_t$$

Where:

β₀: the intercept parameter of the model;

β₁, β₂: response parameters of the dependent variable to the independent variables, where i = 1, 2, ..., n;

ε_t: the random error term.

5. Analysis of Model Estimation Results

5.1. Stability Study Results: In this section, stationarity is tested as an essential prerequisite, as it allows determining whether the series contains a unit root or not. This leads to relying on the PP test, and the following table presents the stability results of the variables. The test is based on the following hypotheses:

- $\left\{ \begin{array}{l} H_0 \dots\dots\dots \text{The series is non-stationary (presence of a unit root).} \\ H_1 \dots\dots\dots \text{The series is stationary (absence of a unit root).} \end{array} \right.$

Table No. (2): Results of the Phillips-Perron (PP) Unit Root Test

Model	UNIT ROOT TEST TABLE (PP)			
	At First Difference			
		LGDP	LIVA	LAVA
With Constant	t-Statistic	-4.0410	-5.1100	-5.0298
	Prob.	0.0055	0.0005	0.0006
With Constant & Trend	t-Statistic	-4.1996	-4.7436	-5.2576
	Prob.	0.0016	0.0053	0.0018
Without Constant & Trend	t-Statistic	-2.7113	-5.2480	-5.0290
	Prob.	0.0092	0.0000	0.0000

N = 23
Accept H_1

Source: Prepared by the researchers based on the Eviews 12 program.

Considering the results of Table No. 2 related to the stability test, it appears that the (P-P) test gave the same results in the three models. The (P-P) test indicates that the time series of the variables are integrated of order one, I in the three models for this test (presence of intercept, presence of intercept and general trend, absence of intercept and general trend), given that the p-values for the (t_Stat) statistic are significantly less than the critical value (0.05) for the aforementioned variables.

Based on the results of the stability tests, which showed that the study model variables were integrated at the first difference, this indicates the possibility of the existence of a cointegration relationship between the agricultural sector, the industrial sector, and economic growth. Since the condition of no variables being stable at the second difference related to the (ARDL) model was met, this allows reliance on this model. Subsequently, other tests related to the data will be conducted, including verifying the optimal lag length, error correction term conditions, and boundary tests (Bound Test).

5.2. Determining the Optimal Lag Length: As a first step before conducting the cointegration test, it is necessary to first determine the optimal lag length for the model. This is done by estimating a set of models with different lags for the variables, and selecting the best model among the estimated ones based on the Akaike Information Criterion (AIC) by choosing the model with the lowest AIC value. The results are shown in the following figure:

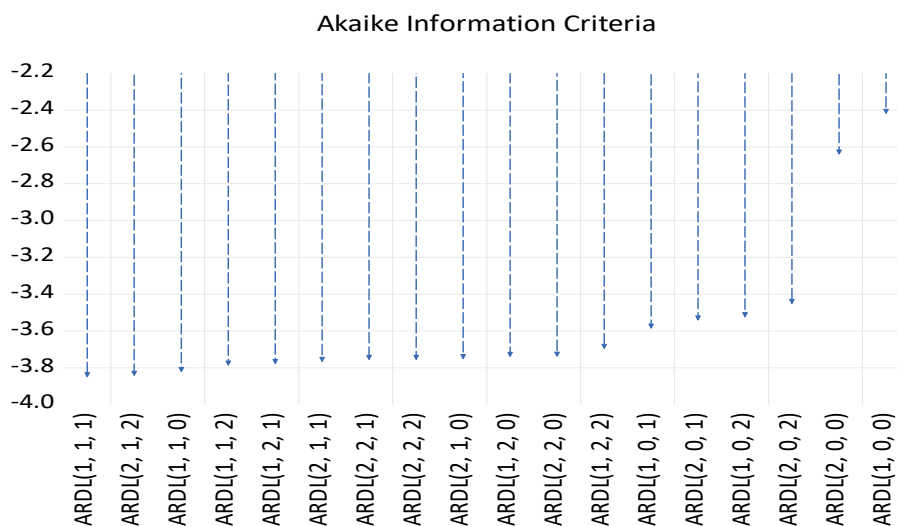


Figure No. (01): Results of the Optimal Lag Length Test

Source: Prepared by the researchers based on the Eviews 12 program.

Based on the above figure, the optimal lag structure selected by the lowest Akaike Information Criterion (AIC) is ARDL (1, 1, 1).

5.3. Bounds test: The bounds test for cointegration is conducted to detect the existence of a cointegration relationship among the study variables or not, as shown in the following table:

Table No. (03): Results of Bounds Test for Cointegration

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	$I(0)$	$I(1)$
F-statistic	36.91626	10%	2.63	3.35
K	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5

Source: Prepared by the researchers based on the Eviews 12 program.

The results of Table No. (3) indicate that the F-statistic value for the bounds test is greater than the upper and lower bounds at different significance levels of 5%, 10%, 1%, and 2.5%. The F-statistic (36.916) exceeds the upper critical bounds at all significance levels, leading to the rejection of the null hypothesis of no cointegration. This confirms a long-run relationship between the variables between the independent variables (value added in the agriculture sector, and value added in the industry sector) and the dependent variable (GDP).

5.4. Model Diagnosis: In this section, the quality and validity of the ARDL model, which will be relied upon in the study, are verified through a set of tests summarized in the following table.

Table No. (04): Shows the diagnostic tests of the ARDL model

Test Type	Test	Statistical Value	Probability Value
Test for Serial Correlation	Breusch-Godfrey Serial Correlation LM Test	0.661687	0.5304
Test for Heteroskedasticity	Breusch-Pagan-Godfrey	0.638071	0.6738
Residual Normality Tests	Jarque-Berra	0.628613	0.730295
Ramsey RESET Test for Functional Form	Ramsey RESET	1.560790	0.2295
F	-	704.0301	0.0000
R-squared	-	0.9951	

Source: Prepared by the researchers based on the outputs of the Eviews12 program.

Based on the results shown in the above table (4), the null hypotheses of the indicated tests state that the estimated model does not suffer from these problems (Residual Serial Correlation LM Tests, Residual Heteroskedasticity Tests, Residual Normality Tests, Ramsey Reset Tests). The results of the three tests related to estimation residuals show that the statistical values of these tests are completely lower than their corresponding critical values at the 5% significance level, considering that the associated p-values are all greater than the p-value (0.05). Therefore, the null hypotheses of these tests were accepted, confirming that the estimated model does not suffer from measurement problems. Accordingly, it can be said that the model is valid for the study and for proceeding with the remaining steps.

On the other hand, looking at table number (4), it appears that the estimated model is statistically significant overall, where the Fisher statistic reached ($F = 704.0301$), which is statistically significant given that its associated p-value is (0.000), less than (0.05). Additionally, the estimated model has a high explanatory power, with the coefficient of determination (R^2) reaching 99.51%. Therefore, the independent variables incorporated in the study model contribute to explaining approximately 99% of

the variations in Algeria's GDP, while the remaining 1% is attributed to other factors not included in the model but accounted for within the margin of error.

As a general conclusion regarding the results of the statistical and metric analysis of the study model, it was confirmed that the adopted model is of high quality both statistically and metrically, as it possesses the properties of overall significance and explanatory power. Additionally, the model does not suffer from econometric problems. Therefore, this model can be relied upon with high confidence in the process of analyzing results from an economic perspective.

5.5. Model Estimation: Based on the model's cointegration test, the following equations can be formulated:

$$\Delta gdp_t = \beta_0 + \beta_1 gdp_{t-1} + \beta_2 lava_{t-1} + \beta_3 liva_{t-1} + \sum_{i=1}^m \theta_i \Delta gdp_{t-1} + \sum_{i=0}^n \theta_i \Delta lava_{t-1} + \sum_{i=0}^n \theta_i liva_{t-1} + \varepsilon_t$$

After confirming the existence of a cointegration relationship between the independent variables (agricultural value added, value added from the industry sector) and the GDP in Algeria during the study period, the presentation of the ARDL model estimation results in the short and long term is accessed, relying on the AIC criterion. The following table shows the estimation results of the model in both terms.

Table No. (05): ARDL Model Estimation Results

Variables	Coefficients	t-Statistic	Prob
Short-Run Estimation			
LAVA	-0.091903	-1.003288	0.3298
LIVA	0.718754	6.799670	0.0000
(ECT) (-1)*	-0.011208	-13.18042	0.0000
Long-Run Estimation			
LAVA	24.60508	0.490590	0.6300
LIVA	53.21770	0.474334	0.6413
C	-230.3719	-0.452716	0.6565

Source: Prepared by the researchers based on the outputs of the Eviews12 program.

Interpretation of the short-term relationship: It is observed through the estimation of error correction results and the long-term relationship that the error correction coefficient is highly significant, less than the 0.05 significance level. This confirms the validity of the long-term equilibrium relationship. The results indicate that the error correction coefficient was estimated at (ECT) (-1)* = -0.0112, negative and significant with P=0.0003. This confirms that the model is valid in estimation, which affirms the existence of a long-term equilibrium relationship between the independent variables (agricultural value added (LAVA), value added from the industry sector (LIVA)) and the dependent variable (gross domestic product (LGDP)), as revealed through the bounds test. The negative value indicates the existence of dynamic convergence of the model in the short term. On the other hand, this negative sign implies the speed of restoring equilibrium, in other words, the speed of adjustment from the short term to the long term. Accordingly, any deviation from the long-term equilibrium in the previous period is corrected by 1.12% in the subsequent period, which is a very slow rate, indicating that adjustment to equilibrium takes a long time. Interpretation of the long-term relationship: Through estimating long-term relationships, the estimated equation can be clarified as follows:

$$LGDP = 24.60LAVA + 53.21LIVA - 230.37$$

What was observed from the equation:

Referring back to the table results related to the long term, it is clear that there is no statistically significant effect of the agricultural sector on the GDP. Although the coefficient value is positive (24.60), its lack of statistical significance indicates that it does not have a real and sustainable impact on the economy.

The results also indicate that there is no statistically significant effect of the industrial sector on the GDP, similar to the agricultural sector. The large positive coefficient cannot be relied upon as evidence of a permanent causal relationship.

Based on the above, the relationship can be analyzed in the Short-Run, which shows that the results of the short-run analysis indicate that the industrial sector has a positive and statistically significant effect on Algeria's GDP. This means that an increase in the added value of this sector leads to immediate economic growth. This strong effect is due to the dominance of extractive industries such as oil and gas in the Algerian economy, as they contribute significantly and directly to the GDP. In contrast, the agricultural sector has no statistically significant effect on economic growth in the short term, indicating that its marginal contribution to the economy is minimal and does not lead to noticeable changes.

In contrast, the results differ when looking at the long-run relationship, where the analysis indicates that neither sector (agricultural nor industrial) has a statistically significant effect on GDP. Although their coefficients are positive, their lack of statistical significance suggests that this relationship is unstable in the long term and may result from random factors. This may explain that the Algerian economy does not rely on sustainable growth from these sectors in the long run but faces structural challenges that prevent their lasting impact. This indicates that long-term economic growth in Algeria may be influenced by other factors beyond the scope of this study, such as global oil price fluctuations or macroeconomic policies.

5.6. Model Validity Test: The validity of the model can be judged through structural stability tests of the model parameters, to ensure that the variables used in the model are free from structural changes, by relying on both the cumulative sum test of residuals and the cumulative sum of squares of residuals. The following figure illustrates this.

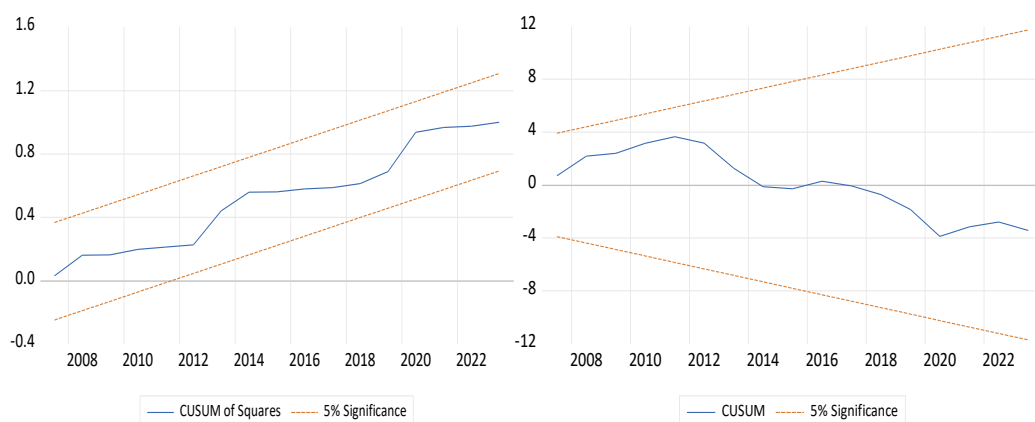


Figure No. (02): Illustrates the structural stability tests

Source: Prepared by the researchers based on the outputs of the Eviews12 program.

What was observed through Figure No. (02) is that the estimated coefficients of the model are structurally stable during the study period. It is noted that the variance curve of the cumulative sum test statistic of the residuals (CUSUM) and the cumulative sum of squares test (CUSUM of Squares) for the

model lies within the critical boundaries within the confidence interval at a 5% significance level. Therefore, there is consistency and stability in the relationship results between each of the independent variables (agricultural value added and value added from the industry sector) and the dependent variable (GDP) in both the long and short terms. Accordingly, the overall stability of the model can be judged.

Conclusion

This research paper aimed to shed light on the role and impact of both the agricultural and industrial sectors on economic growth in Algeria during the period 2000-2023, using the ARDL model. Both the agricultural sector and the industrial sector are considered key sectors that significantly impact economic growth and drive development. They also fall within areas that provide new job opportunities and achieve food self-sufficiency for communities. Hence, several results were achieved, as outlined in the following points:

- The results of the Bound Test indicated the existence of a long-term equilibrium relationship between the logarithm of the agricultural value added, the logarithm of the value added from the industry sector, and the dependent variable, the logarithm of GDP in Algeria during the period 2000-2023.
- Short-term results showed that only the industrial sector has a positive and significant impact on Algeria's GDP, while the agricultural sector has no significant effect, reflecting reliance on the industrial sector, especially oil and gas, to achieve economic growth.
- Long-term results indicate that neither sector (agricultural nor industrial) has a statistically significant effect on GDP in the long run. This may indicate that the Algerian economy suffers from structural problems that prevent these sectors from being engines of sustainable growth, or that other factors not included in the model (such as global oil prices or government policies) determine the path of economic growth in the long term.
- The results also showed that the relationship between variables is limited to the short term only, and that the Algerian economy needs to reconsider the factors affecting the long term to achieve sustainable growth.
- The results of the structural stability tests (CUSUM, CUSUM of Squares) indicated coherence and stability in the relationship results between each of the independent variables (the logarithm of the agricultural value added, the logarithm of the value added from the industry sector) and the dependent variable (the logarithm of GDP) in both the long and short terms.

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