Measuring the contribution of manufacturing industries to the gross domestic product in algeria, during the period 1990-2023 using the ARDL model

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Abstract---The industrial sector is regarded as a crucial economic domain for all nations, both developed and developing, as it significantly contributes to economic growth by facilitating economic interconnections and interlinking various industrial sectors. Furthermore, it establishes diverse industrial frameworks that enhance the industrial sector, thereby maximizing the export potential of the national economy and fostering economic stability. This study seeks to ascertain the short- and long-term relationship between manufacturing output and internal GDP from 1990 to 2018, employing the autoregressive distributed lag (ARDL) model. The findings indicate a balanced relationship in both the short and long term, alongside the absence of autocorrelation issues in the error sequence, with stability maintained over time. The study concludes a statistically significant direct relationship between GDP and the manufacturing sector.

Keywords---industrial sector, economic growth, manufacturing industry, ARDL model.

Introduction

The industrial sector is crucial to the national economy, playing a significant role in economic development and serving as a benchmark for the advancement or regression of nations. The advancement of the industrial sector necessitates the utilisation of natural resources, the cultivation of human resources, and the adoption of contemporary technology, which collectively enhance production capacities and optimise the export potential of the industrial sector.

The national industry has devolved into a sequence of assembly, integration, and packaging procedures, lacking genuine production capabilities and failing to assimilate and leverage current technologies. The new plan is to cultivate a national sector that can diversify export structures, so enabling the economy to reduce its reliance on hydrocarbons.

The manufacturing industry is regarded as the cornerstone of the industrial sector, as it is the productive domain that efficiently utilises available resources, delivers needed goods and services to society, and enhances economic growth rates. Due to Algeria's industrial potential, national authorities have endorsed the industrial sector and given substantial sums for its advancement, with the objective of attaining comprehensive national development. In this study, we shall endeavour to respond to the following primary question:

What is the extent of the contribution of the manufacturing sector to economic growth in Algeria during the period 1990-2023?

2. The Theoretical Framework of Industry

Industry constitutes the cornerstone of the economy for any nation globally. It is fundamentally embedded in the societal framework and affects its cultural and material content, hence shaping its economic, social, and urban growth.

2.1 Definition of Industry
Industry, in its most comprehensive definition, refers to the conversion of raw materials to enhance their value and render them more appropriate for human needs and demands.
Charles and Gareth Jones characterised industry as a collection of entities that offer products or services capable of substituting for one another. These alternatives comprise products or services that fulfil the essential needs of the same consumer. (Jones, 2001, p. 131)
It is described as the human endeavour aimed at producing or altering objects and materials to attain a specific goal. It includes all arts, professions, abilities, and applications of diverse disciplines, all of which are encompassed by the notion of industry. (Nabi, p. 121)
Industrial activity is described as the production of goods and services, utilising material and human resources to fulfil societal demands in the realms of production, consumption, and employment. The industrial sector is regarded as a catalyst for development initiatives, especially in underdeveloped nations. (Haniya, 2007/2008, p. 5)

2.2 Structural Classifications of the Industrial Sector
The advancement of industrial enterprises and their performance has led to the emergence of various classifications that encompass distinct characteristics of the industrial sector. These include classifications based on the production process, which focusses on the inputs and outputs of the sector, and classifications based on ownership structure, which examines the ownership of the enterprise's capital. Moreover, additional endeavours have been undertaken to create extra classes that cannot all be enumerated here. This study will concentrate on classification according to the production process, utilising the type of industrial activity as the foundation for classification, yielding the following categories:

2.2.1 Extractive Industries
These industries generally entail the exploitation of a country's natural resources. Their relevance changes from one country to another based on the availability of mineral resources. The optimal utilisation of these resources involves a complete study of both subsurface and surface minerals, salts, energy materials, and other resources. This method involves very complex technologies and significant financial costs, which are generally unavailable in most impoverished countries. (Bouheidel, 2016, p. 56)

2.2.2 Manufacturing Industries

The manufacturing industry serves as the essential foundation of each aspiring industrial sector. The productive sector significantly contributes to wealth creation and value addition in the national economy by utilising human effort to transform raw materials through diverse technical and technological methods, thereby fulfilling the needs of individuals and society. Nonetheless, despite the benefits that the manufacturing sector offers to the nation's economy, it has considerable hurdles in emerging countries, particularly with funding and control over advanced technologies. This is due to the necessity for considerable cash, which the local financial system may be unable to supply in adequate amounts, and a high degree of technological sophistication that may be challenging for the local labour to acquire. Consequently, the national industry remains intricately linked to the economies of developed nations regarding the procurement of essential industrial equipment for this productive sector's operation. (Mohamed Abdelaziz Agmia, 2004, p. 379)

Consequently, the pursuit of economic independence through the imperative of domestic production of manufacturing inputs may impede the advancement of this sector and render it reliant on local technological progress, which is frequently sluggish, ultimately jeopardising broader economic development initiatives.

2.2.3 Construction Industries

This sector is typically designated as construction and public works. The major purpose is to establish long-term capital assets that furnish the essential infrastructure for holistic economic development, as the outputs of this sector constitute the foundational basis for all economic activities, whether productive or service-oriented. This industry primarily encompasses the establishment of public utility infrastructures, including the construction of roads, transportation networks, railways, and water supply systems, which subsequently attract additional industries to the locations where such infrastructure is present, thereby fostering the development of industrial hubs. (Mohamed Abdelaziz Agmia, 2004, p. 380)

3. Economic Development - Theories of Development and Economic Growth

Economic development has historically been a primary objective and significant concern for all nations and communities, irrespective of their cultural backgrounds and philosophies. Countries consistently endeavour to attain development by finding the causes and methods that can enhance the standard of living for people and society collectively, while ensuring the realisation of a primary objective of economic policy—economic growth.

3.1 The Problem of Economic Underdevelopment

A country is deemed economically underdeveloped if it does not furnish its populace with a sufficient standard of vital requirements and welfare in comparison to what developed nations provide their residents. Underdeveloped countries are characterised by a markedly low quality of living, with average consumption and material well-being constrained in relation to their available material and human resources.

Prior to World War II, economists mostly overlooked the study of economic development. The global interest in post-war development stemmed not from a sudden awareness of pervasive economic underdevelopment, but from a change in attitudes towards its existence. (El-Askari, 1979, p. 18)

The facts of underdevelopment have consistently been accessible to those inclined to investigate them. The objective was to persuade governments and individuals that underdevelopment necessitated urgent and substantial measures to mitigate its burdens and tackle its associated issues. This viewpoint was not broadly embraced until post-World War II. (El-Laythi, 1977, p. 9) for the following reasons: (Mohamed Abdelaziz Agmia, Economic Development (Its Concept, Theories, and Policies), 2003, pp. 15-19)

3.1.1 The Increasing Number of Newly Independent Developing Countries: Subsequent to World War II, the majority of developing nations attained political autonomy from colonial domination. These developing nations sought to enhance living standards for their populations and instituted various internal changes to foster development. This trend was bolstered by the increasing awareness among the citizens of these nations concerning the adverse economic, social, and political conditions they were enduring.

3.1.2 The Declining Effectiveness of Economic Liberalism: The efficacy of economic liberalism as a universal remedy for economic issues has waned, especially in promoting economic growth in developing nations. As a result, governments commenced intervention in the management and direction of national economies. This trend was further reinforced by the swift advancement observed in socialist economies, especially in the former Soviet Union.

3.1.3 Changing Attitudes of Developed Countries Toward Developing Nations: Developed nations had formerly disregarded the economic welfare concerns of the majority in emerging countries. Furthermore, they utilised their economic and political influence to obtain an inequitable portion of the wealth derived from trade with these nations. This was a significant component contributing to the adverse conditions in emerging countries and the challenges they encountered in surmounting them. Nonetheless, wealthy nations subsequently modified their position on the advancement of these countries, addressing—at least partially—their ambitions by offering investment capital, people resources, and technical expertise. The principal impetus for this support was to enhance exports, especially of capital goods, so fostering the economic expansion of the developed nations.

3.1.4 The Growing Role of the United Nations: Founded post-World War II, the United Nations commenced assuming a more significant role in international political and economic matters. The organisation exerted considerable effort to execute the requirements of its charter, which underscore the necessity of elevating living standards and augmenting social and economic situations globally. The influence of emerging nations inside the UN has progressively intensified over time.

3.1.5 Global Population Growth: Subsequent to World War II, the global population experienced an unparalleled increase. Consequently, this resulted in the loss of natural resources and intensified the issue of population growth, necessitating immediate and sustained development activities to alleviate its impacts.

3.2 Economic Development and Economic Growth
It is essential to employ accurate terminology when differentiating among various categories of countries in relation to the development process. The terms economic growth and economic development are sometimes used interchangeably to denote the same notion, despite their basic distinctions.

Economic growth is characterised as the sustained augmentation in the volume of products and services generated within an economy over a designated timeframe, usually one year. The rate of economic growth is assessed by two primary methodologies: estimating the growth rate of real national output, indicative of net national product, or evaluating the growth rate of real per capita income. (Ali, 2009, p. 31)

Economic development pertains to the augmentation of a nation's overall production capacity and the growth rate of per capita output during a defined timeframe, influenced by the improvement of living standards inside that country. (Qablan, 2009, p. 56). Moreover, economic development entails substantial and extensive structural transformations across multiple domains, including economic, social, political, and demographic sectors, along with legislative and regulatory frameworks.

Consequently, economic growth is a systematic and intentional process designed to alter the structural framework of society in all aspects to guarantee a satisfactory level of living. (Al-Qureshi, 2007, p. 125). The notion of economic development encompasses (Kazem, 1980, p. 28):

- A process aimed at instigating immediate, fundamental, and complete alterations in prevailing economic relations, the economic foundation, and the societal class system.
- The creation of a stable, dynamic, and ever evolving national economic framework.
- A procedure that utilises both existing and prospective economic and societal capacities to optimise the advantages gained from international economic interactions.
- A process predicated on the state's leadership role, its predominant economic sector, and the democratic engagement of the populace in the intended reform.

3.3 Theories of Economic Development
Economic theorists have used diverse approaches to promote growth by pinpointing essential elements and formulating foundational links using ideas derived from the historical experiences of multiple nations. These ideas expand upon and critically evaluate prior methodologies of economic development. This section delineates the principal theories and provides an overview of significant international organisations engaged in economic development.

3.3.1 Theories of Economic Growth
Several economic growth theories have emerged, the most notable of which include:

a. The Classical School:
The classical school of economic thinking originated with Adam Smith in 1776, subsequently followed by economists such as Malthus, David Ricardo, John Stuart Mill, and Alfred Marshall in England, along with Jean-Baptiste Say and Charles in France. (Mohamed, 2010, p. 17). This is an overview of the hypotheses proposed by Adam Smith and John Stuart Mill. (Economic Development Theories, s.d.):

- **Adam Smith's Theory:** Adam Smith advocated for economic liberty and opposed governmental interference in economic affairs. He championed specialisation and the division of labour, contending that earnings serve as the basis for savings and enhanced capital accumulation. As a prominent classical economist, Smith's work The Wealth of Nations tackled the issue of economic development, however he did not establish a comprehensive theory of economic growth. Subsequently, following economists expanded upon his concepts to formulate a systematic growth theory.
- **John Stuart Mill's Theory:** Mill regarded economic progress as dependent on land, labour, and capital. He regarded land and labour as essential components of production, whereas capital denoted the accumulation of outputs from previous labour. According to Mill, the pace of capital accumulation was contingent upon the degree of productive employment of labour. He contended that profits derived from utilising unproductive labour resulted solely in income redistribution rather than genuine economic expansion.
- **The Neoclassical School (Schumpeter's Theory):** Joseph Schumpeter's theory of economic growth emphasises the significance of the individual entrepreneur, who devises production strategies to optimise profit, thus fostering competition. Schumpeter posits that economic growth fundamentally depends on two elements: the entrepreneur and bank credit, which supplies essential financial resources for innovation and technological progress. His theory presupposes a completely competitive economy in equilibrium, characterised by the absence of profits, interest rates, savings, investments, and involuntary unemployment. Schumpeter characterised this condition as a cyclic flow of capital.. (Hull, 1986, p. 35)

b. The Keynesian School:
John Maynard Keynes did not explicitly tackle the issues confronting developing countries; his analysis predominantly concentrated on industrialised nations. Keynes posited that total income is contingent upon the employment level inside an economy, indicating that an augmentation in employment results in elevated total income.

3.3.2 Theories of Economic Development

Many economists have developed various principles and theories related to economic development, the most significant of which include:

a. **The Big Push Theory:** The hypothesis, proposed by economist Paul Rosenstein-Rodan, posits that economic progress necessitates a significant and concerted investment initiative—termed a big push—to surmount developmental barriers and establish an economy on a trajectory of self-sustaining growth.. (Salihah Mqaousi, p. 11)

b. **The Balanced Growth Theory:** Promoted by Ragnar Nurkse, this idea underscores the imperative of concurrent investment across many economic sectors to attain balanced and sustainable development. (Shabani, 1997, p. 21)

c. **The Unbalanced Growth Theory:** This idea posits that economic growth should be propelled by targeted investment in priority industries, which will later generate demand and investment prospects in other sectors. (Belhamdi, 2006, p. 38)

Table 1: Summary of the Key Theories of Economic Development and Economic Growth.

Theory	Key Focus of the Theory
Adam Smith's Theory	Focused on specialization, division of labor, and utilizing comparative advantages. It also emphasized exports as a means to overcome the limitations of a small domestic market.
Joseph Schumpeter's Theory	Emphasized the role of entrepreneurs and innovations in achieving economic development.
Stages of Growth Theory (Rostow)	Described the stages a society undergoes from underdevelopment to development.
Surplus Labor Theory (Arthur Lewis)	Focuses on the transition of surplus rural labor to urban areas until structural transformation achieves balance between economic activities, shifting from traditional agriculture to modern industry.
Big Push Theory (Rosenstein)	Argues that overcoming underdevelopment requires a strong push of invested capital to enable nations to surpass the take-off stage.
Balanced Growth Theory (Nurkse)	Stressed the need for a balanced relationship between the industrial and agricultural sectors to prevent agricultural underdevelopment from hindering industrial growth.
Unbalanced Growth Theory (Hirschman)	Suggests that economic development should start by fostering certain sectors or industries, which will subsequently spread across the rest of the national economy.
Neoclassical Growth Theory (Solow)	Considers technology as an external factor, asserting that capital returns are diminishing, meaning that long-term growth cannot rely solely on intrinsic economic characteristics but must involve external technological shocks.
Endogenous Growth Theory (Paul Romer)	Focuses on knowledge generated from physical capital, which leads to positive returns and prevents diminishing marginal productivity of capital. This theory assumes constant capital returns and considers technology an internal variable.

Lucas' Theory (Human Capital Accumulation)	Considers human capital a key factor in growth, viewing it as the primary source of knowledge accumulation, which can be enhanced through education and training. Lucas emphasizes the role of the state in encouraging education and training necessary for human capital development.

Source: Menour Osrir, Economic Development in Developing Countries (Strategies and Dimensions), Economic Reform Journal, Development and Integration Strategies in the Global Economy, Higher School of Commerce, Issue 03, Algeria, 2007; p. 6.

3.4 The Relationship Between Healthcare Expenditure and Economic Growth

The healthcare sector is essential for enhancing the health of individuals throughout society. A more advanced healthcare sector positively influences individual health, resulting in enhanced production. This, in turn, leads to an augmentation of Gross Domestic Product (GDP) and, consequently, elevated economic growth rates.

The World Bank has delineated four mechanisms via which enhancements in healthcare foster economic growth. The initial perspective posits that healthy persons exhibit fewer work absences than those afflicted by illnesses, resulting in enhanced output. Healthier children have reduced absenteeism rates in education compared to their ill counterparts, resulting in superior academic performance and results.

Initially, the correlation between health and economic growth seems rational. When individuals maintain excellent health, they may work and contribute to the enhancement and growth of GDP, thereby increasing their share of national output. Moreover, if individuals anticipate a longer lifespan, they are more inclined to invest in education and save for retirement. As a result, healthier individuals are inclined to invest in knowledge and participate in activities that produce superior economic results. (Mohamed R. M., 2019, p. 75)

4. Modeling and Testing the Cointegration Relationship Between Economic Growth and the Manufacturing Sector Using the ARDL Model

4.1 Definition of the Model

We employ the Autoregressive Distributed Lag (ARDL) model introduced by Pesaran et al. (1997-2001). The ARDL model considers the temporal lag in the gap, with explanatory variables allocated across several time periods, which the model incorporates through multiple distributed delays corresponding to the number of explanatory variables. The economic factors being examined require time to affect the dependent variable, with effects occurring over both short and long terms. Consequently, the ARDL test is applicable, and the model is articulated as follows:

$$\Delta LGDP_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta LGDP_{t-i} + \sum_{t=0}^{q} \beta_2 \Delta LINDUS_{t-i} + \alpha_1 LGDP_{t-1} + \alpha_2 LINDUS_{t-1} + \varepsilon_t$$

Where:

Δ : Refers to the first-order differences;

p, q: The upper limits of the time lag periods for the dependent and independent variables in the model;

$\beta_0, \beta_1, \beta_2$: Short-term relationship coefficients (Error Correction Model);

α_1, α_2 : Long-term relationship coefficients.

The ARDL test utilises the Fisher statistic to ascertain the cointegrating relationship between the dependent and independent variables in both the long and short terms within a single equation, as well as to evaluate the effect size of each independent variable on the dependent variable.

4.2 Model Construction

A model is a simplified and generalised representation of a complicated phenomenon commonly observed in nature. It delineates the fundamental components governing the phenomenon under investigation and the interrelationships of impact among them. Our study aims to elucidate the variations in GDP via the manufacturing sectors. Therefore, we posit that the model's logarithmic representation is as follows:

$$LGDPt = f(LINDUS)\ldots\ldots\ldots\ldots(1)$$

Where:

LGDP: Logarithm of Gross Domestic Product;
LINDUS: Logarithm of manufacturing industries;

4.3 Unit Root Test

The variables' integration order must be either I(0) or I(1). Table 1 presents the stability and degree of integration of the time series analysed, as determined by the Phillips-Perron test. The Gross Domestic Product variable is stationary at the first difference, while the manufacturing industry variable is stationary at the level.

Table 2: Results of the Unit Root Test

UNIT ROOT TEST RESULTS TABLE (PP) Null Hypothesis: the variable has a unit root			
At Level		LGDP	LINDUS
With Constant	t-Statistic	-10.9250	-5.8872
	Prob.	*0.0000* ***	*0.0000* ***
With Constant & Trend	t-Statistic	-2.3916	-11.5175
	Prob.	*0.3768* n0	*0.0000* ***
Without Constant & Trend	t-Statistic	3.4376	2.7768
	Prob.	*0.9997* n0	*0.9980* n0
At First Difference		d(LGDP)	d(LINDUS)
With Constant	t-Statistic	-4.3733	-3.0799
	Prob.	*0.0016* ***	*0.0383* **
With Constant & Trend	t-Statistic	-8.1697	-3.9930
	Prob.	*0.0000* ***	*0.0192* **
Without Constant & Trend	t-Statistic	-2.8878	-2.3821
	Prob.	*0.0053* ***	*0.0188* **

Notes:
a: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant
b: Lag Length based on SIC
c: Probability based on MacKinnon (1996) one-sided p-values.

This Result is The Out-Put of Program Has Developed By:

Dr. Imadeddin AlMosabbeh

College of Business and Economics

Qassim University-KSA

Source: EViews 13 Outputs

4.4 Selection of Optimal Lag Periods for the Model
It is shown that the ARDL (1,0) model is the optimal model, as illustrated in the following figure:

Figure 1: Results of the Optimal Lag Period Test
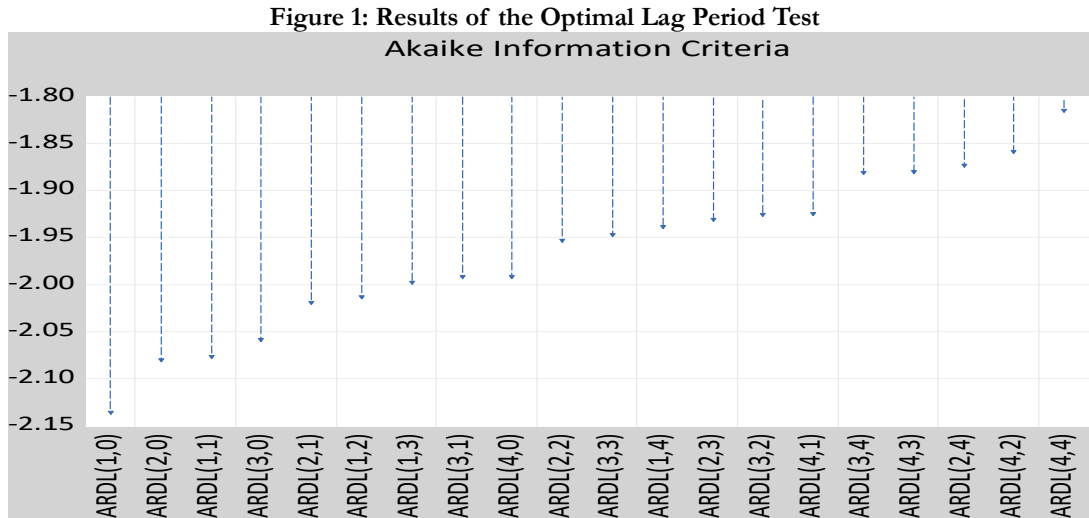
Source: EViews 13 Outputs

4.5 Cointegration Test Using the Bounds Test Method
Table 2 below presents the outcomes of the cointegration test employing the Bounds Test approach. The findings demonstrate that the calculated F-statistic exceeds the threshold values for both the lower and upper bounds across most significance levels. Consequently, we dismiss the null hypothesis, which posits the absence of a cointegrating relationship between the variables. This indicates a sustained equilibrium relationship between GDP and the manufacturing sector.

Table 3: Results of the Bounds Test

Null hypothesis: No levels relationship
Number of cointegrating variables: 1
Trend type: Rest. constant (Case 2)
Sample size: 33

Test Statistic			Value			
F-statistic			28.449578			

	10%		5%		1%	
Sample Si	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
30	3.303	3.797	4.090	4.663	6.027	6.760
35	3.223	3.757	3.957	4.530	5.763	6.480
Asymptotic	3.020	3.510	3.620	4.160	4.940	5.580

* I(0) and I(1) are respectively the stationary and non-stationary bounds.

Source: EViews 13 Outputs

4.6 Model Quality Testing
Prior to employing the ARDL (1,0) model to assess short- and long-term effects, the model's efficacy must be validated through the subsequent tests:

a- Model Quality: To evaluate the model's quality, the real values must be juxtaposed with the estimated values as illustrated in the subsequent figure:

Figure 2: Actual vs Estimated Values and Residuals

Source: EViews 13 Outputs
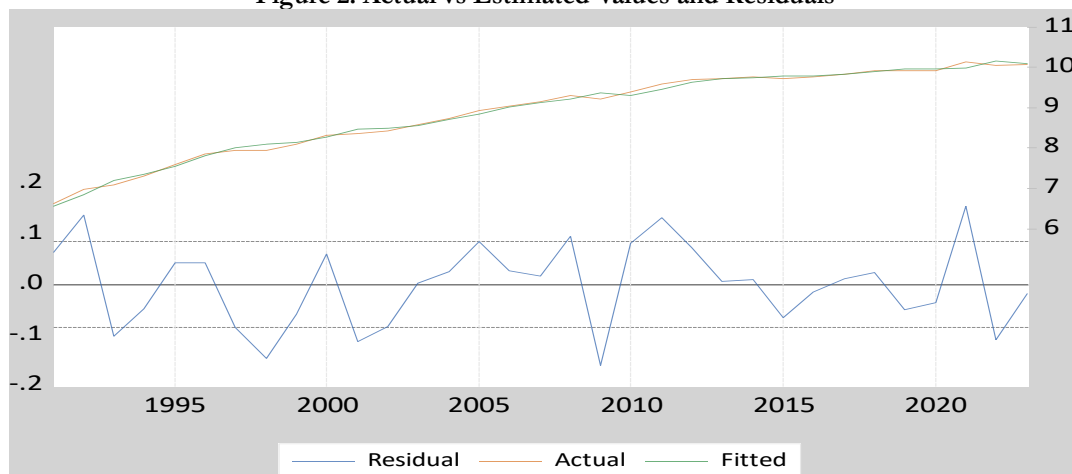
The chart demonstrates that the estimated values closely correspond with the real values, signifying the model's high quality. Consequently, it can be depended upon to interpret and analyse the results.

b- Normal Distribution of Residuals: We employ the Jarque-Bera test to ascertain the normalcy state. The test findings were deemed negligible ($\alpha > 0.05$), indicating that the residuals conform to a normal distribution. The J-B value of 0.71, which is below $\chi^2 = 5.99$, confirms that the model's residuals adhere to a normal distribution, as illustrated in the subsequent figure:

Figure 3: Normal Distribution of Residuals

Series: Residuals	
Sample 1991 2023	
Observations 33	
Mean	-4.04e-17
Median	0.009784
Maximum	0.155887
Minimum	-0.160059
Std. Dev.	0.081809
Skewness	-0.074761
Kurtosis	2.293417
Jarque-Bera	0.717222
Probability	0.698646
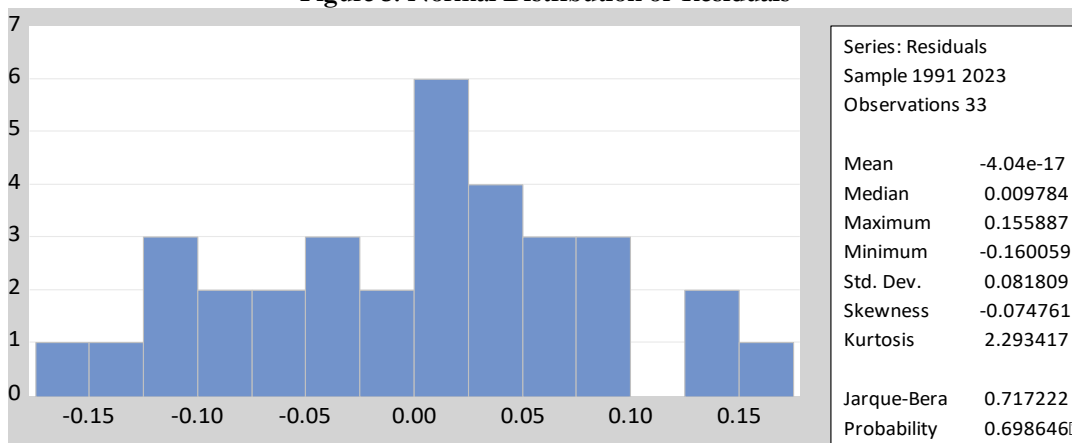
Source: EViews 13 Outputs

c- Autocorrelation Test of Errors: To confirm the absence of autocorrelation, we employ autocorrelation tests, specifically the Autocorrelation and Breusch-Godfrey Correlation LM test, as illustrated in the subsequent figure:

Table 4: Results of Autocorrelation Test of Errors

Breusch-Godfrey Serial Correlation LM Test: Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	1.018098	Prob. F(2,28)	0.3743
Obs*R-squared	2.237116	Prob. Chi-Square(2)	0.3268
Test Equation: Dependent Variable: RESID Method: ARDL Date: 03/08/25 Time: 16:08 Sample (adjusted): 1991 2023 Included observations: 33 after adjustments Presample missing value lagged residuals set to zero.			

Source: EViews 13 Outputs

Table 4 indicates that all columns fall within the confidence interval, and the Q-Star test value is not significant. The LM test indicates that the Prob chi-square exceeds 0.05, leading us to accept the null hypothesis of no autocorrelation.

d- Heteroscedasticity Test: To identify heteroscedasticity, we employ the test presented in the subsequent table:

Table 5: Results of the Heteroscedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey Null hypothesis: Homoskedasticity			
F-statistic	1.085875	Prob. F(2,30)	0.3505
Obs*R-squared	2.227662	Prob. Chi-Square(2)	0.3283
Scaled explained SS	1.190618	Prob. Chi-Square(2)	0.5514
Test Equation: Dependent Variable: RESID^2 Method: Least Squares Date: 03/08/25 Time: 16:11 Sample (adjusted): 1991 2023 Included observations: 33 after adjustments			

Source: EViews 13 Outputs

The test results indicate that the Prob F exceeds 0.05, signifying that F is not significant; hence, we accept the null hypothesis of no heteroscedasticity.

e- Stability Test: To verify that the utilised data do not display any structural alterations, we must employ one of the techniques illustrated in the subsequent figure:

Figure 4: Results of the Model Stability Test

CUSUM — 5% Significance

CUSUM of Squares —— 5% Significance
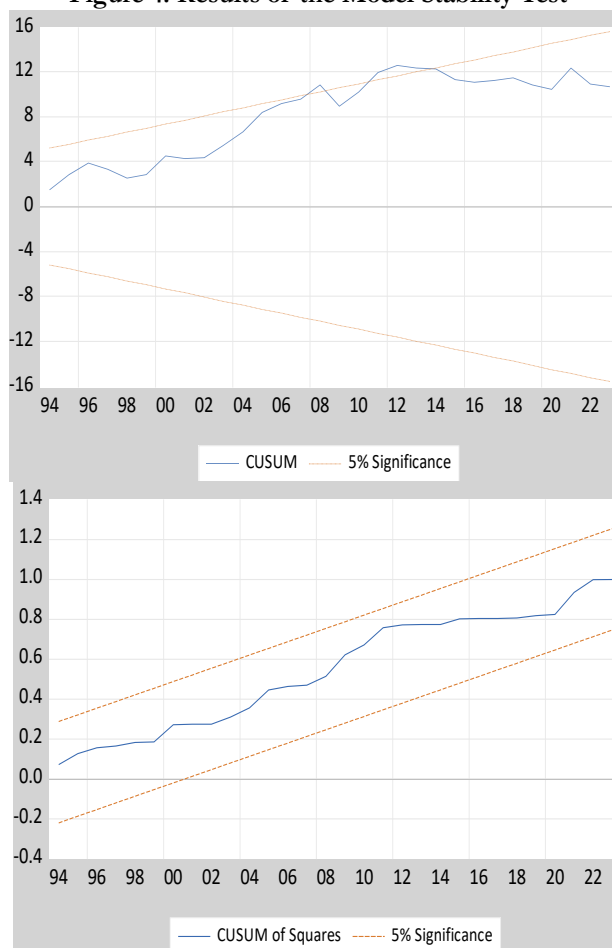
Source: EViews 13 Outputs

Given that the graphical representations in both the CUSUM Test and CUSUM of Squares Test remain inside the critical thresholds at the 0.05 significance level, we affirm the model's stability.

4.6 Estimating Short- and Long-Term Effects Using the ARDL Model
- **Short-Term Relationship:**
  Appendix 01 indicates a beneficial impact of the manufacturing sector, lagging by two periods, on GDP in the short run. When the value added in manufacturing rises by 1%, GDP experiences a corresponding gain of 0.44%. This aligns with economic theory and suggests a little contribution of these businesses to GDP, despite their significance in other economies, like Tunisia and Morocco.
  The findings indicate a short-term dynamic link between GDP and the manufacturing sector, evidenced by the negative and statistically significant estimated error (CointEq(-1) = -0.2185). This quantifies the extent of imbalance in the dependent variable, which may be rectified over time. Specifically, 21.85% of GDP can be adjusted from one period to another, and the negative sign indicates the presence of a long-term equilibrium relationship between the variables.

- **Long-Term Relationship:**
  Appendix 02 indicates a beneficial impact of the manufacturing sector on GDP over the long run. When the manufacturing sector grows by 1%, GDP rises by 0.74%. This aligns with economic theory, which suggests that the manufacturing sector positively influences GDP and enhances income.

5. Conclusion

The performance of Algeria's manufacturing sector has consistently fallen short of the requisite standards in recent years, since it has not achieved notable growth rates. Despite advantageous circumstances stemming from elevated government expenditure resulting in significant public investments, unparalleled growth in domestic consumption, Algeria's participation in free trade agreements with the European Union and Arab nations, and the enhancement of marketing avenues for national products, these elements have not facilitated the anticipated growth rate in the manufacturing sector.

This study analysed the influence of manufacturing sector performance on GDP from 1990 to 2018 by assessing the correlation between manufacturing output and GDP as the dependent variable. We successfully developed a viable econometric model, and the study's findings indicated that the manufacturing sector in Algeria positively influences GDP in both the long and medium term, albeit with a relatively moderate effect.

Recommendations:
- Employing interactive industrial strategies that primarily steer the national industry towards sectors in which Algeria possesses a competitive edge.
- Highlighting the significance of human resources by prioritising creativity and innovation in the new industrial strategy, while enhancing capabilities and competences to augment the manufacturing sector's contribution to economic development.

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Appendices

Appendix 01: Results of Short-Term Parameter Estimation and Error Correction Term

```
Dependent Variable: D(LGDP)
Method: ARDL
Date: 03/08/25   Time: 15:48
Sample: 1991 2023
Included observations: 33
Dependent lags: 4 (Automatic)
Automatic-lag linear regressors (4 max. lags): LINDUS
Deterministics: Restricted constant and no trend (Case 2)
Model selection method: Akaike info criterion (AIC)
Number of models evaluated: 20
Selected model: ARDL(1,0)
```

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COINTEQ*	-0.218554	0.022906	-9.541418	0.0000

R-squared	0.460129	Mean dependent var		0.113720
Adjusted R-squared	0.460129	S.D. dependent var		0.111341
S.E. of regression	0.081809	Akaike info criterion		-2.139023
Sum squared resid	0.214167	Schwarz criterion		-2.093674
Log likelihood	36.29388	Hannan-Quinn criter.		-2.123765
Durbin-Watson stat	2.024136			

* p-values are incompatible with t-Bounds distribution.

Source: EViews 13 Outputs

Appendix 02: Results of Long-Term Parameter Estimation

Deterministics: Rest. constant (Case 2)

CE = LGDP(-1) - (0.748922*LINDUS + 4.081166)

Variable *	Coefficient	Std. Error	t-Statistic	Prob.
LINDUS	0.748922	0.166821	4.489365	0.0001
C	4.081166	1.400712	2.913637	0.0066

Note: * Coefficients derived from the CEC regression.

Source: EViews 13 Outputs