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## **Government Spending and Industrial Sector Performance in Algeria: Using the ARDL Approach**

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**Abstract:** The study aimed to investigate the impact of government spending on Algeria's industrial sector during the period from 1995 to 2022, with a focus on its effect on the dependent variable. To achieve this, competitive industrial performance was used as an indicator to measure the sector's performance. Additionally, independent variables such as inflation, international oil prices, GDP, and the growth of non-hydrocarbon exports were analysed. The study employed the Auto-Regressive Distributed Lag (ARDL) model to conduct the economic analysis, considering the slow time lags of these variables. The study concluded that there was a positive short-term relationship between

government spending and competitive industrial performance in the first year. However, it turned into an inverse relationship in the following year and became insignificant by the third year. In the long term, the study found a significant positive impact of government spending on competitive industrial performance. Additionally, the study identified a significant positive relationship between oil prices and competitive industrial performance, while both inflation and non-hydrocarbon export growth had a significant inverse relationship with competitive industrial performance. The study also found no significant relationship between GDP and competitive industrial performance.

**Keywords:** Government spending, industrial sector, competitive industrial performance, industrial development, oil price, GDP, inflation, non-oil exports

## Introduction

Algeria has been working for years to develop its economic policies to stimulate growth and industrial development. These efforts have centred on utilising government spending as a primary tool for economic policy, aiming to enhance the industrial sector's performance and contribute to overall economic stability. The strategic allocation of public expenditures highlights Algeria's commitment to fostering industrial growth, improving infrastructure, and boosting productivity within the industrial sector.

In an era where global economic challenges are increasingly apparent, government spending plays a crucial role in driving industrial growth. This research delved into the intricate relationship between fiscal policy and industrial development, specifically examining how government spending has influenced Algeria's industrial sector from 1995 to 2022. By analysing the effects of public expenditure, this study aimed to provide valuable insights into how government funds can be most effectively utilised to promote sustainable industrial growth.

Various studies underscore the significance of government expenditure in driving economic and industrial performance (Chandana et al., 2024; Gurdal et al., 2021; Odhiambo, 2015). For example, Oladele et al. (2017) emphasise the importance of well-targeted government spending in South Africa for promoting long-term economic growth. Similarly, Omankhanlen et al. (2021) highlight the varied impacts of different types of government spending on Nigeria's industrial sector, underscoring the need for strategic allocation of public funds.

Additionally, Loizides and Vamvoukas (2005) explore the bidirectional relationship between government expenditure and economic growth, indicating that fiscal policies can both influence and be influenced by economic performance. Muhammed and Asfaw (2014) emphasize the importance of targeted expenditures, such as those in health and capital investment, in fostering economic growth. These insights are particularly relevant for Algeria, where strategic investments in infrastructure and human capital are essential for boosting industrial productivity.

Scientists provide a dynamic investigation into Nigeria's public spending on the industrial sector, revealing the necessity of better fiscal management to ensure that public spending translates into tangible industrial development (Iweriebor et al., 2015; Samuel & Oruta, 2021). Nketiah-Amponsah (2009) illustrated the varied impacts of different types of government expenditures on economic growth, emphasising the need for strategic allocation of resources.

Moreover, Wiryawan and Otchia (2022) provide evidence from Indonesia that increasing local government spending can significantly impact industrial growth, highlighting the challenges of decentralized fiscal management. Sendek and Ngasamiaku (2020) show that development expenditure positively influences economic growth, while recurrent expenditure and taxation can have negative effects, highlighting the importance of prioritising productive public investments.

The main aim of this study was to explore the impact of government spending on Algeria's industrial sector, drawing from a wide range of empirical research and theoretical frameworks. By contextualising these insights within Algeria's economic environment, the research sought to inform policy-making and strategic planning to enhance the country's industrial capabilities.

The importance of the industrial sector in achieving competitive performance and economic growth is well-documented. According to the United Nations Industrial Development Organisation (UNIDO), the industrial sector is a key driver of economic development, contributing to job creation, technological advancement, and increased productivity. Effective government spending in this sector can enhance its competitive performance, making it more resilient to global economic fluctuations and more capable of contributing to sustainable economic growth (UNIDO, 2024).

The main objectives of this research were to:

- Evaluate the current impact of government spending on industrial development in Algeria.
- Identify the key factors that influence the effectiveness of government expenditure in promoting industrial growth.
- Explore the relationship between different types of government spending and industrial sector performance.

### **Research Problem**

Previous research has highlighted the significance of government spending in promoting economic growth and industrial development. However, more academic effort is required to map out the specific impacts of government expenditure on the industrial sector in Algeria. This gap is particularly noticeable given the unique economic characteristics and developmental challenges faced by Algeria, where the industrial sector is crucial for overall economic stability and growth. Thus, despite prior research on fiscal policy and industrial performance, there is a research gap regarding the specific dimensions of government spending that effectively drive industrial development in Algeria.

Although it is widely recognised that the government expenditure holds significant influence over economic and industrial performance, there remains a lack of clarity on its application within specific industrial contexts. This represents a valuable opportunity to enhance economic growth and industrial productivity. Further insights are required to discern how the government spending in Algeria can be optimised to foster sustainable industrial development.

As discussed above, how Algeria leverages government spending to improve its industrial sector's performance and sustainability, this research aimed to bridge this gap by investigating the following:

*Throughout the years 1995–2022, how did government spending affect Algeria's industrial sector?*

This research aimed to contribute to the broader discussion on industrial strategy in emerging economies by providing valuable insights to inform future policy decisions through its comprehensive approach. As Algeria continues to navigate the challenges of economic transformation and diversification, the findings of this study may offer crucial guidance for policymakers and stakeholders in optimising the impact of government spending on the industrial sector.

### **Theoretical Framework**

This framework was underpinned by the synthesis of Keynesian economic principles, the insights of endogenous growth theory, and the broader context of development economics, each offering a unique lens through which to evaluate the role of governmental expenditure in stimulating industrial development.

At the heart of this investigation lies the Keynesian assertion that the government spending is a pivotal driver of economic growth, particularly in times of downturn. This principle suggests that strategic fiscal policies can mitigate economic fluctuations and support industrial sectors by injecting

capital into critical areas such as infrastructure and research and development, thereby fostering an environment conducive to growth and innovation. Such interventions are anticipated to yield immediate economic benefits and lay the groundwork for sustained industrial expansion Keynes (1936).

Building on Keynesian foundations, the theory of endogenous growth provides a further analytical dimension, positing that government expenditure on public goods like education and infrastructure directly influences the rate of technological progress and, consequently, the long-term trajectory of economic growth (Aghion et al., 1998; Howitt, 2010; Lucas Jr, 1988; Romer, 1990). This collection of literature explains how public investment not only increases physical capital but also improves human capital and innovation capabilities, which are essential elements of industrial growth. The endogenous growth theory underscores the importance of internal factors, such as government policy decisions, in determining economic outcomes, challenging the neoclassical emphasis on exogenous technological advancements.

Within the Algerian context, the application of these theories must consider the unique challenges and opportunities faced by the country's industrial sector. This includes navigating the volatility of global oil prices, a critical factor for an economy heavily reliant on hydrocarbon exports, and the structural adjustments prompted by global economic shifts (Cesaratto, 1999; World Bank, 2022). The government's strategic allocation of resources towards industrial diversification and technological upgrades plays a crucial role in shaping Algeria's industrial landscape, with the effectiveness of these expenditures forming a core area of investigation (Lagha & Bachi, 2018).

Moreover, development economics offers valuable insights into the role of state intervention in economic development, highlighting the balance between market forces and government actions in achieving industrial growth. This perspective is particularly relevant in assessing the Algerian government's efforts to foster an enabling environment for industrial innovation and competitiveness on the global stage Stiglitz (1996).

## **Literature Review**

Beginning with the study by Wiryawan and Otchia (2022) concerning Indonesia, which employs a System Generalised Method of Moments (System GMM) to investigate the role of local government spending on industrial development in a decentralised setting, the findings suggest that increased local capital expenditure positively correlates with industrial growth, highlighting the potential benefits of targeted government investment at the local level.

Transitioning to the study by Ozuzu and Isukul (2021) on Nigeria, which employs regression analysis to investigate the impact of government fiscal policies, particularly capital expenditure and tax policies, on the growth of the industrial sector the study concludes that these policies significantly enhance industrial growth, suggesting the efficacy of well-designed fiscal strategies.

Oman Khanlen et al.'s (2021) study, through Johansen co-integration and vector error correction analysis, delves into the nuanced impacts of different types of government expenditure on Nigeria's industrial development. The findings reveal that while capital expenditure negatively impacts industrial output, recurrent expenditure has a positive, albeit statistically insignificant, effect, underscoring the complexity of fiscal policy impacts on industrial growth.

In the context of D-8 countries, Gholami and Sameei (2019) use the fixed effect model to show that increasing government consumption expenditures negatively affects economic growth, cautioning against the inefficiencies of excessive government spending.

Oladele et al.'s (2017) study on South Africa finds a positive long-term relationship between government spending and economic growth using a cointegration approach and Vector Error Correction Model (VECM), suggesting the significance of targeted infrastructure investments to enhance economic development.

(Iweriebor et al., 2015) employ econometric tools in their dynamic investigation into Nigeria's industrial sector, finding that public spending has a weak effect on industrial production in the long run, which suggests a disconnect between public expenditure and real sector performance.

Muhammed and Asfaw (2014) used a co-integration error correction model to uncover the relationship between different compositions of government expenditure and economic growth in Ethiopia, revealing that health expenditure and total capital expenditure significantly contribute to economic growth, advocating for sector-specific government spending.

Nketiah-Amponsah (2009) conducts an empirical analysis to evaluate the effects of aggregated and disaggregated government expenditure on economic growth in Ghana, concluding that while aggregated expenditure hindered growth, spending on health and infrastructure promoted it, emphasising the need for strategic expenditure.

Finally, Loizides and Vamvoukas (2005) utilise a bivariate error correction model within a Granger causality framework, expanding to a trivariate analysis that includes unemployment and inflation. Their findings indicate that government size positively influences economic growth in the short and long term in Greece, the UK, and Ireland, offering a methodological lens through which to examine fiscal policy impacts.

In the landscape of economic research on the impact of government spending on industrial sector, the proposed study on Algeria spanning from 1995 to 2022 holds a distinctive place. Unlike the examined studies, which offer valuable insights into various countries and regions with their unique economic contexts and fiscal policies, this study focuses on a period of significant transformation for Algeria, encompassing shifts in economic policy, structural reforms, and the challenges and opportunities presented by globalisation and oil price volatility.

Moreover, this study aimed to fill a gap in the existing literature by providing a comprehensive analysis of over three decades of economic policy and its direct and indirect effects on Algeria's industrial sector. Given the mixed findings of previous studies, ranging from positive impacts of targeted government spending in sectors like health and infrastructure to the negative effects of excessive government consumption expenditures, this study contribute a nuanced understanding of how Algeria's unique challenges and opportunities can inform broader economic theories and policies.

The interplay between government expenditure and industrial growth is complex and varies across different economic contexts. By integrating the results of prior research and adapting them to the Algerian setting, this paper seeks to enhance our comprehension of how government expenditure can act as a driver for Competitive Industrial Performance. The ultimate goal is to offer actionable insights for policymakers to harness the potential of government expenditure as a tool for sustainable industrial growth.

## **Materials and Methods**

### ***Constructing the Model and Presenting the Study's Variables***

**Introducing the Variables.** In this study, an attempt was made to limit the most important indicators and variables that express the economic behaviour of the phenomenon under study, whether related to dependent variables or independent variables, and therefore the study included the following dependent variable :Competitive Industrial Performance Index CIP, As for the independent variables, a number of variables were relied upon according to the economic model and in connection with what the economic theory stipulates in explaining the economic behaviour of the phenomenon under study, This includes the government expenditure index G, Global Oil Price Index GOP, Inflation Index INF, Gross Domestic Product Growth Index GDP and the growth index of exports outside the oil sector XOOS. The examined variables are presented in Table1.

**Table 1***The Variables Chosen for Examination and the Corresponding Data Source*

Variable	Proxy used	Definition	Source of Data
Competitive Industrial Performance	CIP	The Competitive Industrial Performance (CIP) index takes into account the primary components of industrial performance, which include a country's effect on the global market, intensity of industrialisation, and productive capacity. A upward trend in a country's CIP value over time suggests more productivity and better-quality products with a higher likelihood of success in foreign markets.	UNIDO <a href="https://stat.unido.org/data/table?dataset=cip">https://stat.unido.org/data/table?dataset=cip</a>
Government Spending	G	The term "government spending" describes the sums of money that the public sector spends on purchasing products and providing services.	Bank Of Algeria <a href="https://www.bank-of-algeria.dz/">https://www.bank-of-algeria.dz/</a>
Global Oil Prices	Oil GOP	The price per barrel of crude oil set by the world market is referred to as the global oil price. Many factors, such as the dynamics of supply and demand, changes in geopolitics, and economic indices, and the decisions made by significant oil-producing countries and organizations, all have an impact on these prices. These are the main elements of the world oil price.	National Statistics Office <a href="https://www.ons.dz/">https://www.ons.dz/</a>
Inflation Rate	INF	By computing the annual percentage change in the average consumer's cost of buying a basket of goods and services, the consumer price index calculates inflation. This expense may change once a year or at predetermined intervals, such once a year. Typically, the Laspeyres formula is applied.	World Bank Group <a href="https://data.worldbank.org/">https://data.worldbank.org/</a>
Gross Domestic Product	GDP	The total value of the contributions made by all of the nation's producers, plus any product taxes and minus any subsidies that are not part of the product value is the gross domestic product, or GDP. The computation does not account for the deterioration of natural resources or the depreciation of assets that are man-made.	World Bank Group <a href="https://data.worldbank.org/">https://data.worldbank.org/</a>
Exports outside the oil sector	XOOS	Crude oil and associated petroleum products are not included in the category of exports outside the oil industry, often known as non-oil exports, which include a broad variety of commodities and services that a nation sells to other nations.	National Statistics Office <a href="https://www.ons.dz/">https://www.ons.dz/</a>

**Building the model.** Time series data for Algeria from 1995 to 2022 were used in this analysis; the period was selected based on data availability, current circumstances, and the amount of empirical research on the relationship between government spending and industrial success that has been done.

The stage of familiarity with the data of the sample selected for the study and building the model is one of the most important stages that lead a standard analysis very close to reality, and identical to economic theories and economic significance through the relationship of the independent variable with the dependent variable, and the study model was chosen as follows:

$$CIP = f(G, GOP, INF, GDP, XOOS) \quad (1)$$

where,

*CIP*: Competitive Industrial Performance

*G*: Government Spending

*GOP*: Global Oil Prices

*INF*: Inflation Rate

*GDP*: Gross Domestic Product

*XOOS*: Exports outside the oil sector

**Testing for Stability in Time Series.** The study begins by examining the time series' stability, which is a prerequisite for co-integration. The most crucial method for assessing the stability of time series, learning about their statistical properties, and understanding the features of the time series under investigation in terms of their level of integration is through unit root tests (Levendis, 2023). The examination has been applied. Philips-Perron in order to determine whether the unit root or stationarity is present in every variable under investigation, this test compares the alternative hypothesis—which states that the variable in question is stable—with the null hypothesis. It claims that the variable in question is unstable and contains the unit root (Afriyie et al., 2020).

That is, determining whether the time series of the variable is stable at its original level (level), or if it is unstable, and if it turns out to be unstable, the differences must be taken for it until it reaches a stable state.

The addition provided by Imad Al-Din Al-Musabeh was used on the Eviews program, which performs the Phillips-Perron test in all formats and taking the original level and the first differences, and the slowdown periods were automatically selected through the Schwartz Info Criterion, and the results were as follows:

**Table 2**

*Table of Unit Root Tests (PP)*

		At Level					
		CIP	G	GOP	INF	GDP	XOOS
With Constant	t-Statistic	-1.2488	-4.9949	-1.4421	-7.8587	-3.9533	-6.8562
	Prob.	0.6379 n0	0.0004 ***	0.5468 n0	0.0000 ***	0.0055 ***	0.0000 ***
With Constant & Trend	t-Statistic	-1.7535	-4.9317	-2.0845	-13.6112	-4.6381	-8.0177
	Prob.	0.6988 n0	0.0026 ***	0.5309 n0	0.0000 ***	0.0051 ***	0.0000 ***
Without Constant & Trend	t-Statistic	-0.8468	-3.2309	0.2007	-4.7027	-2.0095	-5.7652
	Prob.	0.3398 n0	0.0023 ***	0.7368 n0	0.0000 ***	0.0444 **	0.0000 ***

*Note.* (\*) Significant at the 10%; (\*\*) Significant at the 5%; (\*\*\*) Significant at the 1%. And (no) Not Significant \*MacKinnon (1996) one-sided p-values.

*Source:* Prepared by researchers using the Eviews 9 results.

Through Table (2), we notice the stability of the time series of all variables in their original state, whether with a constant or constant and a general trend or without a constant and a general trend, except for two variables: CIP and GOP (Which means that there is the unit root of these time series at the level, so it will be re-tested for the two series by taking their first difference, and the results were shown in the following table (3):

**Table 3**

*Unit Root Test Table (PP)*

		At First Difference	
		d(CIP)	d(GOP)
With Constant	t-Statistic	-6.5711	-4.2547
	Prob.	0.0000 ***	0.0028 ***
With Constant & Trend	t-Statistic	-12.0432	-4.1051
	Prob.	0.0000 ***	0.0173 **
Without Constant & Trend	t-Statistic	-6.5738	-4.2333

Prob.	0.0000	0.0002
	***	***

Source: Prepared by researchers using the Eviews 9 results.

The Phillips-Perron test is conducted in the table following the computation of first-order differences in the time series. The ARDL model can be used to investigate the relationship between the dependent variable and the independent variables in Algeria because the results show that the strings are stable, which leads to the conclusion that the variables under study are integrated at level I(0) and from the first order I(1).

**Determine the Optimal Slowdown Period.** Before doing the joint integration test, the appropriate slowdown periods included in the model were determined, and they were selected based on different criteria and then used: Akaike, Schwarz, Hannan and Quinn standard, Prediction Final Error, and LR standard , and the results were as shown in the following table:

**Table 4**

*Criteria for Selecting the Optimal Slowdown Period*

VAR Lag Order Selection Criteria						
Endogenous variables: CIP G GOP INF GDP XOOS						
Exogenous variables: C						
Sample: 1995 2022						
Included observations: 25						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-319.5878	NA	8266.921	26.04702	26.33955	26.12816
1	-261.5375	83.59244	1552.965	24.28300	26.33071	24.85095
2	-216.2514	43.47466	1324.679	23.54011	27.34300	24.59487
3	-70.4056	70.00594*	1.750274*	14.75245*	20.31053*	16.29403*

\* indicates lag order selected by the criterion  
 LR: sequential modified LR test statistic (each test at 5% level)  
 FPE: Final prediction error  
 AIC: Akaike information criterion  
 SC: Schwarz information criterion  
 HQ: Hannan-Quinn information criterion

Source: Prepared by researchers using the Eviews 9 results.

As observed in the preceding table, all criteria indicated that the optimal lag period is:  $k= 3 \text{ lag}$  , and this period is appropriate with the quality of the model that we are going to study, after which the EViews 9 program is used to estimate the ARDL model and the results were as shown in the following table:

**Table 5**

*ARDL Estimation Results*

Dependent Variable: CIP				
Method: ARDL				
Sample (adjusted): 1998 2022				
Included observations: 25 after adjustments				
Maximum dependent lags: 3 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (3 lags, automatic): G GOP INF GDP XOOS				
Fixed regressors: C				
Number of evaluated models: 3072				
Selected Model: ARDL (2, 3, 3, 2, 3, 3)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
CIP(-1)	0.240438	0.198036	1.214114	0.3116
CIP(-2)	-0.601518	0.205541	-2.926512	0.0612

G	5.54E-05	1.70E-05	3.264529	0.0470
G(-1)	2.06E-05	2.74E-05	0.754611	0.5053
G(-2)	0.000120	1.28E-05	9.416906	0.0025
G(-3)	2.13E-05	2.56E-05	0.833403	0.4658
GOP	2.50E-05	1.07E-05	2.347371	0.1005
GOP(-1)	2.96E-06	1.25E-05	0.236007	0.8286
GOP(-2)	-2.77E-05	2.01E-05	-1.374737	0.2629
GOP(-3)	2.95E-05	1.49E-05	1.981070	0.1419
INF	-0.000214	9.56E-05	-2.234703	0.1115
INF(-1)	-0.000272	8.05E-05	-3.371440	0.0434
INF(-2)	6.02E-05	4.50E-05	1.339632	0.2728
GDP	0.000352	0.000123	2.872399	0.0639
GDP(-1)	-0.000242	8.01E-05	-3.023856	0.0566
GDP(-2)	0.000112	7.36E-05	1.518919	0.2261
GDP(-3)	-0.000199	9.61E-05	-2.071707	0.1300
XOOS	-2.72E-05	5.83E-06	-4.659096	0.0187
XOOS(-1)	-2.29E-05	5.56E-06	-4.111193	0.0261
XOOS(-2)	-8.52E-06	8.69E-06	-0.980497	0.3991
XOOS(-3)	-3.15E-05	6.05E-06	-5.207590	0.0138
C	0.021177	0.002730	7.755839	0.0045
R-squared	0.995598	Mean dependent var	0.016318	
Adjusted R-squared	0.964788	S.D. dependent var	0.002008	
S.E. of regression	0.000377	Akaike info criterion	-13.28977	
Sum squared resid	4.26E-07	Schwarz criterion	-12.21716	
Log likelihood	188.1221	Hannan-Quinn criter.	-12.99227	
F-statistic	32.31334	Durbin-Watson stat	2.894323	
Prob(F-statistic)	0.007546			

*Note.* \* p-values and any subsequent tests do not account for model selection.

*Source:* Prepared by researchers using the Eviews 9 results.

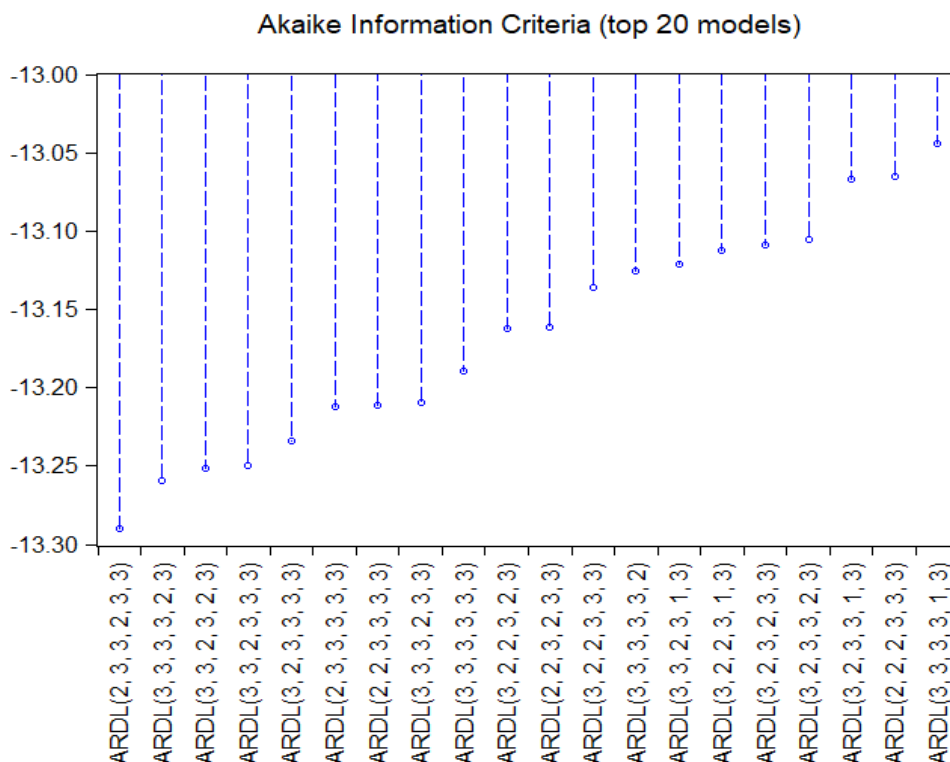
The results of the (Adjusted R-squared) test showed that the interpreted variables have explained (96%) of the changes that occurred to the dependent variable, and that (0.04%) is due to external factors, while the (F-statistic) test was at a probability level (0.007546), which is less than (0.05). This indicates the total significance of the model in statistical terms, and the statistics (D-W), which amounted to (2.894323), indicate that the model is free of the problem of Autocorrelation.

As shown in the previous table, EViews 9 has automatically determined the time slowdown periods, so that the following model is chosen:

ARDL(2, 3, 3, 2, 3, 3), which achieves the lowest value of the AIC standard , and this result can be illustrated graphically through the following figure:

**Figure 1**

*Time Lags According to the Standard AIC*



Source: Prepared by researchers using the Eviews 9 results.

The previous figure shows the preference of the chosen model, that is, the determination of time slowdown periods with two time periods for the dependent variable Competitive Industrial Performance (CIP), and different time periods for the independent variables as follows: three time periods each: government spending (G), oil prices (GOP), gross domestic product (GDP) growth, and export growth outside the hydrocarbon sector (XOOS), while it is the determination of two time periods for the inflation variable (INF).

**Testing the Boundary Approach for Co-integration.** In order to test the inter-integration relationship between the variables of the study, Pesaran et al. (2001) presented a modern approach to testing the extent to which the equilibrium relationship between variables is achieved under the Unrestricted Error Correction Model (UECM).

This method is known as the Bounds Testing Approach, where the ARDL model test is carried out as a first stage to detect the existence of a common integration between the study variables, that is, the existence of a long-term equilibrium relationship between the variables of the model. If this relationship is achieved, we move to the second stage by testing the validity of the model and its absence of statistical problems, then moving to estimating the parameters of the model in the long term, and then estimating the error correction model in the short term.

The model takes the following formula:

$$\Delta CIP_t = C + \beta_1 CIP_{t-1} + \beta_2 G_{t-1} + \beta_3 GOP_{t-1} + \beta_4 INF_{t-1} + \beta_5 GDP_{t-1} + \beta_6 XOOS_{t-1} + \sum_{i=0}^p \alpha_1 \Delta CIP_{t-i} + \sum_{i=0}^{q1} \alpha_2 \Delta G_{t-i} + \sum_{i=0}^{q2} \alpha_3 \Delta GOP_{t-i} + \sum_{i=0}^{q3} \alpha_4 \Delta INF_{t-i} + \sum_{i=0}^{q4} \alpha_5 \Delta GDP_{t-i} + \sum_{i=0}^{q5} \alpha_6 \Delta XOOS_{t-i} + \varepsilon_t \dots\dots\dots 2$$

where:

C: fixed term

Δ: indicates the first differences

p, q1, q2, q3, q4, q5 : represents the upper limit of slowdown periods for variables

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$  : Long-term relationship parameters  
 $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6$  : Short-term relationship parameters  
 $\varepsilon_t$  : Random limit.

Table 6 shows the results of the bounds test and shows that the variables are cointegrated.

**Table 4**

*Boundary Approach Method for Cointegration Testing*

Periods of deceleration	F-Stat	Result
ARDL(2, 3, 3, 2, 3, 3)	18.28633	Having a co-integration relationship
Critical values	Minimalist I(0)	Upper limit I(1)
At a significant level of 10 %	2.26	3.35
At a significant level of 5%	2.62	3.79
At a significant level of 2.5%	2.96	4.18
At a significant level of 1%	3.41	4.68

Source: Prepared by researchers using the Eviews 9 results.

Based on the boundary test results, the null hypothesis of "lack of common integration" can be rejected and accept the alternative hypothesis of "there is a long-term equilibrium relationship" between the study variables because the calculated Fisher statistic F-statistic = 18.28633 is greater than the critical values of the upper limit at the 10%, 5%, 2.5%, and 1% level of significance.

**Model Validity Tests.** Before estimating the parameters of the model, it is very important to carry out other tests that reveal the validity of the model used in the study, which are explained as follows:

**Detection of the Existence of a Problem of Autocorrelation Between the Rests of the Estimate.** A test must be performed to detect the existence of an autocorrelation problem between the estimation remainders (Serial Correlation LM Test), and in the event of a autocorrelation between the remainders, the studied and proposed model cannot be accepted to study the relationship between the research variables.

In this regard, it is important that the model errors are sequentially independent, if this does not happen, the parameter estimates are not consistent (due to the lagging values of the dependent variable that appear as a regression in the model); therefore, two tests are used:

- The first, Breusch-Godfrey Serial Correlation (LM Test), relates to the autocorrelation test.
- The second, Heteroskedasticity Test: Breusch-Pagan-Godfrey) relates to the variance instability test.

Table 7 shows the results of the test for the existence of autocorrelation between residuals (LM).

**Table 7**

*Test for the Presence of Autocorrelation Between Residuals (LM)*

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.850267	Prob. F(2,1)	0.6085
Obs*R-squared	15.74257	Prob. Chi-Square(2)	0.0004

Source: Prepared by researchers using the Eviews 9 results.

According to Table 7's LM Test results, the Fisher statistic's P-Value of 0.6085 is greater than 0.05, meaning that the null hypothesis—that there is no autocorrelation between the remainders—can be accepted. This rejects the alternative hypothesis, which holds that there is autocorrelation. As a result,

the model selected to examine the long- and short-term relationships between variables is appropriate in this regard.

As for the test of instability of variance, the results of the model were shown in the following Table 8.

**Table 8**

*Variance Instability Test*

<b>Heteroskedasticity Test: Breusch-Pagan-Godfrey:</b>			
F-statistic	0.815683	Prob. F(21,3)	0.6750
Obs*R-squared	21.27409	Prob. Chi-Square(21)	0.4423
Scaled explained SS	0.531247	Prob. Chi-Square(21)	1.0000

*Source:* Prepared by researchers using the Eviews 9 results.

Table (8) results indicate that the Fisher statistic's P-Value of 0.6750 is larger than 0.05, indicating acceptance of the null hypothesis, which holds that variance is unchanging, and rejection of the alternative hypothesis.

**Stability Test.** To guarantee that the data used in this investigation is devoid of any structural modifications, one of the suitable examinations has to be employed, like the cumulative sum of residuals (CUSUM) and the cumulative sum of the residuals' squares (CUSUM of Squares) suggested by (Brown et al., 1975).

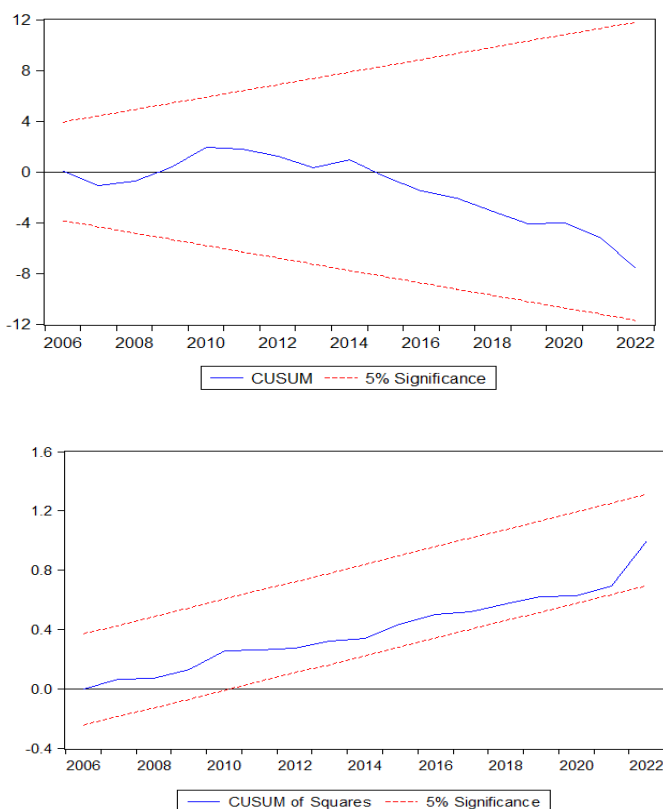
Because they indicate any structural changes in the data as well as the stability and consistency of long-term parameters with short-term parameters, these two tests are regarded as some of the most significant in this subject.

Numerous studies have demonstrated that these tests are invariably linked to the ARDL methodology; the computed coefficients of the error correction formula for the self-regression model of dispersed time gaps are structurally stable if the graphs of the CUSUM and CUSUM of Squares tests are within critical limitations at the 5% level.

After conducting the two tests on the model, we obtained the following Figure (2):

**Figure 2**

*Model Stability Test*



Source: Prepared by researchers using the Eviews 9 results.

The graph shows that the CUSUM cumulative sum test for residuals for this model passes a linear mean inside the critical region's bounds, suggesting some degree of stability in the model at substantial limits of 5%. The CUSUM of Squares cumulative sum test shows a similar pattern, these tests demonstrate the model's stability and consistency across long- and short-term outcomes.

**Estimation of long-term parameters**

We can proceed with estimating the model by obtaining the long-term parameter estimates. Table (9) presents these results, building on previous findings that confirm the stability of the time series at the first difference, the existence of a long-term relationship between the study's two variables, the absence of autocorrelation, the absence of heteroscedasticity in the model, and the overall stability of the model in both the long and short terms.

**Table 9**

*Estimation of Long-term Parameters*

ARDL Cointegrating And Long Run Form  
 Dependent Variable: CIP  
 Selected Model: ARDL(2, 3, 3, 2, 3, 3)  
 Sample: 1995 2022  
 Included observations: 25

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
G	0.000160	0.000035	4.614750	0.0191
GOP	0.000022	0.000004	5.261416	0.0134
INF	-0.000312	0.000092	-3.410871	0.0421

GDP	0.000016	0.000097	0.170342	0.8756
XOOS	-0.000066	0.000011	-6.190559	0.0085
C	0.015559	0.000436	35.686250	0.0000
Cointeq = CIP - (0.0002*G + 0.0000*GOP -0.0003*INF + 0.0000*GDP -0.0001*XOOS + 0.0156 )				

*Source:* Prepared by researchers using the Eviews 9 results.

The results of the statistical and economic analysis extracted from Table (7) can be presented as follows.

*The existence of a positive correlation in the long term between government spending and competitive industrial performance in Algeria, as an increase in government spending by 1% will lead to an increase in competitive industrial performance by 160-0.000.*

Positive correlation means that when government spending increases, competitive industrial performance also increases. This indicates that government policies in Algeria that increase government spending positively affect the industrial sector, this impact is a result of government investments in infrastructure, education, research and development, and other areas that support the growth of the industrial sector and enhance its competitiveness. However, the impact of government spending on industrial performance is weak competitive, and this indicates that government fiscal policies need relatively large increases in spending to achieve a significant impact on industrial performance. This low percentage may be due to several factors, including the effectiveness and distribution of government spending, the size of the Algerian economy, and the efficiency of economic management.

*The existence of a positive correlation in the long term between oil prices and competitive industrial performance in Algeria, as an increase in oil prices by 1% will lead to an increase in competitive industrial performance by 312,000%.*

A positive correlation means that when oil prices increase, competitive industrial performance also increases. This suggests that oil prices have a positive impact on the industrial sector in Algeria, as a country that relies heavily on the oil and gas sector, benefiting from higher oil prices by increasing national revenues. These revenues can be used to support and develop industrial infrastructure and development projects that enhance the competitive performance of the industrial sector, although the response in a small competitive industrial performance reflects a positive long-term impact. This suggests that higher oil prices contribute to improved competitive industrial performance, but it is not the only or biggest factor in this improvement. The impact of oil prices, while positive, needs relatively large increases to achieve a tangible impact on industrial performance.

*The existence of an inverse long-term significant relationship between the inflation rate and the competitive industrial performance in the Algeria, as a rise in the inflation rate by 1% will lead to a decrease in competitive industrial performance by 0.000022%.*

Inverse correlation means that when inflation rises, competitive industrial performance decreases. This indicates that inflation has a negative impact on the competitiveness of the industrial sector in Algeria, as the high inflation rate leads to an increase in production costs, such as the cost of raw materials and wages, which weakens the competitiveness of Algerian industrial products in the local and international markets. In addition, inflation can reduce the purchasing power of firms and consumers, limiting investment and demand for industrial products, thus suggesting that inflation negatively affects competitive industrial performance, but the impact is not significant enough to have a decisive impact on the industrial sector. However, continuously increasing inflation can erode competitiveness over time.

*There is no significant relationship between GDP and long-term competitive industrial performance.*

The lack of significant correlation means that changes in GDP are not associated with significant or influential changes in long-term competitive industrial performance. In other words, there is no strong statistical evidence to suggest that GDP growth leads to improved or deteriorating competitive industrial performance, this may be a result of GDP growth in Algeria not directly reflected in the industrial sector, or that this growth may be concentrated in other sectors such as Oil sector or services . It can also be noted that factors affecting competitive industrial performance are not directly related to GDP, but may relate to other factors such as infrastructure, technology, government policies, or production efficiency.

*There is a significant inverse long-term relationship between non-hydrocarbon exports and competitive industrial performance in Algeria. Specifically, a 1% increase in non-hydrocarbon exports is associated with a 0.000066% decrease in competitive industrial performance.*

An inverse moral correlation means that when exports outside the hydrocarbon sector rise, competitive industrial performance decreases. This suggests that there is a negative impact of non-oil exports on the competitiveness of the industrial sector in Algeria; the inverse moral correlation means that when exports outside the hydrocarbon sector rise, competitive industrial performance decreases. This suggests that there is a negative impact of non-oil exports on the competitiveness of the industrial sector in Algeria.

**Estimation of short-term parameters.** The error correction model will be estimated to extract the short-term parameters of the relationship between the dependent variable represented in competitive industrial performance and independent variables, and after conducting the test, the results shown in the Table 8 were obtained:

**Table 10**

*Error Correction Model Estimation Results*

<b>Cointegrating Form</b>				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
D(CIP(-1))	0.601518	0.205541	2.926512	0.0612
D(G)	0.000055	0.000017	3.264529	0.0470
D(G(-1))	-0.000120	0.000013	-9.416906	0.0025
D(G(-2))	-0.000021	0.000026	-0.833403	0.4658
D(GOP)	0.000025	0.000011	2.347371	0.1005
D(GOP(-1))	0.000028	0.000020	1.374737	0.2629
D(GOP(-2))	-0.000030	0.000015	-1.981070	0.1419
D(INF)	-0.000214	0.000096	-2.234703	0.1115
D(INF(-1))	-0.000060	0.000045	-1.339632	0.2728
D(GDP)	0.000352	0.000123	2.872399	0.0639
D(GDP(-1))	-0.000112	0.000074	-1.518919	0.2261
D(GDP(-2))	0.000199	0.000096	2.071707	0.1300
D(XOOS)	-0.000027	0.000006	-4.659096	0.0187
D(XOOS(-1))	0.000009	0.000009	0.980497	0.3991
D(XOOS(-2))	0.000032	0.000006	5.207590	0.0138
CointEq(-1)	-1.361080	0.163846	-8.307070	0.0037

*Source:* Prepared by researchers using the Eviews 9 results.

We note from the Table 10 the following:

- The existence of a positive moral relationship between government spending and competitive industrial performance for the first year, while this relationship turns into an inverse relationship in the following year, so that this relationship in the third year becomes non-significant.
- There is no significant relationship between oil prices and competitive industrial performance in the short term.
- The existence of an inverse significant relationship between the growth of exports outside the hydrocarbon sector and competitive industrial performance in the first year, to become this relationship is not significant in the following year, and then turns into a positive relationship in the third year.
- The error correction threshold parameter  $\text{CoinEp}(-1)$  was found to be negative at a significant level of 1 per cent, with a value of -1.361080. This indicates that the equilibrium relationship is true and accurate over the long term (i.e., mutual complementarity exists). The model includes an error correcting mechanism. The long-term pace of return to equilibrium is measured by this parameter, and it is equivalent to 136.1080% annually.

## Results

### *Long-term Results*

**The Existence of a Positive Correlation in the Long-term Between Government Spending and Competitive Industrial Performance.** Government spending is pivotal in enhancing key areas such as infrastructure, education, research and development, and public services. These sectors are integral to creating a conducive environment for the industrial sector, fostering its growth and expansion. By improving infrastructure, the government can reduce costs and increase efficiency for industries. Investment in education and research and development leads to a more skilled workforce and innovative solutions, both of which are crucial for sustaining industrial competitiveness. Additionally, robust public services ensure that the basic needs of the population are met, allowing the industrial sector to focus on its core activities without additional social burdens.

Despite the positive impact of government spending, the modulus of elasticity—calculated at 0.000160%—indicates that this effect is quite limited. This minimal influence suggests that either the current level of spending is insufficient to make a significant impact, or the funds are not being allocated effectively to the sectors within the industry that are most in need. The limited elasticity highlights the potential need for increased investment in key industrial areas or a reassessment of how government resources are being distributed across different sectors.

A significant challenge may lie in the efficiency of government spending. If resources are not utilized effectively or are subject to waste, the intended improvements in competitive industrial performance may not be realized. Inefficient spending can result from mismanagement, corruption, or a lack of strategic planning, all of which can undermine the potential benefits of government investment. To maximize the positive effects of spending on the industrial sector, it is essential to ensure that resources are allocated wisely, targeted towards areas with the highest potential for growth, and managed with transparency and accountability.

**The Existence of a Positive Long-term Significant Relationship Between Oil Prices and Competitive Industrial Performance.** Algeria's economy is heavily reliant on the oil sector, making it highly sensitive to fluctuations in global oil prices. When oil prices are high, national revenues surge, providing the government with the financial capacity to invest in the development of other economic sectors, including the industrial sector. This influx of revenue can be channelled into infrastructure improvements, technological advancements, and workforce development, all of which are essential for fostering industrial growth and competitiveness. However, this reliance on oil also makes the economy vulnerable to external shocks, such as sudden drops in oil prices, which can significantly constrain government spending and slow down economic progress.

While higher oil prices can temporarily boost industrial performance by increasing the funds available for investment, Algeria's heavy dependence on the oil sector poses significant long-term risks. To achieve greater economic sustainability, it is crucial for the country to diversify its economy by developing other sectors, such as manufacturing, agriculture, and services. Economic diversification can help mitigate the risks associated with volatile oil markets and provide a more stable foundation for sustained growth. By reducing its dependence on oil, Algeria can build a more resilient economy that is less susceptible to external price fluctuations and better equipped to support industrial development in the long term.

Despite the benefits of higher oil prices, their impact on competitive industrial performance in Algeria remains limited. This suggests that while increased revenues from oil can provide a financial boost, they are not sufficient on their own to drive significant improvements in industrial competitiveness. The limited impact may point to underlying structural issues within the industrial sector that need to be addressed. These could include inefficiencies; outdated technologies, or a lack of innovation and productivity. To fully capitalize on the benefits of higher oil revenues, Algeria may need to implement structural reforms within the industrial sector, such as improving regulatory frameworks, enhancing workforce skills, and encouraging investment in innovation. These reforms can help unlock the sector's full potential and ensure that it contributes more meaningfully to the country's economic growth and diversification efforts.

**The Existence of an Inverse Significant Relationship in the Long-term Between the Inflation Rate and Competitive Industrial Performance.** Inflation has a significant impact on the industrial sector by driving up production costs, including the prices of raw materials, energy, and wages. As production costs rise, the profitability of industrial companies diminishes, making it more challenging for them to maintain their competitive edge. This reduction in profitability can lead to cost-cutting measures, such as reducing investment in innovation, technology, or workforce development, which further weakens the industry's ability to compete both domestically and internationally. In a high-inflation environment, industrial companies may also struggle to set competitive prices for their products without sacrificing margins, putting additional pressure on their financial stability.

High inflation also erodes the purchasing power of both businesses and consumers. For businesses, this means that the cost of goods and services increases, leading to reduced spending power and a decrease in capital available for investment. Consumers, facing higher prices for everyday goods and services, tend to cut back on non-essential purchases, including industrial products. This decline in consumer demand directly affects the industrial sector, leading to lower sales and reduced production. As businesses and consumers alike tighten their budgets, investment in the industrial sector diminishes, stifling growth and innovation and further reducing the sector's competitiveness.

To mitigate the negative effects of inflation on the industrial sector, it is crucial to implement effective monetary and fiscal policies aimed at controlling inflation and maintaining price stability. Central banks can use monetary policy tools such as interest rate adjustments and open market operations to manage inflationary pressures. At the same time, governments can employ fiscal policies, including prudent public spending and taxation measures, to support economic stability. By maintaining low and stable inflation, these policies help create a more predictable and favorable business environment. This stability encourages investment in the industrial sector, supports sustainable growth, and enhances the sector's overall competitiveness. Moreover, effective inflation control strengthens consumer confidence, leading to increased demand for industrial products and further boosting the sector's performance.

**There is no Significant Relationship Between Gross Domestic Product (GDP) and Long-term Competitive Industrial Performance.** The diversification of economic sectors plays a crucial role in understanding GDP growth dynamics. In many economies, growth may increasingly rely on non-industrial sectors, such as oil or services, which can lead to a disconnect between overall economic

performance and the industrial sector's health. This phenomenon highlights the need for targeted strategies to bolster industrial growth, as the lack of direct impact on this sector can hinder long-term economic stability.

**The Existence of an Inverse Significant Relationship in the Long-term Between Exports Outside the Hydrocarbon Sector and Competitive Industrial Performance.** The relationship between product quality, efficiency, and the overall competitiveness of non-oil exports is crucial for industrial performance. Non-oil exports often face challenges related to quality and efficiency, which can hinder their ability to compete effectively in both domestic and international markets. By prioritizing improvements in product quality and operational efficiency, industries can enhance their competitiveness, leading to better market positioning and increased export potential.

However, the distribution of resources plays a significant role in this dynamic. There may be instances where resource allocation and efforts aimed at boosting non-oil exports inadvertently detract from the industrial sector's growth. This misallocation can create imbalances that undermine the overall economic framework, necessitating a thorough reassessment of existing economic strategies. Policymakers must ensure that resources are distributed in a manner that supports non-oil exports and the industrial sector, rather than favouring one at the expense of the other.

Achieving balanced development is essential for fostering inclusive and sustainable economic growth. It is important to strike a harmonious balance between supporting non-oil exports and strengthening the industrial sector. This dual approach not only promotes diversification of the economy but also ensures that all sectors contribute to overall economic stability and resilience. By implementing strategies that recognize the interdependence of these sectors, governments can create a more robust economic environment that benefits all stakeholders and supports long-term growth objectives.

### **Short-term Results**

**The Existence of a Positive Significant Relationship Between Government Expenditure and Competitive Industrial Performance for the First Year, While this Relationship Turns into an Inverse Relationship in the Following Year, so that this Relationship in the third year Becomes Non-significant.**

*First year:* Government spending may have an immediate positive impact on competitive industrial performance by increasing government demand for industrial products and services, improving infrastructure, or offering direct incentives to industrial companies. This effect reflects economic stimulus that can lead to increased production and innovation in the industrial sector in the short term.

*Year two:* Turning to an inverse relationship. It can be explained that additional government spending may lead to inflationary effects or an increase in public debt, these factors can lead to higher production costs and erode the competitiveness of the industrial sector.

*Third Year:* The non-significant relationship indicates that the positive and negative effects of government spending may fade over time, leading to an unnoticeable impact on industrial performance, which can be the result of the market absorbing previous changes and companies adapting to new conditions.

**There is no Significant Relationship Between oil Prices and Competitive Industrial Performance in the Short Term.** Global oil prices may not immediately affect competitive industrial performance, as the economic effects of oil prices need time to be reflected in the overall economy and industrial sectors. Industrial companies may rely on hedging strategies and long-term contracts that minimize the impact of oil price fluctuations on their short-term operating costs.

**There is no Significant Relationship Between the Inflation Rate and Competitive Industrial Performance in the Short Term.** Inflation may not show its immediate impact on competitive industrial performance, as firms can absorb changes in costs and prices for a short period before they clearly affect their competitiveness. Future inflation expectations and government policies may help mitigate the potential negative effects of inflation on industrial performance.

**The Existence of a Positive Significant Relationship Between GDP and Competitive Industrial Performance in the First Year, to Become in the Following Two Years Non-significant.**

*Year One:* GDP growth reflects overall improvement in the economy that could support the industrial sector by increasing demand and improving market confidence. Economic growth can lead to increased investment in the industrial sector, enhancing competitive performance.

*The following two years:* The non-significant correlation suggests that the positive impact of economic growth can fade over time or that other factors may impose greater effects on industrial performance.

**The Existence of an Inverse Significant Relationship Between the Growth of Exports Outside the Hydrocarbon Sector and Competitive Industrial Performance in the First Year, to Become this Relationship is not Significant in the Following Year, and then Turns into a Positive Relationship in the Third Year.**

*First Year:* Growth in non-oil exports may lead to pressures on the domestic industrial sector, such as competitive challenges in international markets in meeting external demand with competitive quality and efficiency, which negatively affects its performance and the use of resources in inefficient ways.

*Year two:* The non-significant relationship suggests that the industrial sector may adapt to changes in non-oil exports over time.

*Year Three:* The shift to a positive relationship reflects an improvement in the ability of the industrial sector to take advantage of growth opportunities in non-oil exports, perhaps as a result of improving production efficiency or adapting to international market demands, suggesting that companies may have succeeded in improving their operations and taking advantage of growth opportunities in foreign markets.

## **Discussion**

Key findings from the study showed a positive long-term correlation between government spending and the performance of the industrial sector in Algeria, with government spending boosting infrastructure, education, research and development, and public services, supporting the growth of the industrial sector. However, the impact has been shown to be relatively limited, suggesting the need for increased efficiency in spending. These findings are consistent with Keynesian theories that emphasise the role of government spending in driving economic growth, especially in recessions. Keynes (1936) suggests that strategic fiscal policies can support industrial sectors by injecting capital into vital areas such as infrastructure and research and development, thereby fostering an environment for growth and innovation. The theory of endogenous growth also concurs with these findings, suggesting that government investment in public goods stimulates technological progress and sustainable economic growth (Lucas Jr, 1988; Romer, 1990).

These findings are consistent with previous studies, such as Omarkhanlen et al. (2021) and Worika and Umofia (2017) which showed the diverse effects of different types of government spending on Nigeria's industrial sector, highlighting the need for strategic allocation of public spending. The study also corroborates the findings of Wiryawan and Otchia (2022). It showed that increased domestic government spending can positively impact industrial growth in Indonesia, pointing to the benefits of targeted government investment at the local level.

The study also shows a positive correlation between oil prices and the performance of the industrial sector, reflecting the role of oil revenues in supporting industrial growth, with the need to diversify the economy to ensure sustainable development. The study also corroborates the findings of Ebimobowei (2022) and Wiryawan and Otchia (2022) which showed the role of oil revenues in supporting industrial growth in Nigeria, but also points to the need to diversify the economy to reduce dependence on oil.

On the other hand, the study showed an inverse relationship between inflation and industrial performance, as inflation increases production costs and reduces competitiveness, which calls for the application of effective monetary policies to control inflation. This finding is consistent with the study of Loizides and Vamvoukas (2005) and Salamai et al. (2022) which showed that high inflation rates erode profitability and industrial competitiveness.

The study as well found no statistically significant relationship between GDP growth and industrial performance, suggesting that growth in Algeria may be driven by non-industrial sectors and require the development of specific policies to support industrial development. This finding supports the study of Nketiah-Amponsah (2009) which showed that economic growth may be caused by non-industrial sectors, underscoring the need for policies directed at directly supporting the industrial sector.

Finally, the study showed an inverse relationship between non-hydrocarbon exports and industrial performance, indicating challenges in quality and efficiency in non-oil exports, and calling for a balance between supporting non-oil exports and strengthening the industrial sector to achieve inclusive and sustainable growth.

## **Conclusion and Implications**

The main objective of this study was to investigate the impact of government spending on industrial development in Algeria. The study found a positive long-term significant correlation between government spending and competitive industrial performance. This suggests that the strategic employment of government spending can enhance the capacity and efficiency of the industrial sector. However, the impact is relatively limited, suggesting that the spending needs to be increased or directed more effectively.

The study also showed a positive long-term correlation between oil prices and industrial performance. This reflects the vital role of oil revenues in supporting industrial growth in Algeria. However, this dependence also highlighted the need to diversify the economy to ensure sustainable development.

By contrast, the study showed a negative long-term relationship between inflation and competitive industrial performance, highlighting the detrimental impact of increased costs on industrial competitiveness. This calls for the application of effective monetary policies to control inflation and achieve economic stability.

The study did not show a significant correlation between GDP growth and long-term industrial performance, suggesting that GDP growth in Algeria may be driven by sectors other than industry, such as oil and services. Hence, the formulation of targeted policies to bolster industrial growth is crucial.

The study also revealed a long-term negative correlation between non-hydrocarbon exports and competitive industrial performance, indicating a negative impact of non-oil exports on the competitiveness of the industrial sector in Algeria.

## Suggestions for Future Research

Government spending should be strategically targeted toward sectors that yield the highest returns to enhance industrial performance. By directing resources efficiently, the government can maximize the impact of its investments, ensuring that funds are allocated to areas with the greatest potential for growth and development within the industrial sector.

Reducing reliance on the oil sector is essential for achieving balanced and sustainable economic growth. Strengthening other sectors, such as manufacturing, agriculture, and services, will help diversify the economy, reduce vulnerability to oil price fluctuations, and create a more resilient economic structure.

Implementing effective monetary and fiscal policies to control inflation is crucial for achieving economic stability. Stable prices enhance the competitiveness of the industrial sector by providing a predictable environment for businesses to operate, plan investments, and manage costs.

Developing targeted policies to improve industrial performance is vital. This includes supporting innovation, enhancing infrastructure, and providing incentives to companies. Policies should focus on creating a favorable environment for industrial growth by fostering technological advancements, improving logistics, and reducing barriers to business expansion.

Striking a balance between boosting non-oil exports and supporting the industrial sector is essential for inclusive and sustainable growth. Promoting a diversified export base will reduce dependency on oil revenues and help stabilize the economy, while ensuring that the industrial sector remains competitive globally.

Establishing research and development (R&D) centers in key industrial areas and offering financial incentives to companies that invest in advanced technology and innovation are crucial steps. These initiatives will drive technological progress, increase productivity, and enhance the global competitiveness of Algeria's industrial sector.

Developing transport and logistics networks is vital to support the efficient movement of goods and raw materials. Additionally, improving digital infrastructure will enhance the competitiveness of technological and digital industries, positioning Algeria as a leader in the global industrial landscape.

Organizing training and development programs to enhance the skills of local workers in industrial fields is critical. Providing scholarships and educational programs focused on industrial technology and innovation will build a skilled workforce capable of driving industrial growth and innovation.

Improving the investment environment by simplifying bureaucratic procedures and offering tax incentives will attract both foreign and domestic investments. Establishing special industrial zones with competitive advantages can further entice foreign investors, boosting industrial development and economic growth.

Organizing promotional campaigns for Algerian products in international markets and providing financial and technical support to SMEs will facilitate their entry into foreign markets. These efforts will expand Algeria's export base and reduce its reliance on a limited number of export markets.

Ensuring the stability of economic policies is the key to encouraging investor confidence. Providing tax and customs incentives to companies that contribute to industrial development will stimulate investment and drive growth in the industrial sector.

Adopting environmentally friendly industrial policies will promote sustainability and improve the global image of Algerian industries. Providing financial support to companies that embrace sustainable production practices will encourage widespread adoption of eco-friendly technologies.

Strengthening partnerships between government and private companies is essential for fostering industrial growth. Establishing advisory councils comprising representatives from both sectors will

support the development and implementation of effective industrial policies, creating a collaborative environment for sustainable industrial development.

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### Conflict of Interest

None.

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### References

- Afriyie, J. K., Twumasi-Ankrah, S., Gyamfi, K. B., Arthur, D., & Pels, W. A. (2020). Evaluating the performance of unit root tests in single time series processes. *Mathematics and Statistics*, 8(6), 656–664. <https://doi.org/10.13189/ms.2020.080605>
- Aghion, P., Howitt, P., Brant-Collett, M., & García-Peñalosa, C. (1998). *Endogenous growth theory*. MIT Press.
- Brown, R. L., Durbin, J., & Evans, J. M. (1975). Techniques for testing the constancy of regression relationships over time. *Journal of the Royal Statistical Society Series B: Statistical Methodology*, 37(2), 149–163. <https://doi.org/10.1111/j.2517-6161.1975.tb01532.x>
- Cesaratto, S. (1999). Critical survey. Savings and economic growth in neoclassical theory. *Cambridge Journal of Economics*, 23(6), 771–793. <https://doi.org/10.1093/cje/23.6.771>
- Chandana, A., Adamu, J., & Musa, A. (2024). Impact of government expenditure on economic growth in Nigeria, 1970–2019. *CBN Journal of Applied Statistics (JAS)*, 11(2), Article 6. <https://dc.cbn.gov.ng/jas/vol11/iss2/6>
- Ebimobowei, A. (2022). Oil revenue and economic growth of Nigeria: 1990–2019. *African Journal of Economics and Sustainable Development*, 5(1), 17–46. <https://www.doi.org/10.52589/AJESD-JWZXIFNW>
- Gholami, M., & Sameei, G. (2019). The Impact of Government Spending on Economic Growth in D-8 Countries. *International Journal of Industrial Mathematics*, 11(3), 157–164. [https://journals.srbiau.ac.ir/article\\_14628\\_79a5fb40abb63615afb4cf2e035195a2.pdf](https://journals.srbiau.ac.ir/article_14628_79a5fb40abb63615afb4cf2e035195a2.pdf)
- Gurdal, T., Aydin, M., & Inal, V. (2021). The relationship between tax revenue, government expenditure, and economic growth in G7 countries: New evidence from time and frequency domain approaches. *Economic Change and Restructuring*, 54, 305–337. <https://doi.org/10.1007/s10644-020-09280-x>
- Howitt, P. (2010). Endogenous growth theory. In S. N. Durlauf & L. E. Blume (Eds.), *Economic Growth* (pp. 68–73). London: Palgrave Macmillan. [https://doi.org/10.1057/9780230280823\\_10](https://doi.org/10.1057/9780230280823_10)
- Iweriebor, S., Egharevba, M. I., & Adegboye, A. C. (2015). Government spending and industrial development in Nigeria: a dynamic investigation. *Annals of the University of Petrosani Economics*, 15(1), 179–190.
- Keynes, J. M. (1936). *The general theory of employment, interest, and money*. London: Palgrave Macmillan.
- Lagha, H., & Bachi, A. (2018). Sustainable development in Algeria. *Algerian Journal of Environmental Science and Technology*, 4(2), 742–749. <https://www.asjp.cerist.dz/en/downArticle/285/4/2/118061>

- Levendis, J. D. (2023). Unit root tests. In *Time Series Econometrics: Learning Through Replication* (pp. 143–173). Cham: Springer. [https://doi.org/10.1007/978-3-031-37310-7\\_7](https://doi.org/10.1007/978-3-031-37310-7_7)
- Loizides, J., & Vamvoukas, G. (2005). Government expenditure and economic growth: Evidence from trivariate causality testing. *Journal of Applied Economics*, 8(1), 125–152. <https://doi.org/10.1080/15140326.2005.12040621>
- Lucas Jr, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22(1), 3–42. [https://doi.org/10.1016/0304-3932\(88\)90168-7](https://doi.org/10.1016/0304-3932(88)90168-7)
- Muhammed, A., & Asfaw, M. (2014). Government spending for economic growth in Ethiopia. *Journal of Economics and Sustainable Development*, 5(9), 66–74. <https://www.iiste.org/Journals/index.php/JEDS/article/view/13215>
- Nketiah-Amponsah, E. (2009). Public spending and economic growth: Evidence from Ghana (1970–2004). *Development Southern Africa*, 26(3), 477–497. <https://doi.org/10.1080/03768350903086846>
- Odhiambo, N. M. (2015). Government expenditure and economic growth in South Africa: An empirical investigation. *Atlantic Economic Journal*, 43(3), 393–406. <https://doi.org/10.1007/s11293-015-9466-2>
- Oladele, M. F., Mah, G., & Mongale, I. (2017). The role of government spending on economic growth in a developing country. *Risk Governance & Control: Financial Markets & Institutions*, 7(2–1), 140–146. <https://doi.org/10.22495/rgcv7i2c1p2>
- Omankhanlen, A. E., Chimezie, P. O., & Okoye, L. U. (2021). Government expenditure and sustainable industrial development in Nigeria. *WSEAS Transactions on Business and Economics*, 18(4), 31–41. <https://doi.org/10.37394/23207.2021.18.4>
- Ozuzu, S., & Isukul, A. (2021). Government expenditure and its effect on the industrial sector in Nigeria. *Asian Journal of Economics, Business and Accounting*, 4(6), 81–92. <https://doi.org/10.9734/ajeba/2021/v21i730404>
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289–326. <https://doi.org/10.1002/jae.616>
- Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy*, 98(5, Part 2), S71–S102. <https://www.journals.uchicago.edu/doi/abs/10.1086/261725#>
- Salamai, A. A., Faisal, S. M., & Khan, A. K. (2022). The relationship between inflation and GDP with reference to oil based economy. *International Journal of Multidisciplinary Research and Growth Evaluation*, 3(1), 375–380. <https://doi.org/10.54660/anfo.2022.3.1.21>
- Samuel, U. D., & Oruta, I. L. (2021). Government expenditure and economic growth in Nigeria: A disaggregated analysis. *Path of Science*, 7(11), 4022–4035. <https://www.ceeol.com/search/article-detail?id=1008143>
- Sende, N. H. B., & Ngasamiaku, W. M. (2020). The impact of government spending and taxation on economic growth in Tanzania (1967–2017). *Business Management Review*, 23(1), 103–120. <https://hdl.handle.net/11159/4604>
- Stiglitz, J. E. (1996). Some lessons from the East Asian miracle. *The World Bank Research Observer*, 11(2), 151–177. <https://doi.org/10.1093/wbro/11.2.151>
- UNIDO. (2024). *Industrial development report 2024*. Vienna: United Nations Industrial Development Organisation. <https://www.unido.org/sites/default/files/unido-publications/2024-06/Industrial%20Development%20Report%202024.pdf>

- Wiryanawan, B. A., & Otchia, C. (2022). The legacy of the reformasi: The role of local government spending on industrial development in a decentralized Indonesia. *Journal of Economic Structures*, 11(1), Article 3. <https://doi.org/10.1186/s40008-022-00262-y>
- Worika, I. L., & Umofia, N. (2017). The impact of infrastructural development on Nigeria's industrial sector. *African Research Review*, 11(3), 23–30. <https://doi.org/10.4314/afrrrev.v11i3.3>
- World Bank. (2022, April 14). *Algeria's economic update — April 2022*. <https://www.worldbank.org/en/country/algeria/publication/economic-update-april-2022>