Measuring the Impact of Export Diversification on Economic Growth in Algeria During the Period 1995-2022

Ghafouri Habiba Mounet Errahmane [1], Ramli Hamza[2]

[1,2]University Center Abdelhafid Boussouf – Mila – (Algeria). Laboratory for Studies on Economic Diversification Strategies for Sustainable Development.

* Corresponding Author: h.ghafouri@centre-univ-mila.dz

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Abstract

This study aims to measure the impact of export diversification on economic growth in Algeria during the period (1995-2022), using the Auto Regressive Distributed Lag (ARDL) methodology to estimate the dynamic relationship between the independent variables represented by export diversification, trade openness, capital, labor, exchange rate, and economic growth in both the short and long terms. The study found a significant and meaningful short and long-term causal relationship between trade openness and economic growth, with the remaining variables in the study showing no significance. These results suggest the ineffectiveness of capital, labor, exchange rate, and export diversification as tools to stimulate economic growth.

Keywords: Export Diversification, Economic Growth, ARDL Model.

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1. Introduction

Export diversification is currently considered vital for both advanced and developing countries alike. The increase in export diversification reflects a country's ability to adapt to global changes and rely on diverse income sources, reducing dependence on a single income source to achieve economic development. In this context, Algeria seeks to enhance its export diversification, aiming for comprehensive economic stability by improving the business environment and providing an conducive investment climate across a wide range of economic sectors. This enables the country to leverage its diverse resources, whether in agriculture and industry or in the development of service and technological sectors. This direction demonstrates awareness of the importance of enhancing competitive capabilities and improving the attractiveness of the investment environment.

Study Problem:

Based on what has been stated, the main question can be posed as follows: To what extent does export diversification impact economic growth in Algeria during the period (1995-2022)?

Subsidiary Questions:

1. Is there a statistically significant relationship between the exchange rate and economic growth in Algeria during the period (1995-2022)?

2. Is there a statistically significant relationship between export diversification and economic growth in Algeria during the period (1995-2022)?
3. Is there a statistically significant relationship between trade openness and economic growth in Algeria during the period (1995-2022)?
4. Is there a statistically significant relationship between labor and economic growth in Algeria during the period (1995-2022)?
5. Is there a statistically significant relationship between capital and economic growth in Algeria during the period (1995-2022)?

Study Hypotheses:

1. There is a statistically significant relationship between the exchange rate and economic growth in Algeria during the period (1995-2022).
2. There is a statistically significant relationship between export diversification and economic growth in Algeria during the period (1995-2022).
3. There is a statistically significant relationship between trade openness and economic growth in Algeria during the period (1995-2022).
4. There is a statistically significant relationship between labor and economic growth in Algeria during the period (1995-2022).
5. There is a statistically significant relationship between capital and economic growth in Algeria during the period (1995-2022).

Study Objective:

This study aims to:
- recognizing the general concepts related to export diversification and economic growth.
- Uncover the direction and nature of the relationship between export diversification and economic growth in Algeria during the period (1995-2022).

Part One: The Theoretical Framework

1- Export Diversification

1-1 Concept of Export Diversification

Export diversification is defined as a change in the composition and structure of a country's exports, which can be achieved either by making alterations in the pattern of exported goods or through the expansion of innovation and technology applied to these goods[1] .

1-2 Measurement of the Diversification Index

There are several statistical indicators for measuring diversification, each varying in its efficiency and suitability for measurement purposes. These differences arise from the fact that each indicator has its unique measurement approach. Some rely on measuring the phenomenon of dispersion, such as the coefficient of variation, while others depend on measuring the property of concentration, like the Gini index. Yet others rely on the degree of diversity, such as the Herfindahl-Hirschman Index (HHI), which is considered one of the most widely used indicators for measuring economic diversity. These indicators provide closely related measurements in their

trends and variations when quantifying the phenomenon of economic diversity. The Herfindahl-Hirschman Index is defined by the following formula[2] :

$$H = \frac{\sqrt{\sum(\frac{Xi}{X})^2 - \sqrt{\frac{1}{N}}}}{1 - \sqrt{\frac{1}{N}}}$$

Where:

H: Herfindahl-Hirschman Index (HHI);

Xi: Gross Domestic Product in sector i;

X: Total Gross Domestic Product;

N: Number of sectors.

1-3 Mechanisms of Export Diversification

The mechanisms of export diversification rely on a set of policies and measures adopted to achieve economic balance and enhance competitiveness.

Diversification and Export Enhancement within the Framework of Economic Reform Policy: Most countries rely on economic reform policies to restructure economic institutions. Among the key reform policies adopted by developing countries facing various imbalances are[3] :

- **Stabilization Policy:** Aims to achieve economic balance through fiscal, monetary, and trade measures, with the objective of reducing inflation rates, achieving stability in the balance of payments and currency, and emphasizing full employment.
- **Industrial Restructuring Policy:** Aims to align the industrial sector with global demand trends.
- **Recovery Policy:** Aims to activate economic activity and stimulate both local and foreign investment. Measures may include actions such as addressing the general budget deficit and increasing wages to boost consumption.

Reducing Currency Value and Its Role in Export Development: Depreciating the currency is an exceptional mechanism used to revitalize national exports by raising import prices, encouraging consumers to shift towards local products. This measure contributes to increasing local supply and enhancing exportation.

2- Economic Growth

1. Definition of Economic Growth and its Determinants:

The term economic growth refers to the creation of an increase in income, i.e., an increase in the average per capita share of output and consumption, taking into account population growth, leading to an improvement in living standards.

Economic growth is expressed through changes in Gross Domestic Product (GDP), and it should be achieved without encountering problems such as inflation and imbalances in balance of payments.

Economic growth is also defined as an increase in the rate of Gross Domestic Product. Economic theory provides three essential determinants for achieving economic growth[4] :

- **First Determinant:** Involves the necessity of achieving accumulation in production factors within the country, including physical capital and human capital.

- **Second Determinant:** Relates to the necessity of achieving efficiency in resource allocation among economic sectors.
- **Third Determinant:** Involves continuous improvements in technology. In these determinants, less developed countries, aiming for a high growth rate, can achieve this at a faster rate compared to their counterparts in advanced countries.

2. Economic Growth Indicators:

Two key indicators can be relied upon to measure economic growth[5] :

1. Real Gross National Product (GNP): Economic growth according to this indicator refers to the rate of increase in the real Gross National Product achieved by the economy over a specific period, usually a year. This indicator is based on the real output of final goods and services, estimated at their real value, rather than their nominal value. This is done to exclude the impact of inflation on the observed increase in Gross National Product. An increase in real GNP signifies economic growth, a decrease indicates economic deterioration, and stability in GNP suggests economic stability.

2. Real Per Capita Income: Economic growth should be measured by the continuous real increase in the average income per person. This is because if mere increases in Gross National Product are taken as a standard for growth, the GNP may increase without a corresponding rise in the average income per person in cases where the population growth rate surpasses the rate of increase in GNP. This could lead to a decline in the per capita income or an improvement that equals the population growth rate, thereby keeping the per capita income constant.

Despite the importance of increasing the average per capita income, it is better to focus on Gross National Product (GNP) as an overall indicator of economic activity in any society. Moreover, an increase in GNP is inherently linked to an increase in the real per capita income.

2. Economic Growth Challenges:

Developing countries face numerous obstacles and difficulties that act as constraints on development and economic growth. Among the most significant challenges are[6] :

1. Low Savings: The savings rate in developing countries is low due to the low individual income, most of which is directed towards consumption. Savings constitute the main source for investment and capital formation. If savings are weak, investment is weak, hindering the economic growth process.

2. Weak Investment Climate: A weak investment climate slows down private investment within the country, reduces the inflow of foreign capital, and leads to the flight of local private capital abroad. Additionally, it increases production costs, hindering economic growth and weakening the capital formation process. The weak investment climate can be attributed to various factors, including inadequate infrastructure, political instability, lack of sound governance, and instability in overall economic indicators such as prices, balance of payments, and the state budget.

3. Insufficient or scarce natural resources: When a country faces a shortage or lack of diversity in its natural resources, it hinders the potential for rapid growth. Additionally, the country may become specialized in the production of one or two goods, especially primary or strategic

commodities such as oil. The future growth remains dependent on global economic developments that affect the movement of prices for primary commodities.

4. Weak human resource development: Some developing countries suffer from high illiteracy rates and a lack of education programs, training, and qualification (e.g., in African countries and some Middle Eastern nations). This situation leads to reduced workforce productivity, resulting in a slower pace of development and growth.

3-Export Diversification and Economic Growth

Numerous empirical studies have shown that export diversification contributes to individual and overall economic growth. For instance, Love (1986) indicated that export diversification is a good strategy to reduce instability by minimizing the impact of cyclical fluctuations in certain export sectors. Love (1986) emphasized the importance of avoiding excessive dependence on exporting a limited number of products. Additionally, Gutiérrez de Piñeres and Ferrantino (2000) found a positive interaction between export diversification and economic growth in their study of Latin American countries. Furthermore, Morgan and Wright (1999) demonstrated that not only does the growth in export value contribute to higher economic growth, but the composition of exports is also crucial.

In this context, Feenstra and Kee (2004) explored the relationship between a country's productivity and the diversification of its exports in a sample of 34 countries over the period 1984-1997. They found that a 10% increase in export diversity across all industries leads to a 1.3% increase in a country's output. Additionally, Herzer and Nowak-Lehmann (2006) discovered that both product-oriented and process-oriented learning strategies have a positive impact on economic growth through learning by doing and learning by exporting in the case of Chile. However, it's important to note that the relationship between export diversification and growth is not always positive. Michaely (1977) found that a minimal level of economic development was required for export diversification to have a positive impact on economic growth. A close relationship between export diversification and economic growth was observed primarily in advanced countries[7] .

Part Two: Measuring the impact of export diversification on economic growth in Algeria during the period (1995-2022):

At this stage, the impact of export diversification on economic growth in Algeria during the period (1995-2022) is measured using the Eviews 12 software.

1. Identifying Study Variables

To measure the impact of export diversification on economic growth, based on previous studies and economic theory, the variables included in the study are presented by taking the natural logarithm of each variable:

- **Dependent Variable:** Logarithm of Economic Growth (Logdgp)
- **Explanatory Variables**, represented by:
  - Logarithm of Export Diversification Index (Logdvi)
  - Logarithm of Official Exchange Rate (Logcth)
  - Logarithm of Trade Openness (Logopen)

- Logarithm of Fixed Capital (Logk)
- Logarithm of Labor (LogL)

1-Table 01: Identifying study variables

source	Variable name	Variable code
UNCTAD	Export Diversification Index Algorithm	Logdvi
World Bank Data	Logarithm of the official exchange rate	Logcth
	Trade openness algorithm	Logopen
	Fixed Capital algorithm	Logk
	Labor algorithm	LogL
	The algorithm of economic growth	Logdgp

Source: Authored by researchers

2- Model Description:

To measure the impact of export diversification on economic growth in Algeria during the period 1995-2022, the model is formulated as follows:

$$\text{Logdgp} = \int (\text{Logcth}, \text{Logopen}, \text{Logdvi}, \text{Logk}, \text{LogL})$$

Where:

- Logdgp: Natural logarithm of economic growth.

- Logdvi: Natural logarithm of the export diversification index.

- Logcth: Natural logarithm of the official exchange rate.

- Logopen: Natural logarithm of the trade openness.

- Logk: Natural logarithm of fixed capital.

- LogL: Natural logarithm of labor.

3-Measurement Methodology:

To measure the impact of export diversification on economic growth in Algeria during the period 1995-2022, the Autoregressive Distributed Lag (ARDL) self-regression methodology was employed, developed by Pesaran et al. (1995), Pesaran et Smith (1998), Pesaran et Shin (1999),

Pesaran et al. (2001). The ARDL model is estimated when the variables are stable at the level, first difference, or a combination of both[8]. This model takes into account the time lag of the gap deceleration LAG, and the independent variables are distributed over time periods incorporated by the ARDL model into a number of distributed lags (lags) corresponding to the number of independent variables. The explanatory economic factors under study take a period of time to influence the dependent variable distributed between short and long-term[9] , and this methodology can be used in case the sample size is small[10] , as is the case in this study (28 observations, less than 30).

The general formula for the ARDL model is as follows[11] :

$$\Delta Y_t = c + \{\sum_{i=1}^{n} \beta_i \Delta Y_{t-i} + \sum_{i=0}^{q_1} \delta_i \Delta X_{t-i}\} + \{\omega_1 Y_{t-1} + \omega_2 X_{t-1}\} + \mu_t$$

Where:

- C: The constant term.

- Δ: First differences.

- q1, q2, …, qk: Lags for the explanatory variables x1, x2, …, xk, respectively.

- P: The lag length for the dependent variable Y.

- β_i, δ_i: Short-run relationship coefficients.

- ω_1, ω_2: Long-run relationship coefficients.

- tε: Stochastic error term.

Based on the above, the relationship between non-oil gross domestic product (GDP) and economic variables can be explained according to the following equation:

$$\begin{aligned}\Delta Lpibhhcr_t = c &+ \sum_{i=1}^{p} \beta_{1i} \Delta Lpibhhcr_{t-i} + \sum_{i=1}^{q_1} \beta_{2i} \Delta Lexpoh_{t-i} + \sum_{i=1}^{q_2} \beta_{3i} \Delta Ltch_{t-i} \\ &+ \sum_{i=1}^{q_3} \beta_{4i} \Delta Lm2_{t-i} + \sum_{i=1}^{q_4} \beta_{5i} \Delta Lg_{t-i} + \sum_{i=1}^{q_5} \beta_{6i} \Delta Lemp_{t-i} \\ &+ \alpha_1 Lpibhhcr_{t-1} + \alpha_2 Lexpoh_{t-1} + \alpha_3 Ltch_{t-1} + \alpha_4 Lm2_{t-1} + \alpha_5 Lg_{t-1} \\ &+ \alpha_6 Lemp_{t-1} + \varepsilon_t\end{aligned}$$

And the cointegration relationship is tested through two hypotheses[12] :

- Null Hypothesis: There is no long-term equilibrium relationship among the study variables.

$H_0: \partial_0 = \partial_1 = \partial_2 = \partial_3 = 0$

- Alternative Hypothesis: There exists a long-term equilibrium relationship among the study variables.

$H_1: \partial_0 \neq \partial_1 \neq \partial_2 \neq \partial_3 \neq 0$

- The F-bound test is used to determine the presence of cointegration among the study variables. It relies on comparing Fisher statistics with critical values for both the upper and lower bounds at each significance level[13] .

- If the calculated F-statistic is greater than the upper critical value, the null hypothesis, suggesting no cointegration, is rejected.

- If the calculated F-statistic is less than the lower critical value, the null hypothesis suggesting no cointegration is accepted.

- If the calculated F-statistic falls between the lower and upper critical values, the result is inconclusive (the gray area).

4- Analysis of Results:

Unit Root Test for Time Series:

To determine the degree of integration of the variables included in the model, the Phillips-Perron (PP) test was employed, as outlined in the following table:

UNIT ROOT TEST TABLE (PP)

	At Level						
		LOGGDP	LOGDVI	LOGK	LOGOPEN	LOGL	LOGTCH
With Con...	t-Statistic	-2.4099	-1.9616	-0.9891	1.6822	-7.1293	-0.5486
	Prob.	***0.1485***	***0.3009***	***0.7425***	***0.9993***	***0.0000***	***0.8663***
		n0	n0	n0	n0	***	n0
With Con...	t-Statistic	-0.1938	-2.2189	-0.5744	-0.7479	-2.2865	-1.4615
	Prob.	***0.9898***	***0.4609***	***0.9725***	***0.9585***	***0.4266***	***0.8178***
		n0	n0	n0	n0	n0	n0
Without C...	t-Statistic	5.6400	0.1368	4.4776	2.9533	5.6628	3.1371
	Prob.	***1.0000***	***0.7175***	***1.0000***	***0.9986***	***1.0000***	***0.9991***
		n0	n0	n0	n0	n0	n0
	At First Difference						
		d(LOGGDP)	d(LOGDVI)	d(LOGK)	d(LOGOP...	d(LOGL)	d(LOGTCH)
With Con...	t-Statistic	-3.9468	-6.0960	-4.8611	-4.3352	-6.4220	-4.1605
	Prob.	***0.0058***	***0.0000***	***0.0006***	***0.0023***	***0.0000***	***0.0035***
		***	***	***	***	***	***
With Con...	t-Statistic	-4.5936	-5.9440	-5.2893	-5.5661	-19.9916	-4.1306
	Prob.	***0.0059***	***0.0003***	***0.0012***	***0.0006***	***0.0000***	***0.0164***
		***	***	***	***	***	**
Without C...	t-Statistic	-2.0764	-6.1991	-2.7999	-3.7556	-3.6353	-3.5242
	Prob.	***0.0385***	***0.0000***	***0.0070***	***0.0006***	***0.0008***	***0.0011***
		**	***	***	***	***	***

Source: Eviews12 outputs.

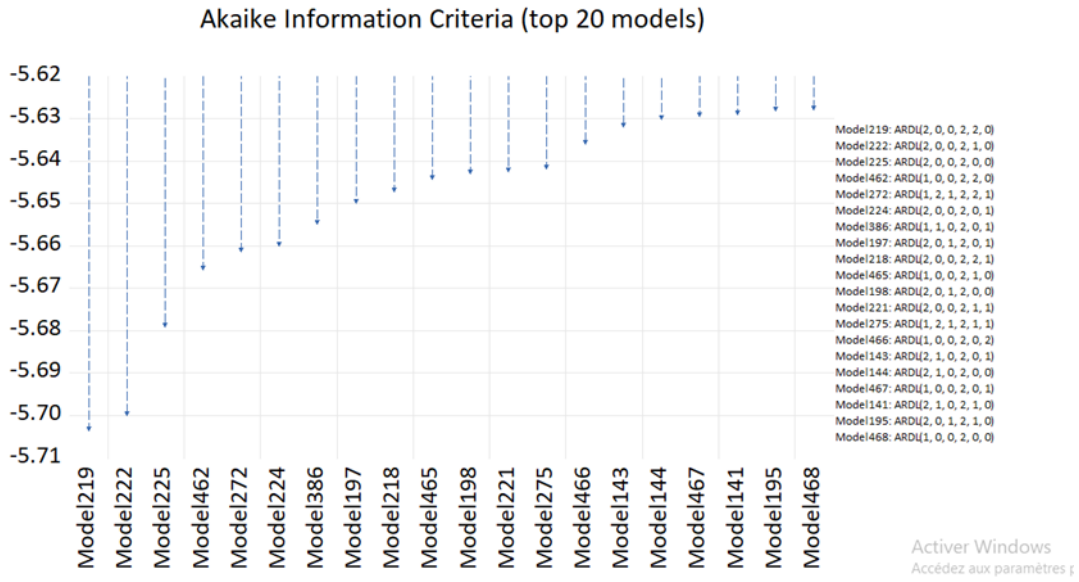
The results of the Phillips-Perron (PP) test, as shown in Table (01), indicate that both economic growth (Logdgp), export diversification index (Logdvi), exchange rate (Logcth), trade openness (Logopen), capital (Logk), and labor force (LogL) are non-stationary at level I(0). However, after taking the first difference, these variables become integrated of order I(1) and are stationary at a 5% significance level. Thus, the ARDL methodology can be applied.

Results of the Cointegration Test Using the ARDL Methodology

- Determining the Optimal Lag Length:

By relying on the Akaike Information Criterion (AIC), the optimal lag length was determined based on the minimum statistical value. The AIC value is (-5.703), and accordingly, the ARDL model (2,0,0,2,2,0) is the optimal model, as illustrated in the following figure:

Figure 1: Results of the Optimal Lag Length Test for the ARDL Model



Source: Eviews12 outputs.

The Bound Test Approach to Cointegration was employed to test the possibility of a long-term equilibrium relationship between economic growth (Logdgp), export diversification index (Logdvi), exchange rate (Logcth), trade openness (Logopen), capital (Logk), and labor (LogL). The results are presented in the following table:

Table 2: Results of the Cointegration Test Using the Bound Test Approach

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	12.09981	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Source: Eviews12 outputs.

The results in Table 2 of the Bound Test approach for cointegration indicate that the computed value of 12.0981 F-statistic exceeds the upper bound I(1) at significance levels of 1%, 2.5%, 5%, 10%. Therefore, we accept the alternative hypothesis suggesting the presence of a long-term

equilibrium relationship between economic growth and the explanatory variables represented by: Export Diversification Index (Logdvi), Exchange Rate (Logcth), Trade Openness (Logopen), Capital (Logk), and Labor (LogL).

Estimation of the study model parameters was carried out after confirming the existence of a long-term equilibrium relationship between the study variables, as shown in the following table:

Table No. 3: Estimation of Co-integration Regression using the ARDL Model

Dependent Variable: LOGGDP
Method: ARDL
Date: 01/16/24 Time: 23:45
Sample (adjusted): 1997 2022
Included observations: 26 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): LOGK LOGL LOGOPEN LOGTCH LOGDVI
Fixed regressors: C
Number of models evaluated: 486
Selected Model: ARDL(2, 0, 0, 2, 2, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOGGDP(-1)	0.378403	0.182310	2.075605	0.0568
LOGGDP(-2)	0.276072	0.211495	1.305334	0.2128
LOGK	0.074938	0.067563	1.109153	0.2861
LOGL	0.346441	0.233466	1.483902	0.1600
LOGOPEN	0.257795	0.081873	3.148709	0.0071
LOGOPEN(-1)	0.100925	0.121253	0.832349	0.4192
LOGOPEN(-2)	-0.198994	0.096785	-2.056048	0.0589
LOGTCH	0.018949	0.055174	0.343445	0.7364
LOGTCH(-1)	0.023260	0.060717	0.383095	0.7074
LOGTCH(-2)	0.046620	0.043069	1.082455	0.2973
LOGDVI	-0.088736	0.132720	-0.668595	0.5146
C	2.385101	2.468148	0.966352	0.3503

R-squared	0.998563	Mean dependent var	30.30722
Adjusted R-squared	0.997435	S.D. dependent var	0.237007
S.E. of regression	0.012004	Akaike info criterion	-5.703077
Sum squared resid	0.002017	Schwarz criterion	-5.122418
Log likelihood	86.14001	Hannan-Quinn criter.	-5.535868
F-statistic	884.6587	Durbin-Watson stat	2.244325
Prob(F-statistic)	0.000000		

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

Source: Eviews12 outputs.

The results of Table No. 02 are as follows:

- Partial Significance:

Through the results of the t-test, it appears that all variables are insignificant at the 5% level (since the probability (Prob) is less than 0.05), except for the variable "Trade Openness" which is significant at the 5% level.

- Explanatory Power:

The value of the determination coefficient (R2) is estimated to be 0.998563, indicating that 99.8563% of the variations in economic growth are explained by the independent variables

represented by the Export Diversification Index (Logdvi), Exchange Rate (Logcth), Trade Openness (Logopen), Capital (Logk), and Labor (LogL).

- Overall Significance:

The calculated Fisher value (F-statistic) is 143.63, and it is significant (P=0.000) at the 5% significance level, indicating the overall significance of the model.

- Diagnostic Tests for the Model:

To ensure the quality of the estimated model, the following tests were conducted:

• Autocorrelation Test:

Table No. 4: Results of Autocorrelation Tests

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.476397	Prob. F(2,12)	0.6323
Obs*R-squared	1.912533	Prob. Chi-Square(2)	0.3843

Source: Eviews12 outputs.

The results of the autocorrelation test showed that the calculated Fisher probability value (F-statistic) = 0.6323 is greater than 5%. Therefore, the null hypothesis, which suggests no autocorrelation problem among the residuals, is accepted.

Contrast Instability Test:

Table 5: Results of variance instability tests

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	0.454236	Prob. F(11,14)	0.9028
Obs*R-squared	6.838671	Prob. Chi-Square(11)	0.8120
Scaled explained SS	1.646255	Prob. Chi-Square(11)	0.9994

Source: Eviews12 outputs.

The results of the heteroscedasticity test indicate that the calculated Fisher probability value (F-statistic) is 0.9028, which is greater than 5%. Therefore, the null hypothesis, suggesting homoscedasticity (constant variance) of errors, is accepted.

Ramsey Reset Test

The results of the appropriate functional form test indicate that the probability value for the Ramsey Reset test is greater than 5%. Therefore, the null hypothesis, stating "the function does not suffer from misspecification," is accepted. This is illustrated in the following table:

Table 6: Ramsey Reset test

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Squares of fitted values
Specification: LOGGDP LOGGDP(-1) LOGGDP(-2) LOGK LOGL LOGOPEN LOGOPEN(-1) LOGOPEN(-2) LOGTCH LOGTCH(-1) LOGTCH(-2) LOGDVI C

	Value	df	Probability
t-statistic	0.287123	13	0.7785
F-statistic	0.082440	(1, 13)	0.7785
Likelihood ratio	0.164359	1	0.6852

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	1.27E-05	1	1.27E-05
Restricted SSR	0.002017	14	0.000144
Unrestricted SSR	0.002005	13	0.000154

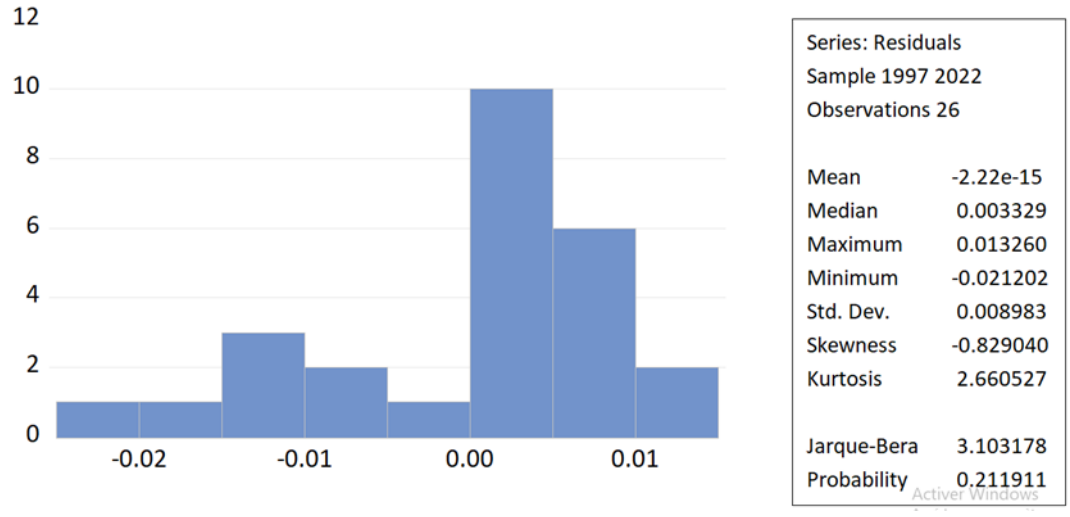
LR test summary:

	Value
Restricted LogL	86.14001
Unrestricted LogL	86.22219

Source: Eviews12 outputs.

Residue distribution test:

Figure nº 2: Results of the test for the normal distribution of residues



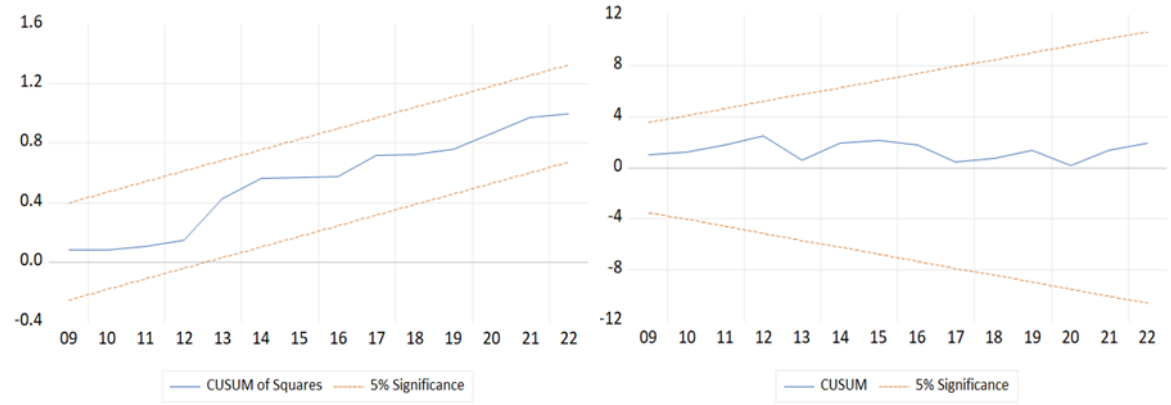
Source: Eviews12 outputs.

The results of the Jarque-Bera test for normal distribution of residuals indicate that the probability value (Prop=0.35) is greater than 5%. This confirms that the residuals follow a normal distribution.

Structural Stability Test:

The figures for both CUSUM and CUSUM of Squares tests indicate that the plot lies within the critical bounds at a 5% significance level. Therefore, the structural stability tests suggest that the model remains structurally stable throughout the period 1995-2022.

CUSUMfigure N3 Test Results of CUSUM and Squares



Source: Eviews12 outputs.

The following table presents the results of estimating the Error Correction Model (ECM) and short-term and long-term relationships according to the ARDL model.

Table No. 7: Estimation of the Error Correction Model (ECM) and Short-Term Relationship

ARDL Error Correction Regression
Dependent Variable: D(LOGGDP)
Selected Model: ARDL(2, 0, 0, 2, 2, 0)
Case 2: Restricted Constant and No Trend
Date: 01/17/24 Time: 01:09
Sample: 1995 2022
Included observations: 26

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGGDP(-1))	-0.276072	0.106632	-2.589022	0.0214
D(LOGOPEN)	0.257795	0.053847	4.787563	0.0003
D(LOGOPEN(-1))	0.198994	0.056460	3.524521	0.0034
D(LOGTCH)	0.018949	0.031090	0.609499	0.5520
D(LOGTCH(-1))	-0.046620	0.031240	-1.492300	0.1578
CointEq(-1)*	-0.345525	0.031412	-10.99991	0.0000

R-squared	0.834739	Mean dependent var	0.028804
Adjusted R-squared	0.793423	S.D. dependent var	0.022097
S.E. of regression	0.010043	Akaike info criterion	-6.164616
Sum squared resid	0.002017	Schwarz criterion	-5.874286
Log likelihood	86.14001	Hannan-Quinn criter.	-6.081011
Durbin-Watson stat	2.244325		

* p-value incompatible with t-Bounds distribution.

Source: Eviews12 outputs.

The results of Table No. 7 indicate the following:

-The error correction term is negative and statistically significant (P=0.00000) at a 5% level. The value of this term, CointEq(-1), is (0.345525), confirming the existence of a long-term equilibrium relationship between the study variables. If the economic growth variable deviates from its long-term equilibrium value in period (t-1), this deviation will be corrected by 0.345525% in period (t).

-The short-term relationship estimation results show a partial elasticity of the trade openness variable (logopen) with a lag of one period concerning economic growth (loggdp), estimated at 0.199%. This means that a 1% increase in trade openness (logopen) leads to a 0.199% increase in economic growth.

-The exchange rate variable (Logtch) is not elastic with respect to economic growth (loggdp) in the short term.

Table No. 8: Long-Term Relationship Estimation

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGK	0.216882	0.153405	1.413785	0.1793
LOGL	1.002651	0.665784	1.505970	0.1543
LOGOPEN	0.462270	0.255738	1.807594	0.0922
LOGTCH	0.257085	0.184665	1.392170	0.1856
LOGDVI	-0.256815	0.419333	-0.612438	0.5501
C	6.902835	6.232658	1.107527	0.2867

EC = LOGGDP - (0.2169*LOGK + 1.0027*LOGL + 0.4623*LOGOPEN + 0.2571 *LOGTCH -0.2568*LOGDVI + 6.9028)

Source: Eviews12 outputs.

The results from the above table indicate the following:

-The capital variable Logk is not elastic with respect to long-term economic growth loggdp.

-The labor variable LogL is not elastic with respect to long-term economic growth loggdp.

-The partial elasticity for the trade openness variable logopen, lagged by one period, with respect to long-term economic growth loggdp is estimated at 0.46227% at a 5% significance level. This means that a 1% increase in trade openness logopen leads to a 0.46227% increase in long-term economic growth.

-The exchange rate variable Logtch is not elastic with respect to long-term economic growth loggdp.

-The export diversification variable Logdvi is not elastic with respect to long-term economic growth loggdp.

Conclusion

The objective of this study was to assess the impact of export diversification on economic growth in Algeria during the period 1995-2022, using the Autoregressive Distributed Lag (ARDL) model. As a first step, the stationarity of the study variables was examined through the Phillips-Perron test. Subsequently, the bounds test was conducted to detect the existence of a long-term equilibrium relationship between the independent variables and economic growth. Finally, the Error Correction Model (ECM) was estimated, capturing both short-term and long-term relationships.

The study revealed the following:

1. The variable Logl representing capital is inelastic with respect to long-term economic growth (loggdp). This is attributed to the inadequate infrastructure in Algeria, leading to increased production and export costs.

2. The variable Logl representing labor is inelastic with respect to long-term economic growth (loggdp). This is due to the dominance of the public sector and the marginalization of the private sector, resulting in higher unemployment rates.

3. The elasticity of the variable logopen, representing trade openness and lagged by one period, with respect to short-term and long-term economic growth (loggdp) is statistically significant at the 5% level. A 1% increase in trade openness (logopen) leads to an increase in economic growth in both the short and long terms. However, this result remains weak compared to advanced countries due to the limited export diversification in Algeria and the lack of foreign investments.

4. The variable Logtch representing exchange rates is inelastic with respect to short-term and long-term economic growth (loggdp). This is attributed to the dominance of the oil sector in Algeria.

5. The variable Logdvi representing export diversification is inelastic with respect to long-term economic growth (loggdp). This is attributed to a heavy reliance on fossil fuels, a lack of diversification in various agricultural, industrial, and tourism sectors that form the basis for exports, and a delay in adopting modern technology, reducing the competitiveness of local industries in global markets. Companies also face challenges in the business environment, diminishing the attractiveness of foreign investments.

6. The error correction coefficient is negative and statistically significant (P=0.00000) at the 5% level. The value of this coefficient, CointEq(-1)= (0.345525), confirms the existence of a long-term equilibrium relationship among the study variables. If the economic growth variable deviates

from its long-term equilibrium value in the period (t-1), this deviation will be corrected by 0.345525% in the period (t).

Recommendations:

1. Rationalize public expenditures and prioritize financing for priority and productive sectors that contribute to job creation, aiming to reduce dependence on oil revenues and increase export diversification for development.

2. Enhance human skills through education and vocational training to ensure the availability of necessary competencies for the workforce in diverse sectors.

3. Promote innovation, research, and development to foster the launch of new industries and improve the efficiency of all sectors, thereby increasing export diversification.

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