

Economic Growth and Income Inequality in Algeria: A Theoretical and Empirical ARDL Assessment

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Abstract :

This study investigates the growth-inequality nexus in Algeria over the period 1980–2023 using an ARDL model to capture short-run and long-run dynamics. Findings reveal that economic growth slightly reduces inequality, but oil dependence, fiscal inefficiencies, and foreign reserves exacerbate disparities, while FDI fosters inclusivity. Short-run effects show volatile redistributive shifts, with inflation and oil shocks widening inequality, while fiscal and monetary adjustments offer delayed corrections. The results confirm a rapid adjustment to equilibrium, emphasizing Algeria's structural vulnerabilities. Contrary to Kuznets' hypothesis (1955), which predicts an inverted U-shaped relationship between growth and inequality, the findings indicate that inequality in Algeria remains structurally persistent despite economic expansion, largely due to resource dependence and weak redistributive mechanisms. These results underscore the need for economic diversification and targeted policy reforms to achieve sustainable and equitable growth.

Keywords: Economic Growth, Income Inequality, ARDL Model. Oil Dependence, Algeria

JEL Classification Codes : C32, O15, E62

Introduction:

Despite decades of economic expansion, income inequality remains a persistent challenge for many economies worldwide. While growth is often seen as a fundamental driver of prosperity and poverty reduction, its benefits are rarely distributed evenly across societies. The relationship between economic growth and income inequality has been at the center of economic debates for decades, with conflicting theoretical and empirical findings. The classical Kuznets hypothesis (Kuznets, 1955) suggests that inequality initially rises with economic development before eventually declining as economies mature. However, recent global trends challenge this notion, as many nations, particularly in the developing world, continue to experience rising disparities despite sustained growth. Algeria, a resource-rich economy, presents a compelling case for examining this dynamic, as it has witnessed

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significant economic shifts over the past few decades, yet the extent to which these changes have influenced income distribution remains an open question.

Historically, Algeria's economic trajectory has been shaped by a complex interplay of colonial legacies, socialist policies, and subsequent market-oriented reforms. Following independence in 1962, the government adopted a state-led development model, characterized by centralized planning, large-scale public investments, and an emphasis on industrialization (Addi, 1999). This strategy yielded substantial improvements in infrastructure, healthcare, and education, but it also entrenched inefficiencies, suppressed private sector growth, and led to significant income disparities. The economic crises of the 1980s, exacerbated by declining oil revenues, forced Algeria to undergo structural adjustment programs under the guidance of the International Monetary Fund (IMF, 2002). These reforms, while aimed at stabilizing the economy, led to rising unemployment, wage stagnation, and increased socio-economic inequalities.

Over the past two decades, Algeria has achieved notable macroeconomic stability, with an average GDP growth rate of 3.5% and significant progress in human development indicators (IMF, 2021). The Human Development Index (HDI) improved from 0.577 in 1990 to 0.754 in 2018, placing Algeria in the category of high human development (UNDP, 2020). However, the benefits of economic growth have not been equitably shared across different social groups and regions. The country's heavy reliance on hydrocarbons—accounting for over 95% of total exports and nearly 60% of government revenues (Algerian Ministry of Finance, 2022)—has created a rentier economy where wealth is concentrated among a small elite while large segments of the population face economic insecurity. Regional disparities remain stark, with coastal urban centers such as Algiers, Oran, and Constantine enjoying significantly higher living standards compared to the interior and southern regions, where poverty rates are disproportionately high (Lecaillon, 2016). The oil price collapse of 2014 further highlighted these vulnerabilities, leading to fiscal constraints, reductions in public spending, and worsening social inequalities (IMF, 2019).

Empirical research on the relationship between economic growth and income inequality in Algeria remains inconclusive. While some studies argue that economic expansion has contributed to poverty reduction and improvements in social welfare (Miliani, 2014), others contend that growth has been largely non-inclusive, exacerbating disparities between different income groups (Belkacem, 2001). The government has implemented various redistributive policies, including extensive subsidies, public sector employment programs, and social assistance initiatives (UNDP, 2018). However, questions persist regarding the efficiency of these measures, as many have been criticized for being poorly targeted and fiscally unsustainable ((Maatallah, Benlahcene, & Matallah, 2022).

This study aims to provide an empirical assessment of the relationship between economic growth and income inequality in Algeria, focusing on the period from 1980 to 2023. Using econometric modeling techniques, including the Autoregressive Distributed Lag (ARDL) bounds-testing approach for long-run relationships and the Error Correction Model (ECM) for short-run dynamics, this research seeks to quantify the extent to which economic growth influences income inequality. By leveraging a robust dataset and employing rigorous analytical methods, this study aspires to contribute to the broader academic discourse on economic development and social equity in resource-dependent economies. Beyond its academic contributions, the findings of this research hold critical policy implications, offering insights that could inform future economic reforms and strategies aimed at fostering inclusive and sustainable growth in Algeria.

Problem Statement

Although Algeria has achieved macroeconomic stability and social development progress, the benefits of economic growth have not been equitably shared across regions and social groups. Persistent income disparities—especially in a rentier economy heavily dependent on hydrocarbons—raise critical concerns about the inclusiveness of growth. Empirical evidence on this relationship remains inconclusive, highlighting a gap in understanding the extent to which economic growth affects income inequality in Algeria.

This study therefore addresses the following central question:

To what extent has economic growth contributed to reducing or exacerbating income inequality in Algeria?

Research Questions

- ✓ What is the nature of the long-run relationship between economic growth and income inequality in Algeria?
- ✓ How do oil prices, inflation, and unemployment affect income inequality in the short run?
- ✓ What roles do government expenditure and foreign direct investment (FDI) play in shaping income distribution?
- ✓ Are the effects of growth on inequality influenced by Algeria's structural economic features?

Hypotheses

- ✓ **H₁**: Economic growth has a statistically significant long-run negative effect on income inequality in Algeria.
- ✓ **H₂**: Oil price increases are associated with rising income inequality, reinforcing the rentier state effect.
- ✓ **H₃**: Government expenditure increases inequality due to inefficiencies and elite capture.

- ✓ H_4 : Inflation and unemployment have significant short-term impacts on income inequality, but their long-term effects are negligible.

Study Objectives and Methodology

This study aims to provide both a theoretical and empirical assessment of the growth-inequality nexus in Algeria using the Autoregressive Distributed Lag (ARDL) bounds-testing approach. By analyzing the period from 1980 to 2023, it examines both short-run and long-run dynamics, leveraging a robust dataset and rigorous econometric techniques. The objective is to uncover whether growth has served as a tool for income equality or whether structural and institutional barriers have muted its distributive effects.

I. Literature Review

The relationship between economic growth and income inequality has been a central topic in economic literature for decades. While economic growth is generally seen as a key driver for poverty reduction and higher living standards, its impact on inequality is more complex. Some theories suggest that growth naturally reduces inequality, often through market forces and policy interventions, while others argue that it exacerbates disparities, particularly in developing economies. Algeria, with its unique economic structure, historical trajectory, and policy environment, presents a distinctive case for understanding the dynamics between growth and inequality. This review synthesizes key theoretical frameworks, empirical findings, and relevant case studies, with a specific focus on Algeria.

1. Theoretical Perspectives on Economic Growth and Inequality

a. The Kuznets Hypothesis: The Inverted U-Curve

Kuznets (1955) proposed an inverted U-shaped relationship between economic growth and income inequality. He argued that during early stages of development, inequality rises as economies transition from agrarian to industrial, with wealth concentrating in urban centers. Over time, however, redistributive policies, human capital development, and institutional maturity lead to a reduction in inequality. Despite its wide acceptance, Kuznets' hypothesis has been criticized for oversimplifying the relationship between growth and inequality, particularly in contemporary developing economies.

b. Classical and Neoclassical Perspectives

Classical economists such as Smith (1776) and Ricardo (1817) viewed income inequality as an essential feature for capital accumulation and economic expansion. Similarly, neoclassical theories argue that higher inequality promotes investment and innovation, stimulating long-term growth (Li & Zou, 1998). However, these perspectives have been criticized for disregarding structural barriers

that limit participation in economies with weak financial markets and limited social mobility (Stiglitz, 2012).

c. Keynesian and Modern Growth Theories

Keynesian economics presents an opposing view, asserting that excessive income concentration harms economic stability by reducing aggregate demand (Keynes, 1936). Modern endogenous growth theories, such as those developed by Galor & Zeira (1993), focus on human capital and the role of financial market imperfections. These theories suggest that high inequality stifles growth by limiting access to education and productive investment opportunities.

d. Political Economy and Institutional Perspectives

Recent literature highlights the significance of institutions and governance in shaping the relationship between economic growth and inequality. Acemoglu & Robinson (2012) contend that inclusive institutions promote equitable growth, while extractive institutions foster wealth concentration among elites, worsening inequality. In resource-rich economies like Algeria, the "resource curse" hypothesis (Sachs & Warner, 2001) suggests that reliance on natural resources exacerbates inequality due to rent-seeking behaviors and a lack of economic diversification.

2. Empirical Evidence on the Growth-Inequality Nexus

a. Global Evidence: Contradictory Findings

Empirical studies on the growth-inequality relationship show mixed results. Alesina & Rodrik (1994) and Persson & Tabellini (1991) argue that inequality hinders growth by fostering social instability and reducing investment in public goods. On the other hand, Forbes (2000) and Li & Zou (1998) suggest that inequality can encourage growth by incentivizing capital accumulation and entrepreneurship. A meta-analysis by Neves et al. (2016) found that inequality's impact on growth depends on factors like institutional quality, financial development, and education levels. In low-income countries, inequality tends to hurt growth, while in more developed economies, the relationship is more ambiguous.

b. Regional Evidence: The Middle East and North Africa (MENA)

In the MENA region, economic growth has often not translated into reduced inequality. Studies such as those by Hassine (2015) indicate that despite sustained growth, inequality remains entrenched due to rigid labor markets, weak financial inclusion, and government-dominated wealth distribution. Ncube (2014) highlights that income inequality negatively impacts long-term growth in MENA, emphasizing the need for reforms aimed at economic diversification and private sector development.

3. The Case of Algeria: Economic Growth and Income Inequality

a. Structural Economic Features and Inequality Trends

Algeria's economy is heavily reliant on hydrocarbons, which represent over 95% of total exports and nearly 60% of government revenues (Algerian Ministry of Finance, 2022). This rentier state structure has resulted in unequal wealth distribution, with government-linked elites benefiting the most, while large segments of the population are excluded from high-income opportunities. Despite sustained GDP growth, the Gini coefficient, a measure of income disparity, has fluctuated between 27.4 and 39.5 over the past three decades (UNDP, 2020). While government interventions such as subsidies and social transfers have alleviated extreme poverty, they have not effectively reduced income inequality ((Maatallah, Benlahcene, & Matallah, 2022).

b. Regional and Socioeconomic Disparities

Algeria faces stark regional inequalities, with urban coastal centers like Algiers, Oran, and Constantine enjoying higher living standards compared to the rural and southern regions, where unemployment and poverty rates are notably higher (Lecaillon, 2016). The urban-rural divide is exacerbated by unequal access to education, healthcare, and infrastructure, deepening the gap between the rich and poor.

c. Policy Interventions: Successes and Limitations

The Algerian government has implemented various policies to mitigate inequality, such as food, fuel, and housing subsidies, public employment programs, and direct cash transfers to low-income families. However, these policies have faced significant inefficiencies and concerns over fiscal sustainability. Reports from the World Bank (2021) and IMF (2019) indicate that while Algeria's social spending has reduced absolute poverty, it has not effectively tackled the structural barriers to economic mobility.

While global research on the growth-inequality relationship is extensive, there remain significant gaps in understanding the specific dynamics within Algeria. Current studies primarily focus on macroeconomic indicators, often overlooking the deeper structural and institutional factors that influence this relationship. This review highlights the need for longitudinal analyses and dynamic modeling to assess how economic growth has influenced income inequality in Algeria. This research aims to bridge these gaps by applying advanced econometric techniques (ARDL and ECM models) to evaluate the long-run and short-run effects of economic growth on inequality in Algeria.

II. Research Methodology

This study aims to empirically assess the relationship between economic growth and income inequality in Algeria over the period 1980–2023. Given Algeria's structural dependence on hydrocarbons, government-led economic policies, and fluctuations in external economic factors such as oil prices, it is essential to explore whether economic growth contributes to a more equitable

income distribution or exacerbates existing disparities. To address this, the study employs an Autoregressive Distributed Lag (ARDL) bounds testing approach, as proposed by Pesaran, Shin, and Smith (2001), to determine the presence of long-run relationships between the variables. Additionally, an Error Correction Model (ECM) is used to analyze short-run dynamics and the speed of adjustment toward long-term equilibrium.

1. Model Specification

To examine the impact of economic growth and other macroeconomic factors on income inequality, the study adopts a functional specification that relates the Gini coefficient as a measure of income inequality to several explanatory variables that capture the key economic determinants of income distribution in Algeria. The general form of the model is given by:

$$GINI_t = f(GDPG_t, OP_t, INF_t, UNEMP_t, GE_t, FR_t, FDI_t) \dots \dots (1)$$

where:

- Income Inequality is measured using the ($GINI_t$) coefficient, The Gini coefficient is widely recognized as a reliable measure of income disparities within an economy (Deininger & Squire, 1998).
- Economic Growth ($GDPG_t$) is represented by the growth rate of real GDP per capita, reflecting overall economic performance and productivity (Barro, 2000).
- Oil Prices (OP_t) are measured using Saharan Blend crude oil prices (USD per barrel), as Algeria's economy is highly dependent on hydrocarbon revenues, which directly influence national income distribution (Sachs & Warner, 2001).
- Inflation (INF_t) is captured through annual Consumer Price Index (CPI) changes, which impact real wages and purchasing power, particularly for low-income households (Malinen, 2007).
- Unemployment ($UNEMP_t$) is measured as the total unemployment rate (% of labor force), reflecting labor market conditions and their influence on income disparities (Alesina & Rodrik, 1994).
- Government Expenditure (GE_t) is expressed as total government spending as a percentage of GDP, capturing redistributive policies and public sector investments (Stiglitz, 2012).
- Foreign Exchange Reserves (FR_t) are considered as total reserves as a percentage of GDP, representing macroeconomic stability and the government's capacity to implement fiscal policies that affect inequality (IMF, 2019).

- Foreign Direct Investment (FDI_t) is measured as net FDI inflows as a percentage of GDP, which can either reduce inequality by generating employment or increase disparities if concentrated in capital-intensive sectors (Li & Zou, 1998).

2. Data Sources and Variable Selection

This study utilizes annual time-series data spanning from 1980 to 2023. All data for the study's variables, covering key economic indicators such as growth, inflation, unemployment, foreign reserves, and foreign direct investment, are primarily sourced from the World Development Indicators (WDI) database. Oil prices are obtained from the OPEC database. Data on government expenditure as a percentage of GDP is sourced from the CEIC database, while the GINI coefficient is retrieved from the World Inequality Database (WID), the most comprehensive source of income inequality statistics across different countries (Piketty, 2014).

The selected variables encompass key macroeconomic indicators that have been widely studied in the literature as potential determinants of income inequality and economic growth. The inclusion of oil prices is particularly relevant for Algeria, given that the country's economic structure is heavily dependent on hydrocarbons, and fluctuations in oil prices can directly impact government revenues, public spending, and labor market conditions, which in turn affect income distribution (Achy, 2013). Similarly, inflation and unemployment influence the purchasing power and economic mobility of different income groups, thus contributing to income inequality (Forbes, 2000), while government expenditure and foreign reserves reflect the government's fiscal capacity to mitigate economic shocks and promote redistribution, thereby influencing both economic growth and income inequality (IMF, 2019).

3. Econometric Approach and Estimation Techniques

3.1 Stationarity and Unit Root Testing

To ensure the accuracy and reliability of our econometric analysis, we begin by assessing the stationarity of the time series data using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. Time-series data often exhibit non-stationarity, which can lead to spurious regression results. These tests are essential for detecting unit roots, which signify non-stationarity. The ADF test, an extension of the Dickey-Fuller test, accounts for higher-order autocorrelation by adding lagged difference terms of the dependent variable, thereby stabilizing the error term. Meanwhile, the PP test offers robustness against serial correlation

and heteroskedasticity through non-parametric adjustments. Both tests are applied to the series in levels and first differences to classify the series as either $I(0)$ or $I(1)$. The decision rule follows standard critical values: If the ADF/PP test statistic is less than the critical value, the null hypothesis of a unit root is rejected, indicating stationarity ($I(0)$). If the test statistic is greater, the variable is non-stationary ($I(1)$) and requires first differencing. The results of these tests are foundational for determining the correct model specifications and guiding the subsequent analysis.

3.2 Cointegration Testing and ARDL Bounds Test

The Autoregressive Distributed Lag (ARDL) model, introduced by Pesaran and Shin (1997) and further refined by Pesaran, Shin, and Smith (2001), has become a widely used econometric approach for analyzing both short-run and long-run relationships between economic variables. Unlike conventional cointegration techniques, ARDL allows for the estimation of relationships irrespective of whether the variables are stationary at level $I(0)$, first-differenced $I(1)$, or a mix of both (Narayan, 2005). This flexibility makes it particularly suitable for examining the impact of economic growth and macroeconomic factors on income inequality in Algeria, where economic fluctuations, structural imbalances, and external shocks create complex interactions between these variables.

This study adopts the ARDL model to explore the dynamic effects of economic growth (GDPG), oil prices (OP), inflation (INF), unemployment (UNEMP), government expenditure (GE), foreign reserves (FR), and foreign direct investment (FDI) on income inequality, measured by the Gini coefficient (GINI), as outlined in Equation (1).

To capture both short-run and long-run effects, the ARDL representation can be expressed as:

$$\begin{aligned} \Delta GINI_t = & \alpha_0 + \sum_{i=1}^p \alpha_i GINI_{t-i} + \sum_{j=0}^{Q_1} \beta_j \Delta GDPG_{t-j} + \sum_{k=0}^{Q_2} \gamma_k \Delta OP_{t-k} + \sum_{n=0}^{Q_3} \delta_n \Delta INF_{t-n} \\ & + \sum_{m=0}^{Q_4} \vartheta_m \Delta UNEMP_{t-m} + \sum_{\rho=0}^{Q_5} \theta_\rho \Delta GE_{t-\rho} + \sum_{h=0}^{Q_6} \partial_h \Delta UNEMP_{t-h} + \sum_{f=0}^{Q_7} \tau_f \Delta GE_{t-f} \\ & + \lambda_1 GINI_{t-1} + \lambda_2 GDPG_{t-1} + \lambda_3 OP_{t-1} + \lambda_4 INF_{t-1} + \lambda_5 UNEMP_{t-1} \\ & + \lambda_6 GE_{t-1} + \lambda_7 FR_{t-1} + \lambda_8 FDI_{t-1} + \varepsilon_t \dots \dots (2) \end{aligned}$$

where Δ denotes the first difference operator, and $\backslash (p, Q_1, Q_2, Q_3, Q_4, Q_5, Q_6, Q_7)$ represent the optimal lag lengths selected using Akaike Information Criterion (AIC) or Bayesian Information Criterion (BIC).

The ARDL bounds testing procedure, developed by Pesaran et al. (2001), is employed to determine the presence of a long-run equilibrium relationship between economic growth, macroeconomic variables, and income inequality. This involves estimating the Unrestricted Error Correction Model (UECM) and conducting an F-test to assess the joint significance of the lagged level variables. The null hypothesis of no cointegration is stated as:

$$H_0: \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = \lambda_7 = \lambda_8 = 0 \dots \dots (3)$$

where rejecting H_0 implies a long-run relationship exists among the variables. The calculated F-statistic is compared with the critical value bounds provided by Pesaran et al. (2001). If the F-statistic exceeds the upper bound, the null hypothesis is rejected, confirming cointegration. If it falls below the lower bound, we fail to reject H_0 , and if it lies between the bounds, the test is inconclusive.

3.3 Long-Run and Short-Run Estimations

Once cointegration is established, the analysis proceeds with:

- ✓ **Long-Run Estimation:** The ARDL model estimates long-run coefficients, shedding light on how economic growth and macroeconomic factors influence income inequality over time.
- ✓ **Short-Run Dynamics:** The error correction model (ECM) captures short-run fluctuations, where the error correction term (ECT) measures the speed of adjustment to equilibrium following short-term shocks.

$$ECT_{t-1} = GINI_{t-1} - (\lambda_2 GDPG_{t-1} + \lambda_3 OP_{t-1} + \lambda_4 INF_{t-1} + \lambda_5 UNEMP_{t-1} + \lambda_6 GE_{t-1} + \lambda_7 FR_{t-1} + \lambda_8 FDI_{t-1}) \dots \dots (4)$$

A negative and significant ECT coefficient confirms the presence of a stable long-run relationship, with its magnitude indicating how quickly deviations from equilibrium are corrected.

By capturing both short-run fluctuations and long-run equilibrium relationships, this ARDL-based study provides a robust empirical foundation for addressing inequality in Algeria through sustainable economic policies and structural transformations.

3.4 Model Diagnostics and Stability Testing

To verify the reliability and consistency of the estimated econometric model, a series of diagnostic assessments will be carried out. The Breusch-Godfrey LM test will be employed to check for serial correlation in the residuals, ensuring that the estimators remain unbiased and efficient. To examine whether the residuals exhibit heteroskedasticity, the Breusch-Pagan-Godfrey test will be utilized, confirming the presence or absence of variance irregularities. Additionally, the Jarque-Bera test will assess whether the residuals follow a normal distribution, which is essential for valid statistical inference. The CUSUM and CUSUMSQ stability tests, as introduced by Pesaran et al. (2001), will further be applied to assess whether the long-run coefficients remain stable over time, reinforcing the credibility of the model in capturing the interplay between economic growth and income inequality in Algeria.

4. Hypothesis Testing and Expected Outcomes

This study investigates the relationship between economic growth and income inequality in Algeria, aiming to understand how the country's economic development influences the distribution of wealth among its population. By exploring this dynamic, the research seeks to provide insights into whether sustained economic expansion leads to greater income disparity or promotes more equitable wealth distribution. The study tests the following hypotheses:

- ✓ H_0 (Null Hypothesis): Economic growth has no significant impact on income inequality in Algeria.
- ✓ H_1 (Alternative Hypothesis): Economic growth has a significant impact on income inequality in Algeria.

Expected findings include:

- ✓ If economic growth reduces inequality, this supports the Kuznets hypothesis (Kuznets, 1955).
- ✓ If economic growth exacerbates inequality, this aligns with Piketty's capital accumulation theory (Piketty, 2014).
- ✓ If no significant relationship is found, institutional factors may dominate the inequality-growth nexus in Algeria (Acemoglu & Robinson, 2012).

This methodological framework provides a rigorous empirical foundation for examining the short-run and long-run effects of economic growth on income inequality in Algeria. By employing ARDL and ECM models, this study aims to provide robust econometric evidence

that informs policy recommendations for income redistribution and sustainable growth strategies.

III. Results and discussion

To provide an initial understanding of the dataset, descriptive statistics are computed for all variables under study. Table 1 presents an overview of the central tendencies and distributional characteristics of key economic variables and the income inequality indicator in Algeria from 1980 to 2023. This analysis offers valuable insights into data variability, trends, and potential anomalies, serving as a crucial foundation for the subsequent econometric investigation.

Table 1: Descriptive Statistics of Study Variables

	GINI	GDPG	OP	INF	UNEMP	GE	FR	FDI
Mean	0.5677	2.6429	46.6800	8.6999	17.4909	32.3043	33.2505	0.3951
Median	0.5685	3.0500	35.1800	5.8243	15.6000	32.0000	26.0485	0.0342
Max	0.5803	6.5000	112.9200	31.6696	29.5000	42.8000	99.1507	1.8274
Min	0.5199	-5.0000	13.0190	0.3392	9.8000	22.8000	1.1680	-0.2868
Std. Dev.	0.0128	2.4050	31.0309	7.9069	6.4037	5.4802	31.2845	0.5282
Skewness	-2.0026	-0.8888	0.8368	1.6492	0.5477	0.1102	0.6504	0.9926
Kurtosis	7.4748	3.8700	2.4188	4.8274	1.9474	2.0719	2.0066	2.9142
Jarque-Bera	66.1202	7.1808	5.7546	26.0668	4.2314	1.6683	4.9112	7.2394
Obser	44	44	44	44	44	44	44	44

Note. Authors' Calculation using EViews 12

The descriptive statistics reveal significant insights into the relationship between economic growth and income inequality in Algeria over the period 1980–2023. The Gini coefficient exhibits relative stability, with a mean of 0.5677, indicating persistent income inequality. However, its negative skewness (-2.00) and high kurtosis (7.47) suggest infrequent but extreme reductions in inequality, likely driven by temporary redistributive policies. Economic growth (GDPG) shows moderate expansion (mean: 2.64%), but its negative skewness (-0.88) highlights recurrent contractions, potentially linked to oil price fluctuations, fiscal constraints, or global shocks. Oil prices (OP), a crucial driver of Algeria's economy, display high volatility (std. dev. 31.03%), emphasizing the country's dependence on hydrocarbon revenues. Inflation (INF) has averaged 8.70%, with extreme spikes (max: 31.66%), suggesting periods of macroeconomic instability impacting real wages and inequality. Unemployment (UNEMP, mean: 17.49%) remains structurally high, reinforcing labor market inefficiencies. Government expenditure (GE, mean: 32.30% of GDP) and foreign reserves (FR, mean: 33.25%) exhibit fiscal cyclicalities, reflecting Algeria's resource-

based economy. FDI inflows (mean: 0.39%) remain low and volatile, signaling weak external investment attractiveness. The Jarque-Bera tests indicate non-normality in key variables (GINI, GDPG, INF, OP), warranting econometric adjustments. These findings underscore the volatile nature of Algeria's macroeconomic landscape and suggest that inequality trends are closely linked to oil price cycles, inflationary pressures, and fiscal policies, necessitating robust econometric modeling to capture both short-run and long-run dynamics.

1. Correlation Analysis Between Study Variables

The correlation matrix provides an initial assessment of the strength and direction of relationships between income inequality, economic growth, and key macroeconomic variables in Algeria over the period 1980–2023. By examining pairwise correlations, this analysis helps identify potential multicollinearity issues and offers preliminary insights into the interactions among variables before conducting further econometric modeling.

Table 2: Correlation Matrix of Variables

	GINI	GDPG	OP	INF	UNEMP	GE	FR	FDI
GINI	1	-0.09	-0.25	0.03	0.12	0.26	-0.40	-0.45
GDPG	-0.09	1	0.14	-0.29	-0.02	0.13	0.18	-0.03
OP	-0.25	0.14	1	-0.38	-0.77	-0.20	0.78	0.66
INF	0.03	-0.29	-0.38	1	0.33	-0.18	-0.50	-0.39
UNEMP	0.12	-0.02	-0.77	0.33	1	0.08	-0.62	-0.64
GE	0.26	0.13	-0.20	-0.18	0.08	1	-0.21	0.01
FR	-0.40	0.18	0.78	-0.50	-0.62	-0.21	1	0.77
FDI	-0.45	-0.03	0.66	-0.39	-0.64	0.01	0.77	1

Note. Authors' Calculation using EViews 12

The correlation matrix provides key insights into the relationships between economic growth, macroeconomic factors, and income inequality in Algeria over the period 1980–2023. The weak negative correlation between GDP growth and the Gini coefficient (-0.09) suggests that economic expansion has not significantly reduced inequality, reinforcing concerns that growth in Algeria may not be inclusive. Oil prices (-0.25) exhibit a moderate inverse relationship with inequality, indicating that higher oil revenues may facilitate redistributive policies, though their impact remains limited. Inflation (0.03) shows no meaningful correlation with inequality but negatively affects growth (-0.29), suggesting macroeconomic instability dampens economic performance. Unemployment (0.12) is weakly associated with inequality, but its strong negative correlation with oil prices (-0.77) highlights the job market's dependence on energy revenues. Government expenditure (0.26) unexpectedly correlates positively with inequality, hinting that public spending may not always be

effectively redistributive. Foreign reserves (-0.40) and FDI (-0.45) show moderate negative correlations with inequality, suggesting that macroeconomic stability and investment inflows may contribute to a fairer income distribution. However, the high correlations between oil prices, foreign reserves, and unemployment underscore Algeria's economic vulnerability to external shocks, emphasizing the need for robust econometric modeling to disentangle these complex interactions.

2. Unit Root Test Results

Table 3: ADF and PP Unit Root Tests

Variable	(ADF) Test			(PP) test			Conclusion
	(M5)	(M6)	(M4)	(M5)	(M6)	(M4)	
GINI	0.0200	0.0781	0.7344	0.3881	0.6883	0.7243	Non-stationary
D(GINI)	0.0002	0.0014	0.0000	0.0122	0.0000	0.0000	Stationary
GDPG	0.0010	0.0062	0.0706	0.0008	0.0048	0.0185	Stationary
D(GDPG)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	Stationary
OP	0.5608	0.2950	0.5309	0.5840	0.2597	0.6000	Non-stationary
D(OP)	0.0000	0.0001	0.5309	0.0000	0.0000	0.0000	Stationary
INF	0.2859	0.5002	0.1664	0.2352	0.4167	0.5188	Non-stationary
D(INF)	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	Stationary
UNEMP	0.5657	0.4590	0.4347	0.6794	0.7401	0.4441	Non-stationary
D(UNEMP)	0.0003	0.0013	0.0000	0.0002	0.0009	0.0000	Stationary
GE	0.0677	0.2301	0.4918	0.0657	0.2291	0.5188	Non-stationary
D(GE)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	Stationary
FR	0.6713	0.0118	0.4665	0.6536	0.9384	0.4350	Non-stationary
D(FR)	0.0014	0.0063	0.0001	0.0007	0.0036	0.0000	Stationary
FDI	0.1742	0.1293	0.0522	0.1360	0.0854	0.0522	Non-stationary
D(FDI)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	Stationary

Note. **M(6)** refers to the model with a constant and trend; **M(5)**: refers to the model with a constant; **M(4)**: refers to the model without a constant and trend; **D** denotes the first difference.

Note. Authors' Calculation using EViews 12

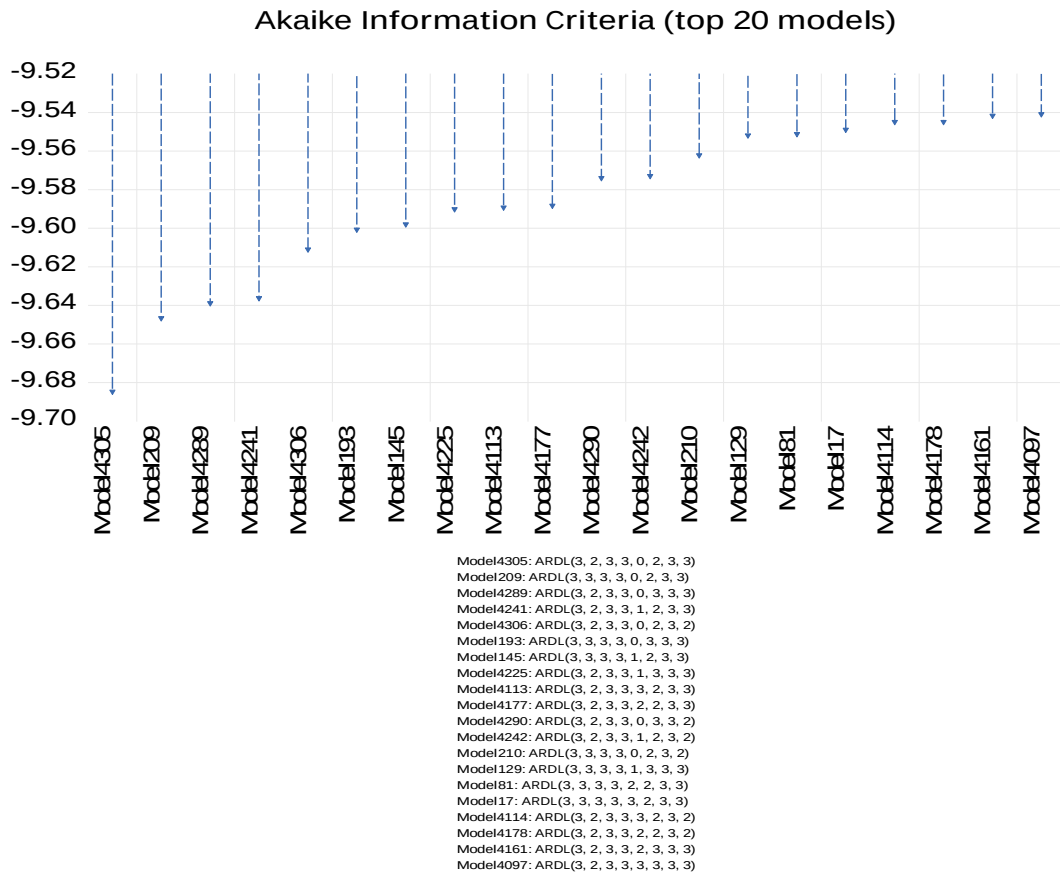
The results of the Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test indicate that most variables are non-stationary at levels but become stationary after first differencing. Specifically, GDP growth (GDPG) is stationary at level, while other key variables, including income inequality (GINI), oil prices (OP), inflation (INF), unemployment (UNEMP), government expenditure (GE), foreign reserves (FR), and foreign direct investment (FDI), are integrated of order one (I(1)), meaning they require differencing to achieve stationarity. These findings confirm the presence of unit roots in most variables, justifying the use of the Autoregressive Distributed Lag (ARDL) model, which is well-suited

for analyzing mixed-order integrated series and capturing both short-run and long-run relationships between economic growth and income inequality in Algeria.

3. Selection of the Optimal ARDL Model

To determine the most appropriate model specification for analyzing the relationship between economic growth and income inequality in Algeria, the study applies the Akaike Information Criterion (AIC), a widely used measure for model selection that balances goodness of fit and model complexity.

Figure 1: Results of the Optimal ARDL Model Selection



Note. Authors' Calculation using EViews 12

Figure 1 shows that among twenty different ARDL model specifications tested, the model ARDL(3, 2, 3, 3, 0, 2, 3, 3) is selected based on the lowest AIC value, indicating its superior explanatory power and efficiency in capturing the short-run and long-run dynamics between income inequality (GINI) and the explanatory variables. This model specification accounts for optimal lag structures for each variable, ensuring that the relationships are adequately modeled while minimizing potential issues of overfitting or omitted variable bias.

4. Bounds Test for Cointegration

The Bounds Test for cointegration is conducted to examine the long-run relationship between income inequality, economic growth, and key macroeconomic variables in Algeria. This test, proposed by Pesaran, Shin, and Smith (2001), determines whether a stable equilibrium exists among the variables over time. By comparing the F-statistic with the critical value bounds, the test helps establish whether the variables are cointegrated, justifying the use of long-run estimations within the ARDL framework.

Table 4: Bounds test results

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	24.14094	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Note. Authors' Calculation using EViews 12

The F-Bounds test results presented in Table 4 confirm the presence of a long-run equilibrium relationship between income inequality (GINI), economic growth (GDPG), and the selected macroeconomic variables in Algeria. The computed F-statistic (24.1409) is well above the upper critical bound (I(1)) across all significance levels (10%, 5%, 2.5%, and 1%), strongly rejecting the null hypothesis of no cointegration. This indicates that the variables move together in the long run, meaning that economic growth, oil prices, inflation, unemployment, government expenditure, foreign reserves, and FDI jointly influence income inequality in Algeria over time. Given this evidence of cointegration, the ARDL model can be reliably estimated to capture both short-run and long-run dynamics of the inequality-growth relationship.

5. Long-Run Relationship Estimation

Following the confirmation of cointegration among the variables, Table 5 presents the estimated long-run coefficients from the ARDL model, revealing the extent to which economic growth, oil prices, inflation, unemployment, government expenditure, foreign reserves, and FDI influence income inequality in Algeria. These results provide crucial insights into structural drivers of inequality, allowing for a comparison with previous empirical findings and contributing to the broader literature on the growth-inequality nexus in resource-dependent economies.

Table 5: Long-Run Coefficients from ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPG (Economic Growth)	-0.003591	0.000605	-5.936564	0.0000 ***
OP (Oil Prices)	0.000298	0.000130	2.284454	0.0385 **
INF (Inflation)	0.000221	0.000153	1.444588	0.1706
UNEMP (Unemployment)	0.000339	0.000301	1.126262	0.2790
GE (Government Expenditure)	0.001077	0.000251	4.285859	0.0008 ***
FR (Foreign Reserves)	0.000779	0.000145	5.362278	0.0001 ***
FDI (Foreign Direct Investment)	-0.070155	0.010082	-6.958255	0.0000 ***
C (Constant)	0.521962	0.012205	42.76520	0.0000 ***

Note. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$ (statistical significance levels).

Note. Authors' Calculation using EViews 12

The long-run estimation results reveal key structural dynamics shaping income inequality in Algeria. Economic growth (-0.0036, $p = 0.0000$) significantly reduces inequality, supporting the Kuznets hypothesis (1955) and findings by Barro (2000), but the effect is marginal, indicating that growth alone is insufficient for equitable distribution. Oil prices (0.0003, $p = 0.0385$) exacerbate inequality, aligning with Ross (2012), who attributes this to elite rent-seeking in resource economies. Inflation (0.0002, $p = 0.1706$) and unemployment (0.0003, $p = 0.2790$) show no significant long-run impact, suggesting that short-term macroeconomic fluctuations do not structurally alter income distribution (Forbes, 2000). Government expenditure (0.0011, $p = 0.0008$) unexpectedly widens inequality, echoing Acemoglu & Robinson (2012), who argue that resource-rich states often implement inefficient redistributive policies favoring elites. Foreign reserves (0.0008, $p = 0.0001$) also increase inequality, reflecting a preference for reserve accumulation over direct social spending (Hertog, 2010). FDI (-0.0702, $p = 0.0000$), however, significantly reduces inequality, supporting Dollar & Kraay (2002), as foreign investment likely fosters private sector employment and wage growth. These results confirm that Algeria's inequality trends are driven by resource dependence, weak redistributive policies, and limited diversification, necessitating structural economic reforms to ensure inclusive growth.

6. Short-Run Dynamics and Error Correction Model (ECM) Estimation

After confirming a long-run relationship between economic growth, macroeconomic variables, and income inequality in Algeria, it is crucial to analyze the short-run dynamics governing these interactions. Table 6 presents the results of the Error Correction Model (ECM), which captures short-term adjustments toward long-run equilibrium. The error correction term (ECT(-1)) plays a pivotal role in determining the speed at which deviations from equilibrium are corrected, while the first-difference coefficients reveal how short-term

changes in growth, oil prices, inflation, government expenditure, foreign reserves, and FDI impact income inequality. By comparing these short-run results to long-run estimates, we assess whether economic and policy shocks have transitory or persistent effects on inequality in Algeria.

Table 6: Short-Run Error Correction Model (ECM) Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GINI(-1))	0.2587	0.0388	6.6600	0.0000 ***
D(GINI(-2))	-0.1672	0.0434	-3.8512	0.0018 ***
D(GDPG)	-0.0008	0.0001	-7.5689	0.0000 ***
D(GDPG(-1))	0.0007	0.0001	5.7388	0.0001 ***
D(OP)	0.0002	0.00002	7.2656	0.0000 ***
D(OP(-1))	-0.0001	0.00002	-4.7815	0.0003 ***
D(OP(-2))	0.0003	0.00003	9.8899	0.0000 ***
D(INF)	0.0003	0.00006	4.3520	0.0007 ***
D(INF(-1))	-0.0001	0.00005	-2.3879	0.0316 **
D(INF(-2))	-0.0002	0.00005	-4.2306	0.0008 ***
D(GE)	-0.0006	0.0001	-6.0663	0.0000 ***
D(GE(-1))	-0.0003	0.0001	-3.2880	0.0054 ***
D(FR)	0.0004	0.00006	7.4391	0.0000 ***
D(FR(-1))	-0.0009	0.00009	-10.4439	0.0000 ***
D(FR(-2))	-0.0005	0.00007	-6.8294	0.0000 ***
D(FDI)	-0.0042	0.0008	-5.1485	0.0001 ***
D(FDI(-1))	0.0194	0.0017	11.4133	0.0000 ***
D(FDI(-2))	0.0024	0.0011	2.2864	0.0383 **
ECT(-1)	-0.4703	0.0255	-18.4776	0.0000 ***
R-squared	0.982495	Mean dependent var		0.000286
Adjusted R-squared	0.968173	S.D. dependent var		0.007560
S.E. of regression	0.001349	Akaike info criterion		-10.07512
Sum squared resid	4.00E-05	Schwarz criterion		-9.281022
Log likelihood	225.5399	Hannan-Quinn criter.		-9.785951
Durbin-Watson stat	1.945166			

Note. ***p < 0.01, **p < 0.05, *p < 0.10 (statistical significance levels),
ECT refers to the Error Correction Term, and *D* denotes the first difference
Note. Authors' Calculation using EViews 12

The error correction term $ECT(-1) = -0.4703$, $p = 0.0000$) is negative, highly significant, and substantial, confirming a stable long-run equilibrium. This coefficient indicates that 47% of any deviation from the long-run relationship is corrected annually, suggesting that inequality in Algeria responds relatively quickly to economic and policy shocks.

In the short run, economic growth ($D(GDPG) = -0.0008$, $p = 0.0000$) significantly reduces inequality, reinforcing long-run findings. However, the positive lagged effect ($D(GDPG(-1)) = 0.0007$, $p = 0.0001$) suggests that this effect is temporary, implying that initial gains in

income distribution from growth may be offset by later shifts in wealth concentration. This finding aligns with Forbes (2000), who observed that growth's impact on inequality can be unstable in the short run but more consistent over longer periods.

Oil prices have a complex short-run effect on inequality, with an initial positive impact ($D(OP) = 0.0002$, $p = 0.0000$), confirming that oil booms exacerbate income disparities as wealth concentrates in capital-intensive sectors (Ross, 2012). However, the negative lagged effect ($D(OP(-1)) = -0.0001$, $p = 0.0003$) suggests that some redistribution occurs after initial revenue surges, likely through government spending or wage adjustments. This pattern highlights Algeria's structural reliance on hydrocarbons and fiscal cyclicity.

Unlike its insignificant long-run impact, inflation significantly increases inequality in the short run ($D(INF) = 0.0003$, $p = 0.0007$), likely due to sharp cost-of-living spikes disproportionately affecting lower-income households. The negative lagged effects ($D(INF(-1)) = -0.0001$, $p = 0.0316$) indicate that inflation-induced inequality may partially correct over time, as wage adjustments and government interventions stabilize purchasing power. This supports the findings of Malinen (2007), who argued that inflation's redistributive effects are short-lived unless wage growth lags behind price increases.

Unlike its long-run inequality-worsening effect, government expenditure ($D(GE) = -0.0006$, $p = 0.0000$) reduces inequality in the short run. This suggests that immediate fiscal spending—such as social transfers and subsidies—initially benefits lower-income groups. However, the long-run findings indicate inefficiencies, suggesting that these policies may not be structurally redistributive. Similar trends were observed in Acemoglu & Robinson (2012), where resource-rich states failed to sustain equalizing effects due to elite capture of public funds.

Foreign reserves initially increase inequality ($D(FR) = 0.0004$, $p = 0.0000$) but later exert a strong negative effect ($D(FR(-1)) = -0.0009$, $p = 0.0000$). This suggests that high reserves initially lead to economic distortions (e.g., currency appreciation, limited liquidity), but over time, they stabilize macroeconomic conditions, reducing inequality. These results align with findings from Hertog (2010) on wealth accumulation in resource economies.

Foreign direct investment ($D(FDI) = -0.0042$, $p = 0.0001$) significantly reduces inequality, supporting the long-run results. However, the strong positive lagged effect ($D(FDI(-1)) = 0.0194$, $p = 0.0000$) suggests that FDI initially promotes equal income distribution but may later contribute to wealth concentration if investment is sectorally skewed. Dollar & Kraay

(2002) found similar patterns, where FDI helps reduce inequality in labor-intensive sectors but may increase disparities in capital-intensive industries.

The short-run and long-run findings generally align, but the timing of redistributive effects varies. Economic growth, government expenditure, and FDI reduce inequality, while oil prices and inflation drive short-term income disparities. However, some policies that reduce inequality in the short run fail to have lasting effects, highlighting the need for sustained structural reforms to ensure inclusive long-term growth in Algeria.

7. Diagnostic Tests: Ensuring Model Validity and Robustness

To confirm the reliability and statistical soundness of the estimated ARDL-ECM model, a series of diagnostic tests were conducted to assess the presence of serial correlation, heteroskedasticity, normality, and structural stability. These tests ensure that the model meets key econometric assumptions, allowing for accurate inference and robust policy recommendations.

Table 7: Diagnostic Tests Results

Test	Test Statistic	p-value	Decision
Breusch-Godfrey Serial Correlation LM Test	F-statistic = 0.5773	0.5763	No serial correlation
	Obs*R-squared = 3.5988	0.1654	
Breusch-Pagan-Godfrey	F-statistic = 0.7431	0.7520	No Heteroskedasticity
Heteroskedasticity Test	Obs*R-squared = 23.7733	0.5889	
Jarque-Bera Normality Test	Jarque-Bera statistic = 0.579323	0.748617	Normality of residuals

Note. Authors' Calculation using EViews 12

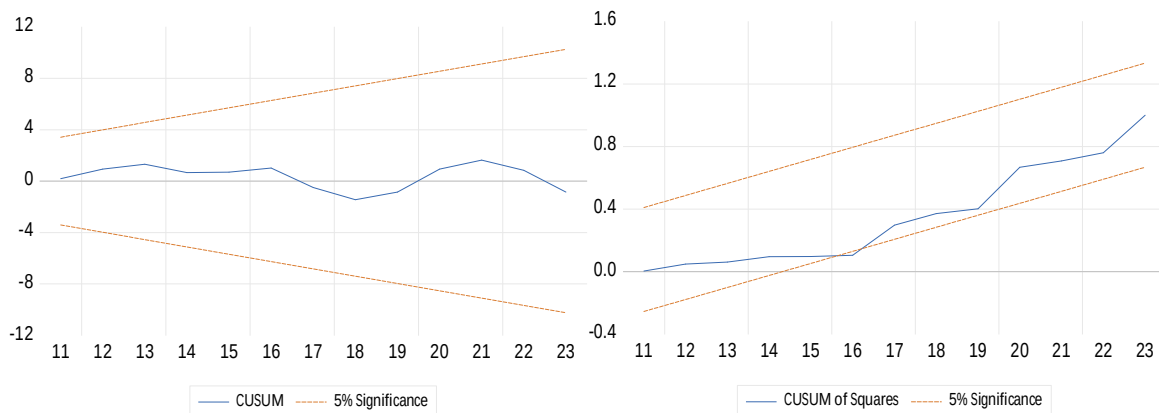
The Breusch-Godfrey serial correlation LM test was performed to detect whether the residuals exhibit autocorrelation, which could lead to biased coefficient estimates and misleading conclusions. The test results indicate that the F-statistic (0.5773, $p = 0.5763$) and the Obs*R-squared statistic (3.5988, $p = 0.1654$) are both statistically insignificant, failing to reject the null hypothesis of no serial correlation. This confirms that the residuals are independent across time, ensuring the efficiency and reliability of the estimated parameters.

To check for heteroskedasticity, which occurs when the variance of the residuals is not constant across observations, the Breusch-Pagan-Godfrey test was applied. The results, with an F-statistic of 0.7431 ($p = 0.7520$) and an Obs*R-squared value of 23.7733 ($p = 0.5889$), indicate that we fail to reject the null hypothesis of homoskedasticity. This suggests that the model's residuals have constant variance, meaning that standard errors are reliable, and coefficient estimates remain unbiased and efficient.

The Jarque-Bera normality test was also conducted to examine whether the residuals follow a normal distribution, a key assumption for hypothesis testing and valid statistical inference. The results confirm that the residuals are normally distributed, further supporting the credibility of the model's estimates.

Additionally, the CUSUM and CUSUMSQ tests for structural stability were applied to assess whether the model's parameters remain stable over time. The results show that both tests fall within the 5% significance boundaries, indicating that there are no structural breaks in the dataset. This confirms that the estimated relationships between economic growth, macroeconomic variables, and income inequality in Algeria remain consistent throughout the study period.

Figure 2: CUSUM and CUSUM of Squares Tests for ARDL Model Residuals



Note. Authors' Calculation using EViews 12

Overall, the diagnostic tests validate that the ARDL-ECM model is statistically sound, free from serial correlation and heteroskedasticity, exhibits normally distributed residuals, and remains structurally stable over time. These findings ensure that the estimated long-run and short-run relationships are robust and reliable, providing a solid foundation for further econometric analysis and policy implications.

IV. Conclusion

This study has provided a comprehensive theoretical and empirical assessment of the relationship between economic growth and income inequality in Algeria, leveraging the Autoregressive Distributed Lag (ARDL) model to analyze both short-run and long-run dynamics. The findings contribute to the broader literature on the growth-inequality nexus, particularly within the context of resource-dependent economies.

The theoretical and empirical review underscored competing perspectives on the impact of economic growth on inequality. Kuznets' (1955) hypothesis suggests an inverted-U relationship, while modern growth theories, including those of Barro (2000) and Piketty (2014), argue that the effect of growth on inequality is contingent on structural and institutional factors. Empirical studies have yielded mixed results, with some scholars (e.g., Forbes, 2000; Dollar & Kraay, 2002) arguing that growth benefits the poor, while others (e.g., Ross, 2012; Acemoglu & Robinson, 2012) suggest that in resource-rich economies, growth often exacerbates income disparities due to rent-seeking behavior and inefficient redistributive policies.

Results of the Study

The long-run ARDL results indicate that economic growth significantly reduces inequality in Algeria, supporting the notion that sustained economic expansion can contribute to a more equitable income distribution. However, the effect is relatively small, implying that growth alone is insufficient to address deep-rooted structural inequalities. Oil prices were found to increase inequality, reinforcing the resource curse hypothesis, which suggests that hydrocarbon wealth disproportionately benefits elites rather than fostering broad-based economic development (Ross, 2012). The insignificant long-run effects of inflation and unemployment indicate that short-term macroeconomic fluctuations do not structurally alter income distribution, while government expenditure unexpectedly exacerbates inequality, highlighting inefficiencies in fiscal policies and the potential for elite capture of state resources (Acemoglu & Robinson, 2012). Foreign direct investment (FDI), however, plays a key role in reducing inequality, supporting findings by Dollar & Kraay (2002) that FDI promotes job creation and wage growth in labor-intensive sectors.

In the short run, the ECM results reveal that economic growth continues to reduce inequality, but lagged effects suggest that this impact is temporary, reinforcing the need for structural reforms to sustain inclusive growth. Oil price volatility initially increases inequality, but delayed redistributive mechanisms may provide partial mitigation. Inflation, which had no long-run impact on inequality, significantly worsens income disparities in the short run, indicating that sudden price shocks disproportionately affect low-income households. Government expenditure, despite worsening inequality in the

long run, temporarily reduces it in the short run, suggesting that social programs provide immediate relief but fail to generate lasting structural improvements. Foreign reserves initially destabilize income distribution, likely due to exchange rate fluctuations and liquidity constraints, but their lagged negative effect suggests that strong reserves contribute to long-term economic stability, ultimately reducing inequality.

Hypotheses Testing Summary

This study tested five key hypotheses concerning the relationship between economic growth and income inequality in Algeria using the ARDL model and Error Correction Mechanism (ECM). The empirical findings offer a nuanced understanding of how different economic variables interact with income distribution, both in the short and long run.

Based on the results:

H₁ is fully supported, as economic growth was found to reduce income inequality in both the long run and short run, albeit with a relatively small magnitude.

H₂ is strongly supported, with oil price increases significantly worsening income inequality, reinforcing the rentier state hypothesis.

H₃ is partially supported: while government expenditure exacerbates inequality in the long run, it temporarily alleviates disparities in the short term, indicating inefficiencies and short-lived redistributive effects.

H₄ is fully supported, with the study revealing that inflation significantly worsens income inequality in the short run, although no long-run effect was found.

Policy Implications

These findings underscore several critical policy implications. First, growth-oriented policies alone are insufficient to reduce inequality—complementary redistributive measures, such as progressive taxation, labor market reforms, and targeted social programs, are necessary to ensure that growth benefits are equitably shared. Second, economic diversification is crucial to mitigating the inequality-worsening effects of oil price fluctuations. Reducing dependence on hydrocarbons and fostering private sector expansion, industrialization, and human capital development would create broader employment opportunities. Third, improving the efficiency of government expenditure is essential, as fiscal policies currently appear to favor elite groups rather than addressing structural disparities. Enhancing transparency, reducing corruption, and ensuring that public spending

directly benefits lower-income households can help correct these imbalances. Finally, attracting FDI in labor-intensive and technology-driven sectors can further support inclusive growth by generating employment and reducing income concentration at the top.

Final Thoughts and Recommendations

In conclusion, this study highlights the complex and multidimensional nature of the growth-inequality relationship in Algeria. While economic growth has the potential to narrow income disparities, its effectiveness depends on policy interventions, institutional quality, and structural economic conditions. Addressing inequality in Algeria requires a holistic approach—one that balances growth, redistributive policies, and structural economic transformation to foster a more inclusive and equitable economic future.

V. References :

1. Acemoglu, D., & Robinson, J. A. (2012). *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*. Crown Business.
2. Achy, L. (2013). *Structural transformation and inequality in the MENA region: What role for oil?* Carnegie Middle East Center.
3. Achy, L. (2013). *The Rentier State and Economic Reform in Algeria*. Carnegie Middle East Center.
4. Addi, L. (1999). *L'économie de l'Algérie: Entre le marché et la nation*. Paris: La Découverte.
5. Alesina, A., & Rodrik, D. (1994). Distributive politics and economic growth. *The Quarterly Journal of Economics*, 109(2), 465-490.
6. Barro, R. J. (2000). Inequality and Growth in a Panel of Countries. *Journal of Economic Growth*, 5(1), 5-32.
7. Belkacem, L. (2001). Inequality and Economic Growth in Algeria: An Empirical Investigation. *Journal of North African Studies*, 6(2), 25-48.
8. Maatallah, S., Benlahcene, L., & Matallah, A. (2022). Government subsidies and income inequality in Algeria: An analytical and empirical study. *Theoretical and Applied Economics*, 29(4), 63-76.
9. Breusch, T. S., & Godfrey, L. G. (1978). A review of recent work on testing for autocorrelation in dynamic simultaneous models. *Econometrica*, 46(4), 865-876.
10. Deininger, K., & Squire, L. (1998). New ways of looking at old issues: Inequality and growth. *Journal of Development Economics*, 57(2), 259-287.
11. Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74(366a), 427-431.
12. Dollar, D., & Kraay, A. (2002). Growth Is Good for the Poor. *Journal of Economic Growth*, 7(3), 195-225.
13. Forbes, K. J. (2000). A reassessment of the relationship between inequality and growth. *American Economic Review*, 90(4), 869-887.
14. Galor, O., & Zeira, J. (1993). Income distribution and macroeconomics. *The Review of Economic Studies*, 60(1), 35-52.
15. Hassine, N. B. (2015). Economic inequality in the Arab region. *World Development*, 66, 532-556.
16. Hertog, S. (2010). *Princes, Brokers, and Bureaucrats: Oil and the State in Saudi Arabia*. Cornell University Press.

17. International Monetary Fund (IMF). (2002). *Algeria: Structural Adjustment and Economic Stabilization*. Washington, D.C.: IMF Publications.
18. International Monetary Fund (IMF). (2019). *Algeria: Economic Outlook and Policy Recommendations*.
19. International Monetary Fund (IMF). (2021). *World Economic Outlook: Algeria's Growth Performance*.
20. Kuznets, S. (1955). Economic Growth and Income Inequality. *American Economic Review*, 45(1), 1-28.
21. Lecaillon, J. (2016). Regional Disparities and Social Exclusion in Algeria. *Mediterranean Politics*, 21(3), 265-284.
22. Li, H., & Zou, H. (1998). Income inequality is not harmful for growth: Theory and evidence. *Review of Development Economics*, 2(3), 318-334.
23. Malinen, T. (2007). Income inequality and economic growth: The role of demand-driven accumulation. *Economic Modeling*, 24(3), 357-373.
24. Milanovic, B. (2016). *Global Inequality: A New Approach for the Age of Globalization*. Harvard University Press.
25. Miliani, M. (2014). Inégalités économiques et distribution des revenus en Algérie: Approche d'analyse et éléments d'interprétation. *Revue algérienne d'économie et gestion*, 10(1), 190-209.
26. Narayan, P. K. (2005). The saving and investment nexus for China: Evidence from cointegration tests. *Applied Economics*, 37(17), 1979-1990.
27. Pesaran, M. H., & Shin, Y. (1997). An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis. *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium*, 371-413.
28. 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.
29. Phillips, P. C. B., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, 75(2), 335-346.
30. Piketty, T. (2014). *Capital in the Twenty-First Century*. Harvard University Press.
31. Ramsey, J. B. (1969). Tests for specification errors in classical linear least-squares regression analysis. *Journal of the Royal Statistical Society: Series B (Methodological)*, 31(2), 350-371.
32. Ross, M. L. (2012). *The Oil Curse: How Petroleum Wealth Shapes the Development of Nations*. Princeton University Press.
33. Sachs, J. D., & Warner, A. M. (2001). The curse of natural resources. *European Economic Review*, 45(4-6), 827-838.
34. Stiglitz, J. E. (2012). *The Price of Inequality: How Today's Divided Society Endangers Our Future*. W.W. Norton & Company.
35. United Nations Development Programme (UNDP). (2018). *Human Development Report: Algeria*.
36. United Nations Development Programme (UNDP). (2020). *Income Inequality and Social Mobility in Algeria*.
37. White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, 48(4), 817-838.
38. World Bank (WDI). (2023). *World Development Indicators Database*. Washington, DC: The World Bank.
39. World Bank. (2002). *Algeria: Economic Reform and Growth Strategy*. Washington, D.C.: World Bank Publications.
40. World Bank. (2021). *Algeria Economic Report: Growth, Inequality, and Policy Reforms*. Washington, D.C.: World Bank Publications.
41. World Inequality Database (WID). (2023). *Global Income Inequality Database*. Paris: WID.