

An Analysis of the Impact of Public Revenues on Economic Growth in Algeria (1990-2022): An ARDL Approach

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Abstract :

The primary objective of this study is to analyze the impact of government revenue fluctuations on economic growth in Algeria from 1990 to 2022. The central question guiding this research is whether revenues from oil or non-oil sources significantly contribute to economic growth. To achieve this, we examine the dynamic relationship between government revenues and economic growth in Algeria using the Autoregressive Distributed Lag (ARDL) model. The findings indicate that all forms of revenue, including total oil and non-oil, positively affect economic growth in the short and long run. However, oil revenues have a greater impact on economic growth than non-oil revenues. This result partially explains Algeria's economic difficulties, as a decline in global oil prices often triggers a revenue shortfall.

Keywords: Fiscal Policy, Revenue Diversification, Economic Growth, Algeria, ARDL Model.

JEL Classification Codes: H2; O47; C51

Introduction

Governments must execute diverse political, social, and economic functions to optimize social and economic welfare. To fulfill these responsibilities and obligations, the government necessitates numerous resources. These assets are referred to as Public Revenues. Furthermore, it is recognized that fiscal policy, which aligns government revenue and expenditure, is essential for fostering price stability and a sustainable increase in output, income, and employment—key indicators of economic growth. It is a macroeconomic policy tool employed to mitigate or avert short-term swings in output, income, and employment, steering an economy toward its potential level. Nonetheless, a comprehensive understanding of the correlation between government revenue and a nation's economic growth is crucial for smart fiscal policy, particularly in addressing budgetary deficits. (CYRUS MAGU, 2013, p. 1).

Algeria is recognized as a significant hydrocarbon-producing nation, possessing proven crude oil reserves since the 1970s. With the onset of the crude oil boom, hydrocarbons have emerged as the country's primary export commodity, on which it heavily depends for revenue and foreign earnings. Conversely, historical evidence indicates that oil revenue is vulnerable to variations in worldwide oil

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prices. This frequently leads to revenue instability, adversely affecting government expenditure and, ultimately, the economy.

The substantial reliance on oil earnings renders Algeria vulnerable to global price fluctuations and impedes efforts to build a diverse, robust economy. As international oil prices fluctuate, the nation faces substantial fiscal challenges that may jeopardize long-term economic stability. Consequently, a more resilient fiscal policy framework that incorporates diversified revenue sources is crucial to mitigate susceptibility to external factors.

Consequently, this research aims to assess the influence of Government Revenue fluctuations on economic growth in Algeria from 1990 to 2022 by posing the critical question, "Do revenues, whether derived from oil or non-oil sources, significantly affect economic growth"?

This study employed a Deductive Approach and a Quantitative research design to assess the impact of Government Revenue fluctuations on economic growth in Algeria, using the ARDL model and Eviews 12 software.

The selection of the ARDL model is particularly pertinent for this study, as it provides a flexible and rigorous framework for examining the relationship between government revenues and economic growth in Algeria, particularly given the heterogeneous nature of the data. In contrast to alternative techniques, ARDL permits the incorporation of both short- and long-term dynamics without necessitating that variables be integrated in the same order.

This study will elucidate the relationship between government revenue and economic growth in Algeria. Furthermore, the findings will be significant for policymakers, particularly regarding taxation and budgeting, to maintain sustainable budgetary deficits.

The remainder of the paper is structured as follows. Section 2 reviews the literature; Section 3 discusses the methodology; Section 4 presents the empirical findings; and Section 5 concludes.

I. Literature Review

1. Relationship between Government Revenue and Economic Growth

Public finance for economic growth and sustainable development, particularly in an uncertain world, has emerged as a critical concern for scholars and policymakers. The literature presents several theories, hypotheses, and models that connect government revenues and expenditures to economic growth through various pathways at both the micro and macro levels. This comprehensive literature originates from Ricardo's seminal work on the financial system. Ricardo (1820) posits that taxation is the optimal means of financing government expenses. Wagner (1893) posits that an economy's real per capita income rises with an increase in the proportion of public expenditures relative to total receipts. Ramsey (1927) introduced the concept of optimal taxation, which Mirrlees (1971) subsequently elaborated. The theory of optimal taxation posits that tax collection aims to enhance societal welfare. Consequently, social planners ought to design the tax system to optimize total societal welfare while accounting for individual economic agents' preferences. As the theory proposes, a tax system is necessary to reduce market inefficiencies and distortions within a specific economic context (Slemrod, 1990). Moreover, Keynes (1936) contended that a rise in government expenditure is an acceptable policy instrument for stimulating effective aggregate demand and achieving the intended target.

Furthermore, the research reveals four hypotheses regarding the causal relationship between revenues and government. The initial concept is the tax-and-spend hypothesis, introduced by Friedman (1978) and Buchanan and Wagner (1978). Friedman asserts that there is a positive causal relationship between government revenues and expenditures. Consequently, a rise in revenues stimulates expenditure. Buchanan and Wagner assert that the correlation between government revenues and expenditures is inverse.

Recent empirical research indicates that the correlation between revenues and economic growth is more intricate. In Algeria, this complexity stems from the dual nature of its revenue sources: oil and non-oil. The oil sector's volatility frequently undermines the feasibility of robust fiscal policies,

underscoring the need for a deeper understanding of this link, especially given the growing imperative for economic diversification.

The second strand of the concept is known as the spend-and-tax hypothesis, proposed by Peacock and Wiseman.(1979)

The spend-and-tax hypothesis posits that an increase in expenditure results in increased revenues. Tax policy is formulated after assessing overall government expenditure. This guarantees the government will generate sufficient funds to fulfill its projected expenditures. Musgrave (1966) and Meltzer and Richard (1981) introduced the third hypothesis, fiscal synchronization. According to them, the relationship between government revenues and expenditures is reciprocal. The government's optimal fiscal strategy regarding revenue and expenditure depends on voters' preferences and decisions regarding their demand for public goods and services and their stance on the government's redistributive function. The fourth hypothesis, referred to as the institutional separation hypothesis or fiscal neutrality hypothesis, was introduced by Baghestani and McNown in 1994. This asserts that government revenues and expenditures are autonomous from one another. This is predicated on the notion that constitutionally, the responsibilities of the executive and legislative branches of government are distinct. This assumes there is no causal link between government revenues and expenditures. (Raifu & Raheem, June 2018, p. 63).

2. Review of Empirical Studies

Many research projects have been undertaken about government revenue and economic development. Ali and Dalmar (2018) analyzed the impact of tax income on Kenya's economic growth from 1980 to 2007 using the ordinary least squares approach. The findings indicate that tax income has a significantly favorable impact on economic growth. Tax revenues can only reach their full potential in the economy if the government formulates fiscal laws and regulations that align with macroeconomic objectives, thereby effectively deterring tax evasion, corruption, and tax avoidance. (Ali, Ali, & Dalmar, 2018).

Additionally, Al-Masaeed and Tsaregorodtsev (2018) investigated the influence of fiscal policy, encompassing government expenditure, government income, internal public debt, foreign public debt, and exports and inflation, on Jordan's GDP growth from 1990 to 2010. The research employed multiple linear regression and the ordinary least squares (OLS) approach to evaluate the hypotheses. The study revealed that government expenditure, exports, and government income positively and significantly influence Jordanian GDP growth while simultaneously negatively and significantly affecting it. (Al-Masaeed & Tsaregorodtsev, 2018).

Conversely, Symoom (2018) contended that government expenditure and tax revenue exert no significant influence on real GDP growth in South Asian nations—Bangladesh, India, Pakistan, and Sri Lanka—while investigating the effects of fiscal policy on economic growth in these four countries. Due to data availability, four countries were analyzed from 1980 to 2016 using the Error Correction Model (ECM) and the Autoregressive Distributed Lag (ARDL) model on pooled cross-section time-series data, as well as on panel data utilizing fixed-effects and random-effects estimators. My current research. (Symoom, 2018).

Al-Sayegh (2019) investigated the feasibility of tax reforms in Kuwait to augment government revenue from non-oil sources by analyzing the correlation among changes in tax revenues, fluctuations in oil revenue, and changes in GDP, using time-series data from 1998 to 2015. The test results indicate that variations in tax collections have a negligible effect on fluctuations in Kuwait's GDP. Consequently, the Kuwaiti government could judiciously enact tax reforms to establish supplementary sources of income beyond oil revenue. Furthermore, it is contended that the government should incorporate comprehensive consumption and value-added taxes into Kuwait's tax framework, utilizing the funds generated to fund productive policies that foster long-term economic growth. (Al-Sayegh, 2019).

Ammari et al. (2021) analyzed Algeria's efforts to achieve economic diversification, emphasizing the influence of the diversification index on economic growth beyond hydrocarbons, employing the

dynamic ARDL model and drawing on the Norwegian experience in oil resource governance. The study determined that the economic diversification policy has not effectively increased long-term non-hydrocarbon growth rates; its short-term impact is gradual and marked by declining returns. The study indicated the imperative of using oil to establish new, sustainable businesses independent of ongoing oil extraction. (ammari, saadoune, & boutiara, 2021).

Similarly, Tagrerout et al. (2021) assessed the influence of economic diversification on Algeria's economic growth from 1980 to 2017 to underscore the significance of diversification for achieving higher economic growth. Algeria, a nation reliant entirely on oil earnings from its petroleum sector, is confronting the threat of instability amid the decline in oil prices now being experienced in international markets. This underscores the need for the Algerian economy to diversify its income sources and build a stable economy grounded in a diverse array of robust economic resources. This research established several findings, most notably the existence of a long-term association between economic diversification and economic growth over the study period; however, this relationship is tenuous due to the ongoing reliance of the national economy on oil as a primary source of revenue. (takeout, Ramla, & abdelhahak, 2021).

Houari and Nekkal (2021) examined the efficacy of tax policy in fostering economic growth in Algeria from 1990 to 2019, concluding that a positive correlation exists between tax policy and economic growth, particularly through petroleum taxes, in both the short- and long-term. (Houari & Nekkal, 2021).

II. METHODOLOGY

ARDL Model Estimation

The ARDL modeling approach was initially developed by Pesaran and Shin in 1999 and further expanded by Pesaran et al. in 2001. The ARDL co-integration strategy offers several advantages over alternative co-integration strategies. In contrast to previous co-integration methodologies, the ARDL does not need the assumption that all variables involved must be integrated in the same order. The ARDL technique can be utilized irrespective of whether the underlying regressors are integrated of order one [I(1)], order zero [I(0)], or fractionally integrated. Secondly, unlike other co-integration methods affected by sample size, the ARDL test remains appropriate even with a small sample. Thirdly, the ARDL methodology typically yields unbiased long-run model estimates and valid t-statistics, even in the presence of endogenous regressors. (Odhiambo, 2009, p. 219). Assumption of ARDL model:

- All variables are stationary at the level.
- All variables are stationary at the first difference.
- All variables are stationary at a level, while a few are stationary at the first difference.
- Data must be normally distributed.
- Data must be free from HSK.
- Data must be free from Autocorrelation.

Consequently, the influence of public income on economic growth in Algeria can be articulated using the subsequent equation:

$$\Delta LGDP_t = \beta_0 + \sum_{i=1}^p \beta_1 \Delta LGDP_{t-i} + \sum_{i=0}^q \beta_2 \Delta LPETTAX_{t-i} + \sum_{i=0}^m \beta_3 \Delta LORDTAX_{t-i} + \sum_{i=0}^z \beta_4 \Delta LOTHTAX_{t-i} + \alpha_1 LGDP_{t-1} + \alpha_2 LPETTAX_{t-1} + \alpha_3 LORDTAX_{t-1} + \alpha_4 LOTHTAX_{t-1} + \varepsilon_t$$

Where:

$LGDP_t$ is the logarithm of gross domestic product (economic growth);

$LPETTAX_t$ is Logarithm of petroleum taxation;

$LORDTAX_t$ is Logarithm of Ordinary tax;

$LOTHTAX_t$ is Logarithm of Other tax;

Δ : is the first difference operator;

p, q, z : are the lagged values of the dependent and independent variables to control for higher-order correlation;

$\beta_0, \beta_1, \beta_2, \dots$: are coefficients of short-run dynamics;

$\alpha_1, \alpha_2, \alpha_3, \dots$: are coefficients corresponding to the long-run dynamic relationship.

III. RESULTS AND DISCUSSION

3.1 Unit Root Test

We employ the Phillips-Perron test, as illustrated in Table 1, to assess the stationarity of differenced variables. The outcome indicates that all variables were integrated at the first difference following a single differencing. All variables were shown to be stationary in this investigation.

Table 1. Phillips-Perron Unit Root Test

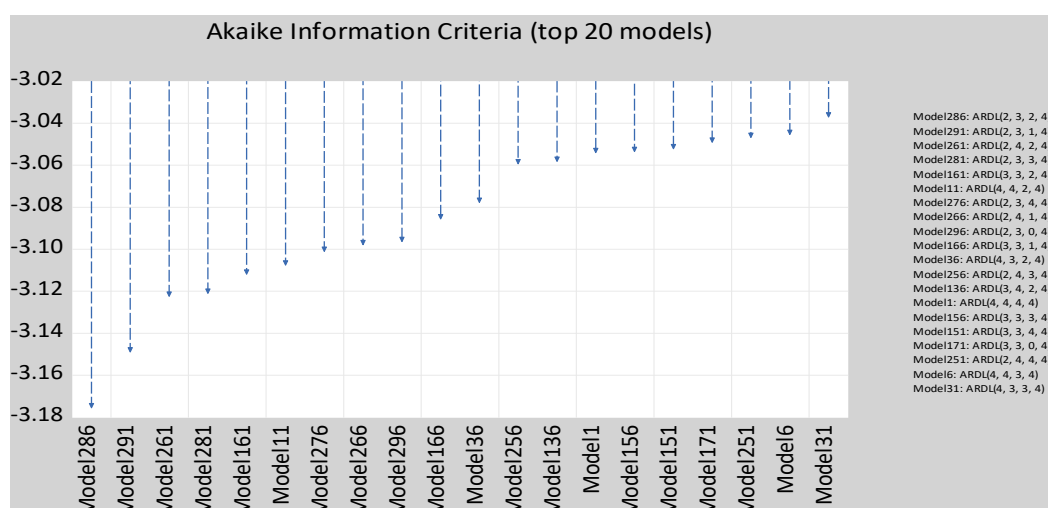
UNIT ROOT TEST RESULTS TABLE (PP)					
Null Hypothesis: the variable has a unit root					
	<u>At Level</u>				
With Constant	t-Statistic	LGDP	LPETTAX	LORDTAX	LOTHTAX
	Prob.	-11.3661 ***	-2.9355 *	-2.2098 n0	-2.6020 n0
With Constant & Trend	t-Statistic	-2.0588 n0	-1.8906 n0	-2.1537 n0	-2.1745 n0
	Prob.	0.5467	0.6344	0.4967	0.4858
Without Constant & Trend	t-Statistic	3.7290 n0	1.5216 n0	4.8917 n0	1.8568 n0
	Prob.	0.9998	0.9653	1.0000	0.9824
	<u>At First Difference</u>				
With Constant	t-Statistic	d(LGDP)	d(LPETTA)	d(LORDTA)	d(LOTHTAX)
	Prob.	-3.7095 ***	-5.0872 ***	-4.0020 ***	-6.0819 ***
With Constant & Trend	t-Statistic	-8.6693 ***	-7.3663 ***	-4.1780 **	-6.5528 ***
	Prob.	0.0000	0.0000	0.0135	0.0000
Without Constant & Trend	t-Statistic	-2.5074 **	-4.8328 ***	-2.4216 **	-5.0997 ***
	Prob.	0.0141	0.0000	0.0173	0.0000
Notes:					
a: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant					
b: Lag Length based on SIC					
c: Probability based on MacKinnon (1996) one-sided p-values.					
This Result is The Out-Put of Program Has Developed By:					
Dr. Imadeddin AlMosabbah					
College of Business and Economics					
Qassim University-KSA					

Source: outputs Eviews 12

3.2 Optimum Lag Selection

The amount of lags necessary for the co-integration test is determined using the Akaike Information Criterion, as illustrated in Figure 1. The AIC results indicated that the optimal lag lengths were (2, 3, 2, 4).

Figure: Results of Akaike Information Criteria



Source: outputs Eviews 12

3.3 F-Bound Tests

The findings in Table 2 indicate that the F-statistic exceeds the upper critical bound at all significance levels with $K = 2$, hence rejecting the null hypothesis and affirming a long-term relationship between the variables.

Table 2. The F-bound tests

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic k	7.663828 3	10%	Asymptotic: n=1000	
		5%	2.37	3.2
		2.5%	2.79	3.67
		1%	3.15	4.08
		1%	3.65	4.66
Actual Sample Size	29	10%	Finite Sample: n=35	
		5%	2.618	3.532
		1%	3.164	4.194
		1%	4.428	5.816
		10%	Finite Sample: n=30	
		5%	2.676	3.586
		1%	3.272	4.306
		1%	4.614	5.966

Source: outputs Eviews 12

3.4 ARDL Error Correction Regression Test

Appendix 02 explains:

- The positive and ethical impact of Petroleum Tax on GDP is statistically significant: a 1% increase in Petroleum Tax results in a 0.16% rise in GDP. This aligns with economic theory and prior research indicating that petroleum taxes are a crucial revenue source in oil-dependent economies, significantly enhancing economic growth rates in Algeria.
- The positive and ethical impact of ordinary tax on GDP is statistically significant: A 1% increase in Ordinary tax results in a 0.45% increase in GDP. This aligns with economic theory, which posits that taxes enhance economic growth rates. Should the tax be efficiently implemented?
- The passive influence is statistically significant for non-tax revenue relative to GDP, indicating a stronger correlation. This 1% decline in revenue resulted in a 0.06% decrease in GDP, consistent with prior findings. (lahouel & boumedine, 2019) Non-tax revenues adversely influence economic agents' decisions, hindering economic growth.

-A short-run dynamic relationship exists between gross domestic product and general revenue, as evidenced by the statistically significant negative coefficient ($\text{CointEq}(-1) = -0.6011$). This value quantifies the extent to which the imbalance in the dependent variable can be rectified from one time period to the next, and the negative sign corroborates the presence of a long-run equilibrium relationship between the variables.

3.5 Estimated Long Run Coefficients

Appendix 03 explains:

-The positive and ethical impact of Petroleum Tax on GDP is statistically significant, indicating that a 1% increase in Petroleum taxes results in a 0.25% rise in GDP. This finding aligns with economic theory and prior research, which affirm that petroleum taxes are a crucial revenue source for the Algerian economy and that Algeria cannot attain economic growth independent of the hydrocarbon sector.

-The positive and ethical impact of ordinary tax on GDP is statistically substantial. A 1% rise in Ordinary tax results in a 0.42% increase in GDP, aligning with economic theory. Algeria's tax reforms, particularly tax incentives, have facilitated the attraction of both domestic and foreign investors, hence positively influencing economic growth rates.

-The positive and ethical impact of non-tax revenue on GDP is statistically significant, indicating that a 1% increase in revenue correlates with a 0.15% rise in GDP, aligning with economic theory.

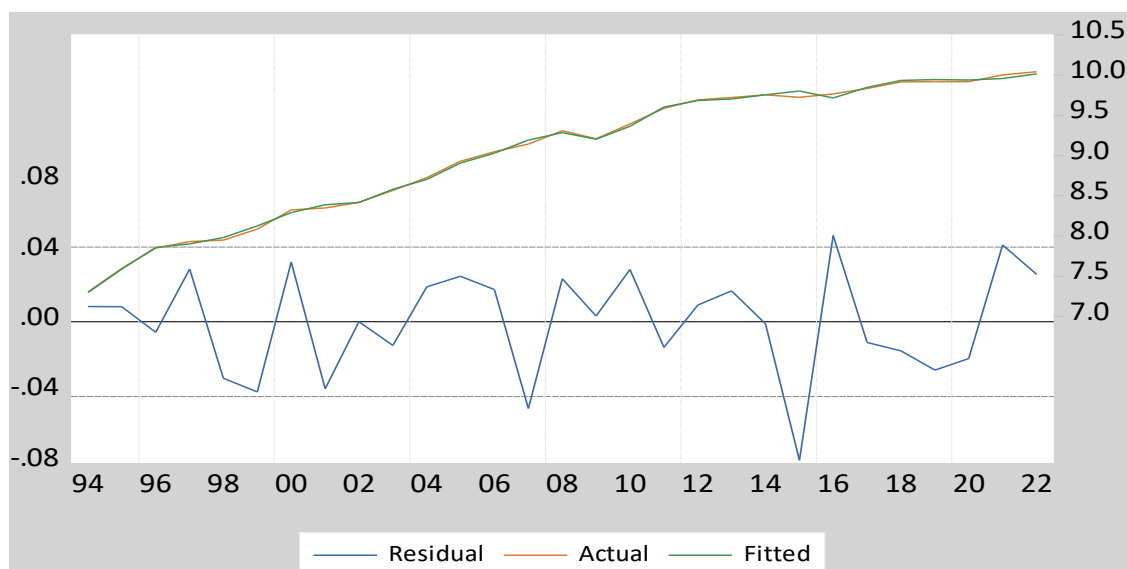
3.6 Residual Diagnostics:

We must assess the ideal model's robustness through Residual and Stability Diagnostics before computing the ARDL (2,3,2,4) for Long-run Coefficients and Error Correction Regression tests.

a. The actual, fitted, and residuals Graph

The findings in Figure 2 demonstrate that the fitted values closely match the variables' actual values, indicating the model's robustness and reliability for interpretation and analysis.

Figure2: The actual, fitted, and residuals Graph

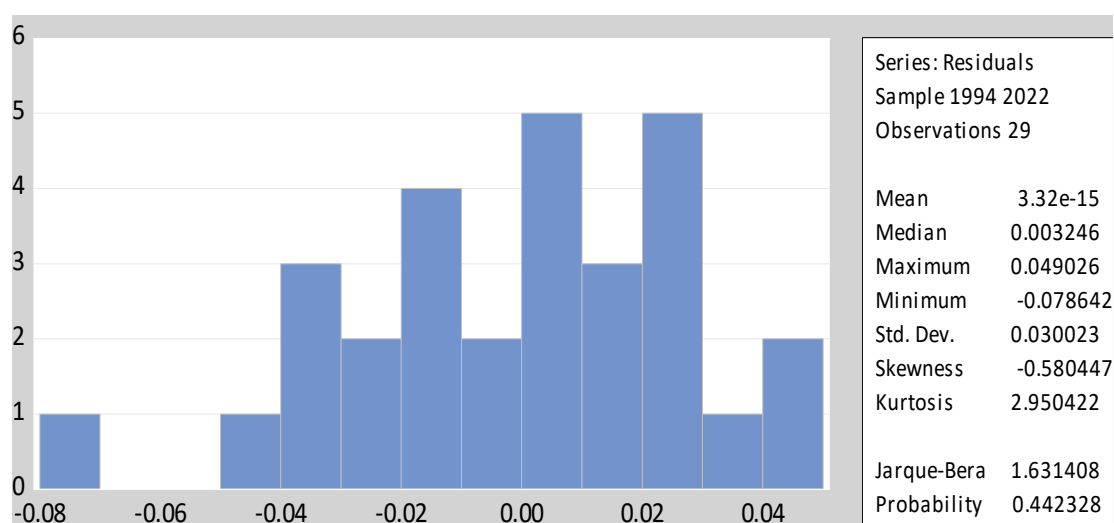


Source: outputs Eviews 12

b. Histogram and Normality Test

The test result was negligible ($\alpha > 0.05$), with a J-B value of 1.63, which is lower than the critical value of $\chi^2 = 5.99$. This implies acceptance of the null hypothesis and that the residuals follow a normal distribution. As illustrated in Figure 3 below.

Figure3:Normality Test Result



Source: outputs Eviews 12

c. Serial Correlation LM Test

As illustrated in Table 3, we employ the Autocorrelation and the Breusch-Godfrey LM test for serial correlation. The LM test indicates that the P-Value for the chi-square statistic exceeds 0.05, leading us to accept the null hypothesis of no autocorrelation.

Table 3. Serial correlation LM test

Breusch-Godfrey Serial Correlation LM Test: Null hypothesis: No serial correlation at up to 1 lag			
F-statistic	1.975720	Prob. F(1,13)	0.1833
Obs*R-squared	3.825918	Prob. Chi-Square(1)	0.0505
Test Equation: Dependent Variable: RESID Method: ARDL Date: 04/04/23 Time: 14:39 Sample: 1994 2022 Included observations: 29 Presample missing value lagged residuals set to zero.			

Source: outputs Eviews 12

d. Heteroskedasticity Test

According to the results in Table 4, the f-statistic is negligible, with prob F above 0.05; thus, the null hypothesis (constant error variance across time) is accepted.

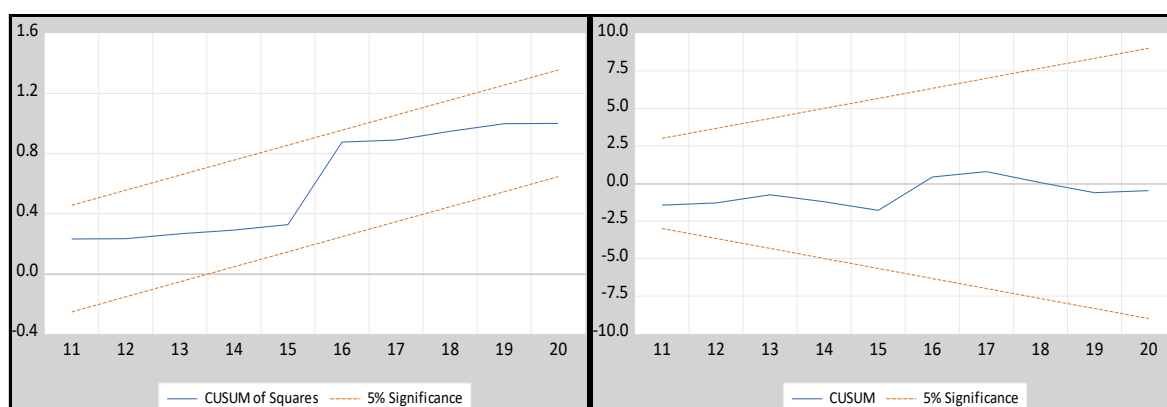
Table 4. Heteroskedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
Null hypothesis: Homoskedasticity			
F-statistic	0.579055	Prob. F(14,14)	0.8409
Obs*R-squared	10.63459	Prob. Chi-Square(14)	0.7145
Scaled explained SS	2.417015	Prob. Chi-Square(14)	0.9997
Test Equation:			
Dependent Variable: RESID^2			
Method: Least Squares			
Date: 04/04/23 Time: 14:40			
Sample: 1994 2022			
Included observations: 29			

Source: outputs Eviews 12

e. Stability Diagnostics

Figure 4 shows that all CUSUM and CUSUMSQ statistics plots remain within the critical boundaries at the 5% significance level. This indicates that all coefficients in the error-correction model are constant and confirms the stability of our ARDL model.

Figure4:Cusum Test and Cusum of Square Test

Source: outputs Eviews 12

IV. Conclusion

This study analyses the dynamic link between government income and economic growth in Algeria from 1990 to 2022 using the Autoregressive Distributed Lag (ARDL) Model. The findings indicate that all examined revenues (total, oil, and non-oil revenue) positively influence economic growth in both the short and long term. Economic growth is more sensitive to oil income than to non-oil revenues.

This outcome underscores the difficulties Algeria encounters in diversifying its economy. Although oil revenues remain pivotal in stimulating economic growth, the economy's poor responsiveness to non-oil income suggests the need for more robust fiscal measures. These findings underscore the need to formulate strategies that enhance non-oil revenues while ensuring their stability against global oil price volatility.

This elucidates the rationale for economic issues arising during revenue shortfalls, often caused by a decline in international oil prices. Based on the aforementioned data, policymakers should implement strategies to enhance non-oil revenue collection, hence facilitating economic diversification.

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VI. Appendices

Appendix 1. The evolution of the components of fiscal policy

Years	Total Revenue	Petroleum Taxation	Ordinary Taxation	Total Expenditures	Current Expenditures	Investment Expenditures	GDP
1990	160,2	76,2	78,8	136,5	88,8	47,7	554,39
1991	272,4	161,5	106,2	212,1	153,8	58,3	752,59
1992	316,8	201,3	109,1	420,131	276,131	144	1074,7
1993	320,1	185	126,1	476,627	291,417	185,21	1189,8
1994	477,2	222,18	175,96	566,329	330,403	235,926	1487,5
1995	611,7	336,15	233,15	759,617	473,694	285,923	1993,5
1996	825,2	496	290,6	724,582	550,569	174,013	2564,7
1997	926,7	564,77	314,01	845,196	643,555	201,641	2780,2
1998	774,5	378,56	329,83	875,739	663,855	211,884	2830,5
1999	950,5	560,12	314,77	961,682	774,695	186,987	3248,2
2000	1578,1	720	349,5	1178,122	856,193	321,929	4123,5
2001	1505,5	840,6	398,2	1321,028	963,633	357,395	4227,1
2002	1603,2	916,4	482,9	1550,646	1097,716	452,93	4522,7
2003	1966,6	836,06	524,9	1639,265	1122,761	516,504	5252,3
2004	2229,7	862,2	580,4	1888,93	1250,894	638,036	6149,1
2005	3082,6	899	640,4	2052,037	1245,132	806,905	7561,9
2006	3639,8	916	720,8	2453,014	1437,87	1015,144	8501,6
2007	3687,8	1890,61	766,7	3108,669	1674,031	1434,638	9352,8
2008	5190,5	4088,6	965,2	4191,053	2217,775	1973,278	11043,7
2009	3676	2412,7	1146,6	4246,394	2300,023	1946,371	9968,02
2010	4392,9	2905	1298	4466,94	2659,078	1807,862	11991,5
2011	5703,4	3979,7	1527,1	5731,752	3797,252	1934,5	14588,5
2012	6339,3	4184,3	1908,1	7054,35	4691,34	2363,01	16208,6
2013	5957,5	3678	2031	6635,62	4156,36	2479,26	16650,1
2014	5738,4	3388,4	2091,4	6995,7	4476,7	2519	17242,5
2015	5103,1	2373,5	2354,7	7746,214	4591,925	3154,289	16702,1
2016	5110,1	1781,1	2482,2	7383,6	4591,4	2792,2	17408,8
2017	6182,8	2372,5	2663,1	6883,2	4591,8	2291,4	18684,1
2018	6342,98	2776,2	3041,42	8628	4584,5	4043,5	20259
2019	6507,91	2714,47	3193,44	8557,16	4954,48	3602,68	20500,3
2020	6289,72	2200,32	3255,86	7823,21	4893,44	2929,77	18383,8
2021	5328,18	1919,23	2651,7	8113,03	5314,51	2798,52	22079
2022	5683,22	2103,9	2857,86	9858,43	6311,53	3546,9	22968,3

Source:

- Algeria's annual finance laws for the years 1990-2022;
- Three-year statistical bulletins of the Bank of Algeria.

Appendix 2. Error Correction Regression test

ARDL Error Correction Regression Dependent Variable: D(LGDP) Selected Model: ARDL(2, 3, 2, 4) Case 2: Restricted Constant and No Trend Date: 04/04/23 Time: 14:32 Sample: 1990 2022 Included observations: 29				
ECM Regression Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGDP(-1))	0.421700	0.111387	3.785902	0.0020
D(LPETTAX)	0.155685	0.027921	5.575923	0.0001
D(LPETTAX(-1))	-0.206232	0.038488	-5.358376	0.0001
D(LPETTAX(-2))	-0.162293	0.038565	-4.208250	0.0009
D(LORDTAX)	0.451415	0.102833	4.389777	0.0006
D(LORDTAX(-1))	0.173774	0.110722	1.569458	0.1389
D(LOHTAX)	-0.061793	0.023294	-2.652749	0.0189
D(LOHTAX(-1))	-0.167335	0.033708	-4.964183	0.0002
D(LOHTAX(-2))	-0.095814	0.028320	-3.383301	0.0045
D(LOHTAX(-3))	-0.107991	0.022564	-4.785898	0.0003
CointEq(-1)*	-0.601181	0.085650	-7.019079	0.0000
R-squared	0.896629	Mean dependent var	0.102080	
Adjusted R-squared	0.839200	S.D. dependent var	0.093380	
S.E. of regression	0.037445	Akaike info criterion	-3.450183	
Sum squared resid	0.025238	Schwarz criterion	-2.931553	
Log likelihood	61.02765	Hannan-Quinn criter.	-3.287755	
Durbin-Watson stat	2.519625			
* p-value incompatible with t-Bounds distribution.				
F-Bounds Test Null Hypothesis: No levels relationship				
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	7.663828	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Source: *EViews12*

Appendix 2. Long Run Coefficients Test

ARDL Long Run Form and Bounds Test Dependent Variable: D(LGDP) Selected Model: ARDL(2, 3, 2, 4) Case 2: Restricted Constant and No Trend Date: 04/04/23 Time: 14:31 Sample: 1990 2022 Included observations: 29				
Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.181059	0.478913	4.554183	0.0005
LGDP(-1)*	-0.601181	0.163668	-3.673162	0.0025
LPETTAX(-1)	0.151150	0.055376	2.729537	0.0163
LORDTAX(-1)	0.254310	0.090347	2.814819	0.0138
LOHTAX(-1)	0.093068	0.040583	2.293279	0.0378
D(LGDP(-1))	0.421700	0.199424	2.114595	0.0529
D(LPETTAX)	0.155685	0.042189	3.690164	0.0024
D(LPETTAX(-1))	-0.206232	0.054251	-3.801426	0.0019
D(LPETTAX(-2))	-0.162293	0.046691	-3.475881	0.0037
D(LORDTAX)	0.451415	0.146369	3.084089	0.0081
D(LORDTAX(-1))	0.173774	0.146662	1.184864	0.2558
D(LOHTAX)	-0.061793	0.031658	-1.951922	0.0712
D(LOHTAX(-1))	-0.167335	0.044202	-3.785676	0.0020
D(LOHTAX(-2))	-0.095814	0.038587	-2.483060	0.0263
D(LOHTAX(-3))	-0.107991	0.030742	-3.512868	0.0034
* p-value incompatible with t-Bounds distribution.				
Levels Equation Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LPETTAX	0.251422	0.053931	4.661954	0.0004
LORDTAX	0.423017	0.077687	5.445164	0.0001
LOHTAX	0.154809	0.047612	3.251475	0.0058
C	3.627959	0.286651	12.65635	0.0000
EC = LGDP - (0.2514*LPETTAX + 0.4230*LORDTAX + 0.1548*LOHTAX + 3.6280)				

Source: *EViews12*