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Analyzing the Dynamics of the Budget Deficit in Algeria and Forecasting the Resort to Domestic and External Borrowing Using the ARDL Model for the Period 2000–2030

BOUARFA Oussama[1], Dr. MORKANE Mohamed El Bachir[2*], Pr. BOUDALI Belkacem[3], Dr. KHITER Houari[4], Dr. MAZOUZ Fethallah[5], Dr. NAKEL Zineb[6]
[123456]Tissemsilt University - Ahmed Ben Yahia Al Wancharissi, Algeria
[1]Email : bouarfa.oussama@univ-tissemsilt.dz ; [2]Email : morkane.elbachir@univ-tissemsilt.dz
[3]Email : Boudali.belkacem@univ-tissemsilt.dz ; [4]Email : khiter.houari@univ-tissemsilt.dz
[5]Email : mazouz.fethallah@univ-tissemsilt.dz ; [6]Email : z.nakel@univ-tissemsilt.dz

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*Correspondence Author

Abstract

This study aims to analyze the dynamics of the budget deficit in Algeria and forecast the reliance on domestic and external borrowing during the period 2000–2030 using the ARDL model. The study is based on annual data for government expenditure, real GDP, and oil prices, assessing both short- and long-term relationships between the deficit and key economic variables. Empirical results reveal a stable long-term equilibrium relationship and dynamic behavior of the variables over time, with the error correction model demonstrating a rapid adjustment mechanism following short-term shocks. Future forecasts indicate that the trajectory of the deficit varies according to economic scenarios: under the optimistic scenario, financing can largely rely on domestic resources, whereas moderate and pessimistic scenarios require increased external borrowing. The study underscores the importance of efficient fiscal and monetary policy management to ensure deficit stability and strengthen the state's ability to cope with future economic fluctuations.

Keywords: Budget Deficit ;ARDL Model ;Financial Forecasting ;Domestic and External Borrowing ;Economic Dynamics.

Introduction

The budget deficit represents one of the most persistent macroeconomic challenges facing hydrocarbon-dependent economies, particularly those exposed to fluctuations in international oil markets. In Algeria, fiscal performance has historically mirrored the volatility of oil prices, given that hydrocarbons constitute the primary source of public revenues. Consequently, episodes of sharp declines in oil prices have frequently led to widening budget deficits and an increased reliance on domestic and external borrowing as alternative financing instruments (Aïssa M. &., 2019). These fiscal pressures raise fundamental questions regarding the sustainability of public debt and the long-term resilience of Algeria's fiscal framework.

The economic literature emphasizes that persistent budget deficits tend to accumulate public debt, which subsequently shapes future fiscal decisions through corrective measures, austerity episodes, or borrowing adjustments. In resource-dependent economies, this relationship is even more complex, as fiscal policy is constrained by exogenous revenue shocks driven by global commodity markets (Bank, 2024). Algeria's experience following the 2014–2016 oil price collapse underscores these dynamics, where fiscal deficits expanded significantly, and compelling policymakers to revisit borrowing strategies and reassess fiscal sustainability.

Within this structural context, the central problem addressed by this study is the transformation of Algeria's budget deficit into a persistent, structural imbalance driven by volatile hydrocarbon revenues and steadily rising public expenditure. Descriptive approaches are no longer sufficient; instead, it becomes crucial to analyze the *dynamic behaviour* of the deficit and to forecast future borrowing needs under alternative economic scenarios. Accordingly, this study seeks to answer the main research question: How are the dynamics of Algeria's budget deficit influenced by oil prices, real GDP, and public expenditure during the period 2000–2024, and how can borrowing requirements be forecasted up to 2030 using the ARDL model?

To address this question, several subsidiary issues are explored, including: (i) the nature of the short- and long-run relationships between the deficit and its macroeconomic determinants; (ii) the sensitivity of the deficit to fluctuations in international oil prices; (iii) the behaviour of the deficit under three alternative forecast scenarios—optimistic, moderate, and pessimistic; and (iv) the scenarios under which Algeria is most likely to increase its reliance on domestic or external borrowing. These questions serve to deepen the understanding of fiscal vulnerability and sustainability in a resource-dependent economy.

The empirical investigation is guided by several hypotheses. It is hypothesized that a stable long-run relationship exists between the deficit and its explanatory variables; that oil prices exert a negative effect on the deficit; that government expenditure increases fiscal imbalances; and that real GDP growth contributes to deficit reduction by broadening economic activity and tax capacity. These hypotheses align with the theoretical expectations of fiscal dynamics in hydrocarbon-based economies.

Based on these hypotheses, the study aims: (i) to assess the impact of oil prices, real GDP, and government expenditure on Algeria's budget deficit; (ii) to estimate an ARDL model capturing both short- and long-run interactions; (iii) to construct deficit forecasts up to 2030 across three prospective scenarios; and (iv) to estimate the resulting financing needs, including the likelihood of resorting to domestic and external borrowing. By integrating scenario analysis within an econometric framework, the study contributes to a forward-looking evaluation of Algeria's fiscal sustainability.

The significance of this research lies in its direct policy relevance. The findings are expected to provide Algerian policymakers with a rigorous quantitative tool for forecasting fiscal imbalances, evaluating borrowing needs, and strengthening resilience to external shocks. Moreover, understanding the dynamics of the budget deficit under varying economic conditions supports the design of long-term fiscal strategies aimed at ensuring macroeconomic stability and sustainable public finance.

Literature Review

Research on government debt and the budget deficit has traditionally focused on developed economies, particularly the United States and European Union countries, leaving emerging oil-dependent economies relatively underexplored. While the literature extensively investigates debt sustainability, stationarity, and cointegration between the budget deficit and government debt, studies focusing on the *dynamics*, *asymmetry*, *and cyclicality* of these variables in the context of resource-dependent economies remain scarce (Ahmed, 2017). Moreover, much of the existing research emphasizes descriptive or structural modeling without adequately forecasting the need for domestic or external borrowing under different economic scenarios (Aïssa M. &., 2019).

Empirical studies employing time-series techniques typically analyze the inter-temporal relationships between government debt and budget deficits. For instance, Hamilton and Flavin (1985), Barro (1986), and Bohn (1998, 2007) examine cointegration and stationarity properties, finding evidence for fiscal sustainability under certain assumptions of economic growth and interest rates (Bohn, 1998). Threshold and regime-switching models have further highlighted asymmetric responses of fiscal policy to debt accumulation and cyclical fluctuations, showing that government deficits often react nonlinearly to macroeconomic shocks (Cassou, 2017). In contrast, some studies (e.g., Hakkio and Rush, 1991; Kremers, 1989) indicate that fiscal policy may violate the inter-temporal budget constraint during periods of significant economic stress, suggesting that deficits can become structurally persistent.

In resource-dependent economies, such as Algeria, budget deficits are closely linked to the volatility of international oil prices. Sharp declines in oil revenues trigger fiscal imbalances, often necessitating recourse to domestic and external borrowing. Previous Algerian studies (e.g., Aïssa & Djennas, 2019; World Bank, 2024) emphasize the structural nature of the deficit and its pro-cyclical behavior, yet there remains a gap in examining the *dynamic interactions* between the deficit, government debt, and macroeconomic variables using advanced econometric models. In particular, the ARDL framework is suitable for estimating both short- and long-term relationships in small samples with mixed integration orders, which is critical for policy-relevant forecasting of borrowing requirements in Algeria (Pesaran, 2001).

Political economy perspectives also contribute to understanding the dynamics of fiscal imbalances. The literature highlights that budget deficits and debt accumulation can be strategically used by incumbent governments to influence successors or accommodate political preferences (Alesina, 1990). While these mechanisms are well-documented in developed economies, their relevance in Algeria remains underexplored, especially considering the structural reliance on oil revenues and the sensitivity of fiscal space to external shocks.

Finally, there is limited research assessing the interaction between the budget deficit and borrowing strategies under alternative economic scenarios. International experiences, such as the contrasting fiscal responses in the United States and Europe during the Great Recession, demonstrate that government policy can exhibit significant asymmetry and counter-cyclicality (Von Hagen, 2006). However, no study has yet applied a regime-based or scenario-driven ARDL approach to forecast both domestic and external borrowing needs for Algeria, highlighting a clear gap in the literature.

This study aims to fill this gap by examining the dynamics of Algeria’s budget deficit from 2000 to 2024 and forecasting the need for domestic and external borrowing up to 2030. By integrating oil prices, real GDP, and public expenditure within an ARDL framework, the paper contributes to the literature on fiscal sustainability in resource-dependent economies, providing policymakers with robust quantitative insights into deficit dynamics and borrowing requirements.

Data and Methodology

This study employs annual data for Algeria covering the period 2000–2030, structured into two empirical segments. The first segment spans 2000–2024 and relies on actual available data to estimate the relationship between the budget deficit and its macroeconomic determinants using the Autoregressive Distributed Lag (ARDL) approach. The second segment extends from 2025 to 2030, during which the study conducts a forecasting exercise based on three hypothetical scenarios—pessimistic, moderate, and optimistic—each incorporating assumed values for the main variables to predict the future trajectory of Algeria’s budget deficit.

The core variables include the budget deficit (DEF), government expenditure (GE), real Gross Domestic Product (GDP), international oil prices (OIL), All historical data were sourced from the Ministry of Finance of Algeria, the World Bank, and OPEC databases. Table 1 presents the definitions and units of measurement for the variables used in the model.

Table 01: Definition of Study Variables

Variable	Definition	Unit	Source
DEF	Budget deficit (Government revenue − expenditure)	Billion DZD	Ministry of Finance, Algeria
GE	Total government expenditure	Billion DZD	Ministry of Finance, Algeria
GDP	Real Gross Domestic Product	Billion DZD	Ministry of Finance, Algeria / World Bank
OIL	International crude oil prices	USD/barrel	World Bank / OPEC

Source : Prepared by researchers

The budget deficit reflects the fiscal gap between government revenues and expenditures, indicating the government's financing needs. Government expenditure encompasses public spending on goods, services, subsidies, and transfers. Real GDP, expressed in constant prices, measures overall economic activity. Oil prices, quoted in U.S. dollars per barrel, represent a key determinant of fiscal performance due to Algeria’s heavy dependence on hydrocarbon revenues.

The ARDL technique (Pesaran, Shin & Smith, 2001) is used to model both short-run and long-run dynamics, making it suitable for variables integrated of mixed orders and for relatively small samples. The baseline ARDL specification for the fiscal deficit is expressed as:

$$\Delta\mathrm{DEF}_{\boldsymbol{t}} = \boldsymbol{\alpha_0} + \sum \boldsymbol{\beta_i}\ \Delta\mathrm{DEF}_{\boldsymbol{t-i}} + \sum \boldsymbol{\gamma_i}\ \Delta\mathrm{OIL}_{\boldsymbol{t-i}} + \sum \boldsymbol{\delta_i}\, \Delta\mathrm{GDP}_{\boldsymbol{t-i}} + \acute{\emptyset}\mathrm{Z}_{\boldsymbol{t-1}} + \boldsymbol{\varepsilon_t}$$

Table 02: Definition of Variables Used in the ARDL Model

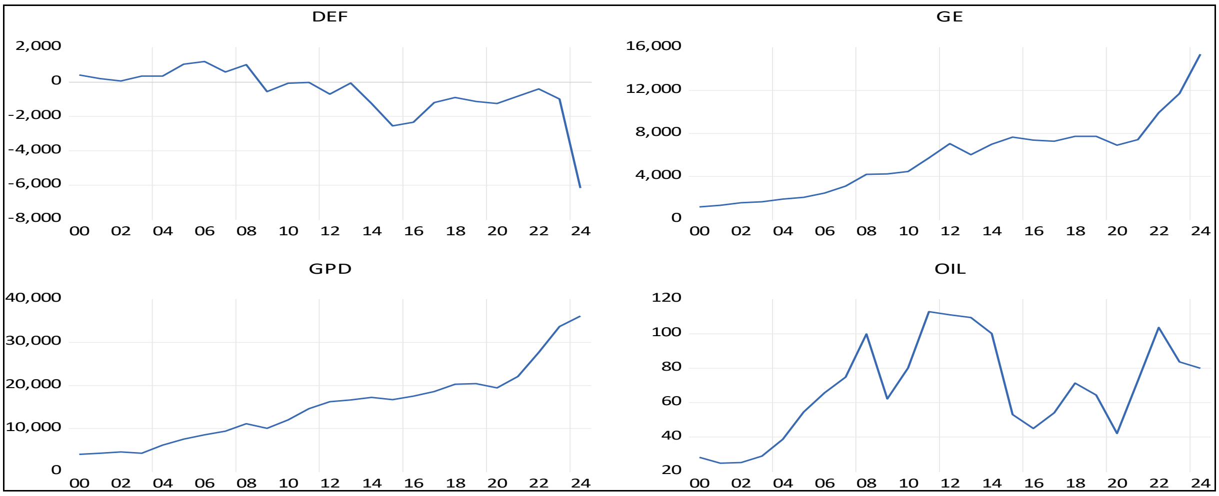
Symbol	Variable Name	Definition
$\mathrm{DEF}_{\boldsymbol{t}}$	Budget Deficit	The gap between total public revenues and total public expenditures in year t, measured in billion Algerian dinars.
$\Delta\mathrm{DEF}_{\boldsymbol{t}}$	Change in Budget Deficit	Annual variation in the budget deficit, capturing short-run fiscal fluctuations.
$\mathrm{OIL}_{\boldsymbol{t}}$	International Oil Price	The global price of crude oil per barrel (USD), a key determinant of Algeria's fiscal performance.
$\Delta\mathrm{OIL}_{\boldsymbol{t-i}}$	Change in Oil Price	Short-run shocks in international oil prices affecting fiscal balances.
$\mathrm{GDP}_{\boldsymbol{t}})$	Real Gross Domestic Product	The real value of total goods and services produced within the economy, indicating macroeconomic activity.
$\Delta\mathrm{GDP}_{\boldsymbol{t-i}}$	Change in Real GDP	Year-to-year fluctuations in real GDP reflecting economic growth dynamics.
$\mathrm{Z}_{\boldsymbol{t-1}}$	Long-run Vector	A vector containing the variables in levels: ((DEF_{t-1}, OIL_{t-1}, GDP_{t-1})), representing the long-run equilibrium relationship.
α_0	Constant Term	The independent component affecting changes in the budget deficit regardless of other variables.
β_i γ_i δ_i	Short-run Coefficients	Parameters measuring the short-run effects of changes in DEF, OIL, and GDP.
$\acute{\emptyset}$	Long-run Coefficient Vector	A set of parameters capturing the long-run cointegration relationship between DEF, OIL, and GDP.
ε_t	Error Term	Captures unexplained variation and external shocks affecting the budget deficit.

Source: Prepared by researchers

The model estimated during 2000–2024 serves as the foundation for projecting Algeria's budget deficit up to 2030 under the three scenario-based simulations, enabling a forward-looking assessment of fiscal sustainability.

The ARDL framework also facilitates **forecasting the budget deficit** under various scenarios. By incorporating alternative projections of oil prices, GDP growth, and public expenditure, we can generate dynamic forecasts of Algeria's fiscal position and the potential reliance on domestic and external borrowing up to 2030. Figure 1 illustrates the historical trend of the budget deficit, government expenditure, and oil prices, highlighting the periods of fiscal stress and surplus.

Figure (01): Trends of Key Macroeconomic Indicators (DEF, OIL, GDP, GTR) Over the Study Period



The source: was prepared by the researchers using the EViews software.

The four-time series collectively depict a macroeconomic structure heavily influenced by external conditions, particularly oil market dynamics. The budget deficit demonstrates a declining yet unstable trajectory, signaling persistent fiscal vulnerabilities. Oil prices trend upward over the long run but remain highly volatile, while real GDP maintains a steady growth path, reflecting ongoing economic expansion. Government expenditure, however, displays marked fluctuations, underscoring its responsiveness to external shocks. Taken together, the data reveal an economy characterized by structural reliance on hydrocarbon revenues, recurrent fiscal imbalances, and gradual long-term economic growth.

Results and analysis

1. Statistical Description of the Study Variables

To statistically examine the variables under study, several descriptive measures were employed, including the mean, maximum and minimum values, and the standard deviation. This analysis aims to provide a concise overview of the main statistical characteristics of the dataset. The following table presents the descriptive summary of the study variables:

Table 03: Descriptive Statistical Summary of the Study Variables

	DEF	GE	GPD	OIL
Mean	-617.4880	5722.604	15154.14	67.48000
Median	-411.5000	6024.100	16208.70	65.70000
Maximum	1186.900	15375.20	36103.50	112.9000
Minimum	-6169.900	1178.100	4010.100	24.80000
Std. Dev.	1503.420	3521.695	8734.897	28.16327
Skewness	-2.053286	0.726153	0.715657	0.086958
Kurtosis	8.533066	3.476904	3.055165	1.904311
Jarque-Bera	49.45703	2.433988	2.137192	1.282064
Probability	0.000000	0.296119	0.343490	0.526749

Sum	-15437.20	143065.1	378853.4	1687.000
Sum Sq. Dev.	54246537	2.98E+08	1.83E+09	19036.08
Observations	25	25	25	25

The source: was prepared by the researchers using the EViews software.

The results indicate that the budget deficit is the most volatile and sensitive variable, largely driven by oil price instability. In contrast, government spending and real GDP show relatively more stable patterns, albeit with noticeable fluctuations. These findings reflect the structural characteristics of the Algerian economy and its persistent dependence on hydrocarbon revenues.

2. **Unit Root Test for Series Stationarity**

The outcomes of the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests at level indicate that all variables under investigation—DEF, GE, GDP, and OIL—are non-stationary, as their probability values exceed the 5% significance threshold across all deterministic specifications (intercept, trend and intercept, and none). This pattern reflects the inherent economic behavior of the variables, which typically evolve over time due to structural shifts in public finance, macroeconomic conditions, and fluctuations in global oil markets. The inability to reject the null hypothesis at level implies the presence of unit roots in the series, necessitating further testing at the first difference to determine the order of integration.

Upon differencing, the majority of the variables exhibit stationarity, particularly under the PP test, which effectively addresses issues of autocorrelation and heteroskedasticity in the residuals. The stationarity of OIL is confirmed in all model specifications at the first difference, while GDP displays significant improvement in both ADF and PP statistics. The DEF variable reaches stationarity only in the specification without deterministic components, whereas GE becomes stationary under the ADF test but remains non-stationary in the PP test.

Overall, the results affirm that all variables are integrated of order one, I(1). This finding supports the application of the ARDL framework and the Bounds Testing Approach for cointegration, given the absence of variables integrated at the second order I(2).

Table 04: showing the results of the unit root test

Variable	ADF Level	PP Level	ADF 1st Diff.	PP 1st Diff.	Integration Order
DEF	Non-stationary	Non-stationary	Stationary only (no deterministic term)	Stationary only (no deterministic term)	**I(1)**
GE	Non-stationary	Non-stationary	Stationary (ADF only)	Non-stationary	**I(1)** *(supported by ADF and series behavior)*
GDP	Non-stationary	Non-stationary	Stationary (intercept)	Nearly stationary	**I(1)**
OIL	Non-	Non-	Strongly	Strongly	**I(1)**

	stationary	stationary	stationary	stationary	

The source: was prepared by the researchers using the EViews software.

3. the results of evaluating the ARDL model.

Table 05: Shows the results of evaluating the ARDL model.

Dependent Variable: DEF
Method: ARDL
Date: 11/27/25 Time: 22:04
Sample (adjusted): 2002 2024
Included observations: 23 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): GE GPD OIL
Fixed regressors: C
Number of models evalulated: 54
Selected Model: ARDL(1, 0, 1, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
DEF(-1)	-0.362566	0.093331	-3.884749	0.0015
GE	-1.200643	0.102590	-11.70334	0.0000
GPD	0.394702	0.054333	7.264541	0.0000
GPD(-1)	-0.111859	0.059291	-1.886610	0.0787
OIL	14.27100	3.860401	3.696766	0.0022
OIL(-1)	21.19027	4.800458	4.414219	0.0005
OIL(-2)	-16.79508	3.740319	-4.490279	0.0004
C	420.6306	193.0185	2.179224	0.0457

R-squared	0.981188	Mean dependent var	-696.5913
Adjusted R-squared	0.972409	S.D. dependent var	1543.672
S.E. of regression	256.4136	Akaike info criterion	14.19967
Sum squared resid	986218.7	Schwarz criterion	14.59462
Log likelihood	-155.2962	Hannan-Quinn criter.	14.29900
F-statistic	111.7648	Durbin-Watson stat	1.998282
Prob(F-statistic)	0.000000		

The source: was prepared by the researchers using the EViews software.

The ARDL (1,0,1,2) model demonstrates strong statistical validity for explaining DEF during 2000–2024, with **R^2 = 0.981** and no autocorrelation (DW = 1.99). Short-run dynamics show a negative lagged deficit (DEF (-1)), a negative effect of government expenditure (GE), a positive impact of GDP, and dynamic effects of oil prices (OIL). These results confirm meaningful short-run interactions and support proceeding to Bounds Testing and the Error Correction Model (ECM) for long-run analysis.

4. Bounds Test for Cointegration

Table 06: Shows the results Bounds Test for Cointegration

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	78.09072	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
Actual Sample Size	23		Finite Sample: n=35	
		10%	2.618	3.532
		5%	3.164	4.194
		1%	4.428	5.816
			Finite Sample: n=30	
		10%	2.676	3.586
		5%	3.272	4.306
		1%	4.614	5.966

The source: was prepared by the researchers using the EViews software.

The Bounds Test within the ARDL framework shows a computed F-statistic of 78.09, well above the upper critical bounds, leading to the rejection of the null hypothesis of no long-run relationship. This confirms the existence of a stable long-term equilibrium between the budget deficit (DEF), government expenditure (GE), GDP, and oil prices (OIL) for 2000–2024. The result validates the ARDL approach and justifies proceeding to estimate long-run coefficients and derive the Error Correction Model (ECM).

5. ECM Error Correction Model

Table07 : showing ECM test results

Variable	Coefficient	Prob. Value	Significance / Interpretation
D(GDP)	0.3947	0.0000	Significant at 1%
D(OIL)	14.2710	0.0000	Significant at 1%
D (OIL (-1))	16.7950	0.0000	Significant at 1%
CointEq (-1)	–1.3626	0.0000	Negative and significant → indicates long-run equilibrium
R-squared	0.9718	—	High goodness of fit
DW-stat	1.99	—	No autocorrelation

The source: was prepared by the researchers using the EViews software.

The ECM from the ARDL (1,0,1,2) model confirms strong short-run dynamics and long-run cointegration between the fiscal deficit and its determinants. The error correction term (CointEq (-1) = –1.3625, 1% significance) indicates rapid adjustment to long-term equilibrium. In the short run, real GDP and oil prices positively affect the deficit, while all coefficients are statistically significant. The model shows high explanatory power (R^2 = 0.9718) and no autocorrelation (Durbin–Watson = 1.99), confirming its robustness for analyzing fiscal deficit dynamics.

6. Diagnostics Tests

6.1 Breusch–Godfrey Serial Correlation LM Test

The test indicates that the residuals are free from autocorrelation at the 95% confidence level. Consequently, the ARDL model employed is robust with respect to serial correlation, and there is no need to re-estimate the model or add additional lags for the dependent or independent variables.

Table 08 : showing the LM test

Item	Value	Interpretation
F-statistic	0.462865	Test statistic
Prob(F)	0.6395	> 0.05 → No serial correlation
Obs*R-squared	1.528953	Alternative LM statistic
Prob (Chi-Square)	0.4656	> 0.05 → No serial correlation
Conclusion	—	No serial correlation → Model is acceptable in this regard

6.2 Heteroskedasticity Test – ARCH / White

The ARCH test results indicate that the variance of the residuals remains constant over time, suggesting no heteroskedasticity problem in the estimated ARDL model. This stability in variance enhances the reliability of the estimates, particularly for the study variables: budget deficit (DEF), government expenditure (GE), real GDP (GDP), and international oil prices (OIL). Constant variance ensures that the estimated relationships are not affected by unexplained fluctuations in error variance, thereby improving estimation efficiency and the accuracy of statistical inferences based on the model.

Table09: showing the **ARCH** test

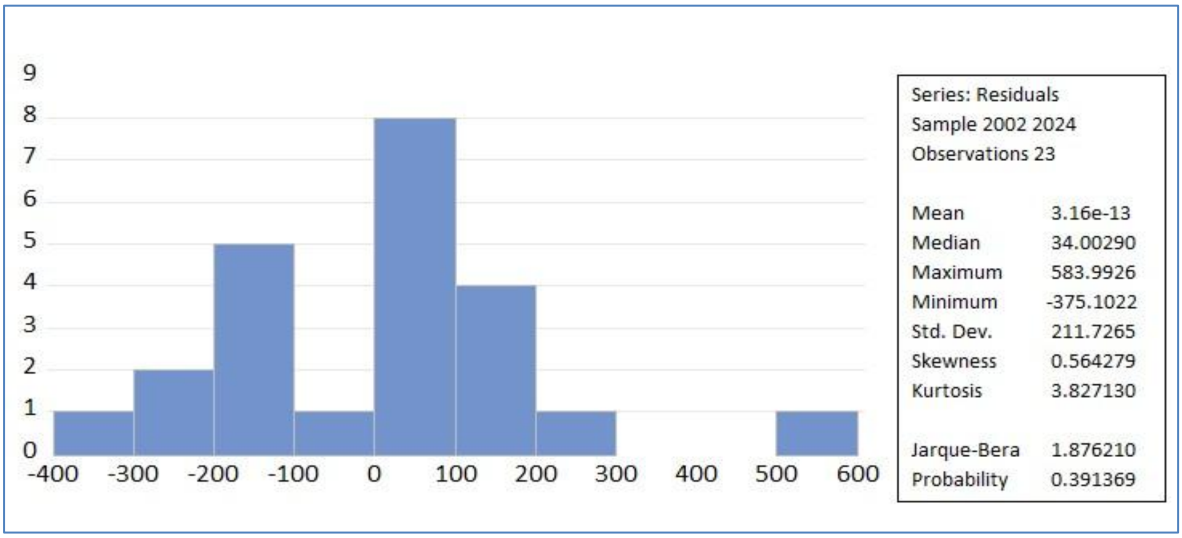
Item	Value	Interpretation
F-statistic	0.279648	Test statistic
Prob(F)	0.7593	> 0.05 → No ARCH effect
Obs*R-squared	0.632848	Alternative LM statistic
Prob (Chi-square)	0.7288	> 0.05 → No heteroskedasticity
Conclusion	—	Residuals are homoscedastic → Model acceptable

The source: was prepared by the researchers using the EViews software.

6.3 Normality Test of Residuals – Jarque–Bera

Based on the Jarque–Bera test results and the statistical properties of the residuals, it can be concluded that the residuals of the ARDL model follow an approximately normal distribution. This supports the reliability of the model and indicates that the statistical inferences regarding the study variables—budget deficit (DEF), government expenditure (GE), real GDP (GDP), and oil prices (OIL)—are based on residuals consistent with the classical assumptions of standard econometric models. Consequently, this enhances the quality of the estimates and the accuracy of the statistical tests.

Figure (02): showing the **Jarque–Bera** test



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6.4 Model Stability Tests

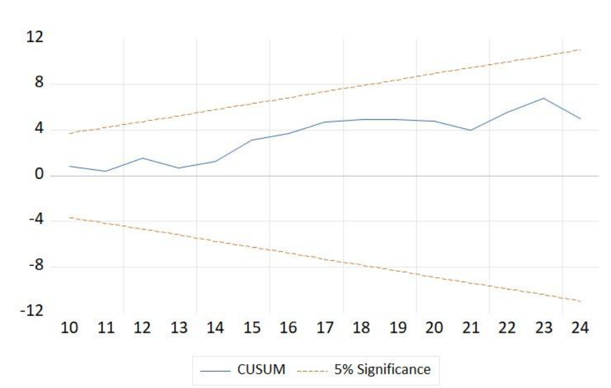
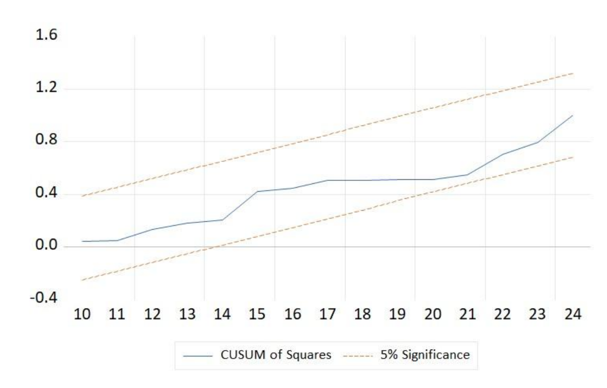
CUSUM

The CUSUM test indicates stability of the ARDL model's coefficients over time. The blue line representing the cumulative sum of residuals remains within the 5% significance confidence bounds throughout the estimation period. This suggests that the model's parameters are stable, with no structural breaks affecting the reliability of the results, thereby reinforcing the model's validity for explaining fiscal deficit dynamics.

CUSUM of Squares

The CUSUM of Squares test shows that the cumulative sum of squared residuals also stays within the 5% confidence bounds. This indicates the absence of major fluctuations in the variance of the model's coefficients and no structural instabilities. The result supports the long-term stability of the model and its ability to provide reliable forecasts of the budget deficit.

Figure (03): Shows the results CUSUM and CUSUM of Squares

CUSUM	CUSUM of Squares
	

The source: was prepared by the researchers using the EViews software

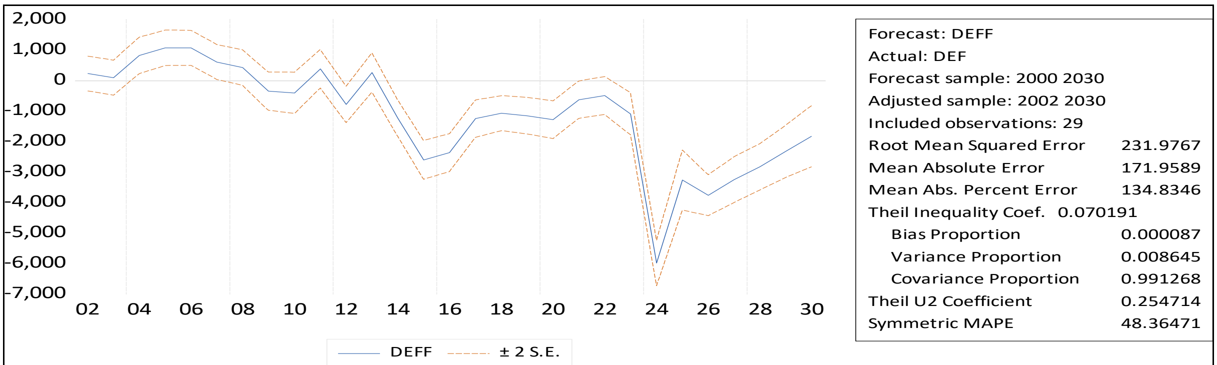
7. Budget deficit forecast for the period 2025-2030

Given the strong performance of the ARDL model and the confirmed existence of a stable long-run relationship among the variables, along with its successful passage of diagnostic tests, the model can be reliably used to generate forecasts for the budget deficit. The following section presents the forecast results derived from the model under three scenarios: pessimistic, moderate, and optimistic. These projections are based on trends in the Algerian economy and reasonable assumptions aligned with expected oil shocks, economic growth, and government spending rates.

7.1 Optimistic Scenario

The budget deficit is projected under conditions of a 15% annual increase in oil prices, coupled with effective control over government expenditure and robust economic growth.

Figure (04) shows the graphical representation of the optimistic scenario.

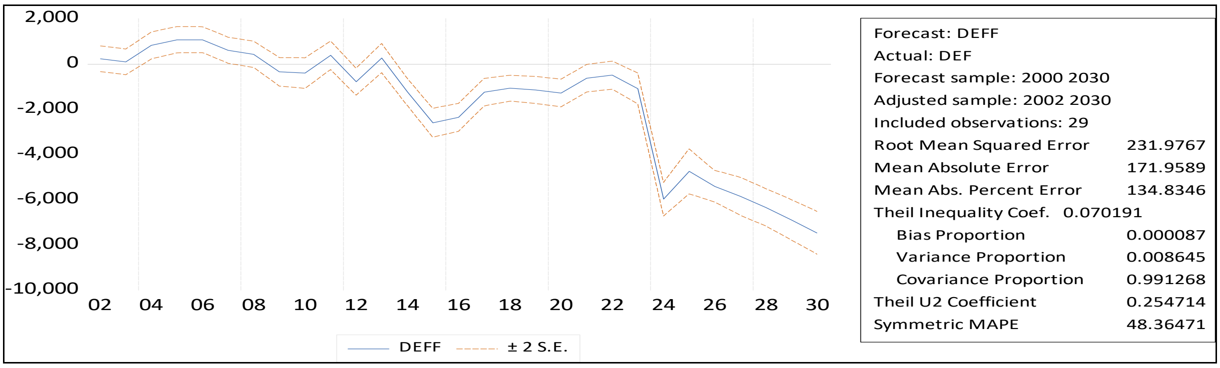


The source: was prepared by the researchers using the EViews software.

7.2 Moderate (Base) Scenario

In the moderate (base) scenario, oil prices remain stable around $80–90 per barrel, GDP growth is relatively steady, and government expenditure continues with a gradual increase.

Figure (05) graphical representation of the moderate scenario

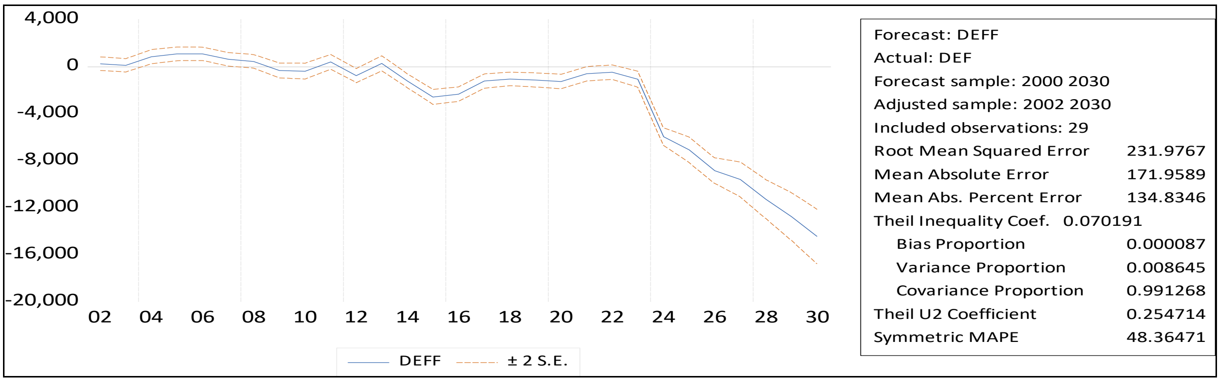


The source: was prepared by the researchers using the EViews software.

7.3 Pessimistic Scenario

il prices collapse by 20%, government expenditure experiences inflation, and the economy undergoes a slowdown.

Figure (06) is a graphical representation of the pessimistic scenario.



The source: was prepared by the researchers using the EViews software.

The forecast results generated by the ARDL(1,0,1,2) model for 2025–2030 indicate different trajectories for Algeria's budget deficit under the assumed economic scenarios. In the optimistic scenario, the deficit rises gradually, supported by strong economic growth, significant oil price increases, and controlled government expenditure, reflecting the economy's capacity to absorb fiscal pressures. The moderate scenario shows a more stable deficit path, with oil prices remaining moderate, steady GDP growth, and gradually increasing public spending, demonstrating the model's reliability under balanced conditions. In contrast, the pessimistic scenario projects higher fiscal pressures due to a collapse in oil prices, economic slowdown, and rising expenditure, highlighting the vulnerability of the deficit to adverse shocks.

All scenarios rely on model coefficients estimated for 2000–2024, ensuring parameter stability and consistent short-term predictive accuracy. Using multiple scenarios allows for sensitivity analysis of the budget deficit under different economic conditions, providing a valuable tool for financial planning and policy decision-making in Algeria.

Conclusions

This study employed the ARDL(1,0,1,2) model to analyze the dynamics of Algeria's budget deficit over the period 2000–2024 and to generate forecasts for 2025–2030. The empirical analysis demonstrates that the budget deficit is significantly influenced by the dynamic and structural interaction of key economic variables, namely government expenditure (GE), real GDP (GDP), and global oil prices (OIL). Unit root tests confirmed that all time series are non-stationary at levels but become stationary at first differences, validating the use of the ARDL methodology without concerns of higher-order integration. The model exhibited excellent statistical properties, with an R^2 of 0.98, absence of autocorrelation, and significant short-run effects of explanatory variables on the deficit. The Bounds Test further confirmed the presence of a long-run equilibrium relationship, while the ECM results indicated rapid adjustment to shocks, demonstrating the system's capacity to restore long-term balance. Diagnostic checks—including LM, ARCH, Jarque–Bera tests, and CUSUM/CUSUM of Squares—confirmed the robustness, stability, and reliability of the model's estimates.

Forecasts for 2025–2030 were generated based on the estimated coefficients without re-estimation, under three distinct economic scenarios. In the optimistic scenario, strong economic growth, rising oil prices, and controlled public spending are projected to lead to a gradual increase in the deficit, reflecting the economy's ability to absorb fiscal pressures. The moderate scenario assumes relatively stable oil prices, steady GDP growth, and gradually increasing expenditure, yielding a balanced trajectory for the deficit and demonstrating the model's reliability under average conditions. Conversely, the pessimistic scenario projects significant fiscal pressures due to falling oil prices, slowed economic growth, and higher spending, highlighting the vulnerability of public finances to adverse shocks.

The study's findings also provide indirect validation of the underlying hypotheses regarding the fiscal dynamics in Algeria. Oil revenues play a critical role in shaping the deficit, with higher prices mitigating fiscal pressure and lower prices exacerbating it. Government expenditure, if uncontrolled, amplifies imbalances, while real GDP growth enhances fiscal capacity by increasing public revenues. The interaction among these factors underscores the structural dependence of Algeria's public finances on hydrocarbon resources, economic activity, and expenditure policies.

Overall, the results offer a comprehensive framework for understanding the determinants and trajectory of Algeria's budget deficit. They emphasize the importance of maintaining fiscal discipline, monitoring oil revenue fluctuations, and promoting sustainable economic growth. Forecast scenarios indicate that the ability to rely on domestic financing versus external borrowing will largely depend on global economic conditions, oil price trends, and fiscal policy choices through 2030. The study provides policymakers with robust, evidence-based insights to support financial planning, debt management, and the formulation of resilient economic strategies aimed at preserving fiscal stability and mitigating the impact of future shocks.

Recommendations

Algeria should control public spending, diversify its economy beyond oil, and strengthen fiscal flexibility to respond to shocks. Effective debt management and scenario-based forecasting are essential to maintain fiscal stability and guide policy decisions.

References

- Ahmed, H. A. (2017). *Dynamics between the budget deficit and government debt: Evidence from the United States*.
- Aïssa, M. S., & Djennas, M. (2019). Oil price shocks, fiscal policy and economic performance in Algeria. *Energy Policy, 129*, 146–159. https://doi.org/10.1016/j.enpol.2019.02.023
- Alesina, A., & Tabellini, G. (1990). A positive theory of fiscal deficits and government debt. *Review of Economic Studies, 57*(3), 403–414. https://doi.org/10.2307/2298040
- Behiani, R. (2025). The asymmetric impact of oil price shocks on the budget deficit: Evidence from a nonlinear autoregressive distributed lag (NARDL) model. *Contemporary Commercial & Economic Studies, 8*(2), 42–59. https://asjp.cerist.dz/en/article/274101
- Benaissa, A. (2024). Fiscal policy and the impact of oil price shocks on non-oil GDP in Algeria: NARDL model. *Journal of Economic and Management Research, 5*(1), 93–110. https://asjp.cerist.dz/en/article/253229
- Bohn, H. (1998). The behavior of US public debt and deficits. *Quarterly Journal of Economics, 113*(3), 949–963. https://doi.org/10.1162/003355398555778
- Cassou, S., Shadmani, R., & Vázquez, G. (2017). Fiscal sustainability and cyclicality: Evidence of asymmetry. *Journal of Macroeconomics, 53*, 150–167. https://doi.org/10.1016/j.jmacro.2017.01.002
- Chibi, A., Chekouri, S. M., & Benbouziane, M. (2019). The dynamics of fiscal policy in Algeria: Sustainability and structural change. *Journal of Economic Structures, 8*, Article 28. https://doi.org/10.1186/s40008-019-0161-3
- Hadjer Ould Hennia. (2024). Budget deficit and unconventional financing in Algeria. *Management & Economics Research Journal, 1*(2), 11–19. https://mer-j.com/merj/index.php/merj/article/view/35
- Lasri, M. A., & Manour, M. (2019). *The impact of oil price shocks on the general budget in Algeria (1970–2017)* (Unpublished working paper). https://dspace.cu-maghnia.dz/items/48790128-1e31-458a-98a8-fe0df6cb5c21
- Medjdoub, F., Abdelhafidh, A., Chentouf, K., Benbekhti, S., & Khelassi, O. (2024). Analysis of the impact of budget deficit on economic growth in Algeria: Between prosperity and oil disillusionment (1990–2022). *Psychology and Education Journal, 61*(8). https://psychologyandeducation.net/pae/index.php/pae/article/view/9054
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16*(3), 289–326. https://doi.org/10.1002/jae.616

- Von Hagen, J., & Wolff, G. B. (2006). Fiscal rules and creative accounting in the European Union. *Journal of Public Economics, 90*(1–2), 123–152. https://doi.org/10.1016/j.jpubeco.2004.07.004
- World Bank. (2024). *Algeria economic monitor*. Washington, DC: World Bank. https://www.worldbank.org/en/country/algeria/publication/algeria-economic-monitor