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Foreign Direct Investment and Economic Growth in Algeria

An ARDL Bounds Testing Approach

Presented by:
Amrani Bouabdellah
Guebli Mohammed Sadreddin

Supervisor:
Dr. Aït Mokhtar

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1. Introduction

Foreign Direct Investment (FDI) has long been recognized as one of the main catalysts for economic growth and development, particularly in emerging and developing economies. It is widely viewed as a channel through which capital, advanced technologies, and managerial know-how are transferred from developed to developing countries, thereby stimulating productivity and competitiveness.

For Algeria, whose economy historically relies on hydrocarbon exports, FDI represents both an opportunity and a structural challenge. Despite reforms to attract foreign investment, FDI inflows have fluctuated significantly due to oil price cycles and global economic conditions.

This raises the question: *Does FDI exert a meaningful long-run impact on Algeria's economic growth, or is its effect only short-term?*

To address this, the study applies the ARDL Bounds Testing approach (Pesaran, Shin & Smith, 2001) for the period 1990–2023. ARDL is suitable because it handles variables integrated of order I(0) and I(1), and works well with small samples such as annual Algerian data. The objective is to examine both long-run and short-run dynamics between FDI and GDP.

2. Literature Review

2.1 FDI and Growth (Algeria 2000–2017)

Bakir Hameed Jasoum, Noaman Mundher Younus, and Fouad Hussein (2021) find that FDI exerts a positive impact on Algeria's economic growth. A one-unit increase in FDI leads to an estimated 6.43 increase in economic growth.

2.2 ARDL Studies on FDI in Algeria

Rarek Nezzari (2019) reports that FDI has a positive impact on growth, contributing 0.03 in the short term and 0.07 in the long term.

2.3 Economic Openness and FDI

Bilal Louail (2015) finds a strong correlation between trade openness and GDP growth in Algeria during 1970–2012. GDP growth attracts FDI and fosters economic openness, but inflation and exchange rate instability show negative effects.

3. Article Discussion

3.1 Bilal Louail; Benanaya, Mohamed; Bakdi, Abdellah (2017). Foreign Direct Investment and Economic Growth in Algeria.

Benanaya & Bakdi (2017) conducted one of the notable ARDL applications on Algeria using annual data from 1980 to 2014. Their study incorporated a broader model—FDI, GDP, Industrial Value Added (IVA), Money Supply (M2), and Net Exports (NX)—to evaluate both the short-run dynamics and long-run equilibrium between foreign direct investment and economic growth. Using the ARDL bounds-testing approach, they reported evidence of a long-run cointegrating relationship, concluding that FDI exerts a positive and statistically significant long-run impact on Algeria's GDP. In particular, their long-run coefficient implied that a 1% increase in FDI leads to a roughly 5% increase in GDP, suggesting strong growth-enhancing effects of foreign capital inflows in the long term. They also found that trade variables and industrial value added play substantial roles, while money supply showed weak significance in the long run.

In the short run, the authors observed several temporary effects, with FDI showing mixed but generally positive short-term responses through its lag structure. Moreover, the error-correction term (ECT) in their model was negative and highly significant, indicating a rapid speed of adjustment (93%) back to long-run equilibrium after short-term shocks. Stability diagnostics such as CUSUM and CUSUMQ plots confirmed that their estimated coefficients remained structurally stable over the sample period.

When compared to the findings of the present report, there are both parallels and contrasts. Similar to the current results, the short-run effects of FDI tend to be mild rather than dominant, showing that FDI does contribute in the short term but not strongly or consistently. However, unlike their study, the bounds test in the present report does not support the presence of a long-run relationship between FDI and GDP. This divergence may stem from differences in sample periods, model specification (e.g., whether additional variables such as M2, IVA, and NX are included), or updated data dynamics after 2014.

Overall, Benanaya & Bakdi's findings highlight that Algeria has historically shown the potential for long-run gains from FDI when the structural environment is stable. The current report, which detects no long-run cointegration but small short-run effects, suggests that the more recent period may reflect weakened linkages between FDI and growth—possibly due to structural rigidities, oil-price volatility, or shifts in FDI composition. Nonetheless, both studies converge on the idea that short-run FDI effects exist but are modest, while the strength and persistence of long-run impacts appear sensitive to methodological choices and the time span considered.

These results are aligned with this report: the bounds test finds no long-run cointegration, but mild short-run effects of FDI exist.

4. Data and Variables

4.1 Data

This study employs annual macroeconomic data for Algeria covering the period 1990–2023, obtained from the World Bank, Macroeconomic Trends, and POILBREUSDA. All monetary variables were transformed into natural logarithms to stabilize variance, reduce heteroskedasticity, and allow for elasticity-based interpretations of the estimated coefficients. The nominal exchange rate series was excluded from the analysis because unit root tests indicated an integration order of I(2), which is incompatible with the ARDL framework that requires all variables to be integrated at order I(0) or I(1).

4.2 Variables Of The Study

The ARDL model incorporates the following variables:

- **log_Real_GDP:** The dependent variable, representing the natural logarithm of real Gross Domestic Product. Real GDP is a standard measure of economic growth and captures overall economic performance adjusted for inflation.
- **FDI%GDP:** Foreign Direct Investment inflows expressed as a percentage of GDP. This variable reflects the relative importance of foreign investment in the domestic economy and allows assessment of its contribution to Algeria's growth dynamics.
- **Inflation:** The annual consumer price index (CPI) inflation rate. Inflation is included to account for macroeconomic stability, as persistent price increases may distort investment decisions and reduce real economic activity.
- **GCF%GDP:** Gross Capital Formation as a percentage of GDP. This indicator measures domestic investment in physical capital such as infrastructure, machinery, and equipment, which is essential for expanding productive capacity and fostering long-term growth.
- **Trade Openness:** Defined as the sum of exports and imports relative to GDP. This variable captures Algeria's integration into the global economy and reflects potential channels of growth through international trade, technology transfer, and market expansion.

- **log(Oil Price):** The natural logarithm of the international crude oil price (in USD). Given Algeria's heavy dependence on hydrocarbon revenues, global oil price fluctuations play a central role in shaping fiscal conditions, external balances, and overall economic performance.
- **D2020:** A dummy variable equal to 1 for the year 2020 and 0 otherwise, used to capture the extraordinary economic impact of the COVID-19 pandemic, including lockdowns, reduced global demand, and supply-chain disruptions.

5. Econometric Framework

5.1 Autoregressive Distributed Lag

This study employs the Autoregressive Distributed Lag (ARDL) bounds testing approach, to investigate both short-run and long-run dynamics between FDI and economic growth in Algeria. ARDL is particularly suitable for small sample sizes and allows for a mixture of I(0) and I(1) variables, while avoiding the pitfalls of spurious regression in the presence of non-stationary series.

The general ARDL(p, q_1, \dots, q_k) model is specified as:

$$\begin{aligned} \Delta Y_t = & \alpha + \sum_{i=1}^p \beta_i \Delta Y_{t-i} + \sum_{j=0}^{q_1} \gamma_j \Delta X_{1,t-j} + \dots + \sum_{j=0}^{q_k} \delta_j \Delta X_{k,t-j} \\ & + \lambda_0 Y_{t-1} + \lambda_1 X_{1,t-1} + \dots + \lambda_k X_{k,t-1} + \epsilon_t \end{aligned}$$

where Δ denotes the first difference operator. The λ coefficients capture the long-run relationship, while the differenced terms capture short-run dynamics. The bounds testing procedure compares the F-statistic for the joint significance of the lagged level variables to critical bounds; if the statistic exceeds the upper bound, long-run cointegration is confirmed.

5.2 Error Correction Term in ARDL

If a long-run relationship exists, the Error Correction Term (ECT) is included in the short-run model:

$$\Delta Y_t = \text{short-run dynamics} + \phi \text{ECT}_{t-1} + \epsilon_t$$

where ϕ measures the speed of adjustment towards the long-run equilibrium after a short-run shock. A negative and significant ECT coefficient indicates convergence to the long-run relationship.

6. Dummy Variables in ARDL Models

Dummy variables are artificial variables that take the value of 0 or 1 in order to represent qualitative events, structural breaks, or exceptional circumstances within an econometric model. Their purpose is to capture the impact of events that cannot be measured on a continuous numerical scale, such as crises, policy changes, reforms, or extraordinary shocks like the COVID-19 pandemic.

6.1 How Dummy Variables Work

In a regression model, a dummy variable acts as an on/off switch. When the dummy equals 1, it allows the model to adjust the intercept (or slope) for the period in which an exceptional event occurs. When the dummy equals 0, the model behaves normally. This mechanism allows dummy variables to isolate the effect of specific events without altering the interpretation of the other variables in the model.

For example, an intercept dummy D_t takes the value:

$$D_t = \begin{cases} 1 & \text{if an exceptional event occurs at time } t, \\ 0 & \text{otherwise.} \end{cases}$$

The coefficient on D_t measures how much the dependent variable changes during that event relative to normal periods.

6.2 Types of Dummy Variables

6.2.1 Intercept Dummies (Shift Dummies)

These are dummy variables that take the value of 1 for a specific period or set of periods and 0 otherwise. They capture level shifts in the dependent variable caused by extraordinary events such as:

- financial crises
- changes in government policy
- wars or political instability
- pandemics
- changes in measurement methodology

Incorporating such dummies helps prevent omitted-variable bias and allows the ARDL model to distinguish between structural shifts and underlying economic dynamics.

6.2.2 Slope Dummies (Interaction Dummies)

Interaction terms (dummy multiplied by an explanatory variable) capture structural changes in the relationship between variables. For example, an interaction between a dummy and trade openness could model periods during which trade reform alters how openness affects GDP. These terms allow the ARDL model to estimate different short-run or long-run elasticities across regimes.

6.2.3 Break Dummies in Cointegration Testing

In ARDL bounds testing, dummy variables can be included in the long-run equation when structural breaks are theoretically or empirically justified. Break dummies help ensure that the estimated long-run parameters are not biased by exceptional periods. However, the dummy should not introduce I(2) behaviour or violate model stability. Proper diagnostics (CUSUM, CUSUMQ) are typically used to ensure that the inclusion of dummies does not distort the model.

6.2.4 Dummies in the Error Correction Model (ECM)

When the ARDL model reveals cointegration and is reparameterized into an ECM, dummy variables can also appear in the short-run dynamic equation. In this case, they help explain temporary deviations from equilibrium. If the dummy enters the ECT, it implies that the event influenced the long-run level of the dependent variable.

6.3 Why Dummy Variables Are Useful in ARDL Models

ARDL models include both lagged values and contemporaneous changes of the variables, which means that ignoring unusual events can distort short-run dynamics and bias long-run relationships. Dummy variables serve three important purposes in ARDL estimation:

- **Capturing sudden or temporary level shifts** in the dependent variable, ensuring that shocks such as crises do not contaminate the estimation of normal economic behaviour.
- **Controlling for structural breaks**, especially when the event affects the equilibrium level of the series, thereby improving model stability and diagnostic performance.
- **Preventing omitted-variable bias**, since unaccounted shocks can incorrectly inflate or reduce the impact of economic variables like FDI, trade openness, or oil prices.

6.4 Intercept Dummy in This Study

In this analysis, the variable D2020 is an intercept dummy that takes the value of 1 in the year 2020 and 0 otherwise. Its purpose is to capture the extraordinary economic contraction caused by the COVID-19 pandemic. Because it only shifts the intercept during that year, this dummy isolates the COVID shock without changing how the other explanatory variables (such as FDI or oil prices) affect GDP.

This type of dummy is appropriate in ARDL models because it cleans the short-run dynamics from an event that would otherwise be misinterpreted as an economic relationship. By controlling for 2020 explicitly, the estimated coefficients better reflect the underlying economic structure rather than the influence of an exceptional one-time disturbance.

7. Unit Root Testing

7.1 Theoretical Foundations of Unit Root Testing

In time series econometrics, the concept of stationarity is fundamental for valid inference and meaningful interpretation of estimated relationships. A time series $\{y_t\}$ is said to be weakly (or covariance) stationary if its mean, variance, and autocovariances are constant over time. When this condition fails—particularly when the series exhibits a stochastic trend—it is classified as non-stationary, often due to the presence of a *unit root*.

Formally, consider the first-order autoregressive process:

$$y_t = \rho y_{t-1} + \varepsilon_t, \quad \varepsilon_t \sim \text{i.i.d.}(0, \sigma^2).$$

If $|\rho| < 1$, the process is stationary. However, if $\rho = 1$, the process becomes a random walk:

$$y_t = y_{t-1} + \varepsilon_t,$$

which is non-stationary and said to contain a unit root. Differencing such a series once yields a stationary process ($\Delta y_t = \varepsilon_t$), and the series is said to be integrated of order one, denoted $I(1)$. In contrast, a series that is stationary in levels is $I(0)$, and one requiring two differences to achieve stationarity is $I(2)$.

Unit root testing aims to distinguish between stationary and non-stationary processes. The most widely used test is the Augmented Dickey–Fuller (ADF) test (?), which extends the basic Dickey–Fuller regression to account for higher-order serial correlation by

including lagged differences of the dependent variable:

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \sum_{i=1}^p \delta_i \Delta y_{t-i} + \varepsilon_t,$$

where α is a constant (drift), βt captures a deterministic time trend (if included), and γ is the parameter of interest. The null hypothesis $H_0 : \gamma = 0$ implies the presence of a unit root (non-stationarity), while the alternative $H_1 : \gamma < 0$ indicates stationarity.

Correctly identifying the order of integration is not merely a diagnostic exercise—it is a prerequisite for choosing an appropriate modeling framework. For instance, regressing non-stationary variables that are not cointegrated can lead to spurious regression results (?). Conversely, if variables are cointegrated (i.e., share a long-run equilibrium relationship despite being $I(1)$), valid inference is possible. The ARDL bounds testing approach, which we employ in this study, provides a flexible method to test for such cointegration even when variables are of mixed integration orders—provided none is $I(2)$.

7.2 Empirical Implementation and Variable Integration Assessment for ARDL Modeling

Before proceeding with the ARDL bounds testing approach to examine the impact of foreign direct investment (FDI) on economic growth in Algeria, we first verified the order of integration of all variables in the model. This step is essential because the ARDL methodology requires that all variables be either $I(0)$ or $I(1)$; the inclusion of any $I(2)$ variable invalidates the asymptotic distribution of the bounds test statistic and compromises the reliability of long-run inference.

To assess stationarity, we employed the Augmented Dickey–Fuller (ADF) unit root test under two deterministic specifications: (i) with a constant only, and (ii) with both a constant and a linear time trend. The optimal number of lagged difference terms was selected automatically using the Akaike Information Criterion (AIC) to balance model parsimony and adequate control for serial correlation. The results indicate that all core variables—including real GDP per capita (as a proxy for economic growth), gross fixed capital formation, trade openness, and FDI inflows—are non-stationary in levels (i.e., they fail to reject the null of a unit root) but become stationary after first differencing. This confirms that these series are integrated of order one, $I(1)$, and thus admissible within the ARDL framework.

Notably, the nominal exchange rate series exhibited unstable diagnostic behavior. Its stationarity properties were sensitive to the inclusion of deterministic components and showed signs of potential structural breaks—likely reflecting Algeria’s history of exchange rate regime shifts and macroeconomic instability during the sample period.

While formal ADF tests did not conclusively classify the series as $I(2)$, the ambiguity and lack of robustness in its integration properties posed a risk to the validity of the ARDL bounds test. To uphold methodological rigor and ensure compliance with the $I(0)/I(1)$ requirement, we conservatively excluded the exchange rate variable from the final model specification.

This careful pre-testing not only aligns with the theoretical prerequisites of the ARDL approach but also enhances the credibility of our subsequent cointegration and error-correction estimates regarding the relationship between FDI and economic growth in Algeria.

8. Model Specification and Lag Selection

8.1 Lag Selection

To determine the appropriate dynamic structure of the ARDL model, a systematic lag selection procedure was carried out using the Akaike Information Criterion (AIC). In time-series modeling, the number of lags determines how many past values of each variable are allowed to influence the present. Choosing too many lags leads to an over-fitted model that wastes degrees of freedom, while choosing too few lags risks omitting important short-run dynamics.

To avoid these problems, all variables were initially allowed up to two lags. This upper bound reflects a balance between capturing meaningful short-run adjustments and avoiding over-parameterization, especially given the relatively small sample size of annual Algerian data.

The AIC was then used to evaluate every admissible ARDL specification. AIC penalizes models that include unnecessary lags, so the selected model is the one that achieves the best compromise between goodness of fit and parsimony. Importantly, only models consistent with ARDL assumptions were considered—specifically, no variable integrated of order $I(2)$ was allowed.

Based on this procedure, the AIC selected the specification ARDL(1,1,0,0,2,2,0). This means that GDP and FDI each enter the model with one lag, inflation and capital formation enter without lags, and both oil prices and trade openness enter with two lags. This combination captures the relevant short-run adjustments while remaining statistically efficient and theoretically consistent.

8.2 ARDL Model Specification

The estimated model can be written as:

$$\begin{aligned}\Delta \ln(GDP_t) = & \alpha + \beta_1 \Delta \ln(GDP_{t-1}) + \gamma_0 \Delta FDI_t + \gamma_1 \Delta FDI_{t-1} \\ & + \delta_0 \Delta INF_t + \eta_0 \Delta GCF_t \\ & + \phi_0 \Delta \ln(OIL_t) + \phi_1 \Delta \ln(OIL_{t-1}) + \phi_2 \Delta \ln(OIL_{t-2}) \\ & + \theta_0 \Delta TO_t + \theta_1 \Delta TO_{t-1} + \theta_2 \Delta TO_{t-2} \\ & + \psi D2020_t \\ & + \lambda_1 \ln(GDP_{t-1}) + \lambda_2 FDI_{t-1} + \lambda_3 INF_{t-1} \\ & + \lambda_4 GCF_{t-1} + \lambda_5 \ln(OIL_{t-1}) + \lambda_6 TO_{t-1} + \epsilon_t\end{aligned}$$

9. Empirical Results

This section presents the empirical findings from the ARDL bounds testing framework applied to examine the relationship between FDI and economic growth in Algeria over the period 1990–2023. The analysis proceeds in four stages: (1) testing for long-run cointegration via the bounds test; (2) estimating the short-run dynamic model; (3) evaluating model diagnostics; and (4) assessing coefficient stability over time using recursive estimation.

9.1 Bounds Test for Cointegration

The first step in the ARDL procedure is to test whether a long-run equilibrium relationship exists among the variables. This is done by computing the F-statistic for the joint significance of the lagged level terms in the ARDL model. The computed F-statistic is **0.5711**, which falls below the lower critical bound (3.13) at the 5% significance level and far below the upper bound (4.33).

Interpretation: Since the F-statistic does not exceed the upper bound, we fail to reject the null hypothesis of no cointegration. This implies that there is **no statistically significant long-run relationship** between FDI and GDP in Algeria over the sample period. In other words, FDI inflows do not appear to drive sustained, equilibrium-based growth in the Algerian economy during 1990–2023.

This finding contrasts with some earlier studies (e.g., Benanaya & Bakdi, 2017) that found evidence of cointegration. The divergence may reflect structural changes in Algeria’s economy post-2014, shifts in FDI composition, or differences in model specification.

9.2 Short-Run Dynamic Model Estimates

In the absence of long-run cointegration, the focus shifts to interpreting the short-run dynamics captured by the ARDL(1,1,0,0,2,2,0) model. The estimated coefficients are presented in Table 1 below.

Table 1: ARDL(1,1,0,0,2,2,0) Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	p-value
const	0.129155	1.565532	0.082499	0.935070
log_Real_GDP.L1	0.997042	0.062455	15.964152	0.000000
FDI%GDP.L0	0.003390	0.009920	0.341739	0.736112
FDI%GDP.L1	0.015741	0.009080	1.733461	0.098405
Inflation.L0	-0.000833	0.000661	-1.259702	0.222279
GCF%GDP.L0	-0.001384	0.001094	-1.264574	0.220562
log(Oil).L0	-0.016819	0.023720	-0.709089	0.486454
log(Oil).L1	-0.038512	0.025094	-1.534755	0.140513
log(Oil).L2	0.075574	0.022008	3.433965	0.002627
TO%GDP.L0	0.001169	0.001123	1.041126	0.310240
TO%GDP.L1	0.001989	0.001570	1.266861	0.219760
TO%GDP.L2	-0.004122	0.001352	-3.049183	0.006333
D2020	-0.078327	0.018829	-4.159988	0.000484

Key Interpretations of Short-Run Coefficients

Despite the absence of a long-run link, we can still interpret the short-run effects of each variable on GDP growth:

- **FDI:** Both current and lagged FDI coefficients are positive but statistically insignificant at conventional levels ($p > 0.05$). The lagged effect (FDI_L1) is marginally significant ($p = 0.098$), suggesting a *weak, delayed positive impact* — consistent with the idea that FDI takes time to affect output, but even then, its effect is not robust.
- **Oil Prices:** The most striking result is the strong, positive, and highly significant effect of oil prices with a two-year lag (log(Oil).L2, $p = 0.0026$). A 1% increase in oil prices two years prior is associated with a 0.076% increase in GDP growth — confirming Algeria's deep dependence on hydrocarbon revenues.
- **Trade Openness:** The lag-2 coefficient (TO_L2) is negative and significant ($p = 0.0063$), implying that higher trade openness two years ago is associated with

slower GDP growth in the current year. This may reflect adjustment costs, import dependency, or volatility in external demand affecting domestic production.

- **COVID-19 Dummy (D2020):** The dummy variable is strongly negative and highly significant ($p < 0.001$), indicating that the pandemic caused a sharp contraction in GDP — approximately 7.8% decline relative to trend — highlighting the economy's vulnerability to global shocks.
- **Other Variables:** Inflation and gross capital formation show no statistically significant short-run effects, suggesting that their influence on growth is either delayed, indirect, or overshadowed by other factors like oil prices.

9.3 Model Diagnostics and Stability

To ensure the reliability of our estimates, we conducted standard diagnostic tests. The results are summarized below:

- **Goodness-of-fit:** The model explains nearly all variation in GDP growth, with an R-squared of 0.998 and adjusted R-squared of 0.997 — indicating excellent fit despite small sample size.
- **Serial Correlation:** Durbin-Watson statistic = 1.53 suggests mild positive autocorrelation, though not severe enough to invalidate inference given the small sample and ARDL structure.
- **Heteroskedasticity:** Breusch-Pagan test p-value = 0.5592 → no evidence of heteroskedasticity.
- **Normality:** Jarque-Bera test p-value = 0.3217 → residuals are normally distributed.
- **Information Criterion:** AIC = -173.58 → supports model parsimony.

Error Correction Term (ECT): As no long-run cointegration was found, the ECT is not included in the final model. This reinforces our conclusion that shocks to FDI, oil prices, or trade do not trigger systematic adjustments toward a stable long-run equilibrium with GDP.

9.4 Recursive Coefficient Stability Analysis

To evaluate whether the estimated short-run relationships remain stable over time, we performed Recursive Estimation Stability Tests (REST) for three key variables: `FDI_L1`, `Oil_L2`, and `T0_L2`. These tests re-estimate the model recursively from 2005 to 2023,

tracking how each coefficient evolves and whether it remains statistically distinguishable from zero.

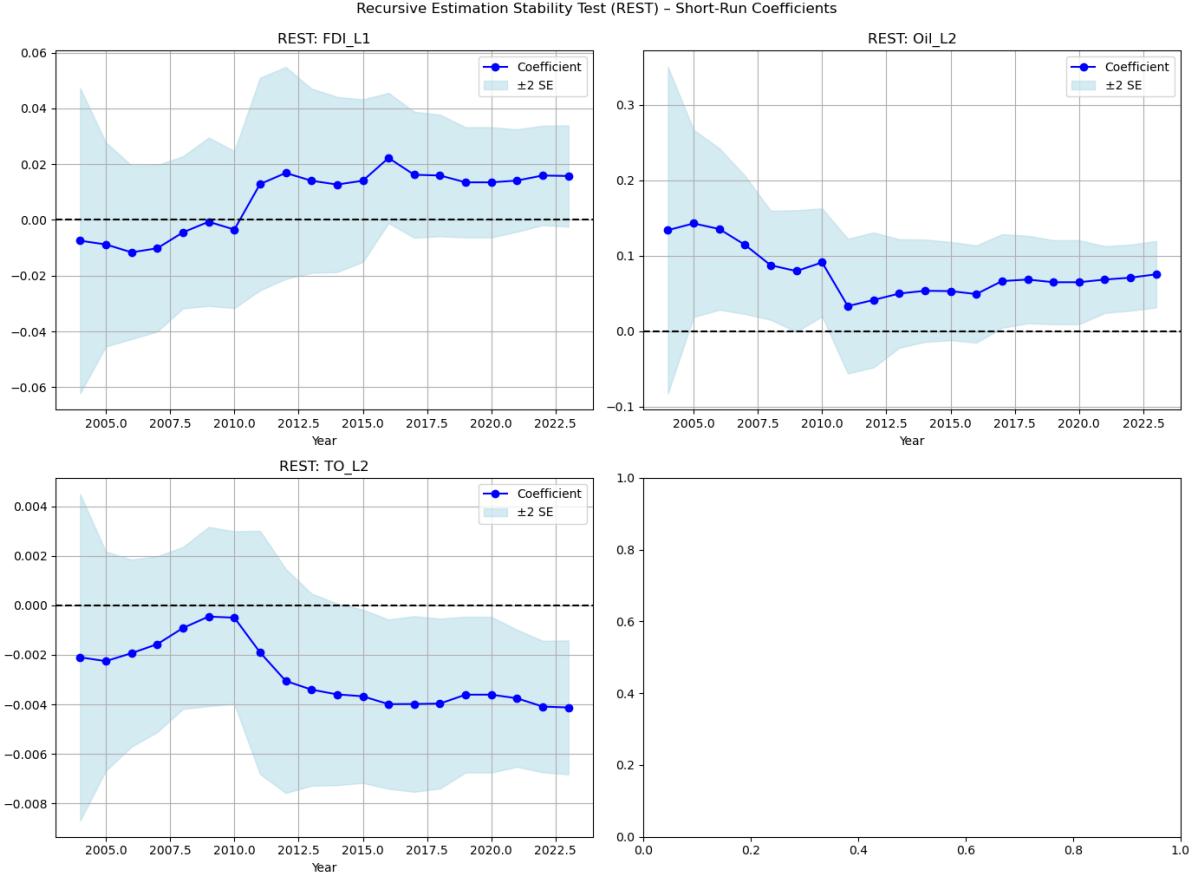


Figure 1: Recursive Estimation Stability Test (REST) – Short-Run Coefficients

Interpretation of REST Plots:

- **FDI_L1:** The coefficient fluctuates around zero throughout the sample and remains within the ± 2 SE band. This confirms the instability and insignificance of FDI's short-run effect — reinforcing that FDI has not consistently contributed to GDP growth in any meaningful way over time.
- **Oil_L2:** The coefficient starts positive, dips sharply around 2010–2012 (possibly due to global oil price crashes or domestic policy responses), then stabilizes at a positive level (0.07) after 2015. Its persistence above zero and within confidence bands indicates a *stable, delayed positive effect* of oil prices — again underscoring Algeria's structural reliance on hydrocarbons.
- **TO_L2:** The coefficient turns persistently negative after 2015 and remains statistically significant (outside the ± 2 SE band). This suggests that increased trade openness, when measured with a two-year lag, tends to have a *contractionary short-run*

effect — possibly reflecting exposure to volatile global markets without sufficient domestic absorptive capacity.

These stability tests provide further evidence that while FDI lacks temporal consistency, macroeconomic drivers like oil prices and trade dynamics exhibit more structured, albeit sometimes counterintuitive, relationships with GDP. Crucially, none of these relationships converge toward a long-run equilibrium — consistent with the bounds test result.

10. Conclusion

The ARDL Bounds Testing results reveal that, over the period 1990–2023, there is no evidence of a long-run cointegrating relationship between foreign direct investment and economic growth in Algeria. This suggests that FDI inflows have not generated sustained growth effects, contrary to some earlier studies covering different periods. In the short run, FDI exhibits only mild and unstable effects, indicating that its contribution to immediate fluctuations in economic activity is limited.

By contrast, oil prices and trade openness emerge as more influential short-run determinants of real GDP. This finding aligns with Algeria's structural reliance on hydrocarbon revenues and its sensitivity to external trade conditions. The inclusion of the 2020 dummy variable further highlights the economy's exposure to global disruptions: the COVID-19 shock produced a clear and measurable deviation from normal growth patterns, underscoring structural vulnerabilities to external crises.

Overall, the empirical evidence suggests that while external factors such as oil markets and trade dynamics continue to shape Algeria's short-run economic performance, FDI has not yet evolved into a stable engine of long-term growth. Strengthening institutional quality, diversifying the economic base, and improving the investment climate may therefore be necessary for FDI to play a more meaningful developmental role in the future..

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