

Analysis of The Impact of Foreign Direct Investment on Economic Growth in Algeria: Empirical Study

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Abstract:

Many works have underlined the importance of FDI as a driver of economic growth. Nevertheless, there aren't many studies on this subject that concentrate on long-term cointegration. Using the Autoregressive Distributed Lag (ARDL) model, this study attempts to investigate the short-term dynamic link between FDI and Algerian economic growth from 1990 to 2022. The empirical findings point to a long-term correlation between investment and economic growth.

Keywords: FDI, Economic Growth, ARDL, Impact, Algeria.

JEL Classification Codes : F21, O49, C22, O55.

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1. INTRODUCTION

Given the frequent perception of foreign direct investment as a potential catalyst for economic growth, its impact has been a significant area of inquiry for governments in developing nations. (Chaalal & Ben bayer, 2023).

Numerous theoretical and empirical works have been devoted to the study of the effects of FDI on economic growth. This study posits that fostering FDI will contribute to economic advancement by facilitating access to global markets, generating employment opportunities, and facilitating the transfer of cutting-edge technology and expertise.

Since the 1990s, the Algerian government has undertaken a series of policy reforms, primarily centered on tax incentives and privatization, with the objective of attracting foreign investment and fostering sustained economic growth and global competitiveness.

This study, which aims to investigate whether FDI attraction strategies implemented by developing nations, particularly Algeria, can serve as a catalyst for economic growth, is situated within this framework. Consequently, we employ the Autoregressive Distributed Lag (ARDL) model, a recent development in time series econometrics.

The article is organized as follows: the initial section will encompass a comprehensive review of the existing empirical literature. Subsequently, a dedicated section will outline the model specification and methodologies. Finally, the concluding section will present the econometric findings.

2. Literature review

It is widely accepted that FDI attraction strategies implemented by different countries can serve as a catalyst for economic growth.

Pioneering work was carried out in 1998 by (Borensztein et al., 1998) the author concluded that foreign direct investment is a catalyst for economic growth.

(Agosin & Machado, 2005) looked at the effects of FDI on economic growth within a sample of 12 Latin American, African, and Asian nations utilizing a panel data model spanning the period 1971 to 2000. Their findings revealed that FDI exerts a positive influence on domestic investment in Asian economies, exhibits a neutral effect in African economies, and exerts a negative influence on domestic investment in Latin American economies.

Using earlier studies as a guide Building upon prior research (Lipsey, 2004) also examined the impact of FDI on both host and origin countries. The author's conclusions acknowledge the significance of national-level variations and posit that FDI may also exert negative externalities on both host and origin economies.

According to a related study (Bresser-Pereira & Gala, 2008), when considered as foreign savings, an increase in foreign direct investment (FDI) has a negative impact on a country's development. They argue that imported savings, or FDI, boost wages and consumption and cause the currency rate to appreciate in favor of this theory.

(Messar, 2013) used annual data from 1970 to 2012 to examine the impact of foreign direct investment (FDI) on economic growth in Algeria using a vector error correction model. The findings indicate that FDI does not stimulate economic growth.

(Chadlia, 2020) used panel cointegration techniques to examine the importance of FDI as a driver of economic growth (Algeria, Morocco, and Tunisia). The study's conclusions, based on data spanning 2009 to 2018, indicate that foreign direct investment (FDI) significantly and positively affects the three countries it examines.

Using modeling using the ARDL cointegration approach, over the period 1980-2018, (Soulah, Hafassi, & Oulad-Laid, 2020), studied the relationship between FDI and economic growth in Algeria. It emerges from this study that IDE is a catalyst for growth

(Hadjoudj & Tchiko, 2021) looked into the question of how IDI can boost economic growth using the ARDL model over the period from 1984 to 2018. The study considered IDE as a beneficial factor for economic growth

In a comparable study, (Chaalal & Ben bayer, 2023) also used the Autoregressive Distributed Lag (ARDL) model for 1990–2021. The authors claim that foreign direct investment (FDI) boosts economic growth. Hammache, S. (2023) used time series data from 1999 to 2021 and the Ordinary Least Squares (OLS) approach to examine the link between (FDI) and economic growth in Algeria. The authors claim that (FDI) boosts economic growth

3. Methodological approach

To find out how FDI impacts Algeria's economic growth, we will estimate the ARDL model. The macroeconomic variables included in this analysis, which covered the years 1990–2022, were given by the National Office of Statistics and the World Bank. The main variables are shown in Table 1.

Table N°1. Study Variables

Variables	Abbreviations
Constant GDP per capita	GDP
Foreign Direct Investment as % of GDP	FDI
Gross Fixed Capital Formation	GFCF
Human Capital measured by gross secondary school enrollment	HC
Inflation	INF
Degree of openness of the economy	DO

Source: Established by authors using Eviews 9

4. RESULTS AND DISCUSSION

Below, we'll try to present and explain the findings of our investigation.

4.1. Study of the stationarity of variables

The results of the ADF stationarity test for the different time series are presented in Table 2:

Table N° 2. Results of the ADF stationarity test

	At Level		First difference		Order of Integration
	T-Statistic	Prob	T-Statistic	Prob	
LGDP	-1.402833	0.8408	-3.891476	0.0246	I(1)
LFDI	-4.055206	0.0193	-	-	I(0)
LGFCF	2.987863	0.1514	-5.233455	0.0010	I(1)
LHC	1.712257	0.7198	-4.754110	0.0035	I(1)
LINF	-2.578415	0.2918	-7.818422	0.0000	I(1)
LDO	0.366881	0.7557	-4.981759	0.0017	I(1)

Source: Established by authors using Eviews 9

Only the FDI variable is stationary at level, according to the results. The remaining variables, GDP, GFCF, HC, INF, and DO, become stationary following the first

difference. Since the variables of interest are $I(0)$ or $I(1)$, we will attempt to ascertain whether the variables have a long-term relationship.

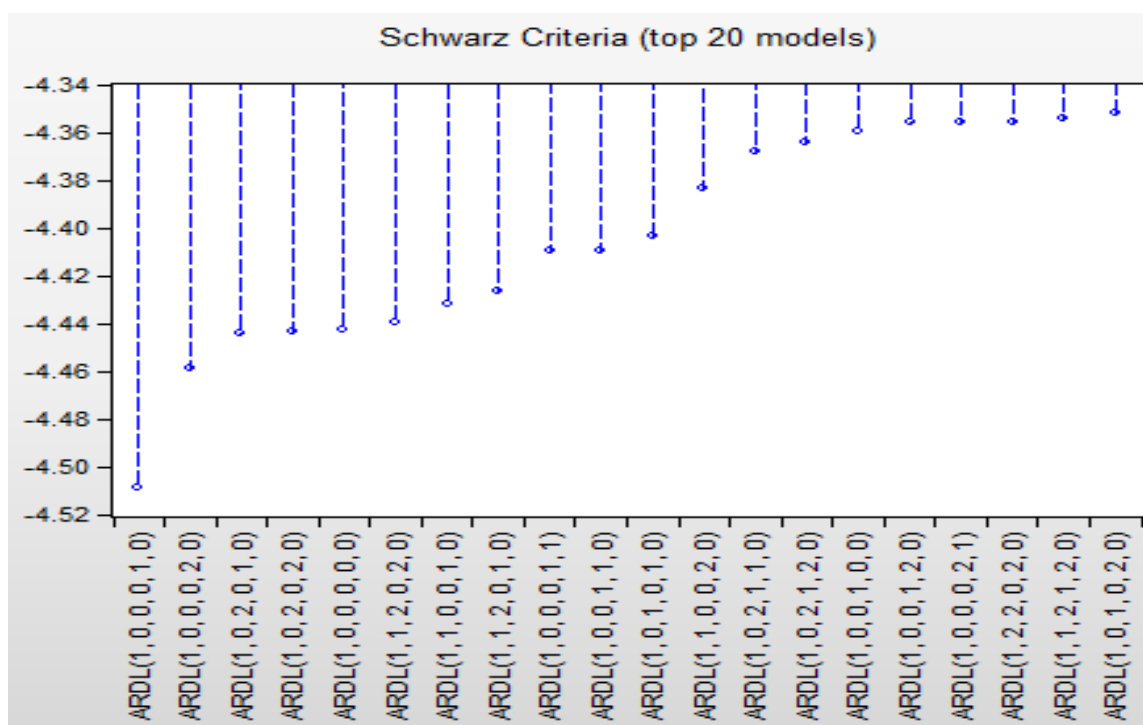
4.2. The ARDL Cointegration Test

The most optimal model must be selected first, and then an estimate of that model must be provided before doing this cointegration test.

4.2.1. ARDL Model, optimal selection, and estimation of the chosen model

To select the optimal ARDL model, we will use the Schwarz Criteria (SC); the graph below highlights the most optimal chosen model:

Figure N° 1. The optimal ARDL model according to Schwarz Criteria ((1, 0, 0, 0, 1, 0))



Source: Established by authors using Eviews 9

Given that the most optimal model is (1, 0, 0, 0, 1, 0), the estimator for this model is provided in the table below:

Table N° 3. Estimation of the ARDL Model (1,0,0,0,1,0)

Variables	Coefficient	Std.Error	t-statistic	Prob
LGDP(-1)	0.629541	0.171477	3.671279	0.0012
LHC	0.156116	0.040506	3.854116	0.0008
LGFCF	-0.019297	0.039284	-0.491216	0.6277
LFDI	-0.004973	0.018332	-0.271242	0.7885
LINF	-0.071311	0.040721	-1.751238	0.0927
LINF(-1)	0.057473	0.036879	1.558442	0.1322
LDO	0.316146	0.082511	3.831583	0.0008
C	3.465208	1.420923	2.438702	0.0225
R2= 0.98=);(T.statistic= 199,25 ;Prob=0.0000;DW=2.55				

Source: Established by authors using Eviews 9

4.2.2. The Bounds Test for Cointegration of the ARDL Model

The F-statistic, presented in the table, indicates the existence of a long-term relationship between the underlying variables. In fact, the observed values exceed the critical value of the upper bound (at the 1% threshold and at the 5% threshold for the model)

Table N° 4. ARDL Bound Test

Significance	I0 Bound	I1 Bound
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99
F-Statistic = 07.809056		

Source: Established by authors using Eviews 9

4.3. Long-Term Coefficients and Short-Term Dynamics

In the following, we will present the long-term elasticities and short-term dynamics.

4.3.1. Long-Term Coefficients

The estimation results of the long-term coefficients are presented in Table 5:

Table N° 5. Estimation Results of Long-Term Coefficients

Variables	Coefficients	Std.Error	T-Statistic	Prob
LHC	0.421412	0.164175	2.566850	0.0169
LGFCF	0.052089	0.096275	0.541039	0.1435
LFDI	1.813423	0.053713	0.249895	0.0048
LINF	-0.037354	0.106641	-0.350280	0.0292
LDO	0.853391	0.386417	2.208475	0.0370
C	9.353834	0.669982	13.961330	0.0000

Cointeq = LGDP - (0.4214*LH C +0.0521*LGFCF +1.1813*LFDI -0.0374*LINF +0.8534*LDO + 9.3538)

Source: Established by authors using Eviews 9

Since the variables are given in natural logarithms, the computed coefficients can be understood as elasticities.

A net increase in FDI of one percentage point of real GDP over an extended period of time leads to an improvement in economic growth of 1.81 percentage points, according to the FDI coefficient, which is 1.81. These results are in line with those of Bresser-Pereira and Gala (2008), Ben Bayer H. (2023), and Chaalal S. and Chadila A. (2020).

Our results indicate a positive and significant coefficient for human capital (HC) at the 5% level. This implies that a 1% increase in human capital results in a growth increase of roughly 0.42% under all other conditions. As long as the population is adequately educated to disseminate technical transfers across the economy, some authors actually contend that foreign direct investment (FDI) can boost the growth of the host country (Borensztein et al., 1998). This suggests that foreign direct investment (FDI) and human capital collaborate during the diffusion process and that weak educational attainment hinders FDI's capacity to spread knowledge and technology.

Inflation is another significant variable that has a positive effect on economic growth. Middle Eastern and North African nations have drawn attention to this finding.

On the other hand, the trade variable—which represents trade openness—has a significant and positive coefficient. This indicates that trade openness has had a direct and positive impact on economic growth in Algeria.

Furthermore, the domestic investment variable is not significant. This finding contradicts the theory that rising levels of domestic investment and foreign direct

investment (FDI) flows directly and positively boost growth, i.e., rising levels of domestic investment or FDI flows spur economic growth.

4.3.2. Estimation results of short-term coefficients

The estimation results of the short-term coefficients are presented in Table 6:

Table N° 6. Estimation results of short-term coefficients

Variables	Coefficients	Std.Error	T-Statistic	Prob
D(LHC)	0.156116	0.040506	3.854116	0.0008
D(LGFCF)	-0.019297	0.039284	-0.491216	0.6277
D(LFDI)	0.004973	0.018332	-0.271242	0.0385
D(LINF)	-0.071311	0.040721	-1.751238	0.1927
D(DO)	0.316146	0.082511	-3.831583	0.1208
CointEq(-1)	-0.680459	0.171477	-2.160392	0.000

Source: Established by authors using Eviews 9

One coefficient that is substantially different between zero and negative is revealed by the error correction model. It is observed that this coefficient, which is approximately 0.68, indicating the existence of a long-term relationship among the variables.

The estimates in Table 6 show that the coefficient of the FDI variable has a positive effect on economic growth, demonstrating the short-term significance of FDI as a factor that stimulates economic growth. Nonetheless, there is a statistically significant and positive correlation between the human capital component and economic growth. For the other variables, there is no discernible influence.

4.4. Robustness of the model

The validation of the different results of the model refers to various statistical tests. It entails testing for heteroskedasticity (Breusch-Pagan-Godfrey), assessing the normalcy of the mistakes, and looking for autocorrelation. The results of these different tests are illustrated in the Table 7, Figure 2, and Table 8, respectively.

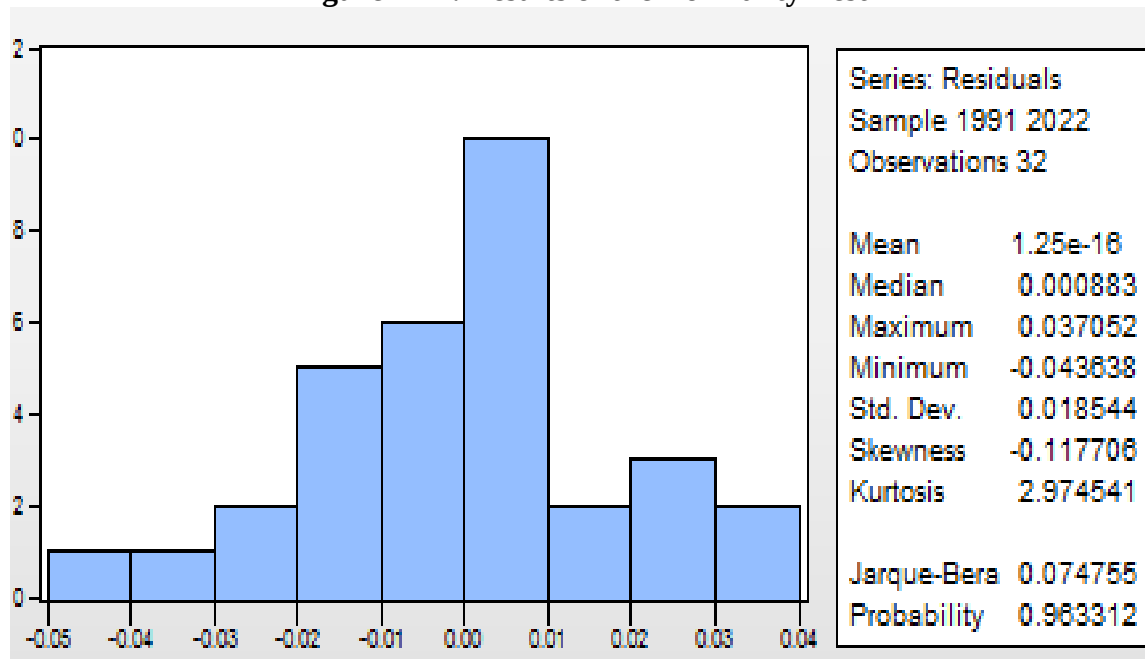
Table N° 7. Results of the Autocorrelation Test

F-statistic	1.574983	Prob. F(2,22)	0.5295
Obs*R-squared	4.007915	Prob. Chi-Square(2)	0.1348

Source: Established by authors using Eviews 9

We can tell that the residuals are not autocorrelated from this software output because the test probability is higher than the critical threshold of 5%.

Figure N° 2. Results of the Normality Test



Source: Established by authors using Eviews 9

The results above confirm that the residuals are Gaussian white noise (follow a normal distribution) because the Jarque-Bera probability is greater than 5%.

Table N° 8. Results of the Heteroskedasticity Test

F-statistic	0.780644	Prob. F(,24)	0.6997
Obs*R-squared	5.934743	Prob. Chi-Square(7)	0.5474
Scaled explained SS	3.295799	Prob. Chi-Square(7)	0.8564

Source: Established by authors using Eviews 9

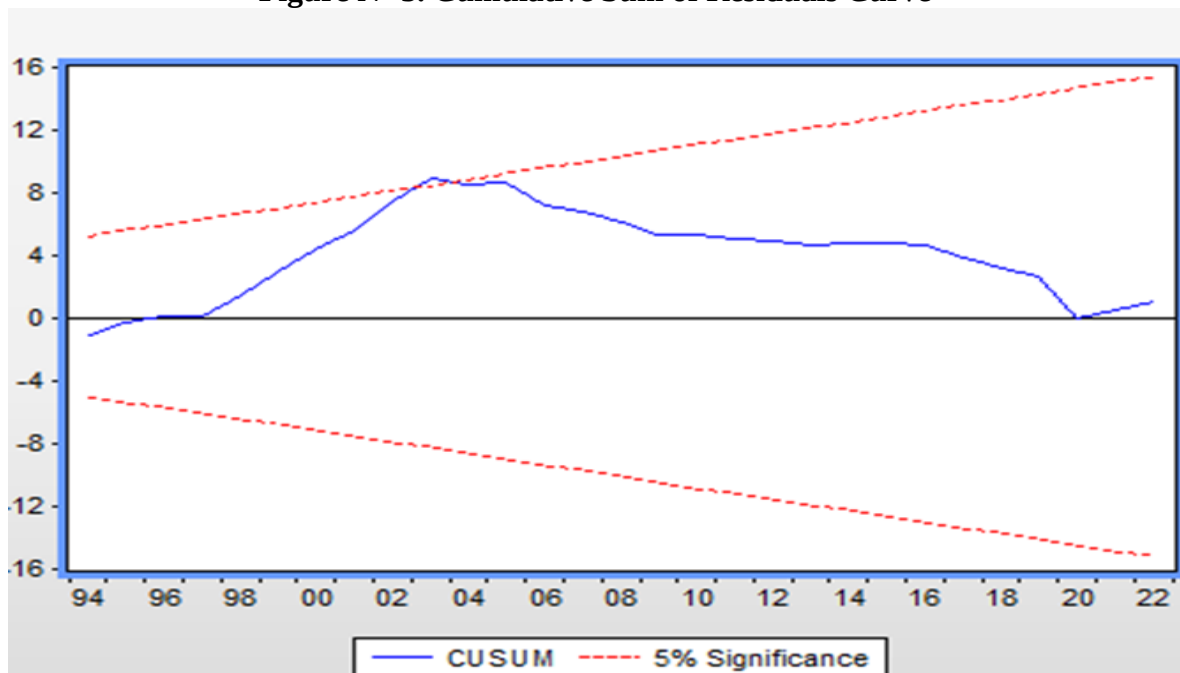
As the F-statistic probability is more than 5%, the previous table indicates that the residuals are not heteroskedastic. Consequently, the variance of our model's residuals remains constant.

4.5. Model Stability

Given that the curve stays inside the dotted corridor in the graph below, which displays the CUSUM of Squares test results, we can conclude that the estimated model is stable. The coefficients remain constant throughout time as a result.

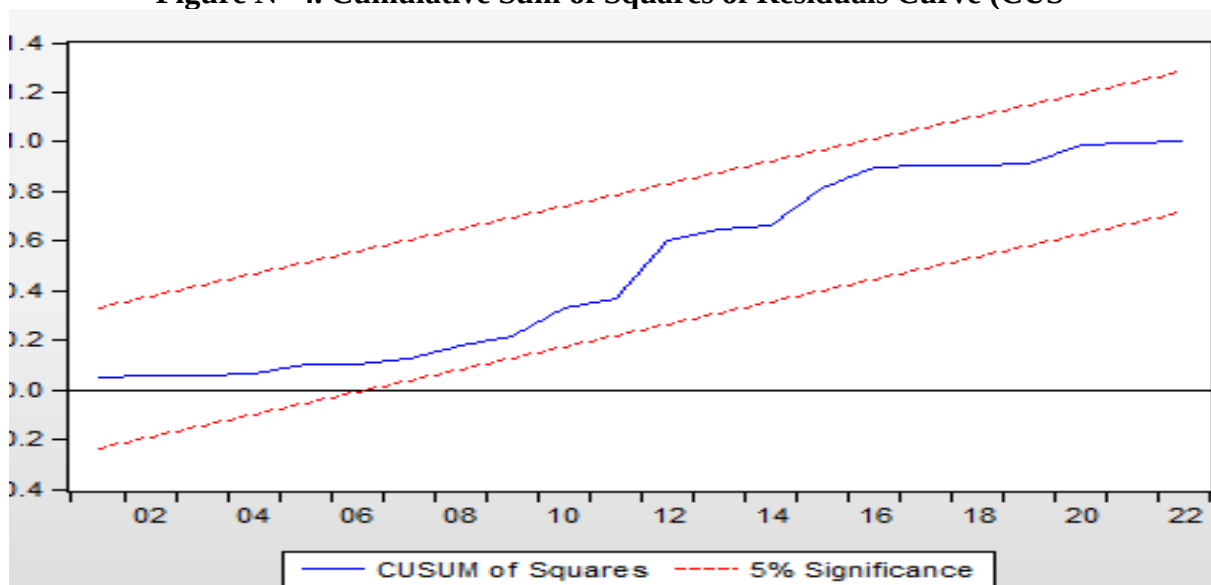
In summary, the results of the various diagnostic tests have led to the validation of our ARDL model from a statistical perspective.

Figure N° 3. Cumulative Sum of Residuals Curve



Source: Established by authors using Eviews 9

Figure N° 4. Cumulative Sum of Squares of Residuals Curve (CUS



UMQ)

Source: Established by authors using Eviews 9

5. CONCLUSION

Nowadays, FDI is seen as a catalyst that helps host countries regain their proper position in international commerce and boost economic growth, both of which increase their overall demand and productive capabilities. In light of this reality, many countries have started enacting various promotional policies to make the environment more attractive to attract foreign direct investment and ensure that resources are better allocated to areas that need them.

Our empirical investigation is mainly carried out using ARDL modeling. The main results we reached are as follows:

- The contribution of FDI to economic growth in Algeria is eminently positive.
- The positive impact of human capital on the latter also emerges.

According to the results, macroeconomic stability—which is demonstrated by controlled inflation—is a prerequisite for FDI to have an impact on growth in terms of the circumstances that enable it to promote economic growth. The analysis, however, indicates that domestic investment has no impact on economic growth.

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