**Journal of Business Administration and Economic Studies**

# The relationship between foreign direct investment inflows and economic growth in Algeria: Econometric Study during the period (1988-2018)

**العلاقة بين تدفقات الاستثمار الأجنبي المباشر والنمو الاقتصادي في الجزائر: دراسة قياسية خلال الفترة**

**(1988-2018)**

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| **Abstract** | **Keywords** |
| --- | --- |
| This study aims to try to measure the economic relationship between of FDI inflows and economic growth in Algeria for the period (1988-2018), using cointegration and the causality of Granger, The results of the study concluded that there is a convergence between the variables in the long term and also an effect between them according to the error correction model as well as a one-way causality out of the total FDI inflows and GDP, where the interpretation rate was somewhat weak, Due to the Algerian economy's link to the Hydrocarbons sector which is subject to fluctuations of prices in the oil market worldwide prices, As a result Algeria is still in need of further reforms that would attract the largest possible amount of foreign direct investment by working first to create an investment encouraging environment. | foreign direct investment inflows; gross domestic product; cointegration; Causality of Granger. |

**JEL Classification Codes**: C15; F21; F43.

| الملخص | الكلمات المفتاحية |
| --- | --- |
| تهدف هذه الدراسة إلى محاولة قياس العلاقة الاقتصادية بين تدفقات الاستثمار الأجنبي المباشر والنمو الاقتصادي في الجزائر للفترة (1988- 2018)، وذلك باستخدام التكامل المشترك وسببية غرانجر، وقد خلصت نتائج الدراسة إلى وجود تقارب بين المتغيرات في المدى الطويل وأيضا تأثير بينهما حسب نموذج تصحيح الخطأ مع وجود سببية في اتجاه واحد مابين إجمالي تدفقات الاستثمار الأجنبي المباشر والناتج المحلي الإجمالي، حيث كانت نسبة التفسير نوعا ما ضعيفة، وذلك راجع لارتباط الاقتصاد الجزائري بقطاع المحروقات فهو عرضة للتقلبات السائدة في أسعار النفط العالمية مما يوحي على أن الدولة الجزائرية مازالت في حاجة للمزيد من الإصلاحات التي من شأنها استقطاب أكبر قدر ممكن من الاستثمارات الأجنبية المباشرة بالعمل أولا على تهيئة مناخ الاستثمار. | تدفقات الاستثمار الأجنبي المباشر؛ الناتج المحلي الإجمالي؛ التكامل المشترك؛ سببية غرانجر. |

**تصنيف JEL**: C15؛ F21؛ F43.

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## I. INTRODUCTION:

Algerian governments have sought to implement a series of reforms since the early 1990s, amend investment legislation, and provide many guarantees and privileges to foreign investors in order to develop their investment climate, thereby motivating foreign investors to export their direct investments to them, especially in other non-hydrocarbon sectors.

And are well known Foreign direct investment the important in the economic growth process, Fdi can increase the host country's export capacity, causing the country to increase its foreign exchange earnings, It can also encourage the creation of new jobs, enhance technologies transfer and boost economic growth (Belloumi, 2014, p. 274).

In this context, we will study an the Algeria, with regard the economic relationship between the Foreign direct investment inflows (FDI) and economic growth, Hence the following problem can be posed:

**What is the link foreign direct investment inflows with economic growth in the Algeria During the period 1988-2018?**

- **The hypothesis of the study**:
- There is a long-term equilibrium relationship between the foreign direct investment inflows and economic growth in Algeria.
- There is a positive effect of foreign direct investment inflows on economic growth in Algeria.
- The relationship between foreign direct investment inflows and economic growth mutual (relationship Dual Trend) in a Short-term And long.

- **Study methodology:**

Given the nature of the topic and in order to achieve the objectives of this research and take note of its various aspects, we will rely on the analytical descriptive approach to studying the performance and evolution of the variables of the study through previous studies and theoretical aspects. The study will also follow the standard approach by using modern standard and statistical methods to determine the nature of the relationship between the two variables.

This paper is organized as follows, The first section Theoretical framework and Previous studies of the  on the link between FDI and economic growth, Thereafter, the second section highlights the of  Method and Procédures Followed in the study, Section 3 describes Study Results (analysis and discussion) The Econometric Study of The relationship between foreign direct investment inflows and economic growth in Algeria During the Period (1988-2018), Finally section 4 presents the conclusion of our study.

## II. THEORETICAL FRAMEWORK AND PREVIOUS STUDIES:

### 1. FDI Promotes Growth: Strong Evidences:

All the countries in the world are continuously striving for rapid economic growth and as a result they are inviting more and more investments by allowing foreign investors to invest in their

land, There are several factors that help or hinder the economic growth of a country, and the factors, that are often identified as stimulants (UNCTAD, 1994, p. 88) ,for a country's growth are: (1) Large amounts of investment capital, (2) Advanced Technologies, (3) Highly skilled labor, (4) Well-developed transportation and communication infrastructure, (5) Stable and supportive political and social institutions, (6) Low tax rates, and (7) Favorable regulatory environment, Differences in the growth rates of the countries are explained by the differences in the endowments or levels of these factors (Dondeti & Mohanty, 2007, p. 2).

FDI has long been recognized as a major source of technology and know-how to developing countries, Indeed, it is the ability of FDI to transfer not only production know- how but also managerial skills that distinguishes it from all other forms of investment, including portfolio capital and aid, While foreign portfolio investment may, in some cases, contribute to the capital formation in a developing country, often, the capital flows via this route are limited, and above all, they do not provide the advanced technologies needed to compete in the world markets, FDI can accelerate growth in the ways of generating employment in the host countries, fulfilling saving gap and huge investment demand and sharing knowledge and management skills through backward and forward linkage in the host countries (Frenkel, Katja, & Georg, 2004, p. 300), Moreover, the very presence of foreign owned firms in the economy, with their superior endowments of technology, may compel locally owned firms to invest in learning if only to keep abreast of the competition, In turn, increased competition from locally owned firms through their investments in innovation may compel foreign firms to bring in superior quality technology and know-how, FDI generates productivity spillovers for the host economy (Blomstrom & Kokko, 2002, p. 247), One idea is that multinational enterprises possess superior production technology and management techniques, some of which are captured by local firms when multinationals locate in a particular economy, In sum, imported skills enhance the marginal productivity of the capital stock in the host countries and thereby promote growth (Wang & Blomstrom, 1992, p. 155).

Though, FDI is seen as a vital factor in inducing growth rate, however, it will only lead to growth if its inflows are properly managed (Henri, 2009, p. 8), The degree up to which FDI can be exploited for economic development depends on conduciveness of economic climate, In the absence of such a climate FDI may be counterproductive, it may thwart rather than promote growth.

## 2. **Previous studies:**

There are several studies tried to explain The relationship between foreign direct investment inflows and economic growth, recall the most recent:

the study of Baharumshah and Thanoon (2006) used a dynamic panel model to examine the link between FDI and growth in East Asian economies, They demonstrated that FDI positively contributes in the process of growth in studied countries, In other words, this study has argued that countries that are successful in attracting FDI can grow faster than those that deter FDI, Based on a number of determinants of the linkage between FDI and economic growth (such as human capital, learning by doing, exports, macroeconomic stability, level of financial development, public investment and other determinants) (Baharumshah & Thanoon, 2006, pp. 70-83);

the study of Bhandari et al (2007) illustrate that an increase in the stock of domestic capital and inflow of foreign direct investment are main factors that positively affect economic growth in East European countries (Bhandari, Dhakal, Pradhan, & Upadhyaya, 2007, pp. 1-9);

Besides, Won et al (2008) focused their analysis on the case of Asian newly industrializing economies, Using the panel vector autoregressive models, results show that the openness of the economy, measured by exports and FDI inflows, is the most common economic factor attributed to the rapid growth of the Asian newly industrializing economies (Won, Frank, & Doo Yong, 2008, pp. 11-86);

Agrawal and Khan (2011) investigated the impact of FDI on economic growth in five Asian countries (China, Japan, India, South Korea, and Indonesia) over the period 1993-2009, This study confirms that FDI promotes economic growth and further provides an estimate that one dollar of FDI adds about 7 dollars to the GDP of each of the five countries (Agrawal & Khan, 2011, pp. 257-264);

Moreover, Adeniyi and al (2012) examines the causal link between FDI and economic growth with financial development in some small open developing economies, Using a trivariate framework which applies Granger causality tests in a vector error correction (VEC) over the period 1970-2005, results suggest that the extent of financial sophistication matters for the benefits of foreign direct investment on economic growth in studied economies (Adeniyi, Omisakin, Egwaikhide, & Oyinlola, 2012, pp. 105-127).

## III. METHOD AND PROCEDURES:

In our study of relationship between foreign direct investment inflows and economic growth in Algeria, the study period was selected from 1988 to 2018, For study variables data taken from the World Bank's approved data base (World Bank data, 2019).

After preparing the data obtained from the World Bank, we use the regression analysis of time series data, based on the common integration methodology and the error correction model and the Granger causation, using Eviews 10, to obtain the results that we will comment on later:
- Study variables Stability chains.
- remove the instability of the time series.
- Test co-Integration.
- error correction models (VECM).
- Causality test.

## IV. STUDY RESULTS (ANALYSIS AND DISCUSSION):

### 1. Study variables Stability chains:
If you settle the time series values fluctuated around the middle of my constant, and variation independent of time (Guy, 1991, p. 282), to test the time series quantitative tests we use the stability shown in the tests Dickey- Fuller Extended(ADF) (Abdel-Qader & Abdel-Qader, 2004, p. 657),

clarify recipe stability or instability of time series, and this is by selecting a specific direction Determinist or Random direction Stochastique If we assume the time series model version of the form AR (1): So for Three cases (Geneidy, 2006, p. 121):

$|\phi| \prec 1$ : Series $Y_t$ stable, her current weight Views greater than the last Views.

$|\phi| = 1$ : Series $Y_t$ Unstable, The current views have the same views last weight.

$|\phi| \succ 1$ : Series $Y_t$ Unstable, Views and current have less weight Views past.

Formulation of hypothesis testing shall be as follows:

Null hypothesis: $H_0 : \phi = 1$ if it was $|\tau_c| \prec |\tau_t|$ , the time series is unstable.

Alternative hypothesis: $H_1 : \phi \neq 1$ if it was $|\tau_c| \succ |\tau_t|$ , The decision is the stability of the time series.

The three extended Dickey-Fuller test models are (Régis, 2005, p. 231):

$$\begin{cases} \Delta Y_t = \lambda Y_{t-1} - \sum_{j=1}^{p} \phi_{j+1} \Delta Y_{t-j} + \mu_t \dots\dots\dots\dots\dots\dots 04 \\ \\ \Delta Y_t = \lambda Y_{t-1} - \sum_{j=1}^{p} \phi_{j+1} \Delta Y_{t-j} + c + \mu_t \dots\dots\dots\dots 05 \\ \\ \Delta Y_t = \lambda Y_{t-1} - \sum_{j=1}^{p} \phi_{j+1} \Delta Y_{t-j} + bt + c + \mu_t \dots\dots\dots 06 \end{cases}$$

Where he represents $\rho$ Delay period and determine the minimum value criteria: Akaike (AC), Hannan-Quinn (HQ), Schwarz (SC).

**- First variable LGDP:** The degree of delay by less than the value of the trade-offcriteria Compatibility $\rho = 0$ The results of the tests accept the null hypothesis: $H_0 : \phi = 1$ Time chain **LGDP** is It contains the root of the unit if it is not stable, a kind DS with derivative.
- **Second variable LFDI:** The degree of delay by less than the value of the trade-off criteria Compatibility $\rho = 0$ The results of the tests accept the null hypothesis: $H_0 : \phi = 1$ Time chain **LFDI** is It contains the root of the unit if it is not stable, a kind DS Without derivative.

Show us the test results (ADF) <u>Shown in Appendix (1)</u> Acceptance of the hypothesis: $H_0 : \phi = 1$ Which provides for the existence of the root of unity in the time series, ie that all time series (LGDP، LFDI) is unstable at the moral level 5%.

**2. <u>remove the instability of the time series:</u>**
Reached the results of the previous test to the instability of the time series, and the best practical way to remove the instability is to carry out the differences first class or second class according to the results of statistical tests, and the new form of time series $D(Y_t)$ Where: $D(Y_t) = Y_t - Y_{t-1}$ And re-perform previous statistical tests.

**- First variable DLGDP:** Lost time series watch one after the application of the differences of the

first class to become 30 watch, and follow the chain statement <u>Shown in Appendix (2)</u> note that it takes a form parallel to the axis intervals, indicating the absence of the problem of the general trend, The results <u>Shown in Appendix (3)</u> of the tests was rejected null hypothesis: $H_0 : \phi = 1$ And accept the alternative hypothesis: $H_1 : \phi \neq 1$‹Time chain DLGDP is stable.

- **Second variable DLFDI:** Lost time series watch one after the application of the differences of the first class to become 30 watch, and follow the chain statement <u>Shown in Appendix (2)</u> note that it takes a form parallel to the axis intervals, indicating the absence of the problem of the general trend, The results <u>Shown in Appendix (3)</u> of the tests was rejected null hypothesis: $H_0 : \phi = 1$ And accept the alternative hypothesis: $H_1 : \phi \neq 1$ ‹Time chain DLFDI is stable.

Showed us the results of the root of the unit tests (ADF) <u>Shown in Appendix (3)</u> Applied to the differences from the first class time series under study, rejected the null hypothesis and accept the alternative hypothesis which provides for the stability of variables.

As the variables under study is stable at the same level, it means the possibility of integrated joint integration in the long term, and to make sure this joint conduct, including integration tests.

### 3. Test co-Integration:
On The light of the results of previous tests stability, show that all variables are integrated in the same class as any non-static in their original level, but still in the first difference, so it will converge in the long term this is called co- integration theory on the time series are not static analysis to generate a linear combination is characterized by stillness in the long term.

**3.1. co-integration testing:** We use the method of Angel -Granger (EG) it relies on two series two time which passes two steps: estimating model and long-term stability of residual study.

### A. Estimate the long-term model:

$$LGDP_t = 10.96 + 0.08\ LFDI_t + \varepsilon_t$$
$$LFDI_t = -42.22 + 4.15\ LGDP_t + \mu_t$$

The long-term model was estimated based on the results of the tests Shown in Appendix 4.

### B. Stability residuum:
During the test results and Shown in Appendix 5 we note Both models remainders $(\varepsilon_t, \mu_t)$ as stable in the original level $I(0)$ then there is a co- integration between variables.

**3.2. error correction models (VECM):**
Trending variables economic co-integration characterized in the long term towards stability or the so-called status of balance, because of some changes in variables deviate temporarily put on track, and this model uses the error correction in order to reconcile long and behaviors of short-term

economic relations.

Form crosses Error correction path for amendment allows the introduction of the resulting changes in the short term in the long-term relationship (Abdel-Jalil, 2012, p. 164)، We use a method Engle - Granger (EG) it relies on two series points in time.

### A. Model Gross domestic crude:

$$\mathrm{DLGDP_t} = 0.035 - 0.075 \times \varepsilon_{(t-1)} + 0.049 \times \mathrm{DLGDP}_{(t-1)} + 0.002 \times \mathrm{DLFDI}_{(t-1)}$$
$$\quad (1.18) \quad (-1.20) \quad (-0.23) \quad\quad (0.23)$$
$$n = 29 \quad\quad R^2 = 7.29\% \quad\quad F_C = 0.67 \quad\quad (.):t-student$$

The model and the rest of the values were estimated based on the results of the tests Shown in Appendix (6)

- **statistical analysis:**

✓ The ability of investment Short-term Not moral Because: $\mathrm{t_{table}} = t_{26}^{0.05/2} = 2.47 \succ |\mathrm{t_{calcul}} = 0.23|$

✓ Not a significant parameter of constant Because: $\mathrm{t_{table}} = t_{26}^{0.05/2} = 2.47 \succ |\mathrm{t_{calcul}} = 1.18|$

✓ The value of the correction coefficient $\alpha = -0.075$ It is a negative signal in line with economic theory, which shows a causal in the long term change in Total FDI inflows toward Change Gross Domestic Production GDP that is Explains in the long-term variable.

✓ The patch is $\left(13.33 = \dfrac{1}{0.075}\right)$ 13years and 4 Months: Once 13years and 4 Month.

✓ The value of Fisher $\mathrm{F_{table}} = F_{2;26}^{0.05} = 3.37 \succ \mathrm{F_{calcul}} = 0.67$ indicate Non Moral model as a whole, as well as on non a causal in the short term of total FDI inflows about GDP.

✓ The parameter of interpretation of the model about 7.29% It is weak because the GDP Several other indicators affected by oil revenues and such as government spending... .

### B. Model Total FDI inflows:

$$\mathrm{DLFDI_t} = 0.074 - 0.454 \times \mu_{(t-1)} + 0.274 \times \mathrm{DLFDI}_{(t-1)} + 1.456 \times \mathrm{DLGDP}_{(t-1)}$$
$$\quad (0.13) \quad (-2.55) \quad (1.35) \quad\quad (0.36)$$
$$n = 29 \quad\quad R^2 = 20.81\% \quad\quad F_C = 2.19 \quad\quad (.):t-student$$

The model and the rest of the values were estimated based on the results of the tests Shown in Appendix (6).

- **statistical analysis:**

✓ The parameter of GDP Short-term not have a statistically significant because: $\mathrm{t_{table}} = t_{26}^{0.05/2} = 2.47 \succ |\mathrm{t_{calcul}} = 0.36|$ while parameter Limit Constant Morale Because:

$$t_{table} = t_{26}^{0.05/2} = 2.47 \succ |t_{calcul} = 0.13|$$

✓ The value of the correction coefficient $\alpha = -0.454$ It is a negative signal in line with economic theory, which shows a causal in the long term change in Gross Domestic Production GDP Toward Change in Total FDI inflows that is Explains in the long-term variable.

✓ The patch is $\left( 2.20 = \dfrac{1}{0.454} \right)$ 2 years and 2.4 Months: Once 2 years and 2.4 Month.

✓ The value of Fisher $F_{table} = F_{2;26}^{0.05} = 3.37 \succ F_{calcul} = 2.19$ indicate Non Moral model as a whole, as well as on non a causal in the short term of total GDP about Total FDI inflows.

✓ The percentage of interpretation of the model to the extent acceptable about 20.81%.

➢ **Model diagnosis:**

**- test the problem of self-link errors:**

| Table (01): Results Test problem of self-link errors | |
|---|---|
| Breusch-Godfrey Serial Correlation LM Test:<br><br>F-statistic    2.707106   Prob. F(2,23)    0.0879<br>Obs*R-squared    5.525832   Prob. Chi-Square(2)    0.0631 | - Model free from the problem of link errors because self:<br>$\text{Prob. Chi - Square}(2) = 0.0631 \succ 0.05$<br>$H_0 : \rho = 0$ |
| **Source:** Prepared by researchers using Eviews10. | |

**- Test problem of instability of variation:**

| Table (02): Results Test problem of instability of variation | |
|---|---|
| Heteroskedasticity Test: White<br><br>F-statistic    1.368819   Prob. F(9,19)    0.2688<br>Obs*R-squared    11.40705   Prob. Chi-Square(9)    0.2488<br>Scaled explained SS    35.48235   Prob. Chi-Square(9)    0.0000 | - The sample does not complain of the problem of instability of variation because:<br>$\text{Prob. Chi - Square}(3) = 0.2488 \succ 0.05$<br>$H_0 : \sigma_i^2 = \sigma_j^2 \quad , i \neq j$ |
| **Source:** Prepared by researchers using Eviews10. | |

**- test The normal distribution of residues:**

**Figure (01): Results test The normal distribution of residues:**



- The model realized the premise of the lack of the arithmetic mean of the residuals because:

$\bar{\varepsilon} = -3.06\text{e-}17 \approx 0$

- Variables that are not included in the model are not included in the interpretation of Dependent variable.

**Source:** Prepared by researchers using Eviews10.

**- Model stability test:**

**Figure (01): Results Model stability test:**



**Source:** Prepared by researchers using Eviews10.
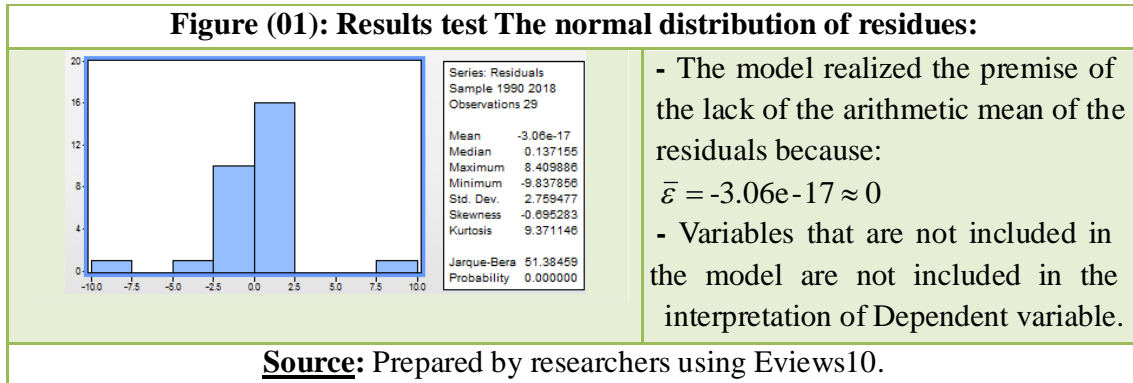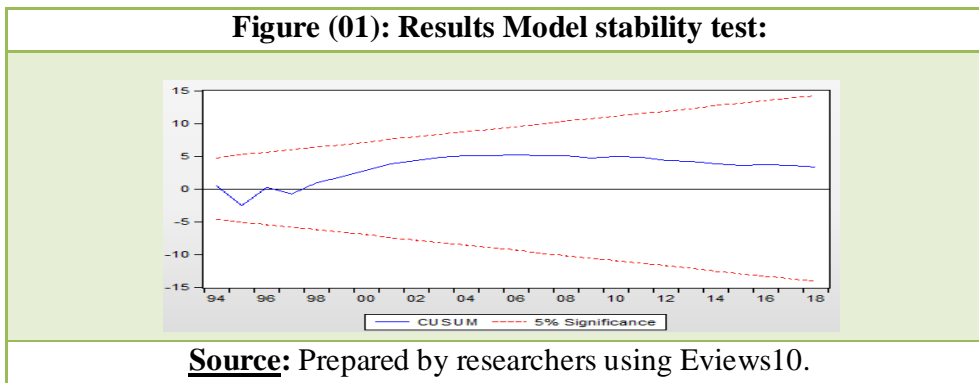
Since the graphical representation in CUSUM Test is within the critical limits at the 0.05 level, we accept the stability of the pattern and say that The model has stable capabilities over time according to the results of the CUSUM test of the curve falling within the confidence domain.

**4. Causality test:**

**Table (03): Causality test Results:**

Pairwise Granger Causality Tests
Date: 02/11/20   Time: 10:51
Sample: 1988 2018
Lags: 2

| Null Hypothesis: | Obs | F-Statistic | Prob. |
|---|---|---|---|
| GDP does not Granger Cause FDI | 29 | 0.81405 | 0.4549 |
| FDI does not Granger Cause GDP | | 7.78126 | 0.0025 |

**Source:** Prepared by researchers using Eviews10.

Through the results of the above table, we have:
- **the first case:** Prob=0.4549 > 0.05  So we accepte $H_0$ and reject $H_1$ And on that: GDP does not

cause FDI.

**- The second case:** Prob=0.0025 $<$ 0.05 So we accepte $H_1$ And on that: FDI does cause GDP.

## V. CONCLUSION:

In this applied study، The relationship between foreign direct investment inflows and economic growth in Algeria، the results of the estimate showed:

- ✓ We found all the variables are unstable chains in the original form, And stable in the first differences;
- ✓ According to the co-integration testing we reached the possibility of convergence between the variables studying In the long term;
- ✓ Through the model of error correction we have acquired the existence of the effect the long term between GDP and total FDI inflows;
- ✓ as well as a one-way causality out of the total FDI inflows toward GDP, where the interpretation rate was somewhat weak;
- ✓ He knew GDP rise marked during the study period due to developmental programs applied by the government Algerian and with This economy is linked to the Algerian hydrocarbon sector, it is vulnerable to fluctuations in the prevailing oil prices Globalism.

## VI. REFERENCES:

- Abdel-Jalil, H. (2012). "The Impact of Exchange Rate Changes on the Trade Balance - Case Study of Algeria -". *Unpublished Master Note, Economic Sciences, International Finance Specialization*, *University of Tlemcen, Algeria,* 164.

- Abdel-Qader, M., & Abdel-Qader, A. (2004). " the talk in Econometrics between Theory and Practice". *University House, Alexandria, Egypt,*  657.

- Adeniyi, O., Omisakin, O., Egwaikhide, F., & Oyinlola, A. (2012). "Foreign Direct Investment, Economic Growth and Financial Sector Development in Small Open Developing Economies". *Journal of Economic Analysis & Policy , 42* (1), 105-127.

- Agrawal, G., & Khan, M. A. (2011). "Impact of FDI on GDP Growth: A Panel Data Study". *European Journal of Scientific Research , 57* (2), 257-264.

- Baharumshah, A. Z., & Thanoon, M. A.-M. (2006). "Foreign capital flows and economic growth in East Asian countries". *China Economic Review , 17* (1), 70-83.

- Belloumi, M. (2014). "The relationship between trade, FDI and economic growth in Tunisia: An application of the autoregressive distributed lag model". *Economic Systems , 38* (2), 274.

- Bhandari, R., Dhakal, D., Pradhan, G., & Upadhyaya, K. (2007). "Foreign Aid, FDI and Economic Growth in East European Countries". *Economics Bulletin , 6* (13), 1-9.

- Blomstrom, M., & Kokko, A. (2002). "Multinational Corporations and Spillovers". *Journal of Economic Surveys , 12* (3), 247.

- Dondeti, V. R., & Mohanty, B.B . (2007). " Impact of Foreign Direct Investment on the Gross Domestic Product, Exports and Imports of Four Asian Countries (A panel Data Analysis) ". *Delhi Business Review , 8* (1), 2.

- Frenkel, M., Katja, F., & Georg, S. (2004). " A panel analysis of bilateral FDI flows to emerging economies". *Economic Systems , 28* (3), 300.

- Geneidy, M. (2006). " An Analytical Standard Study of the Phenomenon of Savings in Algeria Using VAR Self-Regression (1970-2004) ". *Unpublished Master Note, Department of Economic Sciences specializing in Quantitative Economics, University of Algiers*, 121.

- Guy, M. (1991). "Méthodes de prévision à court terme". *Bruxelles: Edition Ellipses*,  282.

- Henri, B. (2009). *"A regional perspective on aid and FDI in Southern Africa" . North West University, Potchefstroom, South Africa, Working Paper Number 147*,  8.

- Régis, B. (2005). "Econometric". *Sixth Edition, Paris: Dound,* 231.

- UNCTAD. (1994). "World Investment Report ". *New York: United Nations,* 88.

- Wang, J.-Y., & Blomstrom, M. (1992). "Foreign investment and technology transfer: A simple model". *European Economic Review, 36* (1), 155.

- Won, Y., Frank, H., & Doo Yong, Y. (2008). "FDI Inflows, Exports and Economic Growth in First and Second Generation ANIEs: Panel Data Causality Analyses". *KIEP Working Paper , 02-08*,  11-86.

- World Bank data. (2019). *Accessed January 22, 2020. OnLine:*
https://data.albankaldawli.org/country.

## VII. Appendices:

<table>
<tr><th colspan="5">Appendice (01): results of Model Estimate (06) To test the ADF for time series(LGDP and LFDI)</th></tr>
<tr><th>Series</th><th>Model 06</th><th>Statistic $|\tau_c|$</th><th>Statistic $|\tau_t|$</th><th>the décision</th></tr>
<tr><td>LGDP</td><td>$\phi = 1$<br>$c \neq 0$<br>$b = 0$</td><td>1.95</td><td>1.10</td><td>- Acceptance of hypothesis: $H_0$ the chain is unstable.</td></tr>
<tr><td>LFDI</td><td>$\phi = 1$<br>$c \neq 0$<br>$b = 0$</td><td>1.95</td><td>1.03</td><td>-Acceptance of hypothesis: $H_0$ the chain is unstable.</td></tr>
</table>

Null Hypothesis: LFDI has a unit root
Exogenous: None
Lag Length: 0 (Fixed)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -1.037958 | 0.2628 |
| Test critical values: | 1% level | -2.644302 | |
| | 5% level | -1.952473 | |
| | 10% level | -1.610211 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LFDI)
Method: Least Squares
Date: 02/11/20  Time: 00:50
Sample (adjusted): 1989 2018
Included observations: 30 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LFDI(-1) | -0.086865 | 0.083688 | -1.037958 | 0.3079 |

| | | | |
|---|---|---|---|
| R-squared | 0.033096 | Mean dependent var | 0.159231 |
| Adjusted R-squared | 0.033096 | S.D. dependent var | 3.047425 |
| S.E. of regression | 2.996571 | Akaike info criterion | 5.065580 |
| Sum squared resid | 260.4038 | Schwarz criterion | 5.112286 |
| Log likelihood | -74.98370 | Hannan-Quinn criter. | 5.080522 |
| Durbin-Watson stat | 1.840383 | | |

Null Hypothesis: LGDP has a unit root
Exogenous: None
Lag Length: 0 (Fixed)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | 1.103540 | 0.9260 |
| Test critical values: | 1% level | -2.644302 | |
| | 5% level | -1.952473 | |
| | 10% level | -1.610211 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LGDP)
Method: Least Squares
Date: 02/11/20  Time: 00:34
Sample (adjusted): 1989 2018
Included observations: 30 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LGDP(-1) | 0.002681 | 0.002430 | 1.103540 | 0.2789 |

| | | | |
|---|---|---|---|
| R-squared | -0.002331 | Mean dependent var | 0.031357 |
| Adjusted R-squared | -0.002331 | S.D. dependent var | 0.151322 |
| S.E. of regression | 0.151499 | Akaike info criterion | -0.903716 |
| Sum squared resid | 0.665602 | Schwarz criterion | -0.857010 |
| Log likelihood | 14.55575 | Hannan-Quinn criter. | -0.888775 |
| Durbin-Watson stat | 1.952596 | | |

**Source:** Prepared by researchers using Eviews10.

| **Appendice (02): Statement of the new chains $D(Y_t)$** |
|---|

DLGDP             DLFDI
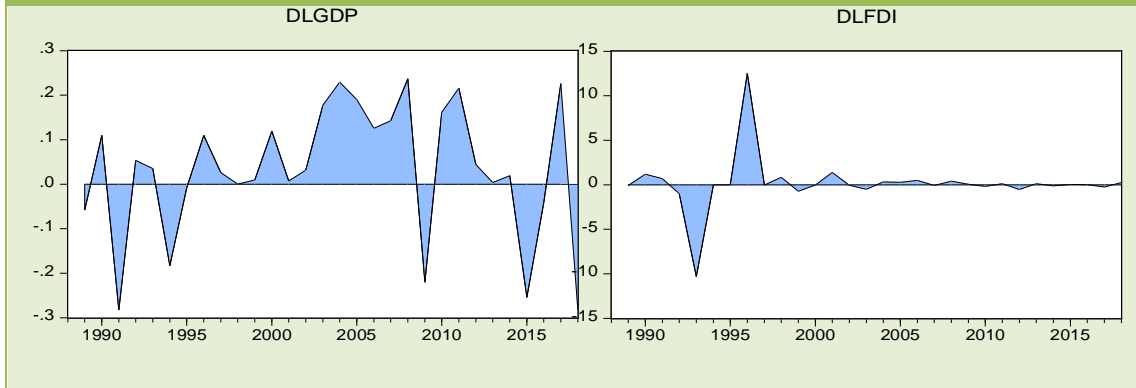


**Source:** Prepared by researchers using Eviews10.

| **Appendice (03): results of Model Estimate (06) To test the ADF for time series(DLGDP and DLFDI)** | | | | |
|---|---|---|---|---|
| **Series** | **Model 06** | **Statistic $\lvert\tau_c\rvert$** | **Statistic $\lvert\tau_t\rvert$** | **the décision** |
| *LGDP* | $\phi \neq 1$ <br> $c \neq 0$ <br> $b = 0$ | 1.95 | 4.95 | - Rejecting the null hypothesis $H_0$ and accepting the alternative hypothesis $H_1$, as the chain is stable. |
| *LFDI* | $\phi \neq 1$ <br> $c \neq 0$ <br> $b = 0$ | 1.95 | 5.12 | - Rejecting the null hypothesis $H_0$ and accepting the alternative hypothesis $H_1$, as the chain is stable. |

Null Hypothesis: DLFDI has a unit root
Exogenous: None
Lag Length: 0 (Fixed)

|  | t-Statistic | Prob.* |
|---|---|---|
| Augmented Dickey-Fuller test statistic | -5.122251 | 0.0000 |
| Test critical values:   1% level | -2.647120 | |
|    5% level | -1.952910 | |
|    10% level | -1.610011 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DLFDI)
Method: Least Squares
Date: 02/11/20   Time: 01:26
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| DLFDI(-1) | -0.967609 | 0.188903 | -5.122251 | 0.0000 |

| R-squared | 0.483748 | Mean dependent var | 0.011206 |
|---|---|---|---|
| Adjusted R-squared | 0.483748 | S.D. dependent var | 4.320184 |
| S.E. of regression | 3.104082 | Akaike info criterion | 5.137187 |
| Sum squared resid | 269.7891 | Schwarz criterion | 5.184335 |
| Log likelihood | -73.48921 | Hannan-Quinn criter. | 5.151953 |
| Durbin-Watson stat | 1.993888 | | |

Null Hypothesis: DLGDP has a unit root
Exogenous: None
Lag Length: 0 (Fixed)

|  | t-Statistic | Prob.* |
|---|---|---|
| Augmented Dickey-Fuller test statistic | -4.959318 | 0.0000 |
| Test critical values:   1% level | -2.647120 | |
|    5% level | -1.952910 | |
|    10% level | -1.610011 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DLGDP)
Method: Least Squares
Date: 02/11/20   Time: 01:10
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| DLGDP(-1) | -0.993967 | 0.200424 | -4.959318 | 0.0000 |

| R-squared | 0.466913 | Mean dependent var | -0.007747 |
|---|---|---|---|
| Adjusted R-squared | 0.466913 | S.D. dependent var | 0.215028 |
| S.E. of regression | 0.156998 | Akaike info criterion | -0.831293 |
| Sum squared resid | 0.690155 | Schwarz criterion | -0.784144 |
| Log likelihood | 13.05374 | Hannan-Quinn criter. | -0.816526 |
| Durbin-Watson stat | 1.847641 | | |

**Source:** Prepared by researchers using Eviews10.

| **Appendice (04): results Estimate the long-term model** | |
|---|---|
| **model** *LFDI* | **model** *LGDP* |

## Appendice (05): Stab...

### residuum model *LFDI*

Dependent Variable: LFDI
Method: Least Squares
Date: 02/08/20 Time: 21:15
Sample (adjusted): 1988 2018

**Left panel**

Null Hypothesis: E2 has a unit root
Exogenous: None
Lag Length: 5 (Automatic - based on AIC, maxlag=7)

| | t-Statistic | Prob.* |
|---|---|---|
| Augmented Dickey-Fuller test statistic | -3.977302 | 0.0003 |
| Test critical values: 1% level | -2.660720 | |
| 5% level | -1.955020 | |
| 10% level | -1.609070 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(E2)
Method: Least Squares
Date: 02/11/20 Time: 02:02
Sample (adjusted): 1994 2018
Included observations: 25 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| E2(-1) | -0.585034 | 0.147093 | -3.977302 | 0.0008 |
| D(E2(-1)) | 0.316885 | 0.153662 | 2.062220 | 0.0531 |
| D(E2(-2)) | 0.537169 | 0.148914 | 3.607249 | 0.0019 |
| D(E2(-3)) | -0.190288 | 0.120526 | -1.578811 | 0.1309 |
| D(E2(-4)) | 0.093533 | 0.123375 | 0.758117 | 0.4577 |
| D(E2(-5)) | 0.355559 | 0.121293 | 2.931402 | 0.0086 |

| R-squared | 0.698264 | Mean dependent var | 0.390079 |
|---|---|---|---|
| Adjusted R-squared | 0.618860 | S.D. dependent var | 2.549085 |
| S.E. of regression | 1.573718 | Akaike info criterion | 3.950322 |
| Sum squared resid | 47.05517 | Schwarz criterion | 4.242852 |
| Log likelihood | -43.37902 | Hannan-Quinn criter. | 4.031457 |
| Durbin-Watson stat | 2.121446 | | |

**Right panel**

Dependent Variable: LGDP
Method: Least Squares
Date: 0208/20 Time: 20:40
Sample (adjusted): 1988 2018
Included observations: 31 after adjustments

Null Hypothesis: E1 has a unit root
Exogenous: None
Lag Length: 8 (Fixed)

| | t-Statistic | Prob.* |
|---|---|---|
| Augmented Dickey-Fuller test statistic | -2.066147 | 0.0397 |
| Test critical values: 1% level | -2.674290 | |
| 5% level | -1.957204 | |
| 10% level | -1.608175 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(E1)
Method: Least Squares
Date: 02/11/20 Time: 01:54
Sample (adjusted): 1997 2018
Included observations: 22 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| E1(-1) | -0.216489 | 0.104779 | -2.066147 | 0.0593 |
| D(E1(-1)) | 0.037452 | 0.190000 | 0.197114 | 0.8468 |
| D(E1(-2)) | 0.153875 | 0.194110 | 0.792722 | 0.4422 |
| D(E1(-3)) | 0.436927 | 0.197268 | 2.214884 | 0.0452 |
| D(E1(-4)) | 0.101544 | 0.164563 | 0.617051 | 0.5479 |
| D(E1(-5)) | 0.047250 | 0.159951 | 0.295401 | 0.7724 |
| D(E1(-6)) | 0.269778 | 0.143297 | 1.882653 | 0.0823 |
| D(E1(-7)) | 0.106610 | 0.138687 | 0.768709 | 0.4558 |
| D(E1(-8)) | -0.131349 | 0.135084 | -0.972351 | 0.3486 |

| R-squared | 0.355995 | Mean dependent var | 0.046474 |
|---|---|---|---|
| Adjusted R-squared | -0.040316 | S.D. dependent var | 0.159033 |
| S.E. of regression | 0.162207 | Akaike info criterion | -0.507793 |
| Sum squared resid | 0.342046 | Schwarz criterion | -0.061458 |
| Log likelihood | 14.58573 | Hannan-Quinn criter. | -0.402650 |
| Durbin-Watson stat | 2.035565 | | |

**Source:** Prepared by researchers using Eviews10.

## Appendice (06): error correction models(VECM)

| model *LFDI* | model *LGDP* |
|---|---|

**model LFDI**

Dependent Variable: DLFDI
Method: Least Squares
Date: 02/11/20 Time: 02:18
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.074270 | 0.568251 | 0.130699 | 0.8971 |
| E2(-1) | -0.454402 | 0.177691 | -2.557257 | 0.0170 |
| DLFDI(-1) | 0.274210 | 0.202198 | 1.356145 | 0.1872 |
| DLGDP(-1) | 1.456497 | 3.961162 | 0.367694 | 0.7162 |

| R-squared | 0.208159 | Mean dependent var | 0.167278 |
|---|---|---|---|
| Adjusted R-squared | 0.113138 | S.D. dependent var | 3.101042 |
| S.E. of regression | 2.920356 | Akaike info criterion | 5.108730 |
| Sum squared resid | 213.2119 | Schwarz criterion | 5.297323 |
| Log likelihood | -70.07658 | Hannan-Quinn criter. | 5.167795 |
| F-statistic | 2.190659 | Durbin-Watson stat | 2.174313 |
| Prob(F-statistic) | 0.114199 | | |

**model LGDP**

Dependent Variable: DLGDP
Method: Least Squares
Date: 02/11/20 Time: 02:15
Sample (adjusted): 1990 2018
Included observations: 29 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.035805 | 0.030253 | 1.183518 | 0.2477 |
| E1(-1) | -0.075732 | 0.062960 | -1.202861 | 0.2403 |
| DLGDP(-1) | -0.049958 | 0.209490 | -0.238475 | 0.8135 |
| DLFDI(-1) | 0.002386 | 0.010101 | 0.236210 | 0.8152 |

| R-squared | 0.074694 | Mean dependent var | 0.034442 |
|---|---|---|---|
| Adjusted R-squared | -0.036343 | S.D. dependent var | 0.153038 |
| S.E. of regression | 0.155794 | Akaike info criterion | -0.753124 |
| Sum squared resid | 0.606793 | Schwarz criterion | -0.564531 |
| Log likelihood | 14.92030 | Hannan-Quinn criter. | -0.694059 |
| F-statistic | 0.672696 | Durbin-Watson stat | 1.864536 |
| Prob(F-statistic) | 0.576839 | | |

**Source:** Prepared by researchers using Eviews10.