

# THE IMPACT OF FOREIGN DIRECT INVESTMENT ON ECONOMIC GROWTH IN NORTH AFRICAN COUNTRIES: AN ECONOMETRIC STUDY USING PANEL DATA FOR THE PERIOD (2000-2019)

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## Abstract:

*This study aims to estimate the impact of foreign direct investment (FDI) on the economic growth of a sample including four North African countries during the period (1990-2019). It utilized panel data analysis and the fully modified least squares method (FMOLS) to estimate the long-term relationship after confirming the existence of cointegration among the study variables.*

*The findings of the study indicate a positive and significant impact of foreign direct investment on economic growth in North African countries. An increase in foreign direct investment by 1% is expected to lead to a 0.02% increase in economic growth in the long term.*

**Keywords:** Foreign Direct Investment; Economic Growth; Fully Modified Least Squares Method.

**JEL Classifications:** F21, O47, C33

## INTRODUCTION:

Foreign Direct Investment (FDI) stands as a pivotal and extensively debated topic across a broad spectrum of economic discourse. Nations, irrespective of their developmental stage, are committed to cultivating an appealing investment atmosphere to magnetize foreign direct investments.

For developing nations, FDI emerges as a strategic avenue to accrue foreign reserves through engagement with investments and multinational enterprises from more developed economies. It serves as an invaluable mechanism for funding and capital accumulation, facilitating the transfer of technology, imparting specialized knowledge, and acting as a crucial conduit for international trade. Viewed from this lens, countries in North Africa, akin to their developing counterparts, are keen on drawing foreign investors to bolster their quota of inbound foreign direct investment flows.

Their objective is to spur economic growth and foster job creation. To this end, North African nations have embarked on a series of economic and legislative reforms aimed at dismantling impediments to their foreign trade, capital, and investment streams. These reforms encompass a wide array of tax incentives and customs facilitations, alongside efforts to establish a conducive institutional framework.

### Study Problem:

The central question of this study revolves around the following:

- **What is the extent of the impact of foreign direct investment on economic growth in North African countries during the period (1990-2019)?**

### Study Hypothesis:

To address this question, the study starts with the following fundamental hypothesis:

- Foreign direct investment positively affects economic growth performance in North African countries, with an increase in foreign direct investment flows leading to higher levels of economic growth.

### Study Significance:

Generally, foreign direct investment is considered a stimulant for economic growth. However, empirical studies somewhat vary, indicating a positive, neutral, or even negative relationship between foreign direct investment and economic growth. Hence, it is important to assess the impact of foreign direct investment on economic growth in North African countries.



### **Study Objectives:**

The primary objective of this study is to test the extent of the impact of foreign direct investment on long-term economic growth in a sample of North African countries during the period (1990-2019), utilizing panel data models and the fully modified least squares method (FMOLS).

### **Study Methodology:**

To achieve the study's objective and test the validity of its hypothesis, the study relies on a descriptive and analytical approach to determine the relationship between foreign direct investment (FDI) and economic growth, as well as an inductive approach through the use of statistical analysis methods to ascertain the impact of foreign direct investment on economic growth in North African countries.

### **LITERATURE REVIEW:**

Numerous empirical studies have focused on examining the impact of foreign direct investment on economic growth using descriptive and econometric methods. While these studies vary in terms of time scope, geographic area, and econometric methods used, most agree on the positive impact of foreign direct investment on economic growth. Here, we review some of the significant studies as follows:

A study by Alaya (2006) aimed to explore the impact of foreign direct investment on economic growth in a sample of 7 countries from the Southern Mediterranean region during the period (1975-2002). Using panel models and the two-stage least squares method (2SLS), the study found that foreign direct investment had a positive impact on the economic growth of Turkey, Egypt, and Morocco, while it had a negative impact on economic growth in Tunisia.

Another study by Adams (2009) attempted to investigate the effect of domestic investment and foreign direct investment on economic growth in a sample of Sub-Saharan African countries using panel models during the period (1990-2003). The study concluded that both domestic investment and foreign direct investment have a significant positive effect on economic growth in the sample countries.

Sauwaluck (2012) conducted a study to determine the impact of foreign direct investment on economic growth in South Korea during the period (1980-2009). Using a multiple regression model, the study found a strong positive impact of foreign direct investment on economic growth. The study also explored the interaction effects between human capital and foreign direct investment, indicating that high technology transfer and knowledge have a negative impact on economic growth in South Korea.

A study by Kamal (2012) aimed to examine the impact of foreign direct investment on economic growth in a sample of 16 Arab countries during the period (1970-2008). Applying dynamic panel models, the study found that the impact of foreign direct investment on economic growth in Arab countries was weak. It also revealed that financial development, trade openness, human capital, and the quality of infrastructure do not significantly enhance the Arab countries' ability to reap the benefits of growth from foreign direct investment.

The study recommended further efforts to improve the conditions for a positive impact of foreign direct investment on economic growth in Arab countries through a series of reforms, including improving institutional quality, macroeconomic policies, and local financial markets.

A study by Anis & Amel (2017) aimed to explore the reciprocal relationship between foreign direct investment flows and economic growth in three African economies: Tunisia, Morocco, and Egypt during the period 1985-2011. Using a simultaneous equations model and the Generalized Method of Moments (GMM), the results indicated a mutual bidirectional relationship between foreign direct investment and economic growth in these countries. Furthermore, the results showed that high levels of foreign direct investment flows have contributed to accelerating economic growth in these economies.

### **Theoretical Framework:**

1- **The Concept of Foreign Direct Investment :**

1-1 **Definition of Foreign Direct Investment:**



The definitions of Foreign Direct Investment (FDI) vary and diversify, and the most significant definitions issued by international organizations and bodies are as follows:

The International Monetary Fund (IMF) defines foreign direct investment as direct when an investor owns 10 percent or more of the voting shares of an enterprise, with such ownership being linked to the ability to influence the management of the enterprise. (Hassan, 2004, p 03)

According to the United Nations Conference on Trade and Development (UNCTAD), foreign direct investment is an investment that involves a long-term relationship and the acquisition of a lasting interest in a company operating in an economy other than that of the investor (the host country), reflecting the foreign investor's interest in managing and controlling its assets from either the home or host country, and the investor may be an individual or a corporate entity. (Hassan, 2011, p 69-70)

The World Trade Organization (WTO) defines foreign direct investment as an activity that occurs when an investor based in one country (the home country) owns productive assets in another country (the host country) with the intention of managing them. (Sofiane, 2017, page 09)

The Organisation for Economic Co-operation and Development (OECD) defines it as an investment made to establish lasting economic relations, allowing the possibility of exercising an effective managerial influence. (Abdel Rezzak, 2014, p 33)

From the above definitions, it is clear that foreign direct investment involves the ownership by an investor of productive assets in another country, with such ownership being linked to the capacity to influence the management of these assets.

**1-2 Importance of Foreign Direct Investment:**

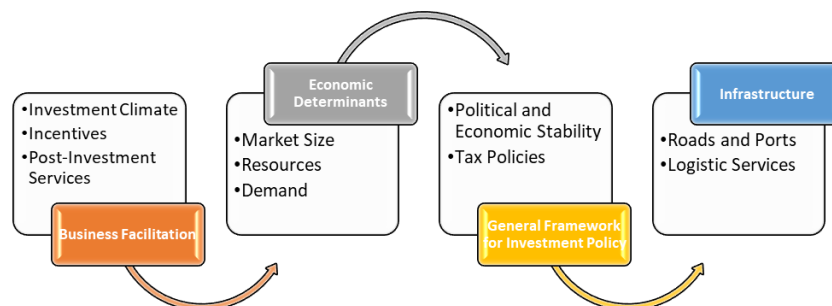
The overall benefits of foreign direct investment for the economies of developing countries are well-documented. Considering the appropriate policies of the host country and the basic level of development, many studies show that foreign direct investment leads to technology spillovers, assists in human capital formation, contributes to international trade integration, helps create a more competitive business environment, and fosters enterprise development.

All these contribute to increased economic growth, which is the most effective tool for alleviating poverty in developing countries. Moreover, beyond the pure economic benefits, foreign direct investment can help improve environmental and social conditions in the host country, for example, through the transfer of technologies and the implementation of more socially responsible institutional policies. (OECD, 2002, p. 05)

**1-3 Determinants of Foreign Direct Investment:**

Several factors determine a foreign investor's decision to invest in host countries, and these factors vary depending on the nature of the investment project and the prevailing investment climate. The investment climate is a fundamental factor in attracting foreign direct investments. The following figure illustrates the main determinants of foreign direct investment in host countries according to the United Nations Conference on Trade and Development (UNCTAD, 1998) report:

**Figure 1: Determinants of Foreign Direct Investment**





**Source: UNCTAD, 1998 World Investment Report: Trends and Determinants**

According to the United Nations Conference on Trade and Development (UNCTAD, 1998), there are three main determinants of foreign direct investment, which are: (1) infrastructure such as roads, ports, and logistic services, (2) the general framework of investment policy including political and economic stability and tax policies, (3) economic determinants such as market size and resource availability, (4) business facilitation including investment incentives and post-investment services.

**2- Foreign Direct Investment and Economic Growth:**

Foreign direct investment is considered one of the main components of total expenditure that significantly impacts the production cycle, employment levels, and unemployment reduction. This is attributed to the crucial role that investment plays in determining economic growth levels, in addition to the fact that improvements in economic activity levels and a decrease in unemployment are largely dependent on investment spending levels. (Mohamed & Djamel, 2017, page 05)

Furthermore, foreign direct investment contributes to economic growth through two main channels. The first establishes an additional capital stock for host countries and adds to these countries' savings or foreign currency reserves. The second provides the technical knowledge required for the successful completion of the investment project, thereby increasing the host country's absorptive capacity. (Hans, 1973, p. 09)

On the other hand, the impact of foreign direct investment on economic growth depends on two main factors: the type of sector invested in and the conditions that must be present in the host country. The impact of foreign direct investment on growth depends on the sector in which it is invested. Investment in basic sectors may have a negative impact on economic growth, while investment in the industrial sector enhances economic growth.

The impact of investment in the service sector is unclear; it may be negative or positive. As for the conditions that must be present in the host country, several studies have shown that the positive impact of foreign direct investment on growth is conditional on several factors specific to the host country, including the quality of education and its outputs, the development of human capital, the size of wealth, the development of the financial market, the degree of trade openness, political and economic stability, and an investment-friendly environment. (Salah & Ahmed, 2016, p 14)

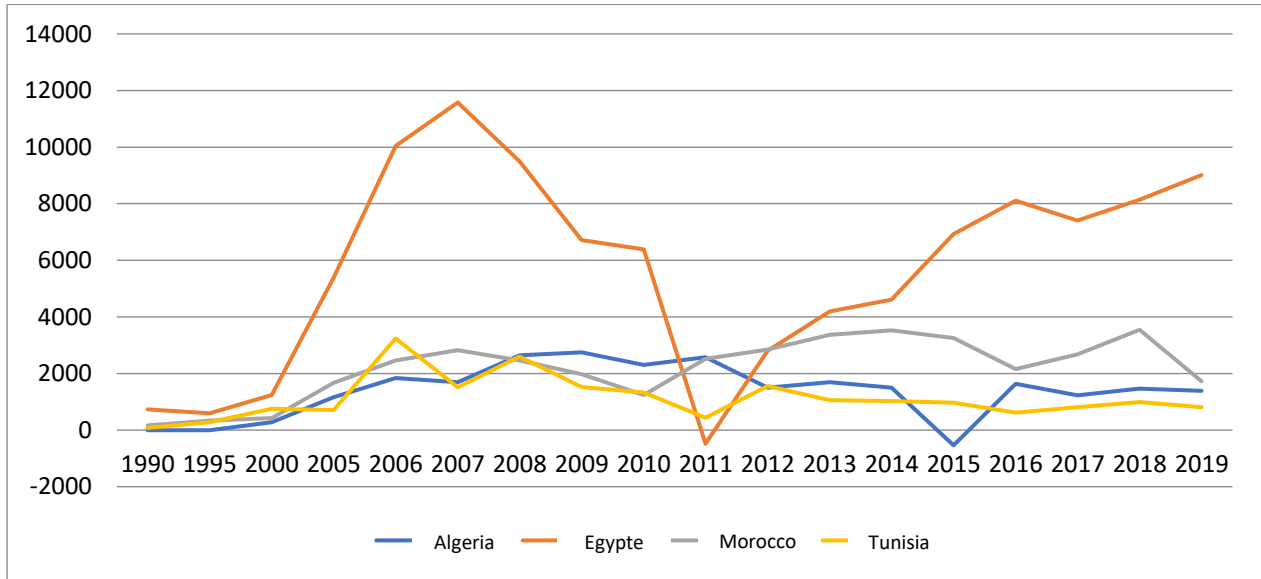
**3- Inflows of Foreign Direct Investment to North African Countries During the Period (1990-2019)**

The inflows of foreign direct investment to a sample of North African countries were characterized by fluctuation and instability from year to year throughout the period (1990-2019). These inflows experienced a significant revival since the beginning of the third millennium compared to the 1990s due to the improvement of the investment climate in these countries.

Figure (02) illustrates the disparity in the amount of foreign direct investment inflows to North African countries during the period (1990-2019). It is evident that Egypt attracted the largest share of foreign direct investment inflows to the North African region during the study period, indicating the suitability of the investment climate in Egypt compared to other countries.

As for Algeria, Tunisia, and Morocco, they experienced lower foreign investment inflows compared to Egypt. It is also noticeable that the political disturbances that occurred in Egypt and Tunisia in 2011 had a negative impact on foreign direct investment inflows, especially Egypt, which recorded a negative value of foreign direct investment inflows in 2011. As shown in the figure above, Algeria also recorded a negative value in 2015 due to the liquidation of foreign investment.

**Figure (02): Foreign Direct Investment Flows to North African Countries During the Period (1990-2019) (Unit: Million USD)**



Source: Prepared by the researcher based on World Bank data.

**Practical Framework:**

**1- Study Sample and Data Sources:**

This study aims to measure the impact of foreign direct investment (FDI) on economic growth during the period (1990-2019) for a sample consisting of 4 countries from the North African region (Algeria, Egypt, Morocco, and Tunisia). Regarding data sources, the study relies on the World Bank database (World Bank, 2021) and the Barro and Lee database (Barro & Lee, 2021) for the indicator of average years of schooling.

**2- Study Model:**

Based on previous empirical studies, this study will use the average per capita GDP (economic growth) as the dependent variable, with physical capital, number of workers, human capital, and foreign direct investment as explanatory variables. This is represented by the following mathematical formula:

$$LGDP_{PC} = f(LK, LL, LH, LFDI) \dots\dots\dots (01) \quad t= 1990-2019$$

Where:

**LGDP<sub>PC</sub>:** Logarithm of per capita GDP;

**LK:** Logarithm of physical capital as a percentage of GDP;

**LL:** Logarithm of the total number of workers;

**LH:** Logarithm of human capital measured by the average number of years of schooling for the age group 15 years and older;

**LFDI:** Logarithm of foreign direct investment as a percentage of GDP.

To study the impact of foreign direct investment on economic growth in North African countries, the following basic regression equation will be used:

$$LGDP_{PC} = \beta_0 + \beta_1LK_{it} + \beta_2LL_{it} + \beta_3LH_{it} + \beta_4LFDI_{it} + \varepsilon_{it}\dots\dots\dots(02)$$

Where *i* represents the number of countries, *t* represents the time period, and  $\varepsilon_{it}$  represents the random error term.

**3- Study of Stationarity and Cointegration of Study Variables:**

**3.1 Study of Stationarity for Study Variables:**

To study the stationarity of the time series data for the study variables and determine their degree of integration, the study will rely on the most important and commonly used stationarity tests in empirical studies, which primarily include: Levin, Lin, and Chu (LLC) test, Im, Pesaran, and Shin (IPS)

test, and Augmented Dickey-Fuller (ADF) test. The null hypothesis (H0) for these tests posits that the series contains a unit root (the series is non-stationary).

**Table (01): Stationarity Tests for Study Variables**

Variables	IPS Test	LLC Test	ADF Test
LGDPpc	1.61675 (0.9470)	1.72709 (0.9579)	5.33400 (0.7214)
LK	-1.49818 (0.0670)	-1.26218 (0.1034)	12.8407 (0.11174)
LL	2.51918 (0.9941)	0.13409 (0.5533)	2.98241 (0.9355)
LH	1.61952 (0.9473)	-0.64364 (0.2599)	2.07853 (0.9785)
LFDI	-3.44089 (0.0003)	-0.91080 (0.1812)	6.24704 (0.6196)
<b>At the First Difference</b>			
DLGDPpc	-3.45533 (0.0003)	-2.75801 (0.0029)	25.0371 (0.0015)
DLK	-6.23303 (0.0000)	-6.55416 (0.0000)	46.2659 (0.0000)
DLL	-5.71437 (0.0000)	5.57583 (0.0000)	42.9484 (0.0000)
DLH	0.21159 (0.5838)	-3.20173 (0.0007)	20.3084 (0.0092)
DLFDI	-16.1291 (0.0000)	-17.2340 (0.0000)	264.804 (0.0000)
<b>H0: Unit Root/Non-Stationarity</b>			

Source: Created using Eviews.10 software.

The results from Table (01) indicate that all stationarity tests (ADF, IPS, and LLC) show the study variables (LGDPpc, LK, LL, LH, LFDI) are non-stationary at the level (Level), as the p-values for these tests exceed 0.05 at a 5% significance level, thus accepting the null hypothesis (H0). However, after differencing these variables at the first difference (1st Difference) and reapplying the same tests, it was found that all the aforementioned variables became stationary (rejecting the null hypothesis), indicating that all study variables are integrated of order one, i.e., I(1).

### 3.2 Study of Cointegration Relationships Between Study Variables:

After confirming that all study variables (Lgdppc, LK, LL, LH, LFDI) are integrated of order one I(1), the next step involves testing for the presence of cointegration (Cointegration test) among these variables.

#### 3.2.1 Pedroni Cointegration Test:

The Pedroni test is one of the most important tests used to detect the existence of cointegration among variables integrated at the same order. Pedroni proposes seven statistics calculated to test the possibility of cointegration within panel data, which can be classified into two groups: within-dimension statistics and between-dimension statistics.

These statistics approximately follow the standard normal distribution. The null hypothesis (H0) for this test posits the absence of cointegration relationships. (Pedroni, 2002) The following table shows the results of this test:

**Table (02): Results of the Pedroni Cointegration Test**

<b>Pedroni Residual Cointegration test</b>		
<b>Null Hypothesis: No Cointegration</b>		
Test	Statistic	Prob
<b>within-dimension</b>		
Panel v-Statistic	1.324167	(0.0927)
Panel rho-Statistic	-0.880272	(0.1894)
Panel PP-Statistic	-3.448985	(0.0003)
Panel ADF-Statistic	-3.440318	(0.0003)
<b>between-dimension</b>		
Group rho-Statistic	0.267546	(0.6055)
Group PP-Statistic	-2.141736	(0.0161)
Group ADF-Statistic	-2.185805	(0.0144)

Source: Prepared using Eviews.10 software.

From the results shown in Table (02), it is evident that most of the Pedroni test statistics are significant at the 5% level except for the Panel  $\nu$ -Statistic, Panel rho-Statistic, and Group rho-Statistic. Consequently, the null hypothesis will be rejected, and the alternative hypothesis (H1), which posits the existence of cointegration among the study variables, is accepted.

**3.2.2 Kao Cointegration Test:**

In addition to the Pedroni test, another test called the Kao test relies primarily on using the Augmented Dickey-Fuller (ADF) test. The Kao test is based on two hypotheses: the null hypothesis H0 (no cointegration) and the alternative hypothesis H1 (existence of cointegration). (Kao, 1999)

The following table presents the results of this test:

**Table (03): Results of the Kao Cointegration Test**

Kao Residual Cointegration test		
Null Hypothesis : No Cointegration		
	Statistic	Prob
ADF-Statistic	-3.005954	(0.0013)

Source: Prepared using Eviews.10 software.

From the Kao test results shown in Table (03), the probability value (0.0013) associated with the ADF-Statistic is less than 0.05. As a result, the null hypothesis will be rejected, and the alternative hypothesis H1, which acknowledges the existence of cointegration, is accepted. Therefore, it is possible to estimate the long-term relationship between the study variables.

**4- Estimating the Long-term Relationship Using the Fully Modified Ordinary Least Squares (FMOLS) Method:**

To estimate the long-term relationship between economic growth and the explanatory variables included in the study model, a non-parametric estimation method called Fully Modified Ordinary Least Squares (FMOLS) will be used.

This method is distinguished by its ability to deal with several econometric problems, including efficiency of estimators, addressing the issue of autocorrelation and bias in parameters, as well as handling the endogeneity of variables. (Irwan et al., 2014, p. 242)

The following table presents the results of estimating the long-term relationship using the FMOLS method:

**Table (04): FMOLS Estimation Results of the Impact of Foreign Direct Investment on Economic Growth in North African Countries**

Dependent Variable : LGDPpc			
Method : Panel Modified Least Squares (FMOLS)			
Periods included : 18			
Cross-sections included : 4			
Variable	Coefficient	T-statistic	Prob
LK	-0.047029	-2.92604	(0.0042)*
LL	0.300639	7.703879	(0.0000)*
LH	0.776263	21.94181	(0.0000)*
LFDI	0.022017	3.414150	(0.0009)*

R-squared	0.971799
Adjusted R-squared	0.969972

Note: (\*) and (\*\*) indicate significance at the 1% and 5% level, respectively.

**Source: Prepared using Eviews.10 software.**

The table above shows the estimation results of the impact of foreign direct investment on long-term economic growth for a sample of North African countries during the period (1990-2019). The results reveal that the explanatory variables have acquired the expected economic sign and were statistically significant at the 1% level, except for the capital variable (LK), which had a sign contrary to economic theory. It is also evident that the value of the adjusted R-squared equals 0.96, indicating the model's quality and its ability to explain the variations occurring in the per capita GDP. The explanatory variables explain approximately 96% of the fluctuations in per capita GDP. The estimation results shown in the table indicate the following outcomes:

Physical capital (LK) has a negative and statistically significant sign, meaning that a 1% increase in physical capital leads to a 0.04% decrease in per capita GDP, contradicting economic theory.

The labor variable (LL) has a positive and statistically significant sign at the 1% level, indicating that each 1% increase in total labor force leads to a 0.30% increase in per capita GDP, confirming the economic theory regarding the relationship between total labor force and economic growth.

Human capital (LH), measured by the average years of schooling, significantly influences long-term economic growth more than other explanatory variables. A 1% increase in human capital leads to a 0.77% increase in per capita GDP, highlighting the importance of human capital stock in supporting long-term economic growth in North African countries.

The foreign direct investment variable (LFDI) has a positive and statistically significant sign at the 1% level, indicating that each 1% increase in foreign direct investment leads to a 0.022% increase in per capita GDP in North African countries. This result aligns with previous empirical studies that found a positive relationship between foreign direct investment and economic growth.

### CONCLUSION:

This study aimed to estimate the impact of foreign direct investment (FDI) on economic growth for a sample consisting of 4 North African countries during the period (1990-2019). To achieve the study's objective, panel data and the Fully Modified Ordinary Least Squares (FMOLS) method were used. The study arrived at a set of findings that can be summarized as follows:

- Numerous empirical studies have affirmed the positive impact of foreign direct investment on economic growth performance, as it contributes to acquiring long-term capital flows which, in turn, enhance economic growth through the utilization of modern technologies and increased productivity, in addition to the efficient use of resources in the host economy.
- The study's results, consistent with the hypothesis that there is a positive impact of foreign direct investment on economic growth in North African countries, indicate that a 1% increase in foreign direct investment results in a long-term economic growth increase of 0.022%. This result aligns with many previous empirical studies, which have confirmed the positive impact of foreign direct investment on economic growth.


Based on the findings of this study, the following recommendations can be made:

- Efforts should be made to learn from the experiences of countries leading in the field of foreign direct investment. North African countries should strive to improve their investment climate to gain the confidence of foreign investors and attract more foreign direct investments.
- North African countries should ensure political and security stability, given its significant importance in attracting foreign investments.

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Annexes:

**Table (01): Pedroni Cointegration Test Results**

Pedroni Residual Cointegration Test  
 Series: LGDPPC LK LL LH LFDI  
 Date: 10/28/21 Time: 19:27  
 Sample: 1990 2019  
 Included observations: 120  
 Cross-sections included: 4  
 Null Hypothesis: No cointegration  
 Trend assumption: No deterministic trend  
 Automatic lag length selection based on SIC with a max lag of 5  
 Newey-West automatic bandwidth selection and Bartlett kernel

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Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	1.324167	0.0927	1.079388	0.1402
Panel rho-Statistic	-0.880272	0.1894	-0.376758	0.3532
Panel PP-Statistic	-3.448985	0.0003	-2.064381	0.0195
Panel ADF-Statistic	-3.440318	0.0003	-2.053927	0.0200

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	0.267546	0.6055
Group PP-Statistic	-2.141736	0.0161
Group ADF-Statistic	-2.185805	0.0144

**Table (02): Kao Cointegration Test Results**

Kao Residual Cointegration Test  
 Series: LGDPPC LK LL LH LFDI  
 Date: 10/28/21 Time: 19:28  
 Sample: 1990 2019  
 Included observations: 120  
 Null Hypothesis: No cointegration  
 Trend assumption: No deterministic trend  
 Automatic lag length selection based on SIC with a max lag of 7  
 Newey-West automatic bandwidth selection and Bartlett kernel

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	t-Statistic	Prob.
ADF	-3.005954	0.0013

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Residual variance	0.000714
HAC variance	0.000895

**Table (03): FMOLS Estimation Results of the Impact of Foreign Direct Investment on Economic Growth in North African Countries**

Dependent Variable: LGDPPC  
 Method: Panel Fully Modified Least Squares (FMOLS)  
 Date: 10/28/21 Time: 19:30  
 Sample (adjusted): 1991 2019  
 Periods included: 29  
 Cross-sections included: 4  
 Total panel (balanced) observations: 116  
 Panel method: Pooled estimation  
 Cointegrating equation deterministic: C  
 First-stage residuals use heterogeneous long-run coefficients  
 Coefficient covariance computed using default method  
 Long-run covariance estimates (Bartlett kernel, Newey-West fixed bandwidth)

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
LK	-0.047029	0.016073	-2.926044	0.0042
LL	0.300639	0.039024	7.703879	0.0000
LH	0.776263	0.035378	21.94181	0.0000
LFDI	0.022017	0.006449	3.414150	0.0009

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R-squared	0.971799	Mean dependent var	7.973481
Adjusted R-squared	0.969972	S.D. dependent var	0.322878
S.E. of regression	0.055951	Sum squared resid	0.338091
Long-run variance	0.000689		