

Study of the Determinants of Foreign direct investments in the Maghreb Region: An Empirical Analysis

Khira Amri ^{1*}, Hakima Moussou ²

¹ Faculty of Economic Sciences, Management Sciences, and Commercial Sciences
University of Bejaia, (Algeria), khira.amri@univ-bejaia.dz

² Faculty of Economic Sciences, Management Sciences, and Commercial Sciences
University of Bejaia, (Algeria), hakima.moussou@univ-bejaia.dz

Received: 04-05-2025

Accepted: 21-09-2025

Published: 30-09-2025

Abstract:

The growth of host nations is being increasingly influenced by foreign direct investments (FDI). In this sense, improving appeal has started to be a clear goal of economic policy in both rich and poor nations. This paper intends to find all the elements that could account for the changing flow of foreign direct investment into the Maghreb nations. Through an econometric panel data analysis performed on a sample of three Maghreb countries Algeria, Morocco, and Tunisia covering the period from 1975 to 2022, the emphasis is on the macroeconomic elements of foreign direct investments. While GDP per capita, inflation rate, credit extended to the private sector, infrastructure endowment, enrollment rate, and currency value do not have any major impact, our results showed that the level of economic openness helps to make FDI in these nations more appealing.

Keywords: Foreign Direct Investment; Attractiveness; Determinants; Panel Data; Maghreb Countries.

Jel Classification Codes: F21, F23, O11, C23.

*Corresponding author

1. INTRODUCTION:

A dynamic process by which world markets become integrated and autonomous, financial liberalization. It is usually linked to a growth of trade exchanges and a trend toward the liberalization of financial and economic flows. But the quickening of this process has helped to highlight the role of multinational companies, especially by means of the increase of foreign direct investment flows.

At present, foreign direct investment (FDI) is a key engine of financial liberalization. The opening of new sectors to investment and the presence of excess savings drive the intensification of activities by a growing number of multinational corporations on a worldwide scale. FDI is seen as a growth engine, a consistent and dependable source of long-term funding, and a way to relieve foreign exchange restrictions and support domestic savings. Certainly, the increased focus on direct investment is a result of its capacity to generate employment and transfer technology. Still, this expression of interest is vulnerable to structural barriers connected to the economic system of the host nation.

Like other developing countries, Maghreb nations have great capital requirements to fund investments. On the other hand, foreign direct investment, as a non-debt-generating replacement, has kept drawing the attention of Maghreb country officials given the 1980s crisis and its detrimental influence on the accumulation process.

These nations must increasingly be drawn to foreign direct investment (FDI). Excessive debt, the collapse of Structural Adjustment Programs, and development aid all provide context in which foreign capital is the primary source of outside funding for their development initiatives. Confronted with the challenge of funding their economic activities with sometimes limited local resources, Maghreb nations have looked to draw and support foreign investors.

In this context, the present work aims to identify the factors that significantly impact the attraction of FDI and to measure their relative importance.

Given the significance of the topic, we can pose the following main research question:

1.1. Study Problem:

What are the factors that influence the attractiveness of Maghreb countries for foreign direct investment?

This main question leads to several secondary questions, including:

- What makes one country more attractive than another?
- What determines the choice of multinational firms in the location of their investment?

1.2. Study Hypotheses:

To answer these questions, our reflection is based on the following hypotheses:

- The selection of foreign investors is mostly influenced by the macroeconomic stability of Maghreb nations. Certainly, good signs for encouraging FDI are a large market size, gauged by GDP per capita, and a regulated inflation rate.
- Attracting foreign investors depends on the presence of good infrastructure, a rich and qualified human capital, and a high economic openness.

Considering the factors needed to promote such investment, the significance of this study resides in the vital part foreign direct investment plays in the growth of these nations.

1.3. Study Objective:

With an eye toward clarifying their formation and distribution in Maghreb nations, the goal of this study is to investigate the elements driving the appeal of Foreign Direct Investment (FDI) in the economies of nations.

Given this study, we will try to examine the elements motivating FDI inflow by emphasizing a review of both theoretical and empirical literature in the first part. Using econometric models, we will concentrate in the second part on the main elements influencing FDI in Maghreb nations.

1.4. Previous studies:

To develop this research, we have drawn inspiration from the following previous studies:

- The study by (Hamra, Aouissi, & Zeghib, 2022) on the impact of some economic factors on the attractiveness of FDI in Algeria. This study aims to empirically evaluate the effect of the growth rate (% GDP), exchange rate and inflation on the attractiveness of foreign direct investment in Algeria over the period 1994-2020 by applying the techniques of the ARDL model. The results of the model studied reveal that the economic growth rate has a significant and positive effect on the attractiveness of FDI in Algeria. While the exchange rate and inflation have negative and significant effects on the attractiveness of these investments.
- A study by (Cédric & Daba, 2019) which focuses on the determinants of the attractiveness of Foreign Direct Investment in the Economic and Monetary Community of Central Africa. The authors aim to examine the determinants of the attractiveness of Foreign Direct Investment (FDI) in CEMAC during the period from 1987 to 2017 using a panel data model. The estimation results indicate that FDI from CEMAC countries are significantly influenced in the long run by the financial development index, the corruption rate, the level of public debt, the population growth rate, the economic growth rate, public investment, trade openness, the level of inflation, the unemployment rate and the real effective exchange rate.
- Study by (ZIANI & ZIANI, 2022) on the determinants of foreign direct investment in Algeria. This study aims to determine the main factors that can influence foreign direct investment (FDI) in Algeria over the period 1980-2017. The results of the autoregressive staggered lag (ARDL) model estimation suggest that the following variables: degree of economic openness, GDP per capita, and school enrollment rate

significantly affect the long-term attractiveness of FDI in Algeria. While the exchange rate, inflation, and population size do not significantly affect it in either the long or short term.

Based on these studies, it appears that many macroeconomic factors can contribute to the attraction of FDI in a country.

2. Determinants of FDI: A Brief Literature Review:

There are many empirical research on the factors influencing foreign direct investment; the outcomes differ by country, degree of development of each nation, and modeling technique used. The different theories and empirical studies draw attention to a variety of factors and determinants economic and political as well as institutional that could help explain the founding choice of companies and the appeal of FDI.

One of the elements foreign investors take into account while investing in another country is GDP per capita, which reflects the market size the economic situation and possible demand of the host country. FDI and GDP per capita show a positive correlation. According to Asiedu (2002, 2006), a higher GDP per capita suggests better business opportunities in the host nation, therefore attracting more foreign investors.

Likewise, (Abderrezzak, 2013) discovered a favorable link between market size in host nations and the investment choices of American multinational companies. According to (Shatz HJ, 2000), Japanese multinational companies are quite well established in major Triad country markets including the United States, European Union. Furthermore, a big market suggests more need for products and services, therefore improving the appeal of the host nation. (Schneider, 1985) draw attention to the beneficial influence of the GDP of the host nation on FDI movements. As multinational companies want to serve the domestic market, host countries' domestic demand can be quite important in luring FDI.

(Artige & Nicolini, 2005) contended in econometric research that the strongest predictor of FDI is probably market size, measured by GDP or GDP per capita. Our model predicts a favorable link between FDI flows and GDP per capita, thus the coefficient will be positive.

Most economists contend that the most important factors are market size, macroeconomic variables, and labor quality (Ang, 2008; Okafor, 2014; Nyamazana, 2017).

(Hussain & Kimuli, 2012) examined several elements causing the fluctuation in foreign direct investment (FDI) flows to developing nations using panel data from 57 low- and middle-income countries between 2000 and 2009. These writers claim that market size is the key driver of FDI in developing nations. A stable macroeconomic environment, global integration, availability of skilled labor, and a developed financial sector were also found by them to encourage foreign direct investment in these nations.

Similarly, Djennas and Kalakhi (2015) looked at the elements motivating foreign direct investment inflows into particular Middle Eastern and North African nations using a fixed-effects model covering the years 1980 to 2010. Their findings show that FDI flows are

positively influenced by government capital, gross national expenditure, trade openness, inflation rate, and labor force.

Hermes and Lensink (2003) claim that a developed financial system in the host country is a key requirement for FDI to help promote economic growth. Attracting foreign investors depends on a financial system that sufficiently offers the required credit for business operations. Domestic credit given to the private sector offers understanding of the value attached to the private sector and the presence of financial intermediaries.

(Alfaro, 2004), Likewise, Sghaier and Zouheir (2013), as well as Greenwood and Jovanovic (1990), contend that FDI's favorable influence on economic growth depends on the evolution of the national financial system, which is a major prerequisite. Our model predicts that FDI flows will be positively influenced by credit given to the private sector as a proportion of GDP.

Apart from economic factors, which remain the main ones, some economists are coming to give political elements more weight for investors. Political uncertainty and insecurity in the surroundings of developing nations have been shown in several studies to have a negative impact on FDI flows there.

(Hefeker & Carsten, 2005) tried to clarify how political risks, institutions, and foreign direct investment interact. Based on a sample of 83 developing nations from 1984 to 2003, they found the indicators most pertinent to multinational companies' operations. The findings show that highly important factors of foreign direct investment flows are government stability, internal and external conflicts, corruption, ethnic tensions, democratic responsibility of the government, and the quality of the bureaucracy.

Every investor has to, therefore, together with economic stability, have a clear knowledge of the political stability of a nation. Policies aimed at attracting foreign firms must prioritize improving the macroeconomic factors of the investor environment. Globalization and changing company strategies have changed the drivers of FDI toward a more complicated mix of components and variables that together produce a business environment usually favorable to investment, especially to foreign investment.

One of the main prerequisites for the success of a nation's appeal to foreign investments is institutional growth. The quality of institutions is seen as a deciding factor in drawing foreign direct investment (FDI). Certainly, political risk, corruption, respect for property rights, the challenges of doing business, and other elements all have a major impact on foreign companies' investment choices. Usually, removing limits and creating good circumstances for business activities usually encourages a good impact.

At present, the quality of the institutional environment in the host country determines FDI entry. Countries with high-quality institutions gain more from the arrival of FDI than those with low institutional quality (Asiedu, 2002, 2006; Alfaro et al., 2005). (Naudé & Krugell, 2007) using a dynamic estimator grounded on the Generalized Method of Moments (GMM), tried to find the drivers of foreign direct investment in Africa. High-quality

institutions helped them to show that FDI inflows help countries more than those with low institutional quality.

Similarly, (Qurat ul Ain, 2020) used a panel data set of seven countries over a 12 year period, from 1996 to 2007, to investigate the impact of macroeconomic policy and institutional factors on FDI flows. The findings imply that the attractiveness of FDI flows is significantly influenced by institutional quality.

Corruption is yet another institutional element shaping the appeal of foreign direct investment. Often viewed as a danger to foreign investment, corruption alters the economic and financial environment, compromises government efficiency, and fosters an unstable atmosphere for foreign investors.

Bayouth (2006) claims that corruption leads to unproductive investments, lowers the quality of infrastructure and public services, decreases tax revenues, raises the price of goods and services, and therefore causes a drop in the quality of any service or production under state control. This distorts public spending priorities and motivates people to look for rents instead of participate in constructive activities. Corruption increases business expenses and impedes a nation's economic growth.

3. Empirical Approach to Panel Data on the Determinants of FDI in the Maghreb:

Using an econometric model, we investigate in this paper the factors shaping the appeal of foreign direct investment in the three Maghreb nations.

3.1. Methodology, Study Relevance, and Specification of the Econometric Model:

The next parts will first show the approach applied and the significance of the study; then, we will identify the selected model.

3.1.1. Methodology and Relevance of the Study:

The literature review reveals that not all studies concur on the relevance of the several factors influencing FDI in developing nations. While some stress political risk (institutional) factors, others highlight market (macroeconomic) ones. We will think just on the macroeconomic factors. The variables used to examine the main drivers of FDI in the chosen countries are selected depending on prior theory and empirical research on this topic.

The equation of the determinants comprises the most often used quantitative variables in empirical studies as determinants of FDI. Although it is recognized that other qualitative elements like corruption, the quality of institutions, democracy, good political and economic governance, and government effectiveness could account for the draw of FDI flows, data constraints and the challenges in measuring these variables have excluded these from the model specification.

This paper employs a panel data regression model comprising three Maghreb countries: Algeria, Tunisia, and Morocco. Panel data has the benefit of combining data over time with knowledge on the variation of individual units in this case, the Maghreb countries. Spanning 1975 to 2022, our work covers On the one hand; this time was selected to reflect the

FDI phenomenon over an extended period. Conversely, it is relevant that the time frame examined also reflects the consequences of the structural adjustment plan carried out in 1994 and the different economic and financial reforms carried out by these nations.

We utilized the World Bank's database, more particularly the World Development Indicators, to preserve as much information as possible and ensure data homogeneity. Our specific interest in the Maghreb nations derives from the fact that little empirical study on foreign direct investment in these nations has been conducted.

3.1.2. Econometric Model Specifications:

This part aims to outline the model employed to empirically assess the degree of impact the above-mentioned factors have on foreign direct investment. The specification of the model first involving the identification of the explanatory variables, their expected signs, and the mathematical structure of the model begins any econometric study. The study model looks at the exogenous variables and the endogenous one the appeal of FDI expressed as FDI as a percentage of GDP.

Gross domestic product per capita, the inflation rate, the degree of economic openness, domestic credit granted to the private sector, secondary school enrollment rate, the number of telephone lines per 100 people, and the currency value were among the variables chosen to account for foreign direct investment (FDI) in Maghreb countries.

Using linear regression analysis, we have data for $N = 3$ countries in the Maghreb region over $T = 48$ periods (1975-2022). Therefore, the total number of panel observations is $N \times T = 3 \times 48 = 144$ observations. The equation to be estimated is as follows:

$$Y_{it} = \alpha + \delta Y_{it-1} + \sum_{k=1}^K \beta_k X_{ik} + \varepsilon_t \quad (1)$$

With $t = 1, 2, 3, \dots, T$ and $i = 1, 2, 3, \dots, N$

Where:

Y_{it} : Dependent variables;

X_{ik} : Matrix of explanatory variables;

N : Total number of countries;

T : Estimation period;

α , δ , and β : Parameters to be estimated;

ε_{it} : Random error term.

Usually, investors decide their investments based on the economic statistics of past years' FDI. The dependent variable's value will therefore be lagged by one period. This study intends to find the shared elements among these three nations. The equation below shows how FDI relates to other explanatory variables.

The sign (+) or (-) below each explanatory variable indicates the expected effect of the considered variable on FDI.

$$IDE_{it} = \alpha + \delta IDE_{it-1} + \beta_1 PIBHAB + \beta_2 INF + \beta_3 OUV + \beta_4 CREDSP + \beta_5 INFR + \beta_6 TSECON + \beta_7 TCHAN + \varepsilon_{it}$$

The studies on the factors influencing foreign direct investment (FDI) are abundant in indicators and variables. Our work combines several elements we have chosen for our model. Our decision centered on eight (08) explanatory variables. We selected the standard variables used in most studies. We have also selected the percentage of FDI as the dependent variable.

"Net FDI flows expressed as a percentage of gross domestic product (GDP)" will be the variable selected as the dependent variable in our analysis. When a nation invests overseas, it exports money to another nation to buy, start, or own a business (the threshold is 10% of voting rights). Gaining effective decision-making authority in business management is the goal. This is the main distinction from portfolio investing, which ignores decision-making authority in favor of concentrating only on financial returns.

Referring to the theoretical works (Dunning, 1993, 2000) and empirical studies by [Fayyaz and Kabibi (2012), Koukpo (2005), Bouklia-Hassane and Zatla (2001), Etayeb Mohamed Sidiropoulos (2010), Bouri (2015), Sane (2016), Nourdinne (2010), Skopor (2008), Khachoo and Khan (2012), Nagou (2016)], We have identified the key factors influencing the appeal of foreign investment. These macroeconomic factors include: GDP per capita, inflation rate, degree of economic openness, infrastructure, domestic credit to the private sector, real currency value, and secondary school enrollment rate.

An indicator of economic growth and the riches of an economy is Gross Domestic Product per capita. Total market value of all final goods and services produced in a given country during a defined period defines GDP. It is also seen as the total value added at every stage of production. Gross Domestic Product (GDP) is a measure of market size. Relatively big domestic markets could draw countries for FDI. The GDP factor assesses the probable favorable impact on the amount of direct investment the host country receives from market size and economic dynamism.

B. Inflation Rate (INFT):

The Consumer Price Index (CPI) estimates inflation. Reflecting the caliber of the macroeconomic policies carried out in a nation, inflation is a sign of macroeconomic stability. Usually, price stability increases people's buying power. Measured by the GDP deflator or the Consumer Price Index (CPI), inflation is the change of prices inside an economy. Being a general measure of price changes, the CPI is the most significant and commonly used.

C. Degree of Economic Openness (OPEN):

The degree of economic openness can be a factor among other elements influencing the selection of foreign investors' entry strategies since it indicates the level of exposure or involvement of the host country in international trade. This variable reflects the level of market openness depending on economic policies promoting trade and investment both inside and outside the nation. It reflects a nation's trade policy and could help to improve its appeal.

Trade as a percentage of GDP that is, (Exports + Imports) over GDP will determine an economy's openness. Trade openness is about the flow of imports and exports. It emphasizes the need of international commerce in the economic activity of the nation. Trade openness is the unrestricted flow of services and commodities. A high ratio indicates low trade barriers, which is especially relevant for export-oriented FDI. Put differently, the more open the nation's economy the higher this proportion.

D. Domestic Credit to the Private Sector (CREDSP):

Many people view it as a proxy indicator for financial growth. As it more clearly reflects the present volume of funds directed to the private sector, it has the benefit of being clearer than other measures such the real interest rate or monetary aggregates such (M1, M2, and M3). Furthermore, since most financial growth takes place inside the banking sector, unlike in developed nations, where a substantial amount of financial development takes place outside the banking system, it is deemed the most suitable indicator for developing countries (Jimborean, 2004).

E. Infrastructure Endowment (INFR):

Infrastructure is a set of economic, social, and institutional systems required for economic activities. Among other things, foreign investors favor nations with a well-developed road system, decent airports, consistent water and power supply, and internet access. Good infrastructure can help lower manufacturing costs. Conversely, poor infrastructure raises the price of operations and lowers profitability.

The availability of infrastructure and communication channels in host nations, which are deemed necessary by international corporations as requirements for investment, is evaluated by counting the number of phone lines and mobile phone subscribers (per 1,000 people) (Asiedu, 2003; Fiodendji, 2006; Anyanwu, 2012). The number of landlines and cell phones per 100 residents serves as a stand-in for infrastructure in our model. It is anticipated that the number of phone lines and net FDI flows will positively correlate.

F. Secondary Enrollment Rate (TSECON):

A key element in drawing FDI is the quality of human resources in the host nation. Apart from inexpensive labor, investors want a more educated society since it fits more with new technology and provides more innovative potential.

While for others it is not relevant in clarifying FDI (Dupuch et al., 2003), human capital is a deciding factor for certain empirical research (Dje, 2007; Koukpo, 2005). Usually, the enrollment rate in gross percentage measures the quality of human capital. Our study found that the variable "secondary enrollment rate (in gross percentage)" was the best way to evaluate the quality of the labor supplied by the three nations given the lack of some data (Fayyaz & Kabibi, 2012). This variable is expected to have a positive correlation with foreign direct investment.

G. Real Currency value (TCHAN):

The currency value reflects global competitiveness. The real currency value is the ratio of the price of the foreign consumption basket to that of the domestic basket. That is to say, it is the ratio of the import price index stated in foreign currency to the price index of exportable goods, which is then multiplied by the nominal currency value.

Theoretically, the link between the currency value and FDI has been established. Certainly, a real depreciation (appreciation) of the currency value in host nations for FDI flows will lead to a rise (fall) in FDI inflows into these nations. The effect of the actual currency value on FDI is still unclear (Bénassy-Quéré et al., 2001).

Currency value volatility affects companies' strategies. If companies plan to sell in the local market, a very erratic currency value draws FDI; if they want to re-export their production, it discourages them. The kind of FDI is influenced by the real currency value (Agénor, 2003). For multinational companies (MNEs) looking to set up in the host country to serve the local market, an increase in the currency value is good. An increase in the currency value, meanwhile, could impede FDI for MNEs spending overseas for re-export goals.

The definition and meaning of the different variables for each dimension are shown in Table 1.

Table 1. Variables and their meanings

Abbreviation	Variables	Meaning	Expected Sign
PIBHAB	Gross Domestic Product per Capita	Economic development (wealth of a country).	+
OUV	Trade Openness Rate	Degree of economic openness in the host country.	+
INFT	Inflation Rate	Citizens' cost of living	-

CREDSP	Domestic Credit to the Private Sector	Development of the financial market	+
INFR	Number of Telephone Lines	Level of infrastructure development: telecommunications	+
TSECON	SchoolEnrollment Rate	Quality of the workforce	+
TCHAN	Real Currency value	Economic volatility	+/-

Source: Compiled by the authors.

3.3. Statistical Analysis of Variables:

Before any econometric estimation, descriptive statistics are very important and highly advised. They study the development of the variables in the econometric model; the correlation between these variables helps to determine whether the variables are stationary or not depending on their graphical depiction. The variables comprising our sample will undergo a series of statistical tests. For the whole time of our study, Table 2 summarizes the statistical features of the several variables. Every variable's mean, median, maximum, minimum, and standard deviation were computed using the econometric program STATA 15.1.

Table 2. Descriptive Statistics of the Sample

	Obs	Mean	Median	S.D	Maximum	Minimum	Jarque-BeraTest:
IDE	144	1.391056	1.028303	1.386240	9.424248	-0.324012	0.0000
PIBHAB	144	2799.100	2855.975	1052.136	4827.724	1019.552	0.0006
INF	144	6.492169	4.943948	5.600462	31.66966	0.339163	0.0000
OUV	144	66.83618	63.98704	17.75125	114.3548	32.68458	0.0205
CREDSP	144	41.46960	46.36933	22.71724	81.15532	3.907417	0.0000
INFR	144	32.39514	4.024039	47.5453	137.8391	0.5687497	0.0000
TCHAN	144	16.27259	4.924849	26.64625	109.4431	0.402267	0.0000
TSECON	144	50.48996	45.77284	26.16231	99.65495	10.01231	0.0000

Source: Results obtained using STATA 15.1 software.

The volume of trade expressed as a percentage of GDP, or (exports + imports) over GDP, is a measure of an economy's openness. The flow of imports and exports is a component of trade openness. It emphasizes how crucial foreign trade is to the nation's economic activity. The free flow of goods and services is a component of trade openness. For FDI that is focused on exports, a high ratio indicates low trade barriers. Stated differently, the greater this percentage, the more open the nation's economy is.

3.4. Domestic Credit to the Private Sector (CREDSP):

Many people view it as a proxy indicator for financial growth. As it more clearly reflects the present volume of funds directed to the private sector, it has the benefit of being clearer than other measures such the real interest rate or monetary aggregates such (M1, M2, and M3). Furthermore, since most financial growth takes place inside the banking sector, unlike in developed nations, where a substantial amount of financial development takes place outside the banking system, it is deemed the most suitable indicator for developing countries (Jimborean, 2004).

3.5. Infrastructure Endowment (INFR):

Infrastructure is a set of economic, social, and institutional systems required for economic activities. Among other things, foreign investors favor nations with a well-developed road system, decent airports, consistent water and power supply, and internet access. Good infrastructure can help lower manufacturing costs. Conversely, poor infrastructure raises the price of operations and lowers profitability (Seetanah & Khadaroo, 2007).

To evaluate the availability of infrastructure and communication tools in host nations, foreign companies considered the number of telephone lines and mobile phone subscribers (per 1,000 people) as prerequisites for investment (Asiedu, 2003; Fiodendji, 2006; Anyanwu, 2012). Our model uses the number of landline and mobile phones per 100 people as a proxy for infrastructure. The number of telephone lines and net FDI flows should be positively correlated.

3.6. Correlation between the study variables:

Examining the correlation matrix of the explanatory variables reveals possible correlations between pairs of them. Calculated using econometric tools, the several correlation coefficients linked to the regressions of each explanatory variable on all others let one find multicollinearity including more than two variables.

Table 3. Correlation Matrix

	IDE_IDE	PIBHAB	INFT	OUV	CREDSP	INFR	TSECON	TCHAN
IDE_PIB	1.000							
PIBHAB	0.1892*	1.000						
INFT	-0.3322*	-0.0355	1.000					
OUV	0.6423	0.3935*	-0.2371*	1.000				
CREDSP	0.4032*	0.2829*	-0.2201*	0.6707*	1.000			
INFR	0.3969*	0.5729*	-0.3507*	0.5336*	0.2975*	1.000		
TSECON	0.3367*	0.7856*	-0.2355*	0.5056*	0.1845*	0.7673	1.000	
TCHAN	-0.1707*	0.4855*	-0.0318	-0.1821*	-0.5788*	0.3009*	0.5168	1.000

Notes : *, **, significance thresholds at 1% and 5%, respectively

Source: Results obtained using STATA 15.1.

From the results in the table, it appears that:

- Foreign direct investment (FDI) is positively correlated with GDP per capita (market size), with a correlation coefficient of 0.1892.
- Regarding the inflation rate (INF), it is negatively correlated with foreign direct investment, which aligns with theory, with a correlation coefficient of -0.3322.
- The endogenous variable, FDI, is also positively correlated with the variable *OUV* (economic openness), which aligns with theory, with a correlation coefficient of 0.6423.
- There is a positive correlation between domestic credit granted to the private sector and foreign direct investment (FDI), with a correlation coefficient of 0.4032.
- There is also a positive correlation between infrastructure (INFR) and foreign direct investment (FDI), with a correlation coefficient of 0.3969.
- Additionally, a positive correlation is recorded between FDI and the enrollment rate (TSECON), with a correlation coefficient of 0.3367.
- We observe that the real currency value (TCHAN) is negatively correlated with foreign direct investment (FDI), which is consistent with theory, with a correlation coefficient of -0.1707.

3.7. Regressions, Results, and Interpretation:

Here we show the model for examining the factors influencing foreign direct investment (FDI). First, we will show the empirical model in its general form; next, we will show the econometric technique employed for the estimation. At last, we will present the estimating findings. We will first analyze the homogeneity test for the data-generating process to support the selection of the panel before starting the estimation.

❖ Homogeneity Test of the Data-Generating Process:

- In the first step, we test the hypothesis of a perfectly homogeneous structure:

$$H_0^1 : \beta_i = \beta \quad \alpha_i = \alpha \quad \forall_i \in [1, N]$$

$$H_a^1 : \exists (i, j) \in [1, N] / \beta_i \neq \beta_j \text{ ou } \alpha_i \neq \alpha_j$$

This test involves imposing, under the null hypothesis of equality of the parameters β_i and α_i , $(K + 1) * (N - 1)$ restrictions on the coefficients of the unconstrained model.

$$y_{i,t} = \alpha_i + \beta_i X_{i,t} + \varepsilon_{i,t}$$

Under the alternative hypothesis, there are at most $(N * K)$ different coefficients for the components of the N vectors β_i (of dimension K) and NNN individual constants. We then

have $N \cdot T - N \cdot (K+1)$ degrees of freedom. Therefore, the Fisher statistic associated with this test is F_1 with $[(N - 1) * (K + 1)]$ and $[N * T - N * (K + 1)]$ degrees of freedom.

Under the assumption of independence and normality of the residuals, the Fisher statistic will take the following form:

$$F_1 = \frac{(SCR_{1,c} - SCR_1)/[(N - 1) * (K + 1)]}{SCR_1/[N * T - N * (K + 1)]}$$

SCR_1 : is the sum of squared residuals of the unconstrained model.

$$y_{i,t} = \alpha_i + \beta'_i X_{i,t} + \varepsilon_{i,t} \dots \dots \dots (1)$$

$SCR_{1,c}$: is the sum of squared residuals of the constrained model (i.e., under the hypothesis H_0^1

$$Y_{i,t} = \alpha + \beta X_{i,t} + \varepsilon_{i,t} \dots \dots \dots (2)$$

In the case where the null hypothesis is supported H_0^1 of homogeneity, we obtain a completely homogeneous panel model (Pooled model) in the following form:

$$y_{i,t} = \alpha + \beta X_{i,t} + \varepsilon_{i,t}$$

However, if we dismiss the null hypothesis, we proceed to the second step, which involves determining whether the heterogeneity comes from the coefficients β_i . Based on the estimation $SCR_1 = 107,61003$ and $SCR_{1,c} = 139.74461$, $F(18,117) \approx 1.67$

And $F_1 = 1.94$  $F_1 = 1.94 > F(18,117) \approx 1.67$  We therefore reject the null hypothesis H_0^1 .

The second step involves testing the equality for all individuals of the K components of the vectors: $H_a^2 : \beta_i = \beta, \forall i \in [1, N]$

$$H_a^2 : \exists (i, j) \in [1, N] / \beta_i \neq \beta_j$$

$$F_2 = \frac{(SCR_{1,c'} - SCR_1)/[(N - 1) * K]}{SCR_1/[N * T - N * (K + 1)]}$$

Where, SCR_1 denotes the sum of squared residuals of the model (1) and $SCR_{1,c}$ represents the sum of squared residuals of the constrained model (the fixed effects model):

$$Y_{i,t} = \alpha_i + \beta' X_{i,t} + \varepsilon_{i,t}$$

We have: $SCR_1 = 107.61003$ and $SCR_{1,c'} = 131.89118$  $F_2 = 1.64$ and $F(16, 117) \approx 1.71$

Since $F_2 = 1.64 < F(16, 117)$  we accept H_0^2 . We then proceed to the third step.

The third step involves testing the equality of the individual constants α_i .

$$H_0^3: \alpha_i = \alpha \forall i \in [1, N]$$

$$H_a^3: \exists (i, j) \in [1, N] / \alpha_i \neq \alpha_j$$

$$F_3 = \frac{(SCR_{1,c} - SCR_{1,c'}) / (N - 1)}{SCR_{1,c'} / [N * (T - 1) - K]}$$

If we dismiss the null hypothesis H_0^3 of homogeneity of the constants α_i , we then obtain a panel model with individual effects:

$$y_{i,t} = \alpha_i + \beta X_{i,t} + \varepsilon_{i,t}$$

In the case where we accept the null hypothesis H_0^3 , we then obtain a completely homogeneous panel structure (pooled model). The test H_0^3 is then used solely to confirm or refute the conclusions of the test H_0^1 . The results of our estimation reveal that:

$SCR_{1,c} = 139,74461$ and $SCR_{1,c'} = 131,89118$  $F_3 = 3.95$ and $F(2, 133) \approx 3.05$,

Therefore, since $F_3 > F(2, 133)$  we reject H_0^3 . The final specification of the model is as follows:

$$y_{i,t} = \alpha_i + \beta X_{i,t} + \varepsilon_{i,t}$$

$$IDE_{it} = \alpha_i + \delta IDE_{it-1} + \sum_{K=1}^K \beta_K X_{Kit} + \varepsilon_{it}$$

Table 4. Specification Test Results

<i>Test</i>	<i>Statistique calculée</i>	<i>Statistique tabulée</i>	<i>Résultat</i>
F_1	1.95	1.67	On rejette H_0^1
F_2	1.64	1.71	On accepte H_0^2
F_3	3.68	3.05	On rejette H_0^3

Source: Results obtained using STATA 15.1 software.

3.8. Study of Stationarity and Correlation:

In the following, we will proceed with the analysis of stationarity and correlation of the variables.

3.8.1. Analysis of Stationarity:

It is first required to decide whether the series under study is stationary or not before carrying out particular tests. The majority of macroeconomic series are non-stationary. A time series is, by definition, non-stationary if its mean and variance shift over time (Bourbonnais, 2005). Stationarizing aims to fairly stabilize an initial non-stationary process. The test is to determine whether the time series data characteristics are independent of time throughout the study period. Should this criterion not be satisfied, the findings are erroneous and the series should be substituted in the estimation with their first differences (Johnston & Dinardo, 1999).

The findings in Table 4 lead us to conclude that in some situations the null hypothesis of a unit root cannot be rejected. The unit root test findings indicate that the variables are non-stationary at level but stationary at first difference. For variables integrated of the same order, this lets us run cointegration tests on panel data linking foreign direct investment and the explanatory factors.

Table 5. Stationarity Test Results

<i>Variables</i>	<i>Harris-Tzavalis</i>		<i>Im, Pesaran and Shin W-stat</i>		<i>ADF - Fisher Chi-square</i>	
	<i>Level</i>	<i>1st difference</i>	<i>Level</i>	<i>1st difference</i>	<i>Level</i>	<i>1st difference</i>
IDE_PIB	0.5028 (0.000)	-0.4620 (0.0000)	-3.8022 (0.001)	-4.57963 (0.0000)	11.3382 (0.0785)	32.5307 (0.0000)
PIBHAB	0.9319 (0.4268)	0.1278 (0,000)	-3.3351 (0.006)	-4.57963 (0.0000)	1.94222 (0.9249)	32.5307 (0.0000)
INF	0.7537 (0.000)	-0.1769 (0.0000)	-2.9372 (0.0044)	-10.9704 (0.0000)	9.56701 (0.1441)	90.8935 (0.0000)
OUV	0.8827 (0.0659)	0.0490 (0.000)	-1.7719 (2992)	-7.63330 (0.0000)	9.48011 (0.1483)	-60.8460 (0.0000)
CREDSP	0.9699 (0.7987)	0.2043 (0.000)	-0.6792 (0.9557)	-5.43224 (0.0000)	2.02413 (0.9175)	41.0147 (0.0000)
INFR	1.0376 (0.9961)	0.6522 (0.000)	7.7416 (1.0000)	-1.82114 (0.034)	0.23081 (0.9998)	12.2165 (0.0573)
TCHAN	0.9709 (0.8059)	0.0126 (0.0000)	2.2322 (0.9872)	-5.96554 (0.0000)	1.76691 (0.9398)	44.8268 (0.0000)
TSECON	0.9941 (0.9316)	0.2688 (0.000)	2.7131 (0.9967)	-4.7915 (0.0000)	2.6136 (0.9955)	1.1000 (0.0000)

Source: Results obtained using STATA 15.1 software.

Notes: The values in parentheses are the probabilities.

3.8.2. Study of Cointegration:

The outcomes of the Pedroni (1999) cointegration tests are shown here. Table 5 shows that six (6) of seven statistics reject the null hypothesis of no cointegration at the 1% level for ADF Statistic and PP Statistic, and at the 5% level for Modified Philips. The outcome of the panel cointegration test with a constant thus indicates the variables' dependence (the variables are cointegrated).

Table 6. Pedroni Cointegration Test

<i>Common AR coefs. (within-dimension)</i>	<i>Statistics</i>	<i>Probability</i>
Panel v-Statistic	-0.2889	0.3863
Panel rho-Statistic	-2.2313	0.0128
Panel PP-Statistic	-5.9437	0.0000
Panel ADF-Statistic	-5.7057	0.0000
<i>individual AR coefs. (between-dimension)</i>		
Group rho-Statistic	-1.9343	0.0265
Group PP-Statistic	-6.6474	0.000
Group ADF-Statistic	-6.2827	0.000

Source: Results obtained using STATA 15.1 software.

3.8.3. Fixed Effects Model or Random Effects Model:

A specification test for individual effects is the Hausman (1978) test. It distinguishes between fixed and random effects. The hypothesis under test is about the relationship between individual effects and the explanatory factors:

$H_0 : E(\alpha_i / X_i) = 0$ (the estimators of the model with composite errors are efficient).

$H_1 : E(\alpha_i / X_i) \neq 0$ (the estimators of the model with composite errors are biased).

The next table shows the key findings of the Hausman test under the null hypothesis of random effects and the alternative hypothesis suggesting the existence of fixed individual effects.

Table 7. Hausman Test Results

P-Value	Test Value (Chi-square, Statistic):
0,0653	5.46

Source: Results obtained using STATA 15.1 software.

The fixed effects panel data model should be used since the Hausman test results indicate that the alternative hypothesis is accepted at the 10% significance level.

$$IDE_{it} = \alpha_i + \delta IDE_{it-1} + \beta_1 PIBHAB + \beta_2 INFT + \beta_3 OUV + \beta_4 CREDSP + \beta_5 INFR + \beta_6 TSECON + \beta_7 TCHAN + \varepsilon_{it}$$

❖ **Estimation and Interpretation of the Results:**

The econometric findings of the investment model estimated from the panel data, as detailed above, are shown in the table below. Annual data covering three (03) nations between 1975 and 2022 is used.

Table 8. Estimation Results of the Determinants of FDI in the Maghreb

Explained Variable: FDI: Net inflows of Foreign Direct Investment as a percentage of the host country's real GDP			
<i>Period: 1975-2022 ; T = 48 ; N = 3 ; Total panel observations : 48×3 = 144 Obs</i>			
<i>Explanatory Variables</i>	<i>OLS</i>	<i>FixedEffects Model</i>	<i>RandomEffects Model</i>
PIBHAB	-0.0972523 (0.753)	0.4344821 (0.620)	-0.1972523 (0.779)
INFT	-0.0299037* (0.007)	-0.0267346 (0.130)	-0.299037* (0.086)
OUV	0.033299*** (0.001)	0.0311333*** (0.010)	0.0332929*** (0.000)
CREDSP	-0.0010511 (0.808)	-0.0138663* (0.096)	-0.0010511 (0.864)
INFR	0.0004272 (0.861)	0.0017354 (0.639)	0.0004272 (0.889)
TSECON	0.0011864 (0.897)	0.0080142 (0.603)	0.0011864 (0.898)
Ln_TCHAN	-0.0330668 (0.958)	2.157385 (0.168)	-0.0330668 (0.964)
IDE (-1)	0.3271737*** (0.001)	0.2761824*** (0.001)	0.3271737*** (0.000)
Constant	-0.4299485 (0.783)	6.836544* (0.086)	-0.4299485 (0.851)
Number of Observations	144	144	144
R2	0.5166	0.3674	0.3488
R ajusté			

Prob	19.39	9.44	141.06
(F-statistic)	(0.000)	(0.000)	(0.000)
FixedEffects	<i>Algeria</i>	-0.6314108	
	<i>Morocco</i>	0.2893807	
	<i>Tunisia</i>	0.3420301	

Notes : The statistics are reported in parentheses. *** Significant at the 1% level or lower, ** Significant at the 5% level or lower, and * Significant at the 10% level or lower.

Notes: The statistics are in parentheses. *** Significant at the 1% level, ** Significant at the 5% level, and * Significant at the 10% level.

Source: Results obtained using STATA 15.1 software.

The Fisher statistic value is 9.44. This high value with a zero probability shows that the model is globally important; this statistic tells us about the general relevance of the model. At 36.74%, the coefficient of determination R² shows a medium-quality econometric fit since the explained variance makes more than 36% of the total variance.

- The variable gauging GDP per capita has a positive but negligible impact. Most prior research, however, have indicated the reverse, thus this finding is unexpected. On the other hand, we can say that attracting FDI to Maghreb nations is not significantly influenced by GDP per capita.
- The degree of economic openness of the host country positively and significantly contributes to FDI flows through trade liberalization and improved competitiveness in some countries in the region, such as Algeria, Morocco, and Tunisia.
- All else being equal, a 1% rise in the economic openness variable (OUV) results in a 0.029167% rise in FDI flows. Economic openness increases the efficiency of FDI projects as it gives companies unimpeded access to all kinds of inputs. An open economy is probably more appealing when FDI is export-oriented since limits on foreign trade raise export-related transaction costs.
- Likewise, private sector domestic credit is inversely related to foreign investment. These findings contradict the earlier developed hypotheses. The underperformance of the financial system which results from other (institutional) variables not covered in our model (corruption, bureaucracy, etc.) helps to explain this.
- It seems to be unimportant for the infrastructure variable, namely the number of fixed and mobile phone subscriptions per 100 people. While the enrollment rate ought to improve the draw of FDI, in our situation it has no effect. Our research showed that, as far as the enrollment rate is concerned, this factor has no effect on FDI draw.
- This finding is unexpected given that the enrollment rate is predicted to benefit FDI. At last, the lagged FDI variable is quite important. This finding underlines the need of the spillover effect past FDI exerts. It suggests that the existence of an agglomeration economy causes new FDI to move in its direction. For any new investor who might

not be completely aware of the surroundings in which they choose to invest, the agglomeration effect is a positive indicator.

4. CONCLUSION:

Ultimately, this study emphasized the elements influencing the appeal of foreign direct investment (FDI). We looked in the second section at the elements that could affect the choice of foreign investors to set up in the Maghreb area, following a panel data estimation method described in the first section. We chose to estimate an econometric model using eight variables on panel data from a sample of three (03) Maghreb countries spanning 1975 to 2022 in order to find the elements affecting FDI appeal.

Our findings indicate that before deciding to invest, foreign investors attach great importance to the economic openness of these nations. Delayed FDI also helps to draw foreign investors. On the other hand, other factors GDP per capita, inflation rate, domestic credit to the private sector, number of telephone lines, secondary school enrollment rate, and currency valuedid not show the anticipated results.

5. Bibliography List:

- Abderrezzak, Z. S. (2013). The Determinants of Foreign Direct Investment and Their Impact on Growth: Panel Data Analysis for AMU Countries. *International Journal of Innovation and Applied Studies*, Vol. 2 No. 3 , p. 303.
- Alfaro, L. &-O. (2004). FDI and economic growth: the role of local financial markets. *Journal of International Economics*, Elsevier, Vol. 64, No. 1 , p. 89.
- Artige, L., & Nicolini, R. (2005). Evidence on the Determinants of Foreign Direct Investment: The Case of Three European Regions. *CREPP Working Paper n° 07, HEC-Management School, University of Liège* , p. 1.
- Bourbonnais, R. (2005). *Econometrics: Manual and Solved Exercises* (éd. 5th). Paris: Dunod.
- Cédric, K. J., & Daba, N. (2019). Les déterminants de l'attractivité des Investissements Directs Etrangers dans la Communauté Economique et Monétaire de l'Afrique Centrale. *BEAC Working Paper- BWP N° 05/19* , p. 18.
- Hamra, Y., Aouissi, O., & Zeghib, S. (2022). L'impact de quelques déterminants économiques sur l'attractivité des IDE en Algérie : Etude empirique. *Industrial Economics Review (KHAZZARTECH)*; Vol.12 . No. 02 , p. 81.
- Hefeker, & Carsten, M. B. (2005). Political Risk, Institutions and Foreign Direct Investment. *HWWA DISCUSSION PAPER 315* , p. 5.
- Hussain, F., & Kimuli. (2012). Determinants of Foreign Direct Investment Flows to Developing Countries. *SBP Research Bulletin*, Vol. 8, No.1 , p. 13.
- Jimborean, R. (2004). *Développement financier et croissance économique dans les pays en transition*. Paris: University Paris II Val de Marne. p 25.
- Johnston, J., & Dinardo, J. (1999). *Econometric Methods* (éd. 4th). Paris: Economica, p. 12.
- Naudé, W. A., & Krugell, W. F. (2007). Investigating Geography and Institutions as Determinants of Foreign Direct Investment in Africa Using Panel Data, Vol. 39 No.10. *Applied Economics* , p. 1223.
- Qurat ul Ain, T. Y. (2020). INSTITUTIONAL FACTORS AND FOREIGN DIRECT INVESTMENT INFLOWS: EMPIRICAL EVIDENCE FROM. *ernational Transaction Journal of Engineering, Management, & Applied Sciences & Technologies*, Vol. 11 No.1 , p. 5.
- Schneider, F. a. (1985). Economic and Political Determinants of Foreign Direct Investment. *World Development*. Vol. 13, No. 2, , p. 161.
- Seetanah, B., & Khadaroo, J. (2007). The Role of Transport Infrastructure in Attracting FDI in Africa. *FDI Conference* (p. 391). Port Louis: Economica.
- Shatz HJ, A. V. (2000). The Geography of International Investment. *POLICY RESEARCH WORKING PAPER 23 3 8, The World Bank group Trad* , p. 31.
- ZIANI, F., & ZIANI, L. (2022). LLes déterminants de l'investissement direct étranger en Algérie : une analyse par l'approche ARDL pour la période (1980-2017). *Journal d'études en économie et Management*; Vol. 05 No. 01 , 30, p. 901.