Territorial Attractiveness of the Foreign Direct Investment: Empirical Evidence from Panel Data Analysis for the Case of Tunisia

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Abstract: The present article aims to evaluate the role of different macroeconomic variables that may promote the entry of the foreign direct investment (FDI) in the industrial sector in Tunisia. In recent decades, several researches indicate that despite the significant impact of the FDI as an important catalyst of development, its benefits remain unequally distributed between countries, sectors and communities. For this reason, the competition between countries becomes more intense and depends on a large set of factors having different importance. In the same order of ideas, we try to estimate the impact of these factors on the FDI attractiveness in Tunisia through an econometric modelling with panel data over the period 2000-2014. We found that the traditional economic factors have the greatest and more significant impact. Also, the results imply that the multinational companies adopt essentially the vertical implementation strategy to invest in Tunisia. The findings have a great value for the decision-makers in Tunisia who can concentrate their efforts on the most important variables to develop the competitiveness of Tunisia.

Key words: foreign direct investment; traditional factors; territorial attractiveness

JEL Classification: C31; F21

1. Introduction

Lipsey and Sjöholm (2003), Lipsey (2004) among others economists argue that the foreign direct investments (FDI) create jobs, improve productivity, facilitate transfers of skills and technology and contribute to long-term economic growth of the developing countries. More than ever, regardless of their level of development, countries seek to take advantages of FDI for development. The economists say that the importance of FDI is justified by their capacity to enrich national externalities offered to domestic companies, by their contribution to the improvement of domestic production and also by the spillover effect that they have on all of the economy.

Ferrara and Henriot (2004), say that the question of foreign direct investment attractiveness (FDI) becomes in the heart of strategic reflections for the developing

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countries. In recent years, there has been a competition between Governments to attract the multinational companies. Some played on fiscal policies by offering exemptions during a given period. Others have proposed specific subsidies and reducing the restrictions habitually imposed as minimum local content or restrictions on the import of intermediate goods to an amount related to exports, a maximum level of exports, etc. For example, the code of investment incentives in Tunisia, which came into vigor in January 1994, provides many incentives in the form of tax exemptions, investment incentives, care of infrastructure costs or even employers' contributions to social security system (for a period of 5 to 10 years and for 25 to 100%).

The objective of this article is to try to assess the importance of certain macroeconomic variables in the determination of the localization of foreign companies operating in the industrial sector in Tunisia such as market size, the availability of labor factor, the free trade agreements, the geographical proximity etc, using an econometric model in panel data on the period 2000-2014. This will allow us to appreciate the nature of FDI implementation in the country. For this reason, we present first, the theoretical study of the key concepts of the work. We define the territorial attractiveness, the foreign direct investment and also the major factors that can determinate the implementation strategy adopted by the foreign investors and affect significantly the entry of these investments in the host countries. Then, we present the econometric model used and the results in the case of Tunisia.

2. Literature Review

According to the regional economy, the country may refer to the city, region, nation or economic union like the European Union (EU) or the Arab Maghreb Union (AMU). So, Coeuré and Rabaud (2003) define attractiveness as "the ability of a country to attract and retain businesses." For Mouriaux (2004) "the attractiveness of a country represents its ability to attract and retain business containing highly skilled work". In its report on the attractiveness of France, Charzat (2001) mentioned the importance of the skills of men and women, the quality of life and the vocational training as basis of the territorial attractiveness. In the same vein, Lamarche (2003) indicated that the territorial attractiveness can be defined as the ability of a territory to capture new foreign investments and retain the investments that are actually present and established on the territory. In this sense and to define the FDI, we retain the definition of the International Monetary Fund (IMF) according to which the FDI is "the action of an investor based in one country (country of origin), who acquires an interest of at least 10 % in a company resident in another country". This percentage is expected to give the investor an effective role in the company's management.

For several reasons, the developing countries encourage the entry of the MNC. Firstly, the MNC generate positive impacts on the productivity of the local firm and the acquisition of advanced technologies. Then, these firms participate effectively in the enhancement of exports, in the creation of jobs and in the improvement of currency reserves. In the other side the multinational firms prefer the delocalization abroad to obtain several advantages. Among the first attempts to identify the various benefits that lead a company to invest abroad and thus to choose a particular territory as new localization, we find the paradigm of Dunning named also the paradigm OLI "ownership, localization, internationalization".

Focusing on the localization advantages of Dunning (1993), Mucchielli (1998) states that the decision of internationalization and the determination of optimal site depends not only on the comparative advantages of the territories, but also on the strategy adopted by the firm. Specifically, the company decided to locate in an area based on four key determinants: the size of the local market, the cost of production factors, the number of companies already present, and the different policies of local authorities. In other words, the choice of new localization follows the microeconomic logic of the firm that seeks a greater profitability determining the localization of its activities according to its own internal characteristics (production cost, potential market size).

Geographical distance has an ambiguous role. On one hand, it can be taken as a proxy of trade barriers (tariff and non tariff barriers, transport costs), in the same way as the products' exchange, the FDI depends on the distance between the two countries. Accordingly, pursuant to the horizontal model, FDI flows are expected to grow with the distance between investor and host countries and, in a vertical model, distance plays a role of repulsion. Conversely, the presence of cultural and legal differences can be an obstacle to the establishment of foreign firms in a country (and therefore to the appearance of FDI inflows). In this case, the expected effect of the distance is negative.

The traditional theory of the multinational activity (Markusen, 1984) showed that the differences between countries (transmitter and receiver) cause FDI flows. This traditional theory provides some explanation for FDI (mostly vertical type) that can be observed between developed and developing countries that are relatively different in terms of factor endowments, of market size and of consumer income, etc. In contrast, the modern theory (Brainard, 1997; Markusen & Maskus, 1999; Markusen & Venables, 2000; Bergstrand & Egger, 2004) argues that the existence of crossed flow of FDI is related to the similarity between the sending and receiving countries in terms of sizes of markets, factor endowments, production technologies and consumer incomes. These similarities are generally characteristics of developed countries, which is in favor of horizontal FDI in both directions.

The works grouped under the name of "new economic geography" from Krugman (1991) contributed to the theoretical analysis of the location of production activities[1]. In general, in theoretical models, each firm belonging to a considered industry tries to locate its production activities in a limited number of regions (countries) where the demand is potentially high; access of goods to consumers is easier, lower production costs. Certain characteristics such as transport costs, economies of scale and the degree of production factors mobility lead to the concentration or geographic dispersion of production.

Several empirical studies, mostly on US data and on OECD countries data, attempted to validate the theoretical models mentioned above. Brainard (1997) found that the location of US companies abroad is positively correlated with the level of customs duties, transportation costs and economies of scale. Markusen and Maskus (1999) indicate that the size of the host country affects positively the localization of these companies. By against, the difference in terms of countries size has a negative impact such as the relative difference in the qualification of the workforce. Similarly, Gao (2003), by considering data on 16 OECD countries shows that the multinational activity is related to the similarity between the investing country and the host country regarding the market size and per capita income. The results of these studies argue in favor of the horizontal model.

A quick review of foreign investment demonstrates that the share of FDI inflows to developing countries is in a rapid increase. This confirms the increasing interest awarded by the multinational firms to the localization of their productive activities in the developing countries[2]. It is therefore necessary to explain why and in what form (horizontal or vertical) the multinational firms move increasingly to developing countries and to what extent the main determinants of implantation abroad[3] play in favor of the multinationals' attractiveness. In the same vein, it is interesting to consider a country like Tunisia, which has a growing local market and a preferential access to the European Union markets (following the free trade agreement signed in 1995) despite its little size. Tunisia is ranked, according to UNCTAD (2006), as attractive for FDI even though its performance in this area remains weak. In the following empirical section, we will try to evaluate the importance of the different factors of FDI previously presented for the Tunisian case for a period of 15 years (2000-2014).

[1] For a detailed description see (Ottaviano & Puga, 1997).
[2] See (Bergstrand & Egger, 2004).
[3] Defined by (Dunning, 1988; Blonigen 2005; Mucchielli, 1998).

3. Empirical Study

3.1. The Econometric Model

Several studies have used econometric models to explain the international trade and FDI flows. Gao (2003); Ferrara and Henriot (2004) seek to identify the key determinants of multinational companies' localization and to provide empirical validations for the theoretical models. For the same purpose, we employ the Cobb–Douglas production function including capital and labor as additional factors of production. Anwar and Nguyen (2010), Anwar and Sun (2011), Bekhet and Othman (2011) use the Cobb–Douglas production function to analyze the relations between the FDI and other variables. Karray and Driss (2009); Sekkat and veganzones-Varoudakis (2004) among others, include qualitative and quantitative variables in their empirical models to examine the impact of economic factors on the FDI attractiveness to the developing countries. While, they find that the traditional factors stimulate significantly the territorial attractiveness of FDI. The empirical model (Eq1) that we develop in this study represents an attempt to study the main determinants of the FDI in the industrial sector in Tunisia.

$$\mathrm{FDI} = \mathrm{DiffGDP}, \mathrm{DiffInc}, \mathrm{Pop_i}, \mathrm{Pop_H}, \mathrm{Ump_H}, \mathrm{Dist_{Hi}}, \mathrm{ComNb_H}, \mathrm{UE_i} \quad \textbf{(1)}$$

Eq. (1) states that the FDI inflows in the Tunisian industrial sector may be affected directly by the differences between countries in terms of the gross domestic product (DiffGDP), income per capita (DiffInc) and the population size (POP). Also, the attraction of the multinationals may depend on the availability of the labor force (Ump), the presence of the companies, in the host country (Tunisia), operating in the same sector as the foreign ones ($\mathrm{CompNb_t^H}$). Equation 1 denotes that the membership of the investor country to the European Union (EU) and the geographical proximity of Tunisia to the EU (Dist) are two variables that can determinate directly the final site of new affiliates. We write Eq. 1 with time series specification that giving Eq. 2 as follows:

$$\mathrm{FDI_t} = \alpha_0 + \alpha_1 \mathrm{DiffGDP_t} + \alpha_2 \mathrm{DiffInc_t} + \alpha_3 \mathrm{Pop_t^i} + \alpha_4 \mathrm{Pop_t^H} + \alpha_5 \mathrm{Ump_t^H} + \alpha_6 \mathrm{Dist_t^{Hi}} + \alpha_7 \mathrm{CompNb_t^H} + \alpha_8 \mathrm{UE_t^i} + \varepsilon_t \quad (2)$$

Since our work is a panel data study, Eq. (2) can be written in panel data form as follows:

$$\ln(\mathrm{FDI})_t^{iH} = \alpha_0 + \alpha_1 \ln\left(\mathrm{DiffGDP_t^{iH}}\right) + \alpha_2 \ln\left(\mathrm{DiffInc_t^{iH}}\right) + \alpha_3 \ln\left(\mathrm{POP_t^i}\right) + \alpha_4 \ln\left(\mathrm{POP_t^H}\right) + \alpha_5 \ln\left(\mathrm{Ump_t^H}\right) + \alpha_6 \ln\left(\mathrm{Dist_t^{iH}}\right) + \alpha_7 \ln\left(\mathrm{ComNb_t^H}\right) + \alpha_8 \ln\left(\mathrm{EU_t^i}\right) + \lambda_t^i + \boldsymbol{\varepsilon_t^i} \quad \textbf{(3)}$$

Where α_0 is a constant, i denotes the investor country, H the host country (the Tunisia), λ_t^i denotes the unobservable individual effects specific to the investor countries, ε_t^i is the classical error term, and where:

FDI_t^{iH} : means the FDI inflows (in thousands of current dollars) of an investor country i in Tunisia at time t.

POP_t^H and POP_t^i: denotes the size of the population of investor host country (in thousands) at time t. This variable reflects the size of the local market in these countries.

$ComNb_t^H$: is the number of companies (local and foreign), expressed in thousands, operating in the Tunisian industrial sector at time t.

Dis_t^{iH} : is the geographical distance between the investor country and Tunisia. It represents a proxy variable of trade barriers such as transportation costs. We assume that the distance between the investor country and the host one (Tunisia) is represented by the distance between the capitals.

$DiffGDP_t^{iH}$: denotes the absolute value of the difference in term of Gross Domestic Product (GDP) between the investor and host country, at time t, expressed by millions of current dollars. It is defined by the relationship: $DiffGDP_t^{iH} = |PIB_t^i - PIB_t^H|$. This is a proxy that can measure the difference between the two countries in terms of market size[1].

$DiffInc_t^{iH} = |Inc_t^i - Inc_t^H|$: means the absolute difference in terms of income per capita. It is considered as proxy of the difference in terms of capital factor endowments[2]. The income per capita is the Gross National Product (GNP) divided by the average population of that year, expressed in current dollar calculated using the Atlas method of the World Bank.

Ump_t^H : means the population in a situation of unemployment in Tunisia, at time t. This variable measures, by thousands of individuals, the availability of labor force in the host country.

UE_t^i **:** is a dummy variable equal to 1 for the countries of the European Union and 0 otherwise. This is a proxy of the trade liberalization policy of Tunisia appreciated by the association agreement and free trade signed in 1995 with the European Union.

3.2. Hypotheses

In the present case, the database retains just one host country, so we are required to adopt a model with specific effects only for the investor countries in Tunisia in order to reflect a global effect of these countries' size. Then, we will try to determine if they are fixed or random effects. For each investor country i, if the values of λ_t^i are significant and constant, we have a model with fixed-effects. However, if these are the achievements of random variables, we speak of model with random effects.

[1] See (Gao, 2003; Markusen & Maskus, 1999)
[2] See (Helpman, 1987; Brainard, 1997).

It should be noted that the different variables used does not presuppose the dominance of a particular theoretical model, horizontal or vertical. Thus, the populations of investor and host countries (POP_t^H and POP_t^i) are two variables related more to the horizontal model. Indeed, a given country with an important population represents a big market for the MNCs, hence the positive effect on the attractiveness to potential investors. As mentioned above and according to the objectives, the geographical distance ($Dist_t^{iH}$) exerts an ambiguous influence on the implementation strategies of the MNCs. The differences in terms of GDP ($DiffGDP_t^{iH}$) or income per capita ($DiffInc_t^{iH}$) play different roles depending on the nature of the implementation strategies. Indeed, horizontal FDI is negatively related to these differences, by against vertical FDI is positively related.

Regarding the number of companies, operating in the same industrial sector as the foreign ones, it is a variable that can play an ambiguous role. On one side, it can affect positively the FDI attractiveness by the imitation effects; also an important number, of companies, reflects the development of the local industry which may be accompanied by the presence of network effects. Moreover, it can play a negative role in the case of horizontal FDI, because the high number of these companies indicates that the local market is saturated and the competition is tough. By against, the variable concerning the availability of labor force (measured by the level of unemployment) should be positively related to FDI flows because more work is available more foreign firms are attracted to the host country. Finally, the dummy variable for the countries of the European Union EU_t^i must play a role of attraction because it is actually a proxy of trade liberalization policies. More the host country market is open, more the FDI flows are important.

Regarding the assumptions of the model given by equation (3), we assume that the specific effects λ_t^i and residuals ε_t^i are independent and identically distributed with null mean and respective unknowns' variances σ_t^2 and σ_ε^2. The hypothesis of no correlation between the explanatory variables and λ_t^i effects will be tested using the Hausman test[1]. The estimations were performed using STATA software.

3.3. Data Source

The data used to estimate the model covers the period from 2000 to 2014 and concern the 18 countries potentially investors in the industrial sector in Tunisia, which gives 270 observations in total. The specific countries selected for the study and the timeframe was dictated by data availability. These include Algeria, Austria, Belgium-Luxembourg, France, Great Britain, Greece, Italy, Japan, Malta, Netherlands, Portugal, Saudi Arabia, Spain, Sweden, Switzerland, Turkey and USA.

[1] See e.g. (Greene, 1993).

The data used are from the foreign investment promotion agency (FIPA) database regarding the apportionment by country of origin of FDI inflows to Tunisia in the industrial sector. GDP, population and income per capita of the investor countries and Tunisia are from the World Bank database. The data related to the unemployment rate is taken from database of the International Labor Organization (ILO). Finally, the variable related to companies' number (local and foreign) in the Tunisian industrial sector is based on the database of the Industry Promotion Agency (API). It is important to note that in this work, we have not been able to integrate the variable directly related to differences in work costs since the data for Tunisia are not yet available.

3.4. Estimation Techniques

It should be noted that the variables POP_t^H and ComNb_t^H are introduced alternately due to the high correlation between them. The first variable (POP_t^H) is introduced into models M1 (Eq 4) and M2 (Eq 5). It was replaced by that relating to the number of enterprises (ComNb_t^H) in the model M3 (Eq 6). Similarly, in a first model (M1), we measure the differences between countries in terms of GDP $\left(\mathrm{DiffGDP}_t^{iH}\right)$, by against the variable related to differences in terms of income per capita $\left(\mathrm{DiffInc}_t^{iH}\right)$ is introduced in other models (M2 and M3). Table 1 shows the results for this estimation. Practically, we have three models named M1, M2 and M3 presented as follow by Eq4, Eq5 and Eq6.

$$\ln(\mathrm{FDI})_t^{iH} = \alpha_0 + \alpha_1 \ln\left(\mathrm{DiffGDP}_t^{iH}\right) + \alpha_3 \ln\left(\mathrm{POP}_t^{i}\right) + \alpha_4 \ln\left(\mathrm{POP}_t^{H}\right) + \alpha_5 \ln\left(\mathrm{Ump}_t^{H}\right) + \alpha_6 \ln\left(\mathrm{Dist}_t^{iH}\right) + \alpha_8 \ln\left(\mathrm{EU}_t^{i}\right) + \lambda_t^{i} + \varepsilon_t^{i} \quad \textbf{(4)}$$

$$\ln(\mathrm{FDI})_t^{iH} = \alpha_0 + \alpha_2 \ln\left(\mathrm{DiffInc}_t^{iH}\right) + \alpha_3 \ln\left(\mathrm{POP}_t^{i}\right) + \alpha_4 \ln\left(\mathrm{POP}_t^{H}\right) + \alpha_5 \ln\left(\mathrm{Ump}_t^{H}\right) + \alpha_6 \ln\left(\mathrm{Dist}_t^{iH}\right) + \alpha_8 \ln\left(\mathrm{EU}_t^{i}\right) + \lambda_t^{i} + \varepsilon_t^{i} \quad \textbf{(5)}$$

$$\ln(\mathrm{FDI})_t^{iH} = \alpha_0 + \alpha_2 \ln\left(\mathrm{DiffInc}_t^{iH}\right) + \alpha_3 \ln\left(\mathrm{POP}_t^{i}\right) + \alpha_5 \ln\left(\mathrm{Ump}_t^{H}\right) + \ln\left(\mathrm{Dist}_t^{iH}\right) + \alpha_7 \ln\left(\mathrm{ComNb}_t^{H}\right) + \alpha_8 \ln\left(\mathrm{EU}_t^{i}\right) + \lambda_t^{i} + \varepsilon_t^{i} \quad \textbf{(6)}$$

3.5. Empirical Results

In order to test the global significance of the models, we conducted a preliminary estimation by ordinary least squares (assuming that there are fixed-effects models where λ_t^i parameters are null). In this case, where we use the OLS method, a Student's test is performed on the coefficients relating to these variables in order to assess their degree of validity. The result indicates that the model is significant according to the values of the coefficient of determination R^2 and that of the global Fisher test.

The obtained results in table 1 demonstrate that the variables related to differences in market size (model M1) and factor endowments (M2 and M3), the size of the investors' countries (M2 and M3) and geographical distance have a significant effect (at the 1 %) on FDI inflows in Tunisia. Also, we can say that more the market size of the investor country is higher, more its investment capacity is important. Similarly, more the differences in market size and in factor endowments are important more the FDI flows are greater. Conversely, the geographical distance effect is negative: more the distance is high (that is to say, more transport costs are significant) more investors are discouraged to invest in Tunisia; this is the negative impact of the long geographical distance. It must be noted that the coefficient on the variable of the Tunisian market size (measured by population) is not significant. These results support the vertical FDI model.

Table 1. Results of estimations by ordinary least squares (OLS)

	M1	M2	M3
CONSTANT	-6.4072	-19.5950	-24.1248
$\text{Ln}(\text{Pop}_t^i)$	0.1245 (0.1522)	0.5699 (0.7754)	0.6012 (0.0798)
$\text{Ln}(\text{Pop}_t^H)$	-2.6651 (4.8452)	-0.5996 (3.9925)	____
$\text{Ln}(\text{DiffGDP}_t^{iH})$	0.4015 (0.1552)	____	____
$\text{Ln}(\text{DiffInc}_t^{iH})$	____	0.4012 (0.0996)	0.4552 (0.0992)
$\text{Ln}(\text{Ump}_t^H)$	4.4001 (8.926)	4.0395 (8.887)	3.8826 (9.0021)
$\text{Ln}(\text{Dist}_t^{iH})$	-0.8222 (0.1901)	-0.8845 (0.2015)	-0.8997 (0.2201)
$\text{Ln}(\text{ComNb}_t^H)$	____	____	-0.10098 (0.7998)
$\text{Ln}(\text{EU}_t^i)$	0.8004*** (0.4007)	0.4004 (0.2645)	0.4122 (0.2552)
R^2	0.6654	0.6524	0.6901
F (Fisher)	11.004	11.478	12.877

Dependent variable: $\ln(\text{FDI})_t^{iH}$

Values in ( ) denote the estimated standard deviations.

* Coefficient significant at the 1% to the value of the Student test.

The variables related to the availability of work factor and to the number of firms in the industrial sector in Tunisia have insignificant effects in the variability of the endogenous variable. This result is logical and not surprising because the MNCs attracted by Tunisia are implemented vertically at the large part. Indeed, the latter variable could have a significant effect in the case of a sectoral analysis (eg network

effects). Finally, the result indicates that the membership of investors to the European Union has a significant effect only when introduced simultaneously with the variable related to differences in GDP (model M1). This result joins the one related to the geographical distance effect. It confirms that the countries of the European Union have the biggest number of industrial firms investing actually in Tunisia (for example, France, Italy and Spain). They are those that invest increasingly in Tunisia to take advantage of these special benefits (vertical FDI).

Secondly, we proceeded to estimate models M1, M2 and M3 assuming that they are models with fixed effects' in an one time and with random effects in a second one (Table 2). Firstly, for the different models with fixed effects, the value of the coefficient of determination R^2 (within) is too low and the statistics of Fisher test that tests the global significance of the explanatory variables appears insignificant.

It should be noted that in this type of model, unlike geographical distance, the dummy variable for membership of the investor countries to the European Union becomes an element of the set of explanatory variables because it is not constant in the time. This is because; Malta, as investors in Tunisia, is not part of the European Union until 2003. Also, the results indicate that the statistics relating to the Fisher test that tests the joint significance of introduced fixed effects is significant (at 1% level). This confirms the existence of specific or individual effects.

Table 2. Estimation results of models

	with fixed effects			**with random effects**		
	M1	M2	M3	M1	M2	M3
Constant	20.154	35.896	44.001	-5.026 (274)	-19.597 (2859)	-23.569 (3826)
$\mathrm{Ln}(\mathrm{Pop}_t^i)$	0.8552 (3.898)	20.115 (4.004)	2.015 (4.072)	0.056 (0.354)	0.6025^{+} (0.205)	0.623^{+} (0.214)
$\mathrm{Ln}(\mathrm{Pop}_t^H)$	-1.782 (5.074)	0.858 (5.127)	____	-2.546 (3.254)	-0.075 (3.015)	____
$\mathrm{Ln}(\mathrm{DiffGDP}_t^{iH})$	0.358 (0.589)	____	____	0.124^{++} (0.259)	____	____
$\mathrm{Ln}(\mathrm{DiffInc}_t^{iH})$	____	-0.201 (0.412)	-0.245 (0.368)	____	0.326 (0.205)	0.348 (0.214)
$\mathrm{Ln}(\mathrm{Ump}_t^H)$	4.582 (5.878)	4.019 (5.782)	4.459 (5.869)	4.452 (5.986)	3.519 (5.642)	4.562 (5.996)
$\mathrm{Ln}(\mathrm{ComNb}_t^H)$	____	____	0.243 (0.814)	____	____	0.002 (0.548)
$\mathrm{Ln}(\mathrm{EU}_t^i)$	-0.558 (0.602)	-0.486 (0.625)	-0.427 (0.655)	0.145 (0.489)	0.091 (0.514)	0.092 (0.456)
σ_{λ}	2.510	3.048	3.182	1.261	0.103	0.103
σ_{ε}	1.845	1.981	1.829	0.744	0.775	0.778
R^2 (Within)	1.005	1.563	1.298	——	——	——
F (Fisher)	0.992	0.857	0.851	——	——	——

Test de Fisher (all $\lambda_t^i = 0$)	12.12*	11.93*	11952*	——	——	——
R^2 (Between)	——	——	——	0.456	0.449	0.448
Wald Chi2(6)	——	——	——	11.5^{+++}	10.5^{+++}	10.4^{+++}
Breush-Pagan	——	——	——	152.99	145.62	145.59
Hausman χ^2	——	——	——	1.88 [0.865]	3.33 [0.663]	3.29 [0.654]

Dependent variable: $\ln(\text{FDI})_t^{iH}$,

Values in ( ) denote the estimated standard deviations,

Value in [ ] indicate the p-value,

* Coefficient significant at the 1% to the value of the Student test,

+, ++, +++ Coefficient significant at the 1%, 5%, 10% to the value of the Wald test.

In the next step, we proceeded to estimate the models defined by equations (4), (5) and (6) assuming the existence of random effects. Table 2 above shows the results for these estimations.

The estimation of a model with random effects requires the application of the test of Wald on the coefficients relating to the variables in order to appreciate their degree of validity. The obtained results argue that the model is significant according to results of the Wald test and the coefficient of determination R^2 (between) which measures the part of inter-individual variability of the dependent variable explained by those of explanatory variables. The results indicate that the FDI flows are positively related to the differences in terms of GDP (M1) and to the market size of the investing countries (M2 and M3), also they are negatively influenced by the geographical distance. Moreover, the probability of the Breush-Pagan test statistics shows that random effects are globally significant at 1%.

We must remember that the models with fixed and random effects allow taking into account the heterogeneity of the data but the assumptions about the nature of specific effects differ from one model to another. The Hausman specification test is used to test which of these two hypotheses is appropriate to our data. This test is based on the quadratic difference between the estimated parameters of the model with random effects and those of the model with fixed effects. Hausman statistics given by Greene (1993) is then calculated (Table 2). In each case, the probability of the test is well above 10%, which means that is very difficult to differentiate the model with fixed effects from those with random effects. However, previous results relating to estimations of the two categories of models widely justify the use of random-effects models for investor countries. Finally, to improve the quality of results and verify their degree of global validity, we proceeded to estimate the same models by the method of quasi-generalized least squares (test of Wald). The results are presented in table 3.

The latter method gives us the tools to take into account the chronological characteristics of the series studied including, in particular, autocorrelation of random terms which are assumed to be independent within the framework of the estimation methods presented above.

Table 3 retraces results for this type of estimation. After these estimations and the obtained results, we can notice that FDI inflows in the manufacturing sector of the Tunisian economy, are positively related to market size of investors' origin country (M2, M3) and the differences in market sizes (M1) and in capital factor endowments (M2 and M3) between the country of investors and the host country. The effect of the availability of labor force (measured by the number of unemployment) appears significant at the 10% level (M1 and M3). Also, we can say that the FDI flows are negatively influenced by the geographical distance because most barriers to trade and transport costs are significant, less foreign firms are attracted to this country to set up their production units.

Finally, we can say that all these results argue again and even more significantly in favor of vertical investment model. The firms from countries with relatively large market size and closest geographically which primarily invest in Tunisia in the industrial sector. They are attracted to the benefits of the availability of a cheap labor force. We can confirm that the free trade agreements signed with the European Union helps to make Tunisia more attractive to foreign companies, mainly the European ones.

Table 3. Results of the model estimates by the method ofquasi-generalized least squares (QGLS)

	M1	M2	M3
CONSTANT	-14.2586 (20.4158)	-19.5546 (18.2245)	-15.4583 (10.1547)
$\text{Ln}(\text{Pop}_t^i)$	0.3014 (0.2001)	0.6256* (0.1102)	0.5523 (0.1220)
$\text{Ln}(\text{Pop}_t^H)$	0.0845 (2.1548)	0.3258 (2.1458)	____
$\text{Ln}(\text{DiffGDP}_t^{iH})$	0.3236 (0.1475)	____	____
$\text{Ln}(\text{DiffInc}_t^{iH})$	____	0.3325* (0.0992)	0.3256 (0.0958)
$\text{Ln}(\text{Ump}_t^H)$	2.7485*** (1.0014)	2.5147 (1.4582)	2.5698*** 1.2580
$\text{Ln}(\text{ComNb}_t^H)$	____	____	0.0158 (0.4144)
$\text{Ln}(\text{EU}_t^i)$	0.3256 (0.2154)	0.2147 (0.2516)	0.2258 (0.2563)
-2ML	225.0148	223.1480	222.1447
WaldChi2 (6)	45.1248*	66.8459*	66.7481*

Dependent variable: $\ln(FDI)_t^{iH}$, Values in ( ) denote the estimated standard deviations.

*, **, *** Coefficient significant at the 1%, 5%, 10% to the value of the Wald test.

4. Conclusion

A multinational company can choose to implement a productive activity in a foreign country to obtain several advantages. Firstly, the MNC seeks the benefits of specific advantages of the selected territory (such as low production cost, availability and qualification of the workforce) and, secondly, to penetrate the local market and distribute a part of its production to domestic consumers. For this, we should try to incorporate into the analysis all the variables leading to investment decisions of multinational firms.

In this work, considering Tunisia as the only host country, we analyzed the factors of attractiveness for foreign companies in the industrial sector. From the application of an econometric model in log-linear panel data assuming the existence of specific effects for the investor countries, it appears that the market size, the differences in terms of GDP and income per capita, geographical proximity to Tunisia and the availability of labor force are the most significant factors of the attractiveness for FDI. This is a result consistent with the traditional theory of the implementation of multinational companies based on the differences between investor countries and the host country.

Besides the introduction of additional factors explaining the localization of production activities, such as the differences in labor costs, confirming certainly the traditional vertical model, several extensions can be suggested. For example, a sectoral analysis could be done using an econometric model on individual data and not on aggregated data. In this case, the variable representing the number of companies (local and foreign) operating in the sector in question can become a significant explanatory factor of the implementation of multinational enterprises in Tunisia.

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