THE INTERACTION BETWEEN TRANSPORTATION, FOREIGN DIRECT INVESTMENT AND HUMAN CAPITAL: A NEW DETERMINANT OF ECONOMIC GROWTH IN DEVELOPING COUNTRIES (THE CASE OF TUNISIA)

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Abstract

Our main goal is to study the impact of transport on the Tunisian economic growth through FDI. Indeed, we seek to focus on the nature of the relationship that may exist between transport, FDI and human capital accumulation in Tunisia. In other words we want to demonstrate the impact of transport on the Tunisian attractiveness in terms of MNC and, in a second step, the effects of FDI on the quality of human capital which is considered as an important factor in the economic growth. Our model will be formed by 38 observations from 1975 to 2012. Using Eviews 7, the obtained results indicate that no significance relationship between the transports and the human capital accumulation furthermore the economic growth in Tunisia. However, through the FDI channel we can say that transport contribute significantly in the economic growth by improving the quality of the human capital.

Keywords: Transportation, foreign direct investment, human capital, endogenous growth

INTRODUCTION

In recent decades, foreign direct investment (FDI) has a great importance for economic growth and improving the attractiveness of this type of investment has become a major priority for the host country. Furthermore, multinational firms are becoming increasingly demanding and competition between host countries is stronger. Indeed the competitiveness of countries based mainly on the traditional factors of FDI attractiveness (difference in factor endowment, natural richness, favorable regulations, etc.) is no longer sufficient. In recent years, the transport is presented as a very important determinant of FDI for host countries and MNCs equally. Several productivity gains can be made in regard to what may be considered by the company as a bottleneck. During their implantation in a developing country, MNCs encounter several problems, not only in administrative procedures and operations of trade, but also in terms of logistics and highway, port and airport infrastructure at their disposal.

In most cases, especially those in developing countries, implementation and maintenance of basic infrastructure and precisely those of transport are considered as essential engines of economic growth. This idea is widely supported by the authors who strongly emphasize the role of transport as a factor in the FDI attracting (Erenberg, 1993, Wei, 2000; zhou, Delios and Yang, 2002). In MNC, the requirement of a certain level of service quality is also a promoting investment in transport infrastructure. But the relationship between the foreign direct investment attractiveness and transport has become a very controversial issue that gave rise to numerous debates and an extensive literature.

To enjoy a greater participation of transport in improving the FDI attractiveness, Tunisia undertakes, like most developing countries, in several planned measures in the short and long term to improve the quality of transport service offered to customers. In this sense, the territorial attractiveness of FDI is strongly affected by the transport system performance in Tunisia. According to the neoclassical approach, the FDI cannot stimulate a long-term growth. Their impacts are limited in job creation, export promotion, maintaining of economic openness, but under the gaze of endogenous growth theorists, FDI has a very important role in the development of nations in the long term.

Under the new economic theory, the accumulation of capital (human, technological and public) is a factor which explains in a large part the long-term growth of nations. In this analysis framework, Borensztein et al. (1998) and Berthélemy Demurger (2000), Baldwin et al. (2005) find that FDI represents an interesting channel which effectively ensures the accumulation of capital. Also they show that FDI can stimulate growth through their contribution in increasing the knowledge stock in the host country. Indeed, FDI participates actively in the creation of dynamic

advantages leading to the transfer of technology, human capital accumulation and intensification of public capital (Bende et al 2000. OECD, 2002).

The interest of our empirical part is mainly to highlight the FDI impact on the long term growth while centralizing the analysis on the concept of positive externalities or spillovers. In the same vein, we discuss the FDI impact on the Tunisian economic growth at the accumulation of human capital. The present article is formed by a first theoretical part where we talk about the transport place in the FDI attractiveness and the importance of the human capital accumulation in the long term economic growth. In the empirical part, we will try to bring up the relationship that may exist between transport, FDI and human capital and its impact on economic growth in Tunisia in the long term.

Place of transport in the FDI attractiveness

In the global economic environment, transport provides several functions. It is regarded as a key factor of globalization that enables businesses and individuals to take better advantages of this phenomenon. Indeed, companies and individuals can benefit from globalization especially that transport networks are efficient and effective. Especially in the economic activities relocation and the firms internationalization, the quality and capacity of the physical infrastructure (airports, roads, public transport, etc..) are among the factors involved in the decision making process of multinational corporations locating. Brainard (1997) finds that transport costs, tariffs and economies of scale at the firm help large americain companies to increase their investments abroad.

Today, companies need to stock up with raw materials at the best possible conditions. Also, they work hard to achieve the delivery of their products in good conditions (time, cost and quality). For them, transport is a decisive determinant of competitiveness. Despite the long distances and different problems for supplies and also to make distributions, their offers must be competitive in comparison to those of competing firms. Studies confirm that FDI is more attracted to areas where transport systems are more efficient (Coughlin, Joseph and Arromdee 1991; Loree and Guisinger, 1995). For this reason, the MNC fully integrates transports into their activities and consider them as a factor of production as well as the human, financial and technological capital. Also, they treat them as a key determinant of the new location.

Concerning the transport infrastructure, little research has tried to discuss their role as determinants of FDI (Wheeler and Mody, 1992; Loree and Guisinger, 1995; Richaud et al, 1999. Asiedu, 2002; Morisset, 2000; Sekkat and Veganzones-Varoudakis, 2004). They demonstrate the importance of such infrastructure as essential elements to strengthen the economic activity of the host country. Indeed, in the early stages of development of a country, transport

infrastructure contributes greatly to its economic growth. For this reason, we find that the railway was at the heart of the industrial area playing a central role in the economic development of highly industrialized countries.

For multinational companies (MNCs) and domestic firms, their operations are largely dependent on the capacity and quality of transport infrastructure especially those providing international transports. In addition, Zhou, Delios and Yang (2002) explain that the transport infrastructure is directly related to the nature of the production, which requires the availability of roads, railways, ports and other installations for efficiency operational. Also, with the increasing competition, companies are seeking to distinguish themselves by some of their offerings. They choose to locate near ports and in the well-equipped areas to ship their products in the best logistics.

Several recent empirical researches suggest that public infrastructure has a significant impact on productivity and cost structure of private firms (Aschauer, 1989; Mamuneas and Nadiri, 1994; Morrison and Schwartz, 1996; Haughwout, 2001). Erenberg (1993) discusses the influence of transport infrastructure on the work of firms. He also believes that if the state does not provide these types of infrastructures, the domestic private sector and multinational companies operate less efficiently and attempts on their part to provide their own networks would result in duplication and waste of resources.

For example, better roads can reduce the costs associated with a construction of a new factory or transportation of heavy equipment. Also, if a private company uses the public road network to receive and ship its products, it can increase productivity, as it combines its own capital with the public one, which reduces the unit cost of production. Why Wei (2000) called "a location with good infrastructure is more attractive than the others."

Some companies find that a particular mode of transport is more compatible and well suited to these activities; they use it more than others. Road transport is the most commonly used to perform transport door to door, but it is not competitive viewpoint mass and transported volume. While shipping remains the first mode in quantitative terms despite its low speed. Each mode of transport has its own advantages that make it the most useful under certain conditions.

The increasing globalization and the rapid growth of FDI volumes generate an international trade in large quantities. Thereafter, in their projects of territorial attractiveness improvement, host developing countries attach more importance to their transport sectors. So, the transport system must acquire the capacity requested by the MNC. What makes consolidate the importance of transport in achieving these exchanges of goods and then use effectively the all modes.

Currently, the opening of developing countries on the FDI is greatly accelerated by the benefits generated by their presence in the host territories. For host economies, MNCs are big job creators with higher salaries than those given by domestic firms. Also, they support the construction of a competitive local industry by enhancing the effects of demonstration, imitation and contagion and the stimulation of competition between firms. For local firms, the acquisition of advanced technologies is easier in an environment where MNC exist. Also, foreign companies help to increase foreign currency reserves by improving exports. Recently, host countries see that the FDI can help them to achieve economic growth that lasts over the long term. According to the endogenous approach, economic growth can be guaranteed by the accumulation of capital, which in turn favored by FDI.

FDI effect in the accumulation of human capital

The role of human capital in economic growth is widely studied by economists. They indicated that the accumulation of this capital can support the economic activity of countries. In addition, other authors have focused on the role of FDI and their impact on human capital in the host countries (Markusen, 1995; Kinoshita, 1998; Sjholm, 1999). In this sense, during the past decade, substantial studies on the role of FDI as drivers of economic growth through the improvement of human resources have been published. These authors argue that MNC during the implementation of the new subsidiaries in a given territory, they will cause a change in technology that can accelerate the effects of imitation and contagion in its industrial sector.

Lucas (1988) said that FDI is not necessarily more attracted to areas where they are more rare, but on the contrary a workforce more educated with more good qualities encourages the entry of MNCs. Mishra et al (2001) showed that the strong presence of foreign firms in any locality may in turn explain the arrival of other firms in the same sector or in different ones. Blomström and Kokko (2003) insist on the relative importance of MNC on the formation of labor in developing countries. They see that MNC stimulates DCs to invest more in their human capital. For them, if the role of FMN is pretty marginal on primary and secondary education, the demand for skilled labor by MNCs may encourage the governments to invest more in the higher education.

Thus, we can estimate with Blomström and Kokko (2001) that a low quality of human capital does not promote the attractiveness of FDI intensive in technologies that can help to increase the qualification of local labor. In this case, multinationals tend to use simpler technologies that will contribute marginally to the learning and development of a local qualification. Research on the relationship between FDI and human capital formation should be

further developed and raise the question of public policy to be implemented to improve the absorption capacity of host countries.

Barro and Lee (1994), Borensztein, De Gregorio and Lee (1998) show that the nature of the FDI externalities on host economies remains in strong relationship with the quality of human capital in the latter. In addition, they verified that the foreign investment has a negative impact on economic activity in countries with very low human capital. In 2002, Ram and Zhang have confirmed this result. They worked on cross-sectional data on a large number of countries and they reported a positive effect of FDI on growth. But they have not found the highlighted links between FDI, human capital and growth.

There is another channel through which FDI can improve the human capital in developing countries. Indeed, the skills acquired by working for a foreign company can take an unquantifiable form, it is obviously tacit knowledge which difficult to codify and develop. The best way to transmit them is by demonstration and experience. "In addition, tacit knowledge is difficult to exchange over long distances. The best way for developing countries to acquire the knowledge contained in the production process of the most developed economies could be the presence of foreign firms in the domestic economy "(OECD, 2003).

Economic theory admitted for a long time a positive relationship between human capital and economic growth (Adam Smith, 1776 and Beker 1964), which questioned in the late 90's by various empirical studies including those of Caselli (1996) and Prichett (2001). In the context of the new theory of endogenous growth, economists attribute the origin of the maintained growth to externalities generated by the accumulation of human capital.

The place of the accumulation of human capital in economic growth

The economic role of human capital is widely studied by theorists. They tried to determine its importance in the realization of a long-term growth. But the effect of the accumulation of the capital remains rarely addressed. Romer (1990), De Gregorio and Lee (2003) include the level of human capital in their regressions in order to bring up its contribution to economic growth. Then one finds that other authors interested in the effect of the human capital accumulation on growth. By a panel data model, Andreosso-O'Callaghan (2002) worked on a sample consisting of 10 Asian countries for the years 1980, 1990 and 1997. The author has found that human capital, expressed by the literacy rate or education level, plays an essential role in the production and hence in the growth of these countries. In the same vein and by the same technique, Aghion and Cohen (2004) work on a sample of more countries over a longer period (N = 110, T = 40). Approximating human capital by the number of education year of the workforce, they also found that the accumulation of this factor affects positively the growth.

Lucas (1988) assumes that the effectiveness of each individual in the production of final goods is even stronger when the social average level of human capital is high. Indeed, each person has more chance to increase their skills by taking advantage of the knowledge accumulated by the society without must pay directly. So each economic agent can become more competent and produce more if the average level of human capital development in the economy is high. In the same vein, the presence of a well trained management, guidance and education staff provides an efficient education system. For some authors as Pigalle (1994) and Rajhi (1996), the model of Lucas (1988) is the starting point for their research in which they offer extensions in order to better explain the relationship between human capital and growth taking into account the institutional environment of the economy

This approach introduced a new law of human capital accumulation that takes into account the training effort of the individual. A part of human capital that has not participated in the final production serves to improve student-teacher ratios. Thereafter, there will be an increase in productivity gained from improving work quality. So this approach represents a new kind of investment rate of the economy and more this portion is higher more the human capital growth is faster. Pigalle (1994) argues that in the productivity growth generated by a good stock of human capital, the supervision rate has a central role. But he said that the increase in staff ratio must be well calculated to avoid its negative impacts, such as reducing the number of people available to produce final goods. Such as coaching can act negatively on growth, it is essential that this negative effect should be minimized by choosing the optimal supervision rate. Indeed, the growth rate is an increasing function of managerial rate until its optimal value. It then decreases if the supervision rate continues to increase.

In the Lucas model, to achieve a sustainable economic growth, one supposes a linear function of human capital accumulation in which the growth rate of this capital depends only on the time of formation technology. But Becker (1964) found that, for the same person the knowledge accumulation is not a completely identical manner throughout his life. Indeed, the impacts of training during his early years are more significant and important than those sudden towards the end of his life. So he concluded that the education benefits decline during the life cycle of an individual. To resolve this problem, Lucas attributes this decreasing to the limited duration of a person's life. To overcome this contradiction, Lucas assumed the transmission of knowledge from one generation to the next. In this way, the initial level of human capital of each individual is determined by the one inherited from the previous generation.

In more recent studies, economists treat the relationship between human capital and sustainable growth by offering models based on research and development (Romer, 1990; Grossman and Helpman, 1990). They started with the idea that the human capital allocated to

the research activity has very significant effects on the innovation process and consequently on economic activity. Inspired by the logic model Romer (1990), Pissarides (1997) proposed a developed model that takes into account the importance of the process of imitation.

He found that human capital allows the sustained increase in the production of less-developed countries through technological development. It should be noted here that the experience of emerging countries (especially Asian countries) seems coherent with the teachings of this approach. The existence of a significant amount of skilled labor has helped to further the technological change that has helped in turn the economic growth of these countries through imitation or innovation.

The interest of our empirical part is essentially to demonstrate the impact of FDI on the long term growth while centralizing the analysis on the concept of positive externalities or spillovers. In the same vein, we discuss the impact of FDI on the Tunisian economic growth by focusing on the FDI effect on the accumulation of domestic human capital. This empirical analysis covers the period from 1975 to 2012 for Tunisia. The objective is to demonstrate the short and long term causal relationships between FDI flows entering in Tunisia and the human capital accumulation. To this end, the human capital is introduced at the heart of the mechanism by analyzing how it interacts with FDI flows. We will try to determine if there are causal relationships in the sense of Granger between FDI and human capital.

EMPIRICAL EVIDENCES ON THE IMPACT OF FDI ON THE QUALITY OF TUNISIAN HUMAN CAPITAL

Analytical framework

In the present work, we use an econometric model under the following form;

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$$\ln(KH_t) = \beta + \alpha_1 \ln(GDPC_t) + \alpha_2 \ln(FDI_t) + \alpha_3 \ln(URB_t) + \alpha_4 \ln(EMP_t) + \alpha_5 \ln(TRSP_t) + \alpha_6 \ln(NIC_t) + \varepsilon_t$$

Where:

KHt: variable to explain

xt: vector of explanatory variables,

β: vector of parameters to estimate,

εt: the usual error term.

Description of variables

The dependent variable - Human capital: KH_t

In most studies, countries with qualified human capital attract more FDI. Indeed, these countries contain a critical mass of human resources have a faster growth. In the present work, human capital is the total number of enrollment in secondary education, regardless of age.

The explanatory variables

- Gross domestic product per capita GDPCt

As defined by the World Bank, GDP per capita is the gross domestic product divided by population at midyear. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

-National income per capita NICt

National income per capita is equal to the total national income divided by the number of inhabitants. Unlike the GDP per capita, national income per capita includes the income of nationals living abroad and removes that of the foreigners living in the country (including the repatriation of FMN profits). In Tunisia, the national income is important because of many migrant workers who live outside and ship their assets in their home country.

-Employment: EMPt

The total labor force includes persons aged 15 years and older who meet the definition of the economically active population of the International Labour Organisation: all people who worked to produce goods and services in a given period. This definition includes both workers and job seekers.

-Urbanization rate: URBt

Urban population refers to people living in urban areas as defined by national statistical offices. It is calculated using the population estimates from the World Bank and urban reports of urbanization perspectives of the world population of the United Nations. In our work, the urbanization degree and urban development institutions, allowing easier access to different institutions (social, cultural, health, sports, etc.) approximated by the urban population as a percentage of the total population.

-Foreign Direct Investment: FDI$_t$

This variable explains the entry of foreign direct investment (in current dollars). This is the volume of foreign direct investment received by Tunisia during the study period (1975-2012).

-Transport: TRSPt:

Transportation is presented as a commercial service (% of commercial service exports) covers all transport services provided by Tunisian to foreign investors implying the movement of goods (freight), rental of carriers with crew and auxiliary services. This ratio is a composite index that summarizes the satisfaction degree of the transportation function and this is as covered by the statistics published by the World Bank. It is these statistics that we consider as values taken by the proxy" Transport".

ANALYSIS

Descriptive statistics and correlation between variables

To treat our model, we begin with a general study, analysis of the descriptive statistics and also on the correlation matrix between the variables.

Table 1: Descriptive Statistics

	Mean	Maximum	Minimum	Std. Dev.	Jarque-	Observations
GDPC	4.694580	3734.95	1508.32	238.9067	4.022197	38
EMP	2986593.	3748418.	2428365.	358.782.0	1.534476	38
FDI	2716.978	3.27E+09	49205031	5394.884	2.19066	38
KH	53.08849	1268219	196447.0	24.09485	3.055251	38
NIC	1886.286	4100.000	770.0000	895.5120	5.347975	38
TRSP	19.97368	32.00000	11.00000	5.957133	2.13912	38
URB	58.19714	65.90400	47.58800	6.025412	3.146923	38

Descriptive statistics are the instrument to give meaning and expression to the required information. It reveals the essential characteristics of a data set for a simplified reflection of reality. Concerning our case, the obtained results give a fairly clear idea of the used database. Concerning the difference between the minimum and maximum values there is a considerable variation for the variables related to rate of GDP per head (min = 1508.32, max = 3734.95) and FDI flows and enrollments in secondary education (min = 196447.0; max = 1,268,219). For other variables, the variation is also equally important. Another result concerns the Jarque-Bera values; we find that the relative probabilities are too low which confirm the normal distribution of the series.

Table 2: correlation of variables

	KH	FDI	TRSP	URB	NIC	EMP	GDPC
KH	1.000000	0.186169	0.074901	0.168764	0.071200	0.319761	0.152361
FDI	0.186169	1.000000	0.222646	0.001712	0.211147	0.340452	0.081197
TRSP	0.074901	0.222646	1.000000	0.402372	0.394912	0.412772	0.024431
URB	0.168764	0.001712	0.402372	1.000000	0.266478	0.316127	0.277186
NIC	0.071200	0.211147	0.394912	0.266478	1.000000	0.228808	0.141841
EMP	0.319761	0.340452	0.412772	0.316127	0.228808	1.000000	0.120193
GDPC	0.152361	0.081197	0.024431	0.277186	0.141841	0.120193	1.000000

The analysis of values given by the second table lets us to note that the variables in our model are characterized by a relatively low level of correlation. So we can conclude that there is no correlation between the explanatory variables of the model that is required to continue the econometric estimation.

Study of the stationarity

Practically in any econometric study, it is essential to avoid the risk of spurious estimates; the variables stationary should be tested. To do this, we used the Dickey-Fuller approach (ADF) to test the non-stationary of the series. So an ADF test (correcting problems of error autocorrelations) was applied to each variable to detect whether or not it has a unit root. Also, to verify the results given by the ADF test, another test shall be used; the Pillips-Perron test (PP). The results of the ADF and PP tests are reported in Table 3 below.

Table 3: unit root tests (ADF, PP)

	ADF		PP	
	In level	primary difference	In level	primary difference
GDPC	-2.18	-3.003***	-1.18	-3,11**
KH	1,57	-2,81*	2,09	-2,08**
NIC	0,46	-3,26**	1,05	-3,36**
EMP	-0,5	-1,93**	-1,07	-1,95**
URB	-1,34	-2,4*	-2,18	-3,46*
TRSP	-2,76	-6,29***	-2,56	-6,32***
FDI	1,61	-4,11*	-2,04	-3,54***

*Stationarity at 10% level   ** Stationarity at 5% level   ***Stationarity at 1% level*

According to the results stored in Table 3, we cannot reject the null hypothesis of unit root test for each variable because none of the variables follow an integrated process of zero order. These variables were not stagnated between 1975 and 2012. They are non-stationary in level, hence the need to make them stationary and make a first difference transformation. Tests on the stationarity of the series allow us to say that the series are integrated in order one. The second step is the study of cointegration for all variables stationary in first difference.

Study of cointegration relationships

In the present work, the study previously done on the stationarity of variables, allow us to retain all variables integrated of order 1: KH, FDI, TRSP, URB, EMP, and NIC GDPC. The study of cointegration helps us to test the existence of long-run equilibrium relationships linking variables. To test the existence of these relationships by the method of Johannsen (1995), it must be determined the optimal number of lags which gives us the best possible estimation. Due to the applied test, we found that our model gives a good result with two lags.

Table 4: optimal number of lags

Lags	1	2*	3
Akaike information criterion	116.986	113.275	115.771

* optimal number of lags

The Johannsen test is based on two different tests, the trace test and the maximum eigenvalue test. The results of both tests are shown in detail in Tables 5 and 6 below.

Table 5: Cointegration relationships of variables: test of trace

	r=0	r ≤1	r≤2	r≤3	r≤4	r≤5	r≤6
eigenvalue	0.831	0.741	0.685	0.601	0.487	0.256	0.077
Trace statistic	206.423	147.649	69.818	47.856	29.797	12.44	2.677
Critical value	125.615	95.753	103.062	64.91	34.50	15.494	3.841
prob	0.000*	0.000*	0.060**	0.061**	0.063**	0.136**	0.101**

H_0 : no cointegration relationships

** Null hypothesis accepted at 0.05.

Table 6: Cointegration relationships of variables: test of the maximum eigenvalue

	r=0	r ≤1	r ≤2	r≤3	r≤4	r≤5	r≤6
eigenvalue	0.813	0.741	0.685	0.601	0.487	0.256	0.077
Max-Eigen statistic	58.773	44.586	33.876	27.584	21.131	9.76	2.677
Valeur critique	46.231	40.077	38.152	30.400	22.064	14.264	3.841
prob	0.001*	0.014*	0.075**	0.070**	0.065**	0.060**	0.0601**

H_0 : no cointegration relationships

 ** null hypothesis accepted at 0.05

The Johannsen (1995) test examines the probability of finding long-term relationships between different variables. Under the null hypothesis, it is assumed that there is no cointegrating relationship while under the alternative hypothesis, we must confirm the presence. According to the recorded p-value, the null hypothesis is rejected and we must say that the variables are cointegrated if the p-value is less than 5%. This result can also be confirmed when comparing the calculated trace values with the critical ones. Theoretically, if the calculated values are larger than the critical ones, we should always reject the null hypothesis.

Using the cointegration test, we can confirm the existence of cointegration relationships. This result seems to note that in the long term, the human capital in Tunisia depends on the foreign direct investment received from different countries, to the performance of the transport service and to the level of economic growth in Tunisia and also the other exogenous variables in our equation.

Study of causality

The cointegration test of Johannsen (1995) confirms the existence of long-term relationships between variables. In coming to this stage, a Granger causality test becomes necessary, it serves to wonder about the direction of this relationship. It must be applied empirically to our different variables and analyze the results. By using Eviews software, we performed the Granger causality test on all variables and all crossings of pairs of variables were considered. To properly treat our initial problem, in which we want to determine the causal relationship between human capital, FDI, transport and the level of GDP per capita, we focus our analysis around these variables only.

Table 7: Results of Granger causality test

Null Hypothesis:	Obs	F-Statistic	Prob.
GDPC does not Granger Cause KH	35	6.1252	0.0190
KH does not Granger Cause GDPC	4.82588	0.0207	
FDI does not Granger Cause KH	33	3.5929	0.0417
KH does not Granger Cause FDI	4.49305	0.0251	
TRSP does not Granger Cause KH	33	0.5019	0.6107
KH does not Granger Cause TRSP	0.75271	0.4804	
FDI does not Granger Cause GDPC	33	6.0520	0.0194
GDPC does not Granger Cause FDI	4.00146	0.0303	
TRSP does not Granger Cause FDI	33	4.77674	0.0206**
FDI does not Granger Cause TRSP	3.18724	0.0344**	

Concerning the relationship between human capital and FDI, the results allow us to say that the causal link between these two variables is significant over a period of two years. It remains to check the direction of the relationship between these two variables. Indeed, a high value of Fisher means that the null hypothesis (absence of a causal relationship from FDI to human capital) must be rejected. So we can say that the FDI affects the variation of the stock of human capital in Tunisia. Also, in the opposite direction the null hypothesis should be rejected again. So according to Granger test, we can accept the presence of a bidirectional relationship at 5%.

Also, the causal relationship between human capital and economic growth, the values of test confirm its significance. For the causality direction, we start with the first sense that human capital affects the GDP per capita, we find an F statistic equal to 4.825 which automatically rejects the null hypothesis. Thus, it is the same for the opposite direction (F = 6.125), so we have another bidirectional relationship between the two variables. Theoretically, many works that have insisted on the strong relationship between human capital and the PGN per capita level.

In a next case, the relationship between transportation and human capital appears to be very low and not significant, which is why a value of Fisher (F = 0.5019) is found confirming the

absence of such relationship. Therefore, the accumulation of human capital stock in Tunisia has a low dependence on the quality of transport services offered by the Tunisian to international investors. In another case, an important relationship and significant causality are found between FDI and economic growth on the one hand and between FDI and transportation services on another.

Econometric interpretation of results

Regressions are on the log-linear transformation of the variable KH, our model will be written under its log-linearized form. Among the advantages of using the log-linear form is that it allows to express the results in terms of percentage, in which a 1% change in one of the independent variables (GDPC, FDI, TRSP, URB, NIC or EMP) leads to a well-determined percentage change in the dependent variable (KH). We estimate for this study an equation with k exogenous variables in the following form:

$$\ln(KH_t) = \beta + \alpha_1 \ln(GDPC_t) + \alpha_2 \ln(FDI_t) + \alpha_3 \ln(URB_t) + \alpha_4 \ln(EMP_t) + \alpha_5 \ln(TRSP_t)$$
$$+ \alpha_6 \ln(NIC_t) + \varepsilon_t$$

Where

kht: variable to explain

xt: vector of explanatory variables

εt: the usual error term.

A first econometric estimation allows us to evaluate the robustness degree of the model and its explanatory power. Also, we can determine the variables with the most significant coefficients. The result of the estimation is shown in Table 8.

Table 8: Estimation of human capital equation

Dependent variable: human capital (KH)				
variables	coefficient	Std.error	t-statistic	prob
C	-0.023664	0.044778	-0.5284	0.6013
LOG(GDPC)	0.489688	0.124739	3.92571	0.0005*
LOG(TRSP)	0.172845	0.153113	1.12887	0.2685
LOG(URB)	1.374322	0.350051	3.92606	0.0005*
LOG(NIC)	1.741381	0.360362	4.83231	0.0000*
LOG(FDI)	0.063603	0.022651	2.80796	0.0090*
LOG(EMP)	-3.02658	0.76293	-3.9670	0.0005*
R-squared	0.799989	Durbin-Watson stat		1.8487
F-statistic	7.567	Prob(F-statistic)		0.0000

*significant at1%, ** Significant at 5%, ** Significant at 10%,

The results given in Table 8, present the FDI effects on employment. From the coefficient of adjusted determination our model appears significant (R^2 = 79%), with a good explanatory power (F-statistic = 7.567). So we can say that the model allows us to draw a clear idea about the relationships between the exogenous and the endogenous variables. Regarding the variables introduced into the explanatory part, certain have significant coefficients indicating its good relationship with human capital in Tunisia. Others have low coefficients reflecting the weak dependence to the rate of enrollment in secondary teaching in Tunisia.

Regarding the relationship between the level of gross domestic product per capita and the human capital level, the value of t-statistic is about 3 and the associated p-value confirms the significance of the relationship between the two variables. So we can say that the Granger causality is confirmed in the positive sense. Theoretically, an extensive literature has discussed the positive impact of a high level of GDP on the quality of human capital (Romer 1986, 1990, Lucas 1988; Borensztein et al 1998.). Concerning the representative variable transport services witch Tunisia offer to the international investors, the relationship seems slightly significant and it does not have a great weight. On the table a t-statistic far enough from two (t-statistic = 1,128, prob = 0.2685) indicates that the transport does not profoundly affect the Tunisian human capital. Therefore the probability of the realization confirms the absence of causality between the two variables.

Therefore, Table 8 allows us to know the nature of the relationship between national income per capita and human capital. A large literature argues that countries where people have significant revenues are generally characterized by a high level of human capital. Indeed, a good education system in primary, secondary and tertiary phases offers a well-trained workforce with a good quality increasingly helping to maintain a more competitive economic system stable in long-term. In addition, we can draw from this table a significant relationship, but in the opposite direction, between employment and human capital. The recorded values for the coefficient (t-statistic and p-value confirms that if the size of the productive mass increases the number of enrollments in secondary education decreases. But the qualities of the human capital stock are becoming higher and more capable to satisfy the needs of local and foreign firms especially in sectors with high technology.

A complementary relationship may exist between enrollment in secondary education and the rate of urbanization in Tunisia. Practically, as the urban population is large as the number of students is important. In the case of Tunisia, a t-statistic equal to 3.92 indicates the importance of this relationship and an associated p-value shows that this relationship is significant at the 1% level. This situation can be explained by a more favorable environment to continue studies in large cities than in the others. So we find that, a person has a more chance to go further in his

research if he lives in an urban environment. For this reason and others that we have a significant impact of the urbanization level on the human capital performance.

In the present work, we are interested more to the relationship between human capital and the flow of FDI attracted by the host country. Tunisia, as the other developing countries took into account the importance of human capital as a major determinant of FDI. The local government works to overcome weaknesses by improving the performance of the education system and enhancing the workforce training. In Table 8, the value of t-statistic (t-statistic = 2.807) confirms the significance of the relationship between enrollment in secondary school and FDI received by Tunisia. Also, a p-value (p = 0.009) shows that this relationship is significant at the 1% level and the direction of this relationship is justified by the positive sign associated to coefficient. Finally, we can conclude that FDI affect directly and significantly the level of human capital in Tunisia.

Theoretically, several studies have investigated the impact of FDI on human capital in the host countries. They treated the different relationships that can exist between the two variables showing the impact of each on the other. Many theorists have shown the existence of a positive relationship with different impacts from one country to another depending on several factors. In Tunisia, they join these results to the nature of attracted flows of FDI which are primarily focused on the energy and the manufacturing sectors. In recent years, the latter sector is characterized by an important domination of traditional industry (textiles and clothing, leather, footwear...). This type of industries does not require a high level of labor qualification or a very advanced technology.

Despite these assumptions robustness, they do not avoid the role of MNCs to obtain a qualified human capital in host countries mainly by the training cycles. Some authors show that MNC is a key factor of human capital accumulation. Indeed, in a MNC, the nature of its activity determines strongly the seeking skill level of the workforce and the intensity of the undertaken training activities. We assume that the MNCs attracted by the low labor costs would be more willing to conduct training of local labor. In contrast, MNC whose activity is directed towards the foreign market are generally more intensive in capital- and they are more willingly to commit in training activities to meet their need for skilled labor. Thereafter, the knowledge generated by training activities within the MNCs may diffuse to domestic firms through staff turnover or when employees leave their jobs in MNCs to create their own businesses.

Among the impacts of FDI on the composition of human capital in Tunisia, we can include the sharp increase in the number of vocational training centers, in order to provide to the international investors a skilled worker force in different specialties. A major public investment

program aims to strengthen trainning at all levels. The Ministry of Vocational Training and Employment has 212 training centers with 451 specialties covering all economic sectors.

Moreover, we can explain this relationship based primarily on vocational training by the fact that the Tunisian educational system is not enough initiator in investment. It provides a qualified labor force but not integrated enough in the economic circuit. Investors are generally looking for skilled and inexpensive labor. This research is called, as already stated before the fact, that sectors with high added value requiring skilled labor are not relatively well developed in Tunisia.

The vocational training policy aims to effectively meet the needs of MNCs and aspirations of young people to enter in active society. Actions of training are articulated on the principle of alternating training by an active partnership between training centers and enterprises. In order to better adapt programs, professional associations are generally agreed to define their needs. Studies have shown that 70% of graduates from vocational training centers have integrated easily into the labor market, the rate is 100% for some specialties.

Convinced of the need to correct these weaknesses, in addition to the enhancing of the level of employee training, Tunisia has launched in recent years improvement and correction projects of its educational system and mainly in the higher level to strengthen these attraction capacities of FDI with high added value and a great capacity for work. Indeed, it seeks a productivity gain by investing in human resources by improving supervision rate within companies and strengthening their control of information technologies and their permeability innovation. Knowing that, intangible investment saves 30% productivity for the company. Also, training of appropriate human resources is another advantage of Tunisia, besides specific decisions have been taken in this direction, it is the increase in the number of engineers and technicians. Objective can be achieved through the creation of three new engineering colleges and increasing the capacity of preparatory schools.

In 2008, Ernst & Young has published an article "National Industrial Strategy on horizon 2016" in which we can found "Tunisia is the first country on the southern shore of the Mediterranean that form each year more engineers and technicians per head capita ". Always in the goal of developing qualified human resources helping to attract MNCs in sophisticated sectors, many efforts are being made to adopt the training needs of foreign firms and the economy in general. Also in 2011-2012, Tunisia has recorded the enrollment of 340,000 students, who 61.6% are girls. Also each year, more than 70,000 new graduates join the labor market with an exceptionally high multilingualism. In addition, 35% of graduates come from the fields of engineering, science, computing, communications and other technical fields.

In order to properly serve the needs of international investors in terms of human capital, an important effort has been made to better adapt the Tunisian skills to the MNCs demands. The state pays the costs of training and vocational adjustment for teaching English and data processing for the benefit of tertiary graduates. Also, many technological institutes were created to increase the number of middle managers and adapt training courses to the needs of local and foreign firms.

For welcoming MNCs in different fields, Tunisia has established research centers and technical centers for almost all sectors and has worked to increase the number of experts in the field of quality, certification, consulting and education. Finally to resist the strong international competition in terms of territorial attractiveness, Tunisia needs to increase its competitiveness and prevent the exit of existing MNCs to competitors. For this reason, Tunisia encouraged the creation of technology in the textile industry, new energy, food processing, pharmaceuticals, information technology, mechanical engineering and electronics.

CONCLUSION

In the literature, we find that the impacts of FDI on the host economies are classified into two groups: static order effects and dynamic order effects. Static effects are the direct result of reallocation effects related to the exploitation of comparative advantages and which give rise to an exchange type inter-industry and higher levels of "outputs" of the biggest jobs and an increase in exports. Indeed, FDI move from one country to another depending on factor endowments, in the sense that capital moves to countries where there is plenty of capital to countries where capital is scarce and must yield be higher.

In contrast, in the theory of endogenous growth, FDI play their role in the long-term growth as an accumulation factor alongside the private investment. This theory and stylized facts showed that the convergence and economic catch are then conditioned by a minimum level of human capital and the acquisition of foreign technology (through imitation and learning) via international trade. Growth dynamics are therefore more dependent on national specificities. In this article, we examined the impact of FDI on economic activity in Tunisia under the vision of the endogenous growth theory. Indeed, in the empirical part, we tested the effect of FDI on the Tunisian human capital. The results show that Tunisia has followed for several years an attractiveness strategy based on the quality of the workforce. Subsequently, we find that human capital is positively influenced by the presence of foreign investments that require well-trained workers. To enhance its attractiveness, Tunisia has increased the number of vocational training centers in all activities essentially those required by MNC. In addition, Tunisia has worked to attract FDI in high-tech sectors, subsequently; enrollment in higher education is increased. By

consequences, a qualified human capital improves the Tunisian competitiveness and enhances its attractiveness in terms of MNC. Adding that, the same human capital serves as a lever to self-sustaining growth over the long term. By the effect of rotation of the workforce, imitation and réeingéring we find that human capital directly affect economic growth in Tunisia.

Concerning the role of transport in the FDI attractiveness, we find that the internationalization of firms increased the need for a transport system with high added value and high performance able to meet the demand of enterprises. Also, the existence of a good transportation and good logistics has a great influence on the nature of FDI inflow. For Tunisia, the development of transport systems and logistics function helps to change the face of FDI installed on the territory.

Indeed, the foreign investors are not only interested in the coastal regions. Their interests gradually spread to inland areas, which resulted in more profits for all Tunisia. Also, horizontal integrations are well marked in recent years where the energy sector is not the only area of investment, there are now manufacturing and the services sector are growing.

According to the approach of endogenous growth, we cannot speak about a long term economic growth without a strong public and technological capital. For this reason the Tunisian government must take care about the two capitals. In other words, it becomes necessary to adopt an efficient strategy which allows to obtain the best possible profits. Also, in Tunisia, the attractiveness strategy was based, for several years, on the lower labor costs, the motivating tax measures proposed to foreign investors and the commercial openness. Some authors say that this strategy encourages the vertical implementation of MNC, subsequently the impact of entrant FDI becomes no significant and incapable to give the estimated results. In the same vein, we find that is necessary to enhance the attractiveness of the horizontal FDI.

To improve its competitiveness in term of horizontal FDI attractiveness, Tunisia gives more importance to transport domain. To withstand the strong competition, Tunisia engages in investment projects in transports. But until today, it's very difficult to obtain the important data concerning the field. Recently, several authors indicate that investment in infrastructure; multimodal transport and logistics become a key factor of a new strategy of FDI attractiveness. So what in Tunisia, as in the developing countries, the added value of different researches concerning the transport and logistics remains insufficient and incapable to give efficient solutions to several problems concerning the transport and its contribution in the economic activity.

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