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The Impact of The Exchange Rate On Tunisia's Attractiveness To Foreign Direct Investment, The Impact Of The Exchange Rate On The Attractiveness Of Tunisia To Foreign Direct Investments

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Abstract

Using an econometric panel data model, this study analyzes the impact of the exchange rate on the attractiveness of Tunisia's manufacturing sector to FDI. The results show that FDI received by this site is negatively related to the real effective exchange rate. This shows the importance of a cheap exchange rate in attracting FDI, especially vertical FDI. This effect is increasingly noticeable in the manufacturing sector.

Keywords: *Attractiveness, FDI, Tunisia, Panel Data.*

INTRODUCTION

The spectacular increase in FDI worldwide over the last three decades has prompted a large number of authors to ask what factors make it attractive. However, to this day, there is no consensus on these factors (Blonigen and Piper 2011). In fact, everything depends on the level of analysis adopted, the assumptions made, the econometric method used and the characteristics of the country under study. Overall, the literature review, particularly the empirical literature, identifies three groups of variables: economic variables, political variables and institutional variables. Several countries have taken advantage of their successful attractiveness policies to attract FDI to their national sites. China remains a benchmark and a model to follow in this respect. Indeed, China's spectacular economic growth, thanks to FDI flows, has finally convinced even the most skeptical that FDI is an essential means of consolidating development and lifting their economies out of the vicious circle of poverty. Several factors have contributed to the success of this policy of attractiveness. Many economists and observers consider the exchange rate to be the decisive variable in this surge in FDI. Indeed, since the mid-1990s, China has been pursuing an exchange-rate policy aimed at manipulating its currency downwards (Goldestein 2005). It is precisely in this context of site competition, notably through the proposal of low production factor costs, that the importance of the exchange rate in the attractiveness of FDI arises. As a measure of the exchange rate, we take the real effective exchange rate, which measures relative prices and accurately reflects relative production costs.

Tunisia, like most developing countries, sees FDI as one of the miracle solutions for accelerating economic growth. As a result, the last three decades in particular have seen a dense web of reforms designed to attract the interest of multinationals.

Tunisia has thus become one of the best-known countries in the region for its integration into international production networks through the reception of re-export FDI or vertical FDI, which requires low production costs on the part of the multinational in a pure logic of international division of the production process. This raises the question of whether the country's exchange rate policy has contributed to strengthening its strengths and relative cost advantage in attracting FDI to the manufacturing sector.

In this work, we begin by situating the subject of the impact of the exchange rate on Tunisia's attractiveness to FDI within its theoretical and empirical framework by presenting an overview of the literature review. We will then present our empirical validation based on a panel data study of the impact of the real effective exchange rate on the attractiveness of Tunisia's manufacturing sector to FDI.

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Impact of the Exchange Rate on the Attractiveness of FDI : Literature Review

Although neglected by classical and neoclassical international economic theories, the exchange rate appears to have an important effect on the relocation of multinationals' activities. At first, two approaches clearly marked the relationship between exchange rates and foreign direct investment, namely the relative wealth effect and the relative factor costs effect. Subsequently, the majority of recent empirical studies have attempted to analyze the impact of the exchange rate on the attractiveness of FDI without reference to these two theories. In both cases, it should be noted that the relationship between the exchange rate and FDI attractiveness is relatively recent. Indeed, it was not until the early 1990s that a fully-fledged theory on the relationship between FDI and the exchange rate emerged. Froot and Stein (1991) developed a theory based on the concept of the wealth effect, also known as relative wealth. Using the US economy as an example, they showed that foreign investors holding the majority of their assets in foreign currency find themselves relatively richer in terms of the US currency when the latter (US dollar) depreciates permanently against the foreign investor's currency. In other words, foreign investors have a cash flow advantage over their American counterparts. Froot and Stein (1991) have shown that the appreciation of the exchange rate of multinationals' home countries against other currencies increases the value of their international assets. In other words, they benefit from a wealth effect.

In addition to Froot and Stein, several studies have attempted to empirically validate this model and have come up with the same results as the theoretical model (Blonigen (1997), UNCTAD (2017)).

Using a relative production cost approach, Buch and Lipponer (2018), Sekkat and Vegansones-Varoudakis (2015) and Lafay (2014) have shown that the exchange rate level, in terms of its effect on relative production factor costs, has a negative impact on a country's attractiveness to FDI. Indeed, taking the United States as an example of an invested country, Mataloni and Slaughter (2019) have shown that a depreciation of the dollar against the foreign currency leads to cheaper production costs denominated in US currency and subsequently the drain of more FDI to that country. In this case, the exchange rate would still have a negative effect on FDI.

De sousa and Lochard (2009) found different results depending on the strategies adopted by multinational firms. According to them, exchange rate volatility has a negative effect on the location of vertical FDI and a positive effect on the location of horizontal FDI. Indeed, Lin, Chen and Rau (2020) have shown that in the case of a horizontal strategy, the company's exposure to risk will decrease, since its prices and costs are denominated in the same currency. However, in the case of a vertical strategy, while costs are expressed in the currency of the multinational's home country, sales prices are expressed in foreign currency, which increases the multinational's exchange rate risk. The increased volatility of the exchange rate would then lead the firm to prefer horizontal FDI.

In a more recent study dating back to 2013, Benjamin (2013) considered a panel of 64 countries mixed between developed and developing countries, including Tunisia, over the period 2004-2010. Distinguishing between two important forms of FDI, the author showed that, unlike M&A operations, greenfield FDI is deterred by high real exchange rates that reflect high production costs. This result can be explained by the commitment of substantial financial resources to greenfield FDI. This is not the case for M&A transactions, which are simply capital recomposition operations.

It should be pointed out, however, that at present, at the empirical level, several authors such as Fontagné and Lahreche (2007), Xing and Wan (2020) and Rasciute and Pentecost (2021) have all come to an important shared conclusion regarding the importance of the role of a cheap currency in draining FDI to host countries.

All in all, we can say that exchange rate stability appears to be a determining factor in the attractiveness of FDI, especially for developing countries. Indeed, it is postulated that low volatility (risk reduction) should reduce the risk of uncertainty and thus attract more FDI.

Empirical Validation

The importance of the effect of the real exchange rate on the attractiveness of Tunisia's manufacturing sector is determined by adopting a log-linear econometric model. Thus, based on explanatory variables inspired by theoretical models and empirical analyses in the field, the model used is as follows:

$$\begin{aligned}\ln\left(IDE_t^h\right) &= \alpha_0 + \alpha_1 \ln\left(DiffPIB_t^{ih}\right) + \alpha_2 \ln\left(DIST^{ih}\right) \\ &+ \alpha_3 \ln\left(INFRA_t^h\right) + \alpha_4 \ln\left(POP_t^i\right) + \alpha_5 \ln\left(POP_t^h\right) \\ &+ \alpha_6 \ln\left(TCR_t^h\right) + \alpha_7 UE_t^i + \lambda_t^i + \varepsilon_t^i\end{aligned}$$

Where h designates the host country, that of Tunisia, i designates the investor country, α_0 is a constant, λ_t^i represents the unobservable individual effects specific to investor countries while ε_t^i represents the random part of the model.

FDI_t : refers to FDI inflows to Tunisia's manufacturing industry from investor country i, expressed in thousands of current dollars.

POP_t^h and POP^i_t refer respectively to the populations of Tunisia and each of its investor countries in thousands of inhabitants at date t. These two variables represent indicators of market size. In line with the literature review, we expect, overall, a positive effect of the investor countries' market size on their capacity to invest in Tunisian industry. On the other hand, Tunisia's limited market size is expected to have a negative effect on its attractiveness to FDI.

$DIST^{ih}$: this variable represents the distance separating the two capitals, that of Tunisia and that of the investor country. It represents a proxy for trade barriers, notably transport costs.

$Infra^h_t$: represents the quality of infrastructure in Tunisia at date t. It can be an important factor of attractiveness for Tunisian industry. In the absence of sufficient data, we use the number of fixed and mobile telephones per thousand people as a proxy for this variable. We assume a positive relationship between this variable and FDI inflows to Tunisian industry.

$DiffPIB^{ih}_t$ represents the absolute value of the difference in terms of gross domestic product at current prices between Tunisia and each of its investor countries at date t. As in Markusen and Markus (1999), this is a proxy for the difference in market size. Subsequently, this variable will be replaced by the absolute difference in revenues (Diff Rev). For reasons of data availability, we take the variable used by Hanson, Matoloni and Slanghter (2001), i.e. the logarithm of the difference in GDP per capita between Tunisia and each of its investor countries. This variable is expected to have a positive effect on inward FDI flows to Tunisian industry, since FDI between Tunisia and its various investors takes place, overall, between two countries that differ enormously in their factor composition, i.e., multinationals choose Tunisia because of its unskilled, cheap labor.

TCR^h_t : This variable refers to Tunisia's real effective exchange rate at date t. Up to now, this is the variable used in econometric empirical studies. According to the literature review cited above, the exchange rate influences FDI through, among other things, the strategies adopted by multinationals (Sousa and Lochard (2009)). Indeed, in order to repatriate more profits, a high exchange rate in the host country may encourage investors to invest in that country, if production is oriented towards the domestic market (horizontal FDI). Conversely, if production is outward-oriented (vertical FDI), a high exchange rate reflecting high input costs may dissuade investors from investing in that country. However, a low exchange rate may encourage vertical FDI into this market. Tunisia, with its small market and high cost advantages as a key factor of attractiveness, may be adversely affected by a high exchange rate, and vice versa.

EU^i_t : This variable is used to evaluate the effect of trade openness, as appreciated in particular by the signing of the free-trade agreement with the European Union in 1995. It is a dummy variable which takes 1 for European investors in Tunisian industry and 0 otherwise.

RESULTS

The data used to estimate the econometric model covers the period from 2010 to 2020, and concerns the top 15 investors in Tunisian industry over this period. The data used come from the database of the Foreign Investment Promotion Agency (APIE) and the United Nations Conference on Trade and Development (UNCTAD). To avoid having an infinite value when the value of the FDI variable is zero, we have added the value 1 to the various observations.

To test the overall significance of the model, we have used three different models. In model M1, we measure the differences between the two countries in terms of market size (DiffGDP). The DiffRev variable, measuring differences in factor endowments, is introduced in models M2 and M3. Finally, due to correlation problems, the variable POP^h_t found in models M1 and M2 is replaced by the variable $INFRA^h_t$ in model M3.

Our gravity model was initially estimated in an ordinary least squares panel and then in a fixed-effects panel (see Appendix 2: Table 1 and Table 2). However, these estimates raise several problems. Firstly, there is a strong correlation between the exogenous variables and the error term, which introduces a bias into the OLS estimator. Secondly, the existence of time-fixed variables such as geographical distance and the dummy variable means that the fixed-effects model cannot be accommodated.

We then performed a random-effects estimation. Assuming that the chronological characteristics of the series studied are independent, the results are presented in the following table:

Table1: Estimation results for the random-effects model

Variable to be explained : Ln(IDE)

	M1	M2	M3
Constant	-8,5613 (41,7610)	-16,7731 (38,4627)	-22,3362 (42,5516)
$Ln(DIST)^{ih}$	-0,8816*** (0,1792)	-0,6631** (0,1813)	-0,6184** (0,1801)
$Ln(TCR)_t^h$	-0,0121 (0,1112)	-0,0111 (0,1621)	-0,0041 (0,2512)
$Ln(POP)_t^i$	3,1523*** (6,1573)	3,6327 (6,5431)	3,5431 (6,4863)
$Ln(POP)^h_t$	-1,5361 (2,5417)	-1,7238 (2,7814)	-
$Ln(DIFFPIB)^{ih}_t$	0,7258*** (0,3351)	-	-
$Ln(DIFFREV)^{ih}_t$	-	0,4245** (0,2057)	0,4981*** (0,2518)
$Ln(INFRA)^h_t$	-	-	6,0014

			(5,9016)
EU^i_t	0,8816** (0,3327)	0,2563 (0,2001)	0,2734 (0,2879)
R^2 (between)	0,4814	0,4701	0,4741
σ_λ	1,1114	1,2111	1,2101
σ_ε	0,8815	0,8821	0,8822
Wald Chi 2	12,15	11,12	11,13
Breush-Pagan	163,41***	156,14***	156,18***
Hausman χ	1,35 p-value 0.7954	2,85 p-value 0.5867	3,15 p-value 0.6274

*Significant at 1% level, **Significant at 5% level, *Significant at 10% level. Values in brackets refer to standard deviations.*

This estimation shows firstly that the model is globally significant according to the Wald test or, in particular, the coefficient of determination R^2 (between) measuring the inter-individual variability of the dependent variable explained by the explanatory variables. Similarly, the Breush-Pagan test is significant at the 1% level for all three models, showing that random effects are highly significant.

The results show that FDI flows received by Tunisian industry are positively related at the 1% level to the population variable (M1) reflecting the market size of investor countries. The geographical distance variable is highly significant at the 1% level. Similarly, in relation to geographical distance, the investor country's membership of the European Union appears to be significant only when introduced with the market size difference variable (M1). Thus, in line with a vertical FDI model, the closest European countries with large markets invest the most in Tunisian industry. Differences in factor endowments are also highly significant at the 1% level (M2 and M3). This shows, as already predicted, that foreign firms set up in Tunisia primarily to take advantage of low-skilled, cheap labor. This result confirms the result detected by Markussen and Markus (2001) and again argues in favor of vertical FDI. Finally, the infrastructure and real effective exchange rate variables are insignificant.

Insofar as our database contains only one host country, we are obliged to retain a model with specific effects only on countries investing in Tunisia. We will then try to determine whether these effects are fixed or random in nature. However, it should be noted that both fixed and random effects models allow us to take into account the heterogeneity of the data. However, assumptions about the nature of specific effects differ from model to model. Credit is given at this level to the Hausman test, which is based on the squared difference between the estimated parameters for the fixed-effects model and the random-effects model, and enables us to determine which of these two hypotheses is appropriate for our data. At this level, we noted that the calculation of the Hausman statistic gave a high probability in each case (see Table 1), showing that we can no longer differentiate between the fixed-effects and random-effects models.

For all these reasons, and in order to improve the results, it proved necessary to find a more suitable estimation method. The merit can be given to the quasi-generalized least squares method. The major advantage of this method is that it allows us to take into account the time-series characteristics of the series under analysis, especially the self-correlation of the random terms which have been assumed to be fixed for both fixed and random effects models. The estimation results are presented in the following table:

Table 2: Quasi-Generalized Least Squares estimation results

Variable to be explained: ln(IDE)

	M1	M2	M3
Constant	-15,3641** (11,9912)	-17,6631 (24,0015)	-19,0412* (20,7721)
$Ln(DIST)^{ih}$	-0,6399*** (0,2431)	-0,6633*** (0,2417)	-0,6543*** (0,2412)
$Ln(TCR)_t^h$	-0,1102** (0,6002)	-0,1004** (0,6742)	-0,103** (0,6531)
$Ln(POP)_t^h$	-0,5328** (0,1873)	-0,4816** (0,1913)	-
$Ln(POP)^i_t$	0,4981*** (0,8791)	0,1635*** (0,7518)	0,1861*** (0,7971)
$Ln(DIFFPIB)^{ih}_t$	0,5618*** (0,0879)	-	-
$Ln(DIFFREV)^{ih}_t$	-	0,4281*** (0,1638)	0,4521*** (0,1718)
$Ln(INFRA)^h_t$	-	-	1,7003** (1.1316)
EU^i_t	0,5481* (0,0164)	0,2221 (0,0089)	0,2411 (0,0115)
Wald Chi 2	58,11***	75,52***	76,05***

*Significant at 1% level, **Significant at 5% level, *Significant at 10% level. Values in brackets refer to standard deviations.*

The estimation results showed, this time, that FDI flows received by Tunisian industry are positively related to differences in market size (M1) and factor endowments (M2 and M3). They are also positively related to the investor country's membership of the European Union at the 10% level (M1) and to the investor countries' market sizes at the 1% level, and negatively related to the host country's market size, that of Tunisia (M1 and M2). All these results are still in favor of vertical FDI. Similarly, the variable measuring infrastructure quality is significant at the 5% level. This shows the importance of this variable in the investor's decision, especially when the investment concerns the industrial sector. As for the geographical distance variable, it is highly significant (at the 1% level) and has the expected negative sign.

Turning now to the variable of particular interest to us, the exchange rate, it is significant at the 5% threshold for all three models, with an expected negative sign. Indeed, expressed in terms of elasticity, let's take model M1 as an example: a 5% increase in the real exchange rate would be accompanied by an 11% decrease in inward FDI to Tunisian industry.

This result can be explained by the one detected by De Sousa and Lochard (2009) when they showed that relative prices act as a deterrent to the entry of FDI, particularly vertical FDI. Indeed, when production is oriented outwards (vertical FDI), as in the case of Tunisia, a low exchange rate can encourage multinationals to invest in the country, whereas a high exchange rate can dissuade investors. In fact, the exchange rate policies of different countries can diverge. It all depends on the country's interests, whether it is a hydrocarbon exporter, or whether it is only marginally integrated into international production networks, welcoming FDI aimed at the local market (in which case, the country's competitiveness is less important). In Tunisia's case, we're talking about a country that receives re-export FDI (vertical FDI) thanks to its integration into international production networks. In this case, competitiveness must be preserved, and the country must then have a cheap exchange rate. It is in this context that Idriss (2017) and Bouklia and Zatla (2021) have shown that the remarkable increase in FDI received by Tunisia over the period 1990-2000 was explained, among other things, by the country's exchange rate stability.

CONCLUSION

In this work, we have tried to analyze the effect of the real effective exchange rate on the attractiveness of Tunisia's manufacturing sector to FDI. We have taken as investor countries the top fifteen investors in Tunisia over the period 2010-2020. Applying a log-linear model and using the panel data method, we noted on the one hand that, in line with the review of empirical literature, when talking about vertical FDI, a low or cheap exchange rate would be needed to attract the interest of multinationals setting up with workshop subsidiaries in a pure logic of international division of the production process. Our study confirms, once again, that the real exchange rate variable reflects, to a large extent, the motivations of vertical and export-platform FDI.

Appendices

Table1: Ordinary Least Squares (OLS) estimates

Variable to be explained : Ln(IDE)

	M1	M2	M3
Constant	-3,4913 (31,9361)	-13,7731 (30,9013)	-18,7428 (33,7191)
$Ln(DIST)^{ih}$	-0,5529*** (0,1519)	-0,7531*** (0,1663)	-0,7271*** (0,1653)
$Ln(TCR)_t^h$	-0,0011 (0,3315)	-0,0071 (0,2521)	-0,0057 (0,2996)
$Ln(POP)_t^h$	-0,8316 (8,3628)	-4,4612 (8,4613)	-
$Ln(POP)^i_t$	0,5442**	0,7164	0,6518

	(9,2351)	(3,1637)	3,4612)
Ln(DIFFPIB)$^{ih}_t$	0,7538*** (0,6715)	-	-
Ln(DIFFREV)$^{ih}_t$	-	0,3281** (0,3314)	0,3212*** (0,3318)
Ln(INFRA)^h_t	-	-	2,2812 (8,8821)
EU^i_t	0,5561** (0,5421)	0,3351 (0,2251)	0,3356 (0,2271)
R^2	0,3881	0,3199	0,3244
Fisher	12,3324***	13,8521***	13,8511***

*Significant at 1% level, **Significant at 5% level, *Significant at 10% level. Values in brackets refer to standard deviations.*

Table2 :

Table1: Estimation results for the fixed-effects model

Variable to be explained : Ln(IDE)

	M1	M2	M3
Constant	-30,7612 (50,2518)	-45,4327 (38,4627)	-48,5412 (40,4213)
Ln(TCR)$_t^h$	-00111 (0,1642)	-0,0113 (0,1612)	-0,0023 (0,2962)
Ln(POP)$_t^h$	-2,1521 (4,0631)	1,5127 (4,0953)	-
Ln(POP)^i_t	-0,9532 (1,9063)	1,8431 (1,9081)	-1,4664 (1,9085)
Ln(DIFFPIB)$^{ih}_t$	3,6621 (3,5136)	-	-
Ln(DIFFREV)$^{ih}_t$	-	3,9236 (2,33041)	-4,6312 (2,3219)

$Ln(INFRA)^{h}_{t}$	-	-	-3,2411 (2,6175)
EU^{i}_{t}	0,4361 (2,5517)	-0,0541 2,5311)	1,6321 (2,5587)
R^2 (within)	0,0131	0,0142	0,0161
σ_{λ}	2,214	1,6651	1,3251
σ_{ε}	0,6613	0,6611	0,6621
Fisher	0,39	0,38	0,37
Fisher test $(all\ \lambda)^{i}_{t}$	13,51***	13,16***	13,16***

*Significant at 1% level, **Significant at 5% level, *Significant at 10% level. Values in brackets refer to standard deviations.*

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