

Sonia Seghir (Tunisia)

## Does foreign direct investment impact the financial stability or conversely: the case of Tunisia? A gravity model approach

### Abstract

The aim of the research is to analyze the relationship between the Foreign Direct Investment (FDI) and a financial market steady in Tunisia through the evolution of the Tunisian stock market or TUNINDEX.

This analysis is going to be conducted on the basis of a gravity model that will justify the foreign direct investment not only by the traditional variables such as Gross Domestic Product (GDP), the country population and the distance but also by the volume of the exchanges on the stock market, the exchange index.

As a matter of fact, the Tunisian movables stock exchange values must be developed to become the favorite scheme for savers and the investments providers; therefore, we will demonstrate by the use of the gravity model how foreign direct investment can impact positively this evolution.

Could we say that harsh competition to win foreign direct investment will be substitute for growing direct investment? This is becoming an imperative to facilitate the evolution towards a market economy, to make up for the shortfalls and failures of banking system and to strengthen Tunisia's insertion in global economy.

**Keywords:** foreign direct investment, gravity model, stock exchange market, Tunisia.

**JEL Classification:** E22, F21.

### Introduction

During the 1990s, some developing countries built a strategy for economic development based on foreign investment in their economies. These countries have realized the key role of FDI in increasing the industrialization and stimulating economic growth. In view of these considerations, attracting foreign direct investment has been an integral element of policy reforms in Tunisia and many developing countries.

The Tunisian government encourages foreign investors to set up manufacturing plants in Tunisia by offering attractive investment incentives to export-oriented investments. Tunisia established an investment incentives code introduced in 1994. It covers all the activity sectors except mining, energy, domestic trade and the financial sector, which are governed by specific texts. This code substantially improved and codified incentives for both national and foreign investors. The incentives can be either financial in the form of subsidies and grants, or fiscal in the form of waivers and tax reductions.

Tunisia has made an important progress in attracting foreign direct investment; in fact the Tunisian government set up starting 1995 a program of privatization. This program consisted largely in the sale of public enterprises.

At the same time, a reform of the financial market started in 1988 with the aim to set up a modern legal frame tending to allow the financial market to con-

tribute to the financing of the economy. This phase gathered favorable conditions to the birth of a real financial market.

The aim of this paper is to investigate, through estimating an econometric model, the impact of foreign direct investment on financial market stability. We will try to answer following questions: What is the direction of causalities between FDI and financial market? What is the role of foreign direct investment in Tunisia's financial market? What is the impact of foreign direct investment on the structure of Tunisia's stock exchange market? Could higher level of transaction in stock exchange market affect FDI positively?

The paper is structured as follows. In section 1, we will examine the relationship between foreign direct investment and financial market. In section 2, we will investigate empirically the impact of inward foreign direct investment on the evolution of stock exchange index (TUNINDEX) in Tunisia. The last section concludes the paper and contains the main findings.

### 1. Relationship between foreign direct investment and Tunisian stock exchange market

This section aims to examine the causalities between FDI and Tunisian stock exchange stability as it is very likely to observe two-way relationships between these variables. A high developed financial market, for example, represents a higher market potential in a country and thus attracts foreign firms. FDI, on the other hand, boosts growth by new investments.

Direction of causalities between the variables examined is tested by applying Granger causality test. Possible causality from FDI to financial market

(FM) would mean that the foreign investment affects FM. The opposite would indicate that FM attracts FDI. Here, the FM could be interpreted as the market size, and such FDI would be more market-oriented. Two-way causality shows both variables affect each other.

The role of financial markets on FDI is searched by Alfaro et al. (2003). They show that when the financial markets are developed, FDI positively affects economic growth. The size of the financial system, as proxied by M2/GDP, is also included as a measure of the host country's level of development. We would expect countries with more developed financial systems to be relatively more attractive for foreign direct investment.

As a result, the financial sector, and in particular, the development of efficient equity markets, are now considered to be an essential aspect of a developing economy. Therefore, the Tunisian government attempts to develop their private sectors, it is becoming clear that the growth of equity markets can offer an important catalyst for sustainable development. A well-functioning stock market is regarded by many as a core component of the financial sector, and proponents of stock market development argue that such markets play a critical role in realizing sustainable economic growth.

This is achieved in interrelated ways number. First, an efficient stock market is a source of equity finance for corporations, thereby enabling them to raise long-term equity capital specially relevant in those countries where commercial banks are largely state-controlled or inefficient in their lending practices. In addition, the development of a stock market will attract inflows of foreign capital and will strengthen linkages between domestic and international capital markets.

The privatization was also conceived as a mean to attract the foreign investors. In fact it constitutes an important vector to stimulate the foreign investment and some privatizations are considered as a supplementary means of attraction of this category of investment which notably contributes to the technology transfer and to the development of the export.

The program of privatization initiated by Tunisian government offers a large opportunity able to arouse the interest of foreign investors.

Direction of causalities between the variables FDI and FM examined is tested by applying Granger causality test. Possible causality from FDI to FM would mean that the foreign investment affects FM stability. The opposite would indicate that FM attracts FDI. Two-way causality shows both variables affect each other.

**1.1. Granger causality test.** Granger proposes the concepts of causality, one variable  $y_{1t}$  affects a second variable  $y_{2t}$  when the prediction of  $y_{1t}$  is improved when we introduce information about  $y_{2t}$  on the analysis. Therefore, endogenous variable is explained by the exogenous variable delayed several successive periods.

Concretely, it is expressed by following both models:

$$y_{1t} = a_0 + a_1y_{2t-1} + a_2y_{2t-2} + \dots + a_iy_{2t-i} + \varepsilon_{1t}$$

$$y_{2t} = b_0 + b_1y_{1t-1} + b_2y_{1t-2} + \dots + b_iy_{1t-i} + \varepsilon_{2t}$$

The test consists in determining if the first variable causes the second and conversely. The hypothesis to be tested is as follows<sup>1</sup>.

- ◆  $y_{2t}$  causes  $y_{1t}$  if the following hypothesis is rejected:

$$H_0: a_1 = a_2 = \dots = a_i = 0;$$

- ◆  $y_{1t}$  causes  $y_{2t}$  if the following hypothesis is rejected:

$$H_0: b_1 = b_2 = \dots = b_i.$$

In case both hypotheses are rejected, the causality is mutual, we speak then of "feedback effect". The Granger test is thus indispensable to our study; it allows to determine the endogenous variables and to define the direction of causality.

We choose, arbitrarily, a delay of two years knowing that the used series contain twenty five years (1980-2005):

Table 1. Granger causality test results

X cause Y*	FDI	Market capitalization	BVMT index	Company quoted
FDI				
Market capitalization	yes		yes	
BVMT index	yes	yes		
Company quoted	yes	yes	yes	

Note: \* indicates the level of significance at 10%.

We observe that the FDI has an effect on the other tested variables. Both market capitalization and Tunindex seem to be affected by the FDI flows attracted by Tunisia during the last twenty five years.

The test also shows that the stock exchange market development in Tunisia passes mainly by the foreign investment growth. This growth is stimulated by the privatization in public sector. The domestic

<sup>1</sup> The method utilized is the Fisher test with nullity of the coefficients.

and foreign investments improve the development of financial market in Tunisia.

Finally, we also observe that there is no mutual causality between the various variables. As an example, we notice that the FDI is determined by the market capitalization while the letter is not explained by FDI flows.

Knowing that the test of Granger allowed us to determine the various existing causalities, we can now proceed in regression of the gravity model.

## 2. Gravity model of determinants of FDI impact on financial market

**2.1. The model.** The empirical framework in this paper is based on a gravity model; we begin our investigation of what attracted FDI by adopting a standard gravity model, akin to that found in the trade literature. The independent regressors are mainly geographical variables, though we replace country size with stock market capitalization. Therefore, the posited model is as follows:

$$\begin{aligned} \ln FDI_{ijt} = & \beta_0 + \beta_1 \ln GDP_i / POP_i + \beta_2 \ln GDP_j / POP_j + \\ & + \beta_3 \ln Dist_{ij} + \beta_4 \ln (index_i) + \beta_5 \ln (index_j) + \\ & + \beta_7 \ln (size_{it} \cdot size_{jt}) + \beta_8 lang_{ij} + \mu_{ij}. \end{aligned} \quad (1)$$

The dependent variable is the foreign direct investment from country  $i$  to  $j$  (Tunisia) and we argue that factors such as financial market development and financial market size should make countries attractive locations for foreign direct investment.

Furthermore, the larger the market capitalization (also known as market value) is, the more integrated the world economy would be due to better communications, better financial infrastructure and more well informed investors in other markets. Market capitalization of listed companies is the share price times the number of shares outstanding. Listed domestic companies are the domestically incorporated companies posted on the country's stock exchanges at the end of the year. Market size is a product of market capitalizations of two countries. As an indicator of financial integration, this variable is directly or positively related to the two countries' stock market correlations.

First, we consider the traditional gravity variables. In the formulation of the gravity model, the volume of FDI (flows) is mostly explained by the size of the market, proxied by GDP, by the country's population and by the distance. Modelling the impact of distance on financial markets is a recent trend in the literature. Portes and Rey (2002) studied bilateral equity flows of fourteen countries in Organization for Economic Co-operation and Development (OECD) from

1989 to 1996. In addition to using distance variable in the model, they included market capitalization, investor sophistication, volume of phone calls, proxies for insider trading, exchange rate stability dummy, and covariances between GDPs and growth rates. Their results were mixed.

Distance had a negative effect on equity flows in 1989. The effect became positive in 1996. Wei (2000) used a gravity model to explain log bilateral FDI and bank lending. He found that the coefficients on distance were negative for both FDI and bank lending. Flavin, Harley, and Rousseou (2001) applied the gravity model to explain stock market correlations in twenty seven countries using only 1999 data. Their data set contains developed countries as well as developing ones.

Their results suggest that distance matters in financial markets co-movements.

Larger markets are expected to attract more foreign direct investment, and the coefficients on GDP/population should thus be positive.

Furthermore, it may be expected that firms will tend to prefer foreign direct investment to exports when trade costs, proxied by distance, rise. However, a negative coefficient on the distance variable might also be expected since the costs of operating overseas affiliates are likely to rise as the distance from their domestic central headquarters increases. The financial variables considered are several. Index main stock exchange index in countries  $i$  and  $j$ , market size is measured by the market capitalization for these markets; it is the multiplication of two countries' market capitalizations. The variable labelled language is a dummy variable, which takes the value of one if the two countries share a common language and zero otherwise.

**2.2. Data.** The dataset is composed of aggregate annual bilateral flows of foreign direct investment between Tunisia and 17 countries (see Table 2 for a complete list of countries and their relative importance to the Tunisian Foreign Direct Investment). There are  $N = 17 \times 16 = 272$  bilateral relations per time period. The data cover the period from 1980 to 2005, yielding a total sample of  $n = 272 \times 25 = 6800$  bilateral observations. Since the dataset includes a few missing observations, the actual dataset is slightly smaller and unbalanced.

The data on FDI are obtained from FIPA (Foreign Investment Promotion Agency). Data on GDP of Tunisia are obtained from NIS (National Institute of Statistics). Finally, the data on GDP of the world and population are extracted from the CEPII database: CHELEM ("Comptes Harmonisés sur les Echanges et l'Economie Mondiale").

Table 2. FDI by country of origin

Country	FDI flows
UE countries	2 323
France	1 095
Italy	592
Germany	260
Belgium	208
Malta	15
Luxemburg	44
The United Kingdom	76
Netherlands	74
Spain	51
Portugal	28
Arab Countries	213
Saudi Arabia	39
Kuwait	22
Libya	46
Algeria	38
Other countries	115
USA	48
Canada	11
Switzerland	90

Source: FIPA in MD 2005.

**2.3. Results.** To investigate the relationship between FDI and financial variables, we use three econometric models: the Fixed Effects, the Random Effects and the Least Squares. The results are grouped in Table 3. In addition, we present the coefficient of determination  $R^2$  and Hausman's test on the correlation between the individual effects and the explanatory variables (i.e. a test of the fixed effects model against the random effects model), distributed as  $\chi^2$ . In this estimation the Hausman test shows that the Fixed Effects Model is preferred to the Random Effects Model.

The estimations results of equation (1) are presented in Table 3. A first result concerns the coefficients of per capita  $GDP_{ij}$  are consistently positive and statistically significant in all regressions. Another important finding concerns the coefficient of INDEX,  $Index_j$ , which is positive and significant in the FDI equation (1.473). Such a result can be explained by the stability of Tunisian stock exchange market and improved foreign direct investment.

However,  $Index_j$  is negative and not significant. The evolution of stock exchange market in source countries doesn't affect foreign direct investment intended to Tunisia.

Finally, in the equation the coefficient of market capitalization (size) is positive and significant (0.805). This result shows that the financial markets development affects positively foreign direct investment.

The estimations results are presented in Table 3.

Table 3. Results of the estimations of gravity model

Variables	FDI <sub>ij</sub>		
	Within	MCQG	HT
$\ln(GDP/POP)_i$	0.356** (17.05)	0.49** (11.64)	0.356** (16.8)
$\ln(GDP/POP)_j$	0.74** (24.21)	0.73** (26.22)	0.74** (22.54)
$\ln Dist_{ij}$		-1.22** (-15.67)	-1.37** (-14.23)
$\ln Index_i$	0.016** (3.16)	0.005* (1.44)	0.016** (4.36)
$\ln Index_j$	0.08** (7.58)	0.021** (2.17)	0.08** (9.56)
$\ln(size_i * size_j)$	0.028** (7.66)	0.05** (6.2)	0.028** (2.5)
$Lang_{ij}$	0.085** (2.36)	0.012** (3.55)	0.085** (2.31)
R <sup>2</sup> Test d'Hausman	0.85	0.76	0.67
Chi 2	30.16		
P-value*	0,043		□
Number of observations	6800	6800	6800

Notes: \*\*, \*\*\* denote significance at the level of 1%, and 5% respectively; \* P-value 0.05 is significant at the level of 5%.

## Conclusion

Other studies have found indications that if financial market development has reached a certain degree of development, it may have a positive effect on FDI. Durham (2004) studies the impact of FDI on growth in a broad panel of countries, investigating the interaction between FDI and a list of factors suspected of determining the level of absorptive capacity. The two factors which come out significant are financial sector development and institutional development.

What do these results imply for the impact of foreign direct investment on financial market of Tunisia?

Gravity models can explain relationship between FDI and financial market. We find that a measure of stock market proximity is an important explanatory variable for FDI flows. Investors may be more comfortable with portfolios that are concentrated in their region, hence amplifying the effects of an adverse shock in that area.

We also find that more conventional financial variables such as market size influence FDI. In particular, larger markets tend to be more attractive for FDI. This result may be due, at least in part, to

market liquidity with larger, more liquid markets exhibiting stronger co-movements than thinly traded markets.

The main contribution of this paper is to show that results found in the literature explaining goods trade

extend to financial asset markets. Even for financial markets, geography and distances matter. Market size and stability of stock exchange market may explain the large and statistically significant influence exerted on foreign direct investment.

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