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The law of growth and attraction: an endogenous model of absorptive capacities, FDI and income for MENA countries

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IDE, attractivité et croissance : une étude des relations d'endogénéité et de feedback dans le cas des PSEM

### **Résumé**

*Dans cet article, nous construisons un modèle structurel de croissance et nous l'évaluons sur des données de panels. Dans ces travaux nous allons plus loin que les études précédentes de Bende et al. (2000, 2003), u Li et Liu (2005), parce que nous contrôlons non seulement l'endogénéité des IDE vers la croissance, mais aussi celle vers les autres variables traditionnelles des modèles de croissance endogène (l'ouverture commerciale, l'investissement domestique, le développement humain). Nous montrons que probablement les effets indirects augmentent les effets d'investissements étrangers sur la croissance par la construction de capacités absorption. Nous montrons que ce modèle introduit des résultats nouveaux et intéressants concernant des interactions entre l'attraction, les IDE et la croissance dans des pays MENA (le Moyen-Orient et des pays d'Afrique du Nord).*

**Mots-clés :** IDE croissance, capital humain, équations simultanées, pays du Bassin

The law of growth and attraction: an endogenous model of absorptive capacities, FDI and income for MENA countries

### **Abstract**

*In this paper, we build a structural model of growth and we estimate it on panel data. We go further than the previous studies of Bende et al. (2000, 2003) or Li & Liu (2005), because we not only control for the endogeneity of FDI towards growth, but we also control for the endogeneity of FDI towards the other variables (trade openness, domestic investment, human development) that are likely to increase the effects of foreign investments on growth through the absorption capacities building. We show that this model brings in new and interesting results about the interactions between attraction, FDI and growth in MENA countries (Middle East and North Africa countries).*

**Keywords:** FDI, Human capital, Growth, simultaneous equations, MENA

**JEL :** F1;O11

An ever growing series of developing countries have introduced FDI attraction measures as part of their ongoing structural reforms. These measures of promotion and incitement bear a cost that is supposed to be more than compensated by the beneficial effects of FDI on growth. FDI are indeed supposed to stimulate the growth of a developing economy by the way of addition to the domestic accumulation capacities and through the modernization of the means of production. Investment from foreign firms is also able to produce diversification effects and to create jobs and demand for the backward industries. But above all, FDI is supposed to stimulate the growth by creating dynamic advantages through technology spillover, training and accumulation of human capital, or by giving access to trade for domestic firms (OECD, 2002). Yet, the technological capacities, the level of human development, as well as the degree of integration to the international trade act consecutively as key determinants of attraction for FDI and as critical factors of GDP growth (Lim 2001, Chakrabarti 2001, Kamaly 2001). Furthermore, the spur generated by FDI inflows on a given factor of growth is likely to stimulate the increase of other determinants of attraction and growth, thus creating a kind of virtuous circle that further increases the degree to which the economy can attract FDI and its capacity to get advantage of FDI through spillover effects.

FDI can be seen as a variable endogenous to growth and economic development because its volume and its content depend on the various dimensions of a country's attraction, particularly when it is assessed in terms of the main factors of growth and development (Görg & Greenaway 2002). But FDI can also have feedback effects over the national capacities of absorption. These effects can be positive, when FDI induce technological acquisition for the local partners of foreign firm or contribute to the training of workers of the host country. But they can also have adverse effects if the competition inflicted by the foreign subsidiary on local firms destroys shares of domestic capital or local technological capacities.

Empirical analysis have indeed shown that the effects of technological and productive spillover do exist and they explain that these are conditioned by factors such as the density of the connection between foreign subsidiaries and the local firms (either partners or competitors), the degree of training and qualification of the local labour force or the capacities of technological and organizational absorption of local firms. On the other hand, analyses that rely on aggregated data give evidence that factors such as the education, the financial development, the degree of trade openness and the extent and quality of local infrastructures and institutions contribute to growth in association with FDI since they ease the coming out of technological spillover from it. Yet, these dimensions are at the same time the determinants of the capacity to attract more FDI for a developing economy.

Since growth and attraction encompass common factors, the matters of growth and attraction should be addressed simultaneously by the academic works on FDI. However, empirical works often split the two questions, and only a few studies (Bende et al. 2000, 2003 ; Li & Liu 2005) have explicitly and extensively associated them altogether in a common structural model. Since some of the variables that produce attraction are also the conditioning factors of the effectiveness of technological spillover or the existence of

complementarities between domestic investment and FDI, the appropriate model requires simultaneous equations in order to set feedback linkages between growth, FDI and the determinants for attraction and absorption capacities.

In this paper, we build a structural model of growth and we estimate it on panel data. We go further than the previous studies of Bende et al. (2000, 2003) or Li & Liu (2005), because we not only control for the endogeneity of FDI towards growth, but we also control for the endogeneity of FDI towards the other variables (trade openness, domestic investment, human development) that are likely to increase the effects of foreign investments on growth through the absorption capacities building. Within the framework of a simultaneous equations model, we have to specify the meaning of the relationship that go from FDI to the set of relevant determinants of growth, while at the same time we control for the feedback effects of these determinants upon FDI.

We show that this model brings in new and interesting results about the interactions between attraction, FDI and growth in MENA countries (Middle East and North Africa countries). All these countries have indeed converted to attraction policies since the beginning of the nineties, but they cannot uphold their shares of world FDI, neither do they reach growth levels as fast as the fast growing economies of South East Asia (Iqbal & Nabli 2004, Chan & Gemayel 2004, Sekkat 2004, Daniele & Marani 2006, Noland and Pack 2007). There are odds that the relative weakness of FDI inflows towards the MENA countries results from an attraction that is still too low, and that this very weakness hamper the spillover effects of FDI on growth. It might also be that FDI lessen the domestic capacities of accumulation of the region, the resulting crowding-out effects being detrimental to economic growth. We test these two hypotheses on Algeria, Egypt, Jordan, Morocco, Syria, Tunisia and Turkey over the 1975-2004 period. We first survey the main results of the empirical literature about the drivers of FDI and the effects of FDI on growth for the developing countries, before we focus on the MENA countries. We then describe the model and the econometric approach. Next the results and comments are reported in last section before concludes.

## **I. The role of “catalyst factors” in FDI attraction and spillover effects**

We first present the results of the recent empirical literature on the links between FDI and attraction, then between FDI and growth. Our basic aim is to underline the common nature of the determinants of attraction and the factors that catalyze the effects of FDI on growth.

### **1.1. Attraction, absorption capacities and growth in MENA countries**

At the end of the 1990s, the under-performance of MENA countries in terms of FDI attraction started to be highlighted. Petri (1988) underlines the lack of performance for FDI attraction by comparing it to the higher performances of similar countries. In MENA countries, the FDI share in GDP was on average of 0.9% during the 1990s, against 2.5% for African countries, 3.8% for Eastern Asia and 4.5% for Latin America (Sekkat 2004). A few years later, despite a fast increase in the flow of received FDI for some of the MENA countries (Tunisia, Morocco, Egypt), this weakness in the attraction capacities of this area is still perceived as a problem (Iqbal & Nabli 2004, Chan & Gemayel 2004, Sekkat 2004, Daniele & Marani 2006) and the degree of integration to the global production chains is very limited despite the proximity of the European market and firms (Noland & Pack 2007, Iqbal

& Nabli 2004)<sup>1</sup>. Most of these analyses concur to explain the weak attraction performances of MENA countries by a too restricted international and regional integration and the slowness and inefficiency of structural reforms (privatizations, improvement of regulations) that cannot create adequate conditions for the establishment of foreign firms<sup>2</sup>. The significant efforts towards openness and convertibility made at various degrees in the different countries have also been opposed to the lack of complementary reforms regarding infrastructures and socio-institutional and political environment (Sekkat, 2004)<sup>3</sup>.

At the same time, capacities of absorption of the MENA countries, rather limited when compared to others developing countries, are put forward to explain the weak effects of FDI on growth (Sekkat 2004, Elmawazini 2007). Boukolia-Hassane & Zatlal (2001) analyse the FDI effects on growth and convergence over a panel of MENA countries, and they cannot conclude unambiguously on a positive and significant relation. They also explain this weak significance of FDI on growth by threshold effects in terms of FDI stocks and human capital as well as crowding-out effects towards domestic investment. Jallal et al. (2007) show that, if macroeconomic stability affects the FDI impact on growth in MENA countries, trade openness and initial development are not significant. There are few empirical surveys on the microeconomic spillover effects in MENA countries. Haddad & Harrison (1993), then Harrison (1996) find few empirical proofs of existence of technological spillover for local firms, even if at the same time the joint-ventures in Morocco display higher productive performances than the local firms. Harrison (1996) even suggests that in Morocco, the FDI effect on productivity could be negative in the short term because of the consequences of the loss of local market shares by domestic firms in terms of production scale. Yet, Bouoiyour & Akhawayn (2005) show on a panel of Moroccan industries that FDI have a significant spillover effect on the productivity of labour, and that this impact is proportional to the technological gap between foreign subsidiaries and domestic firms and increase with the openness of the export sectors.

There are few works trying to measure the FDI effects on growth at an aggregate level for MENA countries. Boukolia & Zatlal (2001) only find a weakly significant effect of FDI on growth, while Darrat et al. (2005) and Meschi (2006) do not find any significant effect<sup>4</sup>. In their survey over nine countries of the South and East Mediterranean Basin, Boukolia and Zatlal (2001) observe that FDI acts in weakly significant way on the growth of South Mediterranean economies. Darrat et al. (2005), on their side, carried out a comparative analysis on 23 countries belonging to two different regions, i.e. North Africa and Middle East (MENA

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<sup>1</sup> Yet, several surveys show the importance of FDI, especially the vertical ones, in the process of productivity and GDP increase for a developing economy. De Gregorio (1992) or Blomstrom et al. (1992) have thus showed that FDI are three times more “efficient” than domestic investments, notably because of their capacity to stimulate internal investment (crowding-in) and the externalities linked to their content of technology and organization (spillover).

<sup>2</sup> Boukolia-Hassane et Zatlal (2001) show that trade openness and infrastructures have a positive influence on incoming FDI in MENA countries, while the traditionally significant factors such as the market size or the levels of productivity and labour costs are less important in the MENA countries case than in other developing countries. Onyeiwu (2003) shows on his side that the incoming flow of FDI are explain positively and negatively by openness and administrative rules; the variables of infrastructure, macro-economic stability and investment output are not significant. The political, legal and administrative frameworks of the MENA countries attraction have been scrutinized in several surveys on transversal data, and they all show that all these variables play a significant role in the MENA countries attraction (Alessandrini 2000, Daniele & Marani 2006, Chan & Gemayel 2004, Benassy-Quéré et al. 2005, Sekkat 2004, Aysan et al. 2006).

<sup>3</sup> However, his econometric analysis is made on developing countries sample and not only on MENA countries.

countries) and Central and Eastern Europe. From an ordinary estimation by double least squares, and using data over the 1979-2002 period, they note that the FDI flows only stimulate economic growth in the countries which are candidate to the European Union. However, the FDI effects on MENA countries and on non-candidate countries in negative or non-existent. Meschi (2006) studied the FDI effects on economic growth in North Africa and Middle East countries. She concludes that FDI do not have any positive effect on growth. Indeed, based on an econometric work using data from a panel of 14 countries in the region over the 1980-2003 period, she finds out that the FDI coefficient is generally negative, and if not, rarely significant. Such results can be explained in different ways. While Darrat et al. (2005) points that the application to become a European Union member seems to trigger reforms, Meschi (2006) attributes this result to the strong concentration of FDI in the primary sector of these countries, and especially in the hydrocarbons sector.

These results are confirmed by the Sadik & Bolbol (2001) growth accounting study on six Arab countries (Saudi Arabia, Oman, Morocco, Jordan, Tunisia and Egypt) over the 1978-1998 period. They show that FDI have more effects on growth via capital accumulation than via productivity gains, and they even measured a significantly negative effect of FDI on the Total Factor Productivity (TFP) for Saudi Arabia, Tunisia and Egypt<sup>5</sup>. The two authors explain these results by the sensibility of growth rates to external factors for these two countries (volatility of oil prices for Oman and climatic risks for the Moroccan agricultural sector). As for the FDI received by Egypt, Jordan and Tunisia, inflows of FDI concern sectors that generally induce few technological spillover effects (energy and textile for Tunisia, energy and services for Jordan) or sectors that benefit from a high level of protection against external competition for Egypt<sup>6</sup>. Bouklia-Hassane & Zatl (2001) are the only ones to articulate attraction and spillover effects in the MENA countries case. But they only propose a sequential estimation strategy for these two relations, without endogeneizing FDI neither linking the attraction factors to growth. However, Giovannetti and Ricchiuti (2005 :17) try to explain the poor empirical evidence that support the hypothesis of a positive effect of FDI on growth for South Mediterranean countries, by the weakness of incoming FDI either in absolute value and relatively to the GDP. They also incriminate the idiosyncrasy of growth in these countries as a likely explanation of the failure of FDI to spur growth. We show that it might also be that the relative weakness of FDI is the consequence of an attraction that is still too weak, and that this latter weakness simultaneously restricts the spillover effects of FDI on growth. Or it could be that FDI weakens the regional capacities of domestic accumulation, and that some crowding-out effects detrimental to growth happen. These two assumptions will be assessed within the framework of an econometric investigation for Algeria, Egypt, Jordan, Morocco, Syria, Tunisia and Turkey over the 1975-2004 period.

From all this previous literature, we can conclude that there is a circular causality between FDI, GDP growth, and the variables that determine both the attraction and the absorption capacities of an economy. Such endogeneity can create important estimation problems and it must then be treated accordingly. Furthermore, the observed relations between growth and FDI can be affected by a problem of reverse causality (*feed back effect*) since FDI might be attracted by countries with a rather high growth rate, thus requesting to introduce some instrumental variables or multiple equations in order to resolve these problems of endogeneity. Up till now, the empirical literature has rarely addressed the dynamic

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<sup>5</sup> FDI do not explain significantly growth for Morocco, Oman and Saudi Arabia.

<sup>6</sup> Sadik & Bolbol (2001) also highlight the fact that the efficiency gains recorded by the textile sector in Tunisia during the nineteen nineties are more linked to the intensification of competition resulting from the presence of foreign firms than to the spillover effects of an advanced technology.

feedbacks that exist between growth and FDI via the factors that are common to the attraction of FDI and to its spillover effects.

## II. model of FDI endogeneization for MENA countries

### II.1. FDI and absorption capacities: a simultaneous equation model

To go beyond endogeneity problems and take into account the channels through which FDI and growth interact, we construct a structural model made out of five simultaneous equations. This model is estimated on a panel of seven countries<sup>7</sup> from the Southern Mediterranean shore over the 1975-2004 period. The central equation of our model is thus trying to link the economic growth to FDI and other growth factors such as domestic investment, exports and human capital. It can be written under the following form:

$$Y_{it} = f(X_{it}) + \varepsilon_{it}$$

With  $(i,t)$  respectively indicating the country and time,  $y$  the dependent variable,  $X$  the vector of explanatory variables and  $\varepsilon_{it}$  the disturbance term

The model has a linear form, and is written as follows:

$$GDPgrowth = f(FDI, Education, Export, Investment) \quad (1)$$

$$Investment = f(GDPgrowth, FDI, Credit, Interest, Saving) \quad (2)$$

$$Export = f(FDI, Exrate, phone) \quad (3)$$

$$Education = f(FDI, Deducation, Urban) \quad (4)$$

$$FDI = f(GDPgrowth, Energy, Education, Openness, Inflation) \quad (5)$$

The endogenous variables are the GDP growth per capita (*GDPGrowth*); the net flows of direct foreign investments in percentage of GDP (*FDI*), the human capital which is approximated by the gross school rate at secondary level (*Education*)<sup>8</sup>, the share of domestic investment in GDP (*Investment*) and the share of exports of goods and services in GDP (*EXPORT*).

The exogenous variables are the ratio of the credit to the private sector to the GDP (*CREDIT*), the spendings on education in percentage of GDP (*Deducation*), the production of energy expressed in 1000 T.O.E. (Ton of Oil Equivalent) (*ENERGY*), the domestic saving rate (*SAVING*), the annual inflation rate (*INFLATION*), the capital cost measured by the real interest rate (*INTEREST*), the money supply in the sense of M2 as a proxy the level of financial development (*M2*), trade openness (exports and imports on GDP) (*OPEN*), the exchange rate of the dollar against the local currency (*EXRATE*), the number of telephone subscribers per 1000 persons (infrastructure of the communication facilities) (*TEL*), as well as the degree of urbanization measured by the urban population in percentage of the total population (*URBAN*) as a proxy of the access to social, cultural, medical and educative amenities. The equations of the system and the expected sign of the various variables are summarized in Table 1.

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<sup>7</sup> Algeria, Egypt, Jordan, Morocco, Syria, Tunisia and Turkey

<sup>8</sup> However, we must admit that the school rates constitute an indicator that should be used with caution because they are a rather inadequate measure of education levels and of the degree and structure of qualification of the labour force. But they are the only data allowing international comparisons.

**Table 1. Expected association between variables ( $y = f(x)$ )**

<i>endogenous y</i>	<i>GDPgrowth</i>	<i>FDI</i>	<i>Education</i>	<i>Investment</i>	<i>Export</i>
<i>GDPgrowth</i>		+		+	
<i>FDI</i>	+		+	+/-	+
<i>Education</i>	+	+			
<i>Investment</i>	+				
<i>Export</i>	+				
<i>Credit</i>				+	
<i>Educspend</i>			+		
<i>Energy</i>		+			
<i>Saving</i>				+	
<i>Inflation</i>		-			
<i>Interest</i>				-	
<i>M2</i>					
<i>Openness</i>		+			
<i>phones</i>					+
<i>Exrate</i>					+
<i>Urban</i>			+		

## II.2. Endogeneity, stationarity, fallacious regressions

All equations are over-identified; therefore the model can be solved. By implementing the method of the Two Stage Least Squares (TSLS) to all equations, we thus try to estimate both the determinants of growth (FDI, Education, Investment, Exports) and the very factors that explain these determinants. Furthermore, the model sheds light on the factors explaining FDI inflows and their effects on growth in the South Mediterranean region. The Hausman tests<sup>9</sup> show that the fixed effects model is preferred to the random effects model. It is indeed more adapted to capture the unobserved specific effects of the countries, such as institutions, geographical characteristics, cultural norms, that could influence both FDI and economic growth.

To avoid the risk of fallacious regressions between dependent and explanatory variables, the Augmented Dickey-Fuller (ADF), Levin, Lin & Chu (LLC) and Im, Shin & Pesaran (ISP) tests of stationarity have been applied to all the variables of the model<sup>10</sup>. These tests show that except for *GDPgrowth*, *Investment*, *EXPORT*, *INFLATION*, *INTEREST* and *TEL*, all other variables (*CREDIT*, *ENERGY*, *SAVING*, *FDI*, *EducSpend*, *OPEN*, *Education*,

<sup>9</sup> The results of the Hausman test are reported in Table 6

<sup>10</sup> The results of the stationarity test are reported in appendix.



$M2$ ,  $URBAN$ ,  $EXRATE$ ) have a unit root but are stationary in first difference<sup>11</sup>. Therefore, in the regressions, all the previous non stationary variables have been computed in first difference while the stationary variables remain in level. Moreover, the matrix of partial correlations reported in appendix indicates that there are no serious problems of multicollinearity between the explanatory variables included in the regressions.

### III. Results and comments

#### III.1. FDI and attraction

The results of the regression for equation (1) are reported in table 2. All variables are significant and have the appropriate sign<sup>12</sup>.

**Table 2. Determinants of FDI inflows, 1975-2004**

Constant	-0.73 (2.53)***
GDPgrowth	0.008 (2.22)**
Education	0.02 (2.56)***
Energy	4.05E-06 (1.81)*
Open	0.09 (2.37)***
Inflation	-0.004 (1.79)*
$R$ -squared = 0.23	
$F$ -statistics = 18.48	
Observations	
<i>Notes</i>	
*** significant at 1% level	
** significant at 5% level	
* significant at 10% level	
$t$ -statistics are reported in parentheses	

Education, economic growth and trade openness seem to be the most deciding factors of FDI in MENA countries. The endowment in natural resources also explains FDI inflows in these countries, yet one could expect a much higher degree of significance given the rather high share commodities and hydrocarbons in the trade structure of some of these countries. Inflation has a negative and significant sign at 10%, indicating that foreign investors are not insensitive to economic instability. Not having a complete set of data about institutional factors, these could not be taken into account in the relations. But several works previously

<sup>11</sup> Given that the results on the stationarity of variables sometimes diverge according to the method which is used (ADF or Levin, Lin & Chu or ISP, etc.), we consider that a variable is only stationary when at least two tests indicate that the variable does not have a unit root.

<sup>12</sup> Even if the literature on FDI determinants is becoming very large, it is not totally convincing. Indeed, given the multidimensional nature of the FDI determinants, most of the empirical works are implemented without any particular theoretical rationale. Bende-Nabende et al. (2002, p.5) underline that as studies of the determinants of FDI have sometimes swerved from theoretical hypothesis, they can produce unconvincing conclusions. Chakrabarti (2001) explains the lack of consensus on what makes a firm invest in a foreign country (or carry out a part of its operations) by the scarcity of theoretical works on that matter. According to the author, the interpretation of the impact of the explanatory variable on the explained variable is made ex post and falls under a subjective judgement, since it is mainly a « measurement without theory».

quoted showed that the quality of institutions is particularly linked to the attraction performances in MENA countries.

### **III.2. FDI and trade openness**

The results for the equation of trade are reported in the Table 3. It turns out that FDI significantly explain the development of exports in MENA countries. That result suggests that a large number of subsidiaries settled in these countries adopt a vertical strategy and export their production towards their country of origin or towards their parent companies, thus contributing, all things being equal, to the increase of the exports volumes in the host countries. In the same way, in their efforts to attract FDI, MENA countries have implemented number of measures (such as the setting up of free zones, the abolition of certain hindrances to import and export, tax incentives, etc.) which could have contributed to the increase of trade between these countries and the rest of the world.

The variable indicating the quality of infrastructure is significantly positive at 5%. Indeed, to have an adequate infrastructure is a necessary condition for the promotion of exports. For instance, infrastructures of good quality help to reduce export transaction costs by making export easier and cheaper, for both national and foreign companies.

**Table 3 Determinants of Exports, 1975-2004**

Constant	22.86 (4.83)***
FDI	2.93 (3.37)**
Exrate	4.98 <sup>E</sup> -06 (1.86)*
phone	0.03 (2.02)**
<i>R</i> -squared = 0.81	
<i>F</i> -statistics = 46.55	
Observations	
<i>Notes</i>	
*** significant at 1% level	
** significant at 5% level	
* significant at 10% level	
<i>t</i> -statistics are reported in parentheses	

The depreciation of the local currency also seems to have a positive and significant impact on exports in MENA countries. Indeed, in several countries of this region, the depreciation of the local currency plays an important part in the improvement of the products competitiveness for exports.

### **III.3. FDI, human capital and knowledge externalities**

Results of the model are reported in Table 4. They indicate that FDI act positively and significantly on the development of human capital in MENA countries. Indeed, because of their size, the sophisticated technology they use, their need to face the norms of developed products and to expose themselves to international control, it can be expected that the foreign subsidiaries take part in the improvement of the human capital in the host country through training activities, participation to R&D activities, etc.

For OECD (2002), the presence of MNC in a host country could be a key factor for the development of new skills, especially when knowledge cannot be codified. Indeed, the skills gained through working for a foreign firm can take the form of tacit know-how that are impossible to formulate nor to codify. The best way to pass them on is to experiment and demonstrate them<sup>13</sup>.

**Table 4: Determinants of Education, 1975-2004**

Constant	3.86 (1.01)
FDI	5.68 (4.91)***
Urban	0.52 (6.70)***
Educspend	0.29 (5.70)***
<i>R</i> -squared = 0.88	
<i>F</i> -statistics = 50.55	
Observations	
<i>Notes</i>	
*** significant at 1% level; ** significant at 5% level ; * significant at 10% level	
<i>t</i> -statistics are reported in parentheses	

For the same reasons as for FDI, the government expenses in education and the degree of urbanization robustly explain the accumulation of human capital in MENA countries. This suggests that, next to the education expenses, the economies of integration and the fact of belonging to urban areas take an active part in the development of human capital. Obviously, the degree of urbanization and development of urban institutions enables to have an easier access to various key amenities (social, cultural, health, political, etc.), and this might stimulate the accumulation of knowledge and the development of skills.

### III.4. Crowding-in or crowding-out?

It is quite important to find out to what extent FDI can overthrow [« crowding out»] or spur [« crowding in »] the domestic investment. We must note that crowding-out effects of FDI were more frequently observed than the crowding-in in the context of developing countries (Caves 1996). But there has not been any proper survey on this effect concerning MENA countries. This matter is addressed by the literature either by including the domestic investment directly into the growth equation<sup>14</sup> (Borensztein et al. 1998) or by estimating a domestic investment equation that incorporate FDI (Agosin & Mayer 2000, Mc Millan 1999). Yet, the likely complementarities between foreign investment and domestic firms have been emphasized by Rodriguez-Clare (1996) or Markusen & Venables 1999). But crowding-out effects can result from the setting up of barriers to entry, thus discouraging the incoming of new firms and causing the exit of local entrepreneurs (Backer 2002).

<sup>13</sup> Furthermore, OECD (2002: 143) adds that tacit knowledge is not easy to share over long distances, and for developing countries, the best way to acquire the know-how held in the production process of more developed economies could thus be the presence of foreign companies in the national economy.

<sup>14</sup> Borensztein et al. (1998) assert that the coefficient associated to FDI captures the whole spillover effect associated to foreign investments.

**Table 5: Determinants of Investment, 1975-2004**

Constant	16.68 (8.73)***
GDPgrowth	0.30 (1.43)*
FDI	0.30 (0.46)
Interest	-0.06 (1.34)
Saving	0.26 (4.27)***
Credit	0.07 (2.75)***
<i>R</i> -squared = 0.58	
<i>F</i> -statistics = 43.95	
Observations	
<i>Notes</i>	
*** significant at 1% level	
** significant at 5% level	
* significant at 10% level	
<i>t</i> -statistics are reported in parentheses	

The results reported in Table 5 show that FDI do not have a significant effect on domestic investment in MENA countries. This can be explained by the absence of significant crowding-in effects generated by the foreign firms settlements on the MENA territories, thus supporting the thesis of enclave formation by these very firms. Moreover, the variable that expresses the real interest rate is not significant, even though it bears the expected sign. Lastly, according to the model, it seems that the domestic credit, the savings and to a lesser degree the growth of GDP, take a significant part in the accumulation of domestic capital.

### **III.5 FDI, absorption capacities and growth**

According to the model's results, it turns out that FDI have a negative but non significant sign. Obviously, the weakness of FDI flows towards these countries partly explains this rather unexpected result in comparison with the theoretical literature that tends to take for granted the positive effect of FDI on host economies. But the structure of our model allows to show that FDI still play an indirect role in growth through their positive effects on the formation of human capital and the international integration in MENA countries. Furthermore, the domestic investment that is not affected by the received FDI does not seem to have a significant impact on the economic growth of MENA countries. This might be due to the predominance of the public sector in these countries.

**Table 6. Determinants of GDP growth, 1975-2004**

Constant	-11.99 (3.94)**
FDI	-0.17 (1.43)
Education	0.13 (4.14)***
Export	0.21 (3.65)***
Investment	0.04 (0.68)
<i>R</i> -squared = 0.51	
<i>F</i> -statistics = 24.23	
Observations	
<i>Notes</i>	
*** significant at 1% level	
** significant at 5% level	
* significant at 10% level	
<i>t</i> -statistics are reported in parentheses	
Test de Hausman: $\kappa^2(4) = 32.28$ (P-value =0.00)	

Reports for the estimation of GDP growth are reported in Table 6. We Despite the positive effect of FDI on a few engines of growth, such as exports and human capital, their direct contribution to the economic growth in MENA countries is still not significant. Such result could be puzzling if it did not confirm the studies on this region by Sadik & Bolbol (2001), Sekkat (2004), Darrat et al. (2005) and Elmawazini (2007). As we do not control for the quality of foreign investments, the weakness of the FDI impact on growth in MENA countries could be explained by the weakness of the effective FDI flows to this region. But microeconomic analysis (Kokko 1994, Kokko et al. 1996, Moran 1998, Harrison 1996, Görg & Hijzen 2004) show that the impact of FDI on local production systems is tightly linked to the type of establishment (greenfield or acquisition), the sector of activity, the competition between MNC and local firms, or the degree of development of the host country. Sadik & Bolbol (2001) or Meschi (2006) thus explain the weakness of spillover effects measured by econometric studies by the very nature of the FDI received by MENA countries, since they are mostly made of primary and tertiary investments that produce few technological externalities.

Yet, the works that have been dedicated to MENA countries up to now can only gauge the global effects of FDI on growth, without telling the difference between direct and indirect effects that go through the factors determining both the attraction and growth of an economy. Our model enables us to distinguish direct and indirect effects and to assess spillover effects more consistently. Therefore, failure of the previous studies to measure an effect of FDI on growth in MENA countries does not necessarily mean that spillover effects do not exist. A more appropriate model allows capturing some of these effects for MENA countries, without contradicting the more global result according to which the FDI variability does not explain significantly the growth variability between the different countries and the different years of the sample. If FDI affect growth in MENA countries, it is probably through some effects of technological spillover linked to the training and turn-over of the labour force, as well as some effects of information spillover that can give access to the world market to local firms that become exporters.

## Conclusion

The FDI effects on growth are not easy to understand. Most probably, FDI and productivity gains have a two-way relationship (Görg & Greenaway 2002). The efficiency gains in production are the consequence of spillover effects and pro-competing effects of incoming FDI, but they are also one of the factors of attraction for new FDI inflows. This is especially true for vertical FDI and when the productivity gains rest partly on the gains linked to the concentration of investments (clusters). Economic policy must then be carried out in several directions that can be complementary. The challenge for MENA countries is to improve the attraction through a series of more ambitious structural policies (openness to trade and regional integration, development of institutions and infrastructure). The point is that these reforms also contribute to the creation of an environment that is more favourable to spillover effects since they improve the social returns to domestic and foreign investments (Sadik & Bolbol 2001, Hausmann & Rodrik 2004). It is thus necessary for policy makers to address the questions of the attraction of FDI and their effects on growth in a simultaneous way.

The empirical results obtained on MENA countries show that it is much more difficult to benefit from foreign investors than to convince them to come and settle in a host country, especially since these investors are not always settled where they are the most needed. We lessen this observation by showing that FDI can have a positive indirect effect on growth as long as they increase the local capacities of absorption via the training of human capital and allow a deeper integration of the local production system within the global market and value chains. Therefore, the biggest challenge for MENA countries is to know how to take advantage of the presence of MNC on their territories and what to do to make them become driver of growth and economic development. Policies must go towards the two following paths. Promote the international integration of MENA countries as it is recommended in the recent World Bank reports on MENA countries (World Bank 2007, World Bank (2006)]. And create more favourable conditions for vertical FDI (special zone, infrastructure, labour training).

In this regard, several questions remain unanswered: is government intervention useful to negotiate with foreign investors and make them aware of their responsibilities to do better? Do the attraction effects made by MENA countries over almost two decades produce social returns over their social and private cost? Sector-based analyses using disaggregated data according to the type of FDI could bring in more light on these matters. In the same way, it would be quite interesting to carry out some cost/benefit analyses to justify the political choices that have been made.

## APPENDIX

### A : Stationnarity tests

Variables	ADF		Levin, Lin & Chu		Im, Pesaran et Shin	
	En niveau	En différence 1 <sup>ère</sup>	En niveau	En différence 1 <sup>ère</sup>	En niveau	En différence 1 <sup>ère</sup>
Cr	(46.42)* **	-	(-1.82)**	-	(-4.54)***	-
IDE	(18.16)	(95.81)***	(-0.11)	(-7.53)***	(-0.63)	(-10.52)***
Export	(25.62)* **	-	(-1.97)**	-	(-2.12)***	-
KH	(17.76)	(40.74)***	(-2.36)***	(-4.46)***	(0.62)	(-3.99)***
ID	(27.67)* **	-	(-2.60)***	-	(-2.47)***	-
CREDIT	(17.58)	(46.11)***	(-0.81)	(-3.27)***	(-0.54)	(-4.35)***
ENERGIE	(12.14)	(40.97)***	(-0.36)	(-2.52)***	(0.71)	(-3.99)***
Déduction	(16.75)	(78.10)***	(-1.24)	(-6.45)***	(-0.04)	(-7.78)***
OUVERT	(12.44)	(65.82)***	(-0.24)	(-6.34)***	(0.30)	(-6.31)***
INTERET	(22.45)*	-	(-2.85)***	-	(-1.85)**	-
SAVE	(12.51)	(65.30)***	(3.69)	(-4.98)***	(0.03)	(-6.60)***
M2	(10.72)	(39.97)***	(1.40)	(-3.78)***	(1.44)	(-3.89)***
TEL	(27.06)* **	-	(-1.32)*	-	(-0.43)	-
TXCHANGE	(12.99)	(39.15)***	(-0.42)	(-5.88)***	(-0.28)	(-3.96)***
INFLATION	(19.67)	-	(-1.54)*	-	(-1.36)*	-
URBAN	(3.53)	(15.75)	(0.47)	(-1.90)**	(-0.05)	(-4.09)***

\*\*\*, \*\*, \* : variable stationnaire respectivement à 1%, 5% et 10%.

## B : Data and sources

Variables	Source
<b>Croissance du PIB/tête</b>	<b>WDI (2006)</b>
<b>IDE en pourcentage du PIB</b>	<b>WDI (2006)</b>
<b>Taux de scolarisation brut au niveau secondaire</b>	<b>WDI (2004), UNESCO Statistical Yearbooks</b>
<b>FBCF en pourcentage du PIB</b>	<b>WDI (2006)</b>
<b>Dépenses d'éducation en pourcentage du PIB</b>	<b>WDI (2004) et WDI (2006)</b>
<b>exportations en pourcentage du PIB</b>	<b>WDI (2006)</b>
<b>Crédit accordé au secteur privé en pourcentage du PIB</b>	<b>WDI (2006)</b>
<b>Production d'énergie exprimée en 1000 T.E.P</b>	<b>WDI (2006)</b>
<b>Epargne domestique en pourcentage du PIB</b>	<b>WDI (2006)</b>
<b>Taux d'inflation annuel</b>	<b>WDI (2006)</b>
<b>Taux d'intérêt réel</b>	<b>WDI (2006)</b>
<b>Masse monétaire au sens de M2</b>	<b>WDI (2006)</b>
<b>Ouverture économique</b>	<b>WDI (2006)</b>
<b>Taux de change du dollar en monnaie local</b>	<b>WDI (2006)</b>
<b>Population urbaine en % de la population totale</b>	<b>WDI (2006)</b>

## Annex C : corrélation matrix

	CR	ID	EXPORT	INFLATION	INTERET	TEL	ΔCREDIT	ΔENERGIE	ΔEPARGNE	ΔIDE	ΔÉducation	ΔOUVERT	ΔKH	ΔM2	ΔURBAN	ΔTXCHANGE
CR	1,00															
ID	0,13	1,00														
EXPORT	-0,02	0,16	1,00													
INFLA	-0,10	-0,12	-0,44	1,00												
INTERET	0,19	-0,10	0,31	-0,70	1,00											
TEL	-0,05	-0,26	0,14	0,43	-0,07	1,00										
ΔCREDIT	0,03	0,06	0,04	-0,13	0,18	-0,03	1,00									
ΔENERGY	0,11	0,18	-0,10	-0,02	-0,03	-0,18	-0,03	1,00								
ΔEPARGNE	0,05	-0,06	0,06	-0,06	0,02	-0,02	-0,01	0,11	1,00							
ΔIDE	-0,01	0,01	0,04	-0,03	0,02	0,01	0,00	-0,07	-0,12	1,00						
ΔÉducation	-0,19	-0,03	0,07	0,12	-0,03	0,25	-0,05	-0,12	-0,06	-0,06	1,00					
ΔOUVERT	-0,18	0,02	0,20	0,12	-0,15	0,05	0,01	-0,07	-0,07	0,12	0,09	1,00				
ΔKH	0,05	0,15	0,06	-0,05	0,02	-0,02	-0,03	-0,01	0,01	-0,02	-0,03	-0,11	1,00			
ΔM2	-0,30	0,01	0,07	-0,09	0,15	0,02	0,29	0,01	-0,08	0,01	0,20	0,00	-0,07	1,00		
ΔURBAN	-0,09	0,07	0,08	0,15	-0,03	-0,09	-0,01	-0,06	0,07	-0,05	0,03	0,09	-0,07	-0,03	1,00	
ΔXR	-0,13	-0,09	0,00	0,32	0,01	0,49	-0,09	-0,06	-0,03	0,03	0,31	0,06	-0,02	0,13	-0,03	1,00



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