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# Foreign Direct Investment, Macroeconomic Instability And Economic Growth in MENA Countries

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## Abstract:

This paper aims at analyzing the possible influence of foreign direct investment (FDI) on economic growth in the particular case of Middle East and North African countries (MENA). During the last years, the relation between FDI and growth in LDCs has been discussed extensively in the economic literature. However, the view that FDI stimulates economic growth does not receive an unanimous support. In order to access empirically this relation in MENA countries, we use a dynamic panel procedure with observations per country over the period 1970-2005. To improve efficiency, we use the standard “difference” and “system” GMM and 2SLS estimators. Our findings show that there is no independent impact of FDI on economic growth. The growth-effect of FDI does not also depend on degree of openness to trade and income per capita. But, the positive impact of FDI on economic growth depends on macroeconomic stability: there is a threshold effect of annual percentage change of consumer prices.

**Key words:** Foreign Direct Investment, Macroeconomic stability, Economic Growth, Middle East and North Africa, Two-stage Least Squares, Generalized Moments Methods.

**JEL Classification:** C32, C33, F21, F23, F43

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## 1. Introduction

An important aspect of globalisation during the last 20 years has been the impressive surge of Foreign Direct Investment (FDI) to less developed countries (LDCs). According to the UNCTAD database, FDI flows to LDCs has been multiplied by 7 between 1991 and 2000, while the stock of FDI has been multiplied by 5. The inward FDI flows to LDCs considered as a whole increased again by 52% between 2001 and 2005 (see figure 1). Such a fast increase is unprecedented. It does not involve only LDCs, but also developed countries and countries in transition. Nowadays, the total FDI stocks represents more than 20% of the global GDP.

If the FDI boom to LDCs is indubitable, its consequences on economic growth leads to debates. During the last decades, the relation between FDI and growth in LDCs has been discussed extensively in the economic literature. The positions range from an unreserved optimistic view (based for example on the neo-classical theory or, more recently, on the New Theory of Economic Growth) to a systematic pessimism (namely among ‘radical’ economists).

The most widespread belief among researchers and policy makers is that FDI boosts growth through different channels. They increase the capital stock and employment, stimulate technological change through technological diffusion and generate technological spillovers for local firms. As it eases the transfer of technology, foreign investment is expected to increase and improve the existing stock of knowledge in the recipient economy through labor training, skill acquisition and diffusion. It contributes to introduce new management practices and a more efficient organization of the production process. As a result, FDI improves the productivity of host countries and stimulates thus economic growth. As a consequence of technological spillovers, FDI increases the productivity not only on the firms which receive these investments, but potentially on all host-country firms (Rappaport, 2000). These spillover effects are resulting both from intra-industry (or horizontal, i.e.: within the same sector) externalities and inter-industries (or vertical) externalities stemming from forward or/and backward linkages (Javorcik, 2004; Alfaro and Rodriguez-Clare, 2004).

As Campos and Kinoshita (2002) wrote: “the positive impact of foreign direct investment (FDI) on economic growth seem to have acquired status of stylised fact in the international economics literature”. The earliest macroeconomic empirical approaches are in line with this optimistic view. According to these analyses, the adoption of foreign know-how and technology, the development of human capital and spillover effects related to productivity and knowledge externalities are the main channels whereby the beneficial influences of inward FDI are transmitted to a large range of local firms (not only those receiving capital inflows).

These expected benefits explain that a lot of LDCs have relaxed or eliminated restrictions on incoming international investments which were very frequently applied until the 80s, and offered more and more frequently tax incentives and subsidies in order to attract capital inflows. The fact that most rapidly growing emerging countries catch an increasing share of global FDI and that they have implemented export and FDI oriented development strategies tends to give credence to this optimistic view.

However, the growth effect of FDI does not win unanimous support. This pessimist view was particularly important during the 50s and the 60s. It is still defended by several recent firm or industry level studies which emphasize poor absorptive capacity, crowding out effect on domestic investment, external vulnerability and dependence, a possible deterioration of the balance of payments as profits are repatriated and negative, destructive competition of foreign affiliates with domestic firms and “market-stealing effect”. In an interesting study, Aitken and Harrison (1999) do not find any evidence of a beneficial spillover effect between foreign firms and domestic ones in Venezuela over the 1979-1989 period. Similarly, Haddad and Harrison (1993) and Mansfield and Romeo (1980) find no positive effect of FDI on the rate of economic growth in developing countries, namely in Morocco. As De Melo (1999) points out: "whether FDI can be deemed to be a catalyst for output growth, capital accumulation, and technological progress seems to be a less controversial hypothesis in theory than in practice" (1999, p. 148).

Moreover, there is no common view on the influence of particular environments for growth-effect of FDI. Whereas Blomstrom et al (1994) found that education does not act for growth-effect of FDI, Borensztein et al (1998) argued that a positive growth-effect of FDI exists whether the educated workforce of the country can take advantage of technical spillovers associated with FDI. More precisely, they found a negative direct effect of FDI in countries with low levels of human capital. But this direct effect of FDI becomes positive above a threshold of human capital. In the other hand, Carkovic and Levine (2002) found no evidence that years of schooling is critical for growth-effect of FDI. According to Balasubramanyam et al (1996), trade openness is very important in order to obtain the growth-effect of FDI. This finding is also true according to Kawai (1994). Carkovic and Levine (2002) suggested that there is no robust link between FDI and growth, allowing this relationship to vary with trade openness. Blomstrom et al (1994) also showed that a positive growth-effect of FDI may be real whether the country is sufficiently rich. Carkovic and Levine (2002) rejected this finding, taking account of an interaction term from income per capita and FDI. Alfaro et al (2007) suggested that FDI has a positive growth-effect in

countries with sufficiently developed financial markets. According to Carkovic and Levine (2002), this view is not true since FDI flows do not exert an exogenous impact on growth in financially developed economies.

As we have seen, findings of Carkovic and Levine (2002) refute the main conclusions of several previous studies. The authors are sceptical because these previous studies did not fully control for simultaneity bias, country-specific effects, and the use of routine of lagged dependant variable in growth regressions<sup>2</sup>. In order to estimate consistent and efficient parameters, Carkovic and Levine used the Generalized Method of Moments (GMM) panel estimators<sup>3</sup> designed by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998). Our paper integrates to certain extent some methodological elements used in the study of Carkovic and Levine. However, we also use the Two Stage Least Square (2SLS) panel estimators designed by Anderson and Hsiao (1982) in order to show the sensibility of the results from the two used methods.

We also include macroeconomic instability environment in our study. Indeed, economic literature largely supports the fact that during 80s and 90s, many developing countries exhibited chronic and high inflation rate and excessive budgets deficits. Several empirical studies supported the view that macroeconomic instability is unfavourable to capital accumulation and economic growth (for instance, Kormendi and Meguire, 1985; Fisher, 1993; Bleaney, 1996).

Our interest goes to MENA countries because MENA region attracted an important amount of FDI flows during the last four decades, but the situation changed significantly since the 2000s. For instance, in North Africa, inflow of FDI increased substantially from \$1,214 million<sup>4</sup> in 1992 to \$2,330 million in 1994 and to 2,643 million in 1998 (UNCTAD, 1999). Unfortunately, MENA region seems to have difficulties in drawing FDI in recent years. From 2001 to 2003, the UNCTAD inward FDI performance index shows that the MENA is far behind any other developing region except South-Asia (UNCTAD, 2004). Moreover, FDI outflows of the MENA region remain important: for instance, they amounted to \$2 billion in 1998.

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<sup>2</sup> For instance, Bloomstrom et al (1994) found that FDI causes economic growth, using Granger causality methods. In the other hand, Kholdy (1995) disagreed.

<sup>3</sup> GMM panel estimator

<sup>4</sup> Annual average for 1987 to 1992 period.

Contrary to Carkovic and Levine, to assess empirically the impact of FDI on economic growth, we use FDI net inflows as a share of GDP<sup>5</sup>. So, our measure of FDI flows does not neglect FDI outflows. Our paper provides much more support for the view that the impact of FDI flows depends crucially on the macroeconomic stability environment. But, there is no independent link between FDI flows and economic growth. Trade openness and wealth of the population (income per capita) do not influence the growth-effect of FDI.

The rest of the paper is organized as follows. In Section 2, we describe the econometric framework which formalizes the link between economic growth and FDI. Section 3 describes our data and variables. Section 4 presents our main findings and recommendations. Section 5 concludes.

## 2. Econometric specification

This sub-section describes the econometric method that we use to assess the impact of FDI flows and economic growth. In order to control for individual heterogeneity (unobserved country-specific effects), we use a dynamic panel procedure with observations per country over the period 1970-2005. We average data over non-overlapping five-year periods (except six-periods for data from 2000 to 2005). So, we have seven observations per country: 1970-1974, 1975-1979, 1980-1984, 1985-1989, 1990-1994, 1995-1999, 2000-2005. Our panel procedure also controls for the endogeneity of FDI, openness to trade, and macroeconomic instability. It also accounts for the bias induced by including the lagged real per capita GDP in the equation of growth<sup>6</sup>. Our strategy for estimation uses the Generalized Method of Moments (GMM) estimators suggested for the dynamics of adjustment that were developed by Arellano and Bond (1991), and Blundell and Bond (1998). To analyse the sensibility of our results to the GMM method, we also use the standard Two-stage Least Squares (2SLS) estimators developed by Anderson and Hsiao (1982). Our unbalanced panel consists of data for MENA countries.

We consider a dynamic growth equation of the form

$$y_{it} - y_{i,t-1} = (\delta - 1)y_{i,t-1} + \beta' X_{it} + \mu_i + \varepsilon_{it} \quad i = 1, \dots, N; \quad t = 1, \dots, T \quad (1)$$

---

<sup>5</sup> Carkovic and Levine (2002) used gross FDI inflows. Then, they extracted the exogenous component of FDI, but they did not suggest how they did it.

<sup>6</sup> The empirical problem in applying OLS is that one period lagged real per capita GDP is endogenous to the fixed effects in the error term. The correlation between lagged real per capita GDP and error term inflates the coefficient estimate for lagged real per capita GDP. It is not also efficient to use the Within Groups estimator because it does not eliminate dynamic panel bias (Nickell, 1981; Judson and Owen, 1999; Bond 2002).

where  $y_{it}$  is the natural logarithm of real per capita GDP in country  $i$  for the period  $t$ , the vector  $X$  contains a set of explanatory variables<sup>7</sup>,  $\mu$  is an unobservable country-specific effect,  $\varepsilon$  is the error term,  $\delta$  is a coefficient and  $\beta$  is a column vector of coefficients.

Equation (1) can be rewritten

$$y_{it} = \delta y_{i,t-1} + \beta' X_{it} + \mu_i + \varepsilon_{it} \quad (2)$$

where  $E[\mu_i] = E[\varepsilon_{it}] = E[\mu_i \varepsilon_{it}] = 0$ . The disturbance term has two orthogonal components, i.e. the fixed effects,  $\mu_i$  and the idiosyncratic shocks,  $\varepsilon_{it}$ . We assume that  $\varepsilon_{it}$  are not serially correlated.

In order to get a consistent estimate of  $\delta$  and  $\beta$ , some transformations are commonly used. The most used transformation is the first-difference transform: we first difference equation (2) to eliminate the country-specific effect

$$y_{it} - y_{i,t-1} = \delta (y_{i,t-1} - y_{i,t-2}) + \beta' (X_{it} - X_{i,t-1}) + (\varepsilon_{it} - \varepsilon_{i,t-1}) \quad (3)$$

The lagged dependant variable is still endogenous, since  $y_{i,t-1}$  term in  $(y_{i,t-1} - y_{i,t-2})$  correlates with  $\varepsilon_{i,t-1}$  in  $(\varepsilon_{it} - \varepsilon_{i,t-1})$ . We need to use instrumental variables to deal with the problem of endogeneity. From equation (3), natural candidates for  $(y_{i,t-1} - y_{i,t-2})$  are  $y_{i,t-2}$  and  $(y_{i,t-2} - y_{i,t-3})$  because both  $y_{i,t-2}$  and  $(y_{i,t-2} - y_{i,t-3})$  are mathematically related to  $(y_{i,t-1} - y_{i,t-2})$  but not to the term error  $(\varepsilon_{it} - \varepsilon_{i,t-1})$ , as long as the  $\varepsilon_{it}$  are not serially correlated. One way to incorporate either instrument is to use the 2SLS “level” and “difference” estimators developed by Anderson-Hsiao (1981). In short panels, it seems preferable to use the “level” estimator because instrumenting with  $y_{i,t-2}$  instead of  $(y_{i,t-2} - y_{i,t-3})$  permits to maximize sample size<sup>8</sup>.

But, in order to work in the GMM framework, using deeper lags of  $y$  as additional instruments, we use both classic Arellano-Bond (1991) difference and Blundell-Bond (1998) system estimators for dynamic panels. These estimators use a larger set of moment conditions. So, they exploit more information than the preceding estimators.

<sup>7</sup> We also include time dummies in order to remove universal time-related shocks from the errors. These time dummies are omitted from the equations in the text.

<sup>8</sup> In general,  $(y_{i,t-2} - y_{i,t-3})$  is not available until  $t = 4$  whereas  $y_{i,t-2}$  is available at  $t = 3$ .



$X$  may contain endogenous variables and, weakly and strictly exogenous variables. In our case, we have the following additional moment conditions, using weak exogenous variables<sup>9</sup>:

$$\begin{cases} E[y_{i,t-j} \cdot (\varepsilon_{it} - \varepsilon_{i,t-1})] = 0 \\ E[X_{i,t-j} \cdot (\varepsilon_{it} - \varepsilon_{i,t-1})] = 0 \end{cases} \quad \text{for } j \geq 2; \quad t = 3, \dots, T \quad (4)$$

Blundell and Bond (1998) demonstrated that if  $y$  is close to a random walk, difference GMM presents a statistical shortcoming because past levels render little information concerning future changes. In other words, untransformed lags are weak instruments for transformed variables<sup>10</sup>. From equation (2), it is possible to increase efficiency of the Arellano-Bond estimator through a great number of instruments. Arellano and Bover (1995) developed idea of a transformation of the system of equations, which favours the use of more information from observations<sup>11</sup>. Blundell and Bond developed an approach that transforms the instruments to make them exogenous to the fixed effects (instead of transforming the explanatory variables). Their approach is interesting since they assume that changes in any instrumenting variable are uncorrelated with the fixed effects in equation (2). From mathematical perspective, we have

$$\begin{cases} E[y_{i,t+p} \cdot \mu_i] = E[y_{i,t+q} \cdot \mu_i] \\ E[X_{i,t+p} \cdot \mu_i] = E[X_{i,t+q} \cdot \mu_i] \end{cases} \quad \text{for all } p \text{ and } q \quad (5)$$

Equation (5) means that  $E[y_{i,t-1} \mu_i]$  and  $E[X_{it} \mu_i]$  are time-invariant. In this case,  $(y_{i,t-1} - y_{i,t-2})$  is a valid instrument for  $y_{i,t-1}$ , and  $(X_{i,t-1} - X_{i,t-2})$  is a valid instrument for  $X_{it}$ . So, we have the following additional moment conditions<sup>12</sup>

$$\begin{cases} E[(y_{i,t-1} - y_{i,t-2}) \cdot (\mu_i + \varepsilon_{it})] = 0 \\ E[(X_{i,t-1} - X_{i,t-2}) \cdot (\mu_i + \varepsilon_{it})] = 0 \end{cases} \quad (6)$$

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<sup>9</sup> A variable is weakly exogenous means that it is uncorrelated with future realizations of the error term. We do not assume that the explanatory variables are endogenous variables. Indeed, to deal properly with endogenous variables, we need additional instruments apart from lagged variables. Using endogenous variables is beyond the scope of the study.

<sup>10</sup> Weak instruments affect the asymptotic and small-sample performance for the difference GMM.

<sup>11</sup> The model in first-difference of Arellano-Bond (1991) does have a shortcoming. It enlarges gaps in unbalanced panels and it is possible to construct data sets that completely vanish in first differences. This motivated Arellano and Bover (1995) to use a second transformation called “forward orthogonal deviations” or “orthogonal deviations”. Contrary to first-difference transformation which subtracts the previous observation from the contemporaneous, the “orthogonal deviations” transformation subtracts the average of all future available observations. No matter how many gaps, it is computable for all observations except the last for each country. So it permits to minimize data loss. They are also valid instruments since lagged observations do not be used to compute them.

<sup>12</sup>  $E[(z_{i,t-1} - z_{i,t-2})(\mu_i + \varepsilon_{it})] = E[(z_{i,t-1} - z_{i,t-2})\mu_i] + E[z_{i,t-1} \varepsilon_{it}] - E[z_{i,t-2} \varepsilon_{it}] = 0 + 0 - 0 = 0$

Thus, we observe that contrary to Arellano and Bond (1991), Blundell and Bond instruments levels with differences. Equation (6) holds because we assume that  $\varepsilon_{it}$  are not serially correlated. If  $X$  is endogenous,  $(X_{i,t-1} - X_{i,t-2})$  may be used as an instrument because  $(X_{i,t-1} - X_{i,t-2})$  should not be correlated with  $\varepsilon_{it}$ ; it is also possible to use earlier realizations of  $(X_{i,t-1} - X_{i,t-2})$ . If  $X$  is predetermined, the contemporaneous  $(X_{it} - X_{i,t-1})$  is also valid, since  $E[X_{it}\varepsilon_{it}] = 0$ .

Next, Blundell and Bond suggested an additional stationarity restriction on the initial conditions process. They considered that the absolute value of  $\delta$  must be inferior to 1, so that the process is convergent<sup>13</sup>.

As Blundell and Bond, we exploit at once the new moment conditions for the observations in levels and the Arellano-Bond moment conditions for the transformed equation. This permits to derive an extended “system” GMM estimator. System GMM estimator uses lagged differences of  $y_{it}$  as instruments for equations in levels and lagged levels of  $y_{it}$  as instruments for equations in first differences. We use lagged two and/or three periods of  $y$  and  $X$  as valid instruments to generate consistent and efficient parameters estimates.

Arellano and Bond suggest two specification tests to address consistency issue of the GMM estimator. First, the Sargan/Hansen test of over-identifying tests for joint validity of the instruments. The null hypothesis is that the instruments are not correlated with the residuals. Second, the Arellano-Bond test for autocorrelation examines the hypothesis that the idiosyncratic disturbance  $\varepsilon_{it}$  is not serially correlated<sup>14</sup>. In order to examine for autocorrelation aside from the fixed effects, the Arellano-Bond test is applied to the residuals in difference. We know that  $(\varepsilon_{it} - \varepsilon_{i,t-1})$  is mathematically related to  $(\varepsilon_{i,t-1} - \varepsilon_{i,t-2})$  via the shared term  $\varepsilon_{i,t-1}$ . So, we expected a first-order serial correlation in differences. This is not informative for the Arellano-Bond test. To examine first-correlation in levels<sup>15</sup>, our interest goes to the second-order correlation in differences because we consider that this will detect correlation between the  $\varepsilon_{i,t-1}$  in  $(\varepsilon_{it} - \varepsilon_{i,t-1})$  and the  $\varepsilon_{i,t-2}$  in  $(\varepsilon_{i,t-2} - \varepsilon_{i,t-3})$ .

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<sup>13</sup> The system GMM is shown to have striking efficiency gains over the first-difference GMM as  $\delta \rightarrow 1$  and  $(\sigma_\mu^2 / \sigma_\varepsilon^2)$  increases.

<sup>14</sup> The full disturbance  $v_{it}$  ( $v_{it} = \mu_i + \varepsilon_{it}$ ) is presumed autocorrelated since it contains fixed effects.

<sup>15</sup> Roodman (2006) notes that, in general, in order to check for serial correlation of order  $l$  in levels, we look for correlation of order  $(l+1)$  in differences.

### 3. Data and Variables

The sample period runs from 1970 to 2005 for the MENA countries, but we exclude some countries for which FDI observations are not available or satisfactory<sup>16</sup>. The data are drawn from the World Development Indicators published by the World Bank (2006). MENA countries are an interesting group for analysis because they have different history of macroeconomic experience, policy regimes and growth patterns from 1970 to 2005. We choose the real *per capita GDP* growth<sup>17</sup> to represent the economic growth. Ratio of FDI to GDP is often used in empirical works to capture degree of integration in world market or globalization in certain cases. The variable *foreign direct investment* equals to FDI net inflows<sup>18</sup> as a percentage of GDP.

Among the other determinants of economic growth, we choose to focus on three factors. We include income per capita as the natural logarithm of *lagged real per capita GDP*<sup>19</sup>. *Inflation* is used as a proxy for macroeconomic stability. The influence of *inflation* is assessed with the annual percentage change of consumer prices. The *degree of trade openness* is measured by the share of the sum of exports plus imports to GDP<sup>20</sup>. It captures the trade policy.

[INSERT TABLE 1]

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<sup>16</sup> We retain the following MENA countries: Algeria, Egypt, Iran, Israel, Jordan, Kuwait, Lebanon, Morocco, Oman, Syrian, and Tunisia. We exclude Bahrain, Djibouti, Iraq, Libya, Malta, Qatar, Saudi Arabia, United Arab Emirates, West Bank, Palestine, and Yemen.

<sup>17</sup> We use the natural logarithm of real per capita GDP (constant 2000 US \$).

<sup>18</sup> According to the World Bank, FDI represents “net inflow of investment to acquire a lasting management interest in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital (capital raised from owners), reinvestment of earnings, other long-term capital and short-term capital”. A negative value means that the capital flowing out of the country exceeds that flowing in.

<sup>19</sup> We also run estimates with *log Initial real per capita GDP* at the start of each period, in order to benchmark Carkovic and Levine (2002).

<sup>20</sup> A lot of measures of openness to trade have been used in economic literature on trade policy. Dollar (1992) constructed two separate indices: an “index of real exchange rate distortion” and an “index of real exchange rate variability”. Sachs and Warner (1995) constructed an openness indicator which is a zero-one dummy. This indicator takes the value 0 if the economy was closed according to any one of the following criteria: it had average tariff rates higher than 40%; its non-tariff barriers covered on average more than 40% of imports; it had a socialist economic system; it had a state monopoly of major exports; its black market premium exceeded 20% during either the decade of the 1970s or the decade of the 1980s. We have also other openness indicators in economic literature: the World Bank subjective classification of trade strategies in *World Development Report 1987*; E. Learner’s (1988) openness index; the average black market premium; the average import tariffs from UNCTAD via Barro and Lee (1994), the average coverage of non-barriers, also from UNCTAD via Barro and Lee (1994); the subjective Heritage Foundation index of Distortions in International Trade; the ratio of total revenues on trade taxes (exports + imports) to total trade; and the Holger Wolf’s regression-based index of import distortions for 1985 (Edwards, 1998).

Table 1 summaries some statistics from our sample. For all variables, the cross-country variation is very large, except openness to trade. The average of net inflows of foreign direct investment is 1.2 percent of GDP, with a standard deviation of 2. The minimum value of net inflows of FDI concerns Oman (-3.7 in 1974), whereas the maximum value is for Lebanon (14.4 in 2003). Concerning economic growth, we observe that average of rate of real per capita GDP growth is -0.08, with a standard deviation of 0.15. The minimum reaches -0.8 (Israel in 1984) and the maximum 0.4 (Kuwait in 1986). Macroeconomic instability seems critical since the average of annual percentage change of consumer prices equals to 14, with a standard deviation of 32.2. The minimum value goes to Kuwait (-21.7 in 1978) and the maximum to Israel (373.8 in 1984).

*[INSERT TABLE 2]*

Table 2 presents the pairwise correlation coefficients. It suggests that there is a weak linear relationship between the real per capita GDP growth and each explicative variable. The correlation coefficient between real per capita growth and inflation is the only one which is significant at 5% level. But, we know that a low value of the correlation coefficient is not sufficient to conclude about the lack of a strong relationship between two variables under consideration. Next, we will provide some regression specifications to confirm that there is a link between the real per capita GDP growth and FDI in a macroeconomic instability environment.

#### **4. Findings**

*[INSERT TABLE 3]*

Table 3 shows results from “first-difference” and “system” GMM estimators. We used observations during the period 1970-2005 for eleven countries. The panel is unbalanced because we have more observations on some countries than on others. Since the missing observations are important, we did not substitute zeros for them because the substitutions might seem like a dubious managing of the data. We chose to “collapse” the instrument set<sup>21</sup>. But, this generates slightly less count of instruments.

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<sup>21</sup> This method is available from Stata software command `xtabond2`. Collapsing the instruments is critical to identification of our models because we have only eleven countries.

Given that we have eleven countries, for each econometric specification, we cannot use more than eleven instruments to favor identification of our estimates. We lose two cross-sections in constructing lags and taking first differences, so that the estimates cover the period 1980-2005. Openness, inflation and income per capita GDP variables has been instrumented with lagged two and three periods. Hansen overidentifying test<sup>22</sup> is clearly not reject with a pvalue more than 0.3 in columns (1)-(5). The Arellano-Bond test for second order autocorrelation<sup>23</sup> is accepted with a pvalue greater than 0.2 in each specification. The model seems correctly specified. Nevertheless, from a theoretical point of view, the Arellano-Bond test for autocorrelation has been constructed on the assumption that the number of countries is large but the number of periods may not be. Given that we used only eleven countries for our GMM dynamic models, our statistic tests must be taken with caution.

From table 3, columns (1), (2), (4), and (5) show that FDI does not exert an impact on economic growth, using “difference” and “system” GMM estimators. In particular, results of column (4) convey the view that there is no reliable relationship between economic growth and FDI, when allowing for growth-effect of FDI to depend on the degree of openness to trade. These findings are provided by the fact that the coefficient of FDI variable and the coefficient of FDI-openness to trade interaction term are both insignificant at 10% level. Column (5) also shows that there is no growth-effect of FDI depending on income per capita. Indeed, the coefficient of FDI and the coefficient of FDI-income per capita interaction term are both non-significant at 10% level. Columns (1) and (2) also show that FDI does not exert an independent growth-effect. Our findings strengthen the conclusion of Carkovic and Levine (2002), but rejecting the results of Kawai (1994) and Balasubramanyam et al (1996, 1999).

Perhaps the most important finding of our study is at once the positive and significant coefficient of FDI and the negative and significant coefficient of FDI- inflation interaction term (from column 3). We find that FDI has a negative impact on economic growth when inflation would to be greater than 15.49 (annual percentage change)<sup>24</sup>. But the growth-effect of FDI becomes positive when inflation would be smaller than the threshold (15.49). Thus, we suggest that the relationship between FDI and economic growth varies with macroeconomic stability. The direction of the link FDI-growth depends on the threshold of the annual percentage change of consumer prices. Maintaining macroeconomic stability has to be a challenge for MENA countries in order to obtain a positive growth-effect of FDI.

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<sup>22</sup> The Sargan/Hansen test: the null hypothesis is that the instruments are not correlated with residuals

<sup>23</sup> Arellano-Bond test for second order autocorrelation in first differences : the null hypothesis is that the errors in the first difference regression exhibit no second order correlation.

<sup>24</sup> The cut-off is  $0.8316/0.00537=15.49$ .

In order to benchmark Carkovic and Levine (2002), from table A.1 (appendix), we replace log lagged real per capita GDP by log initial real per capita GDP (it is income per capita variable). We again confirm our previous results. The threshold of the annual percentage change of consumer prices equals to 15.27.

In order to analyze sensibility of our estimates from the using of GMM dynamic panel estimators, we re-run our real per capita GDP growth dynamic model with the two stage least square (2SLS) estimators. We used the Anderson-Hsiao(1982) “levels” estimators.

[INSERT TABLE 4]

Table 4 summaries the results of 2SLS method. For the first-stage regressions, the test of Anderson (1984) canonical correlations<sup>25</sup> is rejected with a pvalue less than 0.1 from our four specifications. From specification #1 to specification #3, our model is exactly identified. Sargan/Hansen overidentifying statistic is not rejected with a pvalue more than 0.19 for specification #4. Our model is correctly specified from these specifications.

Overall, Table 4 confirms the results of this article. Nevertheless, from specification #2, we find that the coefficient of FDI is non-significant at 10% level and the coefficient of FDI-inflation interaction term is significant at 10% level. Thus, countries with positive annual percentage change of consumer prices would have a negative impact of FDI on economic growth. But, countries with negative annual percentage change of consumer prices would get a positive impact of FDI on economic growth. This finding imposes more severe condition on macroeconomic stability (than condition obtained from GMM estimators) in order to obtain a positive growth-effect of FDI: the threshold of annual percentage change of consumer prices equals to zero<sup>26</sup>.

Specification#1, specification #3, and specification #4 show that the lack of an impact of FDI on growth does not depend of the openness to trade and the income per capita. This finding does not mean that FDI is irrelevant as suggested by Carkovic and Levine; it conveys the fact that FDI does not accelerate economic growth. This conclusion is also in accordance with many microeconomic studies. The latter studies shared unenthusiastic evidence on the growth effects of foreign capital.

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<sup>25</sup> The test is a likelihood ratio test of whether the equation is identified, i.e. that the excluded instruments are “relevant”, meaning correlated with the endogenous regressor. The null hypothesis is that matrix of reduced form coefficients has rank=k-1 (under identified) and the alternative hypothesis is that matrix has rank=k (identified). Where k is the number of regressors.

<sup>26</sup> In the case with a significant coefficient of FDI, the threshold of annual percentage change would be 4.61, which seems more realistic.

## 5. Conclusion

We have scrutinized in this article the impact of foreign direct investment on economic growth, taking account of macroeconomic environments (degree of trade openness, income per capita and macroeconomic stability in MENA countries). We assessed the growth-effect of FDI, using data from MENA countries on period 1970-2005. To deal properly with dynamic panel models, we use GMM estimators designed by Arellano and Bond (1991), Blundell and Bond (1998), and 2SLS estimators designed by Anderson and Hsiao (1982).

Our findings may be summarized in these words: First, there is no significant independent impact of FDI on economic growth in MENA countries. Second, the lack of growth effect of FDI does not depend on the degree of trade openness and income per capita. This conclusion strengthens the findings of Carkovic and Levine (2002) and of most recent microeconomic studies. Third, the most important finding of this study is undoubtedly that the positive impact of FDI on the economic depends on macroeconomic stability. More precisely, we find that there is a threshold effect of annual percentage change of consumer prices on the link between FDI and economic growth.

Our study does not reduce the significance of previous studies but intends to enhance the latter strand of research. In particular, we conjecture that macroeconomic stability environment is critical in order to favor positive impact of FDI on economic growth. One important economic policy deriving from our findings is that MENA countries need strong and stable economic situations in order to obtain positive effect of FDI. In particular, they must lead some macroeconomic policies which favors the reduction of consumer prices.

Moreover, this paper must not be considered as a support to capital restriction. Our skeptical conclusions suggest only that FDI policies implementing incentives for foreign investors (such as tax reductions, import duty exemptions, subsidies, etc.) aimed at attracting foreign capital are not sufficient to generate economic growth. A more ambitious policy aimed to change the local environment, increasing human capital endowment, facilitating skill upgrading, creating a sound macroeconomic, promoting the development of the financial market, in tandem with FDI strategy complementary with the local production is more likely to boost the GDP, than subcontracting the task of economic growth and development to foreign firms by granting them pecuniary advantages. Economic growth and development cannot be purchased abroad. It has to be built collectively, by mobilizing the full resources of the country, while learning at the same time on foreign contributions.

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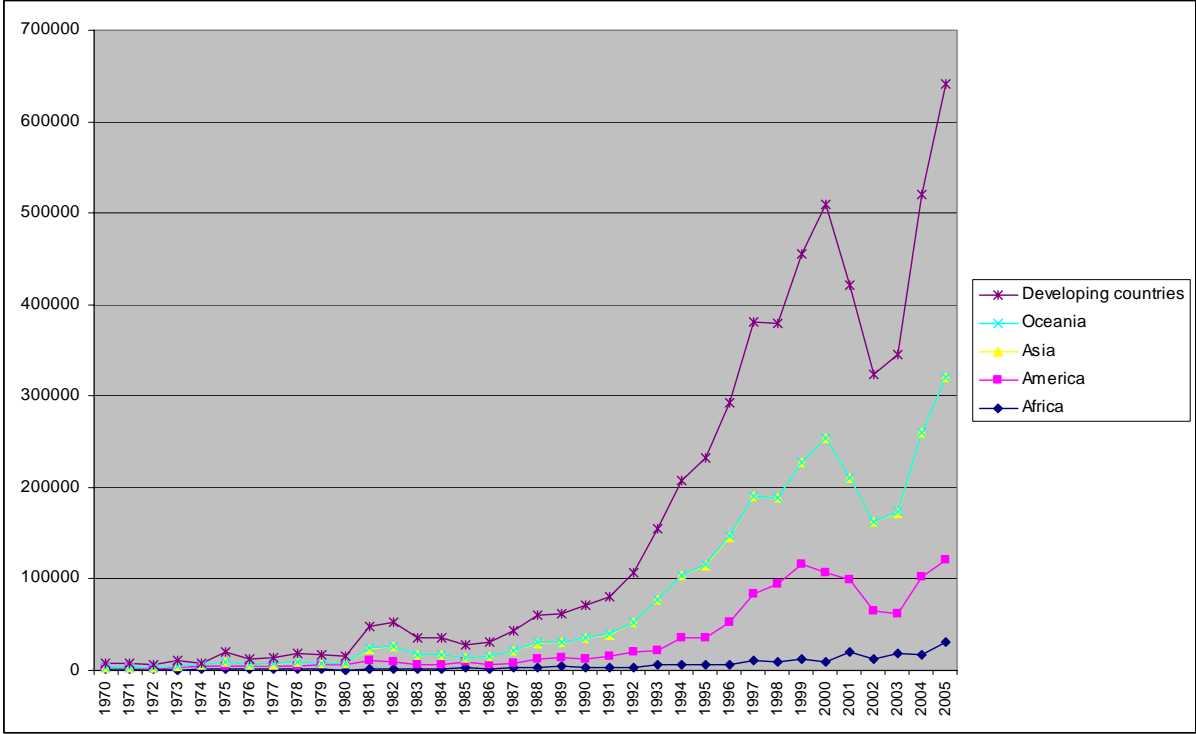
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**Figure 1. Inward FDI flows to developing countries**

(US dollars at current prices in millions)



Source: UNCTAD FDI database

**Table 1. Descriptive Statistics. Period 1970-2005**

	Mean	Standard Deviation	Minimum Value	Maximum Value
Rate of real per capita GDP growth	-0.08	0.15	-0.80	0.40
Inflation	14.21	32.20	-21.67	373.82
Foreign direct investment	1.17	1.91	-3.71	14.44
Openness to trade	73.28	26.79	13.77	154.64
Real per capita GDP	83705	572685.1	0.91	5395983

**Table 2. Pairwise correlation coefficients. Period 1970-2005**

	Real per capita GDP growth	Inflation	Foreign direct investment	Openness to trade
Real per capita GDP growth	1			
Inflation	-0.4784 <sup>a</sup>	1		
Foreign direct investment	0.0986	-0.1881	1	
Openness to trade	-0.2366	0.1508	0.0996	1

Notes

(a) means that the correlation coefficient is significant at 5% level.

**Table 3: Dynamic panel-data estimation, two-step GMM, five year-averages observations**

Dependent variable: log of real per capita GDP growth

Independent Variables	Difference GMM (1)	System GMM (2)	Difference GMM (3)	Difference GMM (4)	Difference GMM (5)
log Real per capita GDP(t-1)	0.7235*** (0.1281)	0.8162*** (0.0210)	1.0347*** (0.1387)	0.8107*** (0.0858)	0.8652*** (0.1257)
Foreign Direct Investment	-0.3992 (0.7642)	0.0301 (0.0307)	0.8316*** (0.3192)	-0.2249 (0.3429)	-0.8349 (0.9903)
Inflation					
Openness					
FDI × Openness				0.0036 (0.0036)	
FDI × Inflation			-0.0537*** (0.0066)		
FDI × log Real per capita GDP					0.2267 (0.2482)
Period 1980-1984	-0.2181 (0.2215)	0.1333 (0.0962)	-0.0081 (0.2185)	-0.1786 (0.1292)	0.0009 (0.1415)
Period 1985-1989	-0.2092 (0.5662)	0.4384* (0.2646)	0.3887 (0.4557)	0.0369 (0.2352)	0.1932 (0.2078)
Period 1990-1994	-0.4956 (0.4374)	0.0639 (0.1166)	-0.2139 (0.2227)	-0.2901 (0.2399)	0.0772 (0.3221)
Period 1995-1999	-0.4100 (0.3238)	0.1538 (0.0961)	-0.1850 (0.2788)	-0.2375 (0.2637)	0.1561 (0.3501)
Period 2000-2005	0.1918 (0.7586)	0.2999*** (0.1100)	-0.8025 (0.3959)	-0.1476 (0.1949)	0.5862 (0.8369)
Number of observations	48	60	42	48	48
Number of countries	11	11	10	11	11
Number of instruments	9	11	10	10	10
Arellano-Bond test for AR(2) in first differences: pvalue	0.353	0.274	0.201	0.321	0.293
Hansen test of over-identification Restrictions: pvalue	0.426	0.616	0.308	0.411	0.417

**Notes**

1. Two-step standard errors are robust to the Windmeijer (2005) finite-sample heteroskedasticity correction. They are in bracket below estimates coefficients values.

2. Researchers often reported one-step results because of downward bias in the computed standard errors in two-step. But, Windmeijer has greatly reduced this problem.

3. Concerning estimates of GMM difference (3), we exclude Oman from our sub-sample of countries because his observations of inflation variable are not available.

4. We collapsed the instruments to limit the instruments count. This is available from the Stata command xtabond2 (Roodman, 2006).

5. FDI×Openness, FDI×Inflation, and FDI× log of real per capita GDP are strictly exogenous variables.

6. Sargan/Hansen test: the null hypothesis is that the instruments are not correlated with the residuals.

7. Arellano-Bond test for AR(2) in first differences: the null hypothesis is that the errors in the first difference regression exhibit no second order serial correlation.

One, two and three stars respectively means 10%, 5% and 1% significance.

**Table A.1: Dynamic panel-data estimation, two-step GMM, five year-averages observations**

Dependent variable: log of real per capita GDP growth

Independent Variables	Difference	System	Difference	Difference	Difference
	GMM	GMM	GMM	GMM	GMM
	(1)	(2)	(3)	(4)	(5)
log Initial real per capita GDP	0.7994*** (0.1318)	0.8385*** (0.0273)	1.0709*** (0.1414)	0.8061*** (0.0968)	1.0425*** (0.2044)
Foreign Direct Investment	-0.1136 (0.2927)	0.0206 (0.0358)	1.0246** (0.4046)	-0.4567 (0.4551)	-3.0588 (2.5618)
FDI × Openness				0.0058 (0.0050)	
FDI × Inflation			-0.0671*** (0.0138)		
FDI × log Real per capita GDP					0.8017 (0.6657)
Period 1980-1984	-0.1958 (0.1447)	0.1528 (0.1245)	0.1404 (0.2910)	-0.1647 (0.1791)	0.5511 (0.6502)
Period 1985-1989	-0.2439 (0.2934)	0.2814 (0.2460)	0.5751 (0.4562)	-0.1249 (0.2355)	0.6304 (0.8188)
Period 1990-1994	-0.5894 (0.4285)	-0.0178 (0.1983)	-0.1836 (0.3747)	-0.4490 (0.3543)	0.9853 (1.1746)
Period 1995-1999	-0.5898 (0.4792)	0.0051 (0.1347)	-0.2391 (0.4675)	-0.5224 (0.4324)	1.1356 (1.4157)
Period 2000-2005	-0.1661 (0.2276)	0.2321* (0.1381)	-0.9419** (0.4817)	-0.2866 (0.3549)	2.7015 (2.4176)
Number of observations	48	60	42	48	48
Number of countries	11	11	10	11	11
Number of instruments	9	11	10	10	10
Arellano-Bond test for AR(2) in first differences: pvalue	0.379	0.449	0.652	0.397	0.366
Hansen test of over-identification Restrictions: pvalue	0.344	0.361	0.501	0.311	0.338

**Notes**

1. Two-step standard errors are robust to the Windmeijer (2005) finite-sample heteroskedasticity correction. They are in bracket below estimates coefficients values.

Researchers often reported one-step results because of downward bias in the computed standard errors in two-step. But, Windmeijer has greatly reduced this problem.

2. Concerning estimates of GMM difference (3), we exclude Oman from our sub-sample of countries because his observations of inflation variable are not available.

3. We collapsed the instruments to limit the instrument count. This is available from the Stata command xtabond2 (Roodman, 2006).

4. FDI×Openness, FDI×Inflation, and FDI× log of real per capita GDP are strictly exogenous variables.

5. Sargan/Hansen test: the null hypothesis is that the instruments are not correlated with the residuals.

6. Arellano-Bond test for AR(2) in first differences: the null hypothesis is that the errors in the first difference regression exhibit no second order serial correlation.

One, two and three stars respectively means 10%, 5% and 1% significance.

**Table 4: Dynamic panel-data estimation, Two-Stage Least Square (2SLS), Anderson-Hsiao (1981) “level” estimator, five year-averages observations**

Dependent variable: log of real per capita GDP growth

Independent Variables	specification #1	Specification #2	Specification #3	Specification #4
log of real per capita GDP growth (t-1)	1.0832** (0.5164)	0.8538** (0.4251)	1.0776* (0.5890)	0.8269 (0.6518)
Foreign Direct Investment	0.4557 (0.489)	0.0882 (0.3340)	0.4841 (0.7151)	0.3090 (0.5029)
Openness	0.0142 (0.0457)			
FDI × Openness				-0.0013 (0.0034)
FDI × Inflation		-0.0191* (0.0114)		
FDI × log Real per capita GDP			-0.0486 (0.0938)	
Period 1985-1989	0.4147 (0.5195)	0.2875 (0.3016)	0.2946 (0.4218)	
Period 1990-1994	0.5004 (1.0140)	0.6501 (0.4851)	0.5720 (0.8697)	0.0599 (0.4986)
Period 1995-1999	0.5806 (1.3838)	0.9924 (0.6261)	0.7103 (1.2723)	0.1623 (0.7184)
Period 2000-2005	0.1537 (2.4425)	1.2707 (0.9912)	0.7029 (1.8814)	0.1546 (0.9337)
Constant	-0.0058 (0.5849)	-0.1402 (0.3390)	0.0655 (0.7236)	0.0631 (0.5772)
Number of observations	48	44	48	38
Number of countries	11	10	11	9
Number of instruments	8	8	8	8
Sargan/Hansen test of over-identification Restrictions: pvalue	nr	nr	nr	0.1966
First stage regression: Under identification test of Anderson (1984)canonical correlations: pvalue	0.0472	0.0636	0.0941	0.0399

Notes

1. Standard errors are robust to the presence of arbitrary heteroskedasticity, we used the White estimator of variance in place of the traditional calculation. They are in bracket below and estimate coefficients values.
  2. “nr” means “equation exactly identified”.
  3. The test is a likelihood ratio test of whether the equation is identified, i.e. that the excluded instruments are “relevant”, meaning correlated with the endogenous regressors. The null hypothesis is that matrix of reduced form coefficients has rank=k-1 (under identified) and the alternative hypothesis is that matrix has rank=k (identified).
  4. FDI × Openness, FDI × Inflation, and FDI× log of real per capita GDP are strictly exogenous variables.
  5. Concerning estimates of specification (3), we exclude Oman from our sub-sample of countries because his observations of inflation variable are not available. In specification #4, we used three lagged FDI with other instruments. So, our estimates exclude observations of Lebanon because there are many missing observations of FDI.
- One, two and three stars respectively means 10%, 5% and 1% significance.