

# Determinants Of Foreign Direct Investment In MENA Region: Panel Co-Integration Analysis

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## ABSTRACT

*This paper aims to investigate the relationship between Determinants of Foreign Direct Investment (FDI) inflows and their determinants in MENA (Middle East and North Africa) region during the period 1970- 2010. Using panel data techniques, we take into account the both hypothesis economic dependencies and structural breaks. We find that the macro determinants like openness, growth rate, exchange rate, and economic instability have a long-run impact on FDI inflows in our panel.*

**Keywords:** Macro determinants of FDI; Dependences and Structural breaks; Panel co-integration Analysis

## 1. INTRODUCTION

Since the mid 1980, the foreign direct investments have grown faster in the entire of the world. According to UNCTAD (1995), the developing countries have received 19 Billion of dollar (US) of FDI inflows in the period 1982-1986 and 84 Billion of dollar in 1994 alone. So, the perception towards FDI has been modified and we see that Michalet (1999) called the great turnaround. Two main reasons explain this evolution of FDI. The first one, the FDI is seen as driver of productivity growth in these countries and the second the FDI can transfer a new technology and create the employment in the recipient countries. To take advantages for the foreign capital, many countries of MENA region have played an important role to attract more FDI by pursuing economic policy centered on attractiveness of this FDI. The policies conducted were often focused on the adjustment structural program to pursue the policies on economic openness, tax exemptions and financial subsidies and so on.

Despite their efforts, these countries still attract lows FDI and their share of FDI to GDP was the lowest one among the all region in the world (Sekkat 2004). Makdissi, Fattah and Limam (2005) have shown that the low performance of MENA region is due to their economics features (the very low level of their integration in the world, the poorest institutions and so on). Dasgupta (2002) examines the links between the reforms and growth in MENA countries. He has shown that the reforms undertaken still lagging behind the other countries in the region. He concludes also that these reforms have at least reversed the negative sign of the total productivity of the factors during 1970s and 1980s.

The purpose of this paper is to assess the main determinants of FDI always discussed in the literature in the context of MENA region over the period 1970-2010. The literature on the topic remains largely poor and widely concentrated in few cross section data. The existing body of the literature investigates the impact of the macro determinants on FDI over the short period of the observation by using the averages of data of this period. Mainly due to the limitations of data, these studies ignore the impact of the economic shocks and economic dependencies that may exist between the countries. In this case, Westerlund and al. (2007) have highlighted the role of inter-economic linkages in macroeconomic and financial data and structural breaks when analyzing data covering the long period of time. In addition, Kamaly (2003) has revealed the importance of the long term effects of the macro determinants of FDI. For these reasons, this study aims to explore the effects of the determinants of FDI in MENA

region considering the both possibility of existing of the economic dependencies between the countries of our panel and the effects of the economic shocks when the evolution of FDI is subjected of murky periods.

This paper is organized as follows. The second section we discuss the main macro determinants addressed in the literature. The third one, we focused on the empirical exercise and in the last section we conclude.

## **2. RELEVANT LITERATURE ON DETERMINANTS OF FDI**

In the literature, the theoretical investigation of the determinants of FDI offers a variety of models and approaches. For instance, Dunning (1981) has proposed a synthesis of international production theories summarized in his known paradigm called "eclectic paradigm OLI". This paradigm emphasizes three advantages sought by the firms that choose to invest abroad. These advantages relate to inherent advantages of the firm "Ownership Advantages", "Localization Advantages" and "Internationalization Advantages". Although, his model did not have a great success to explain the rapid increasing of FDI, it has allowed other theories to draw on its general framework (Di Mauro, 1999; Bevan and al., 2004). In this context, significant approaches are developed to take into consideration the factors like the geographic distance between the countries and international markets with the gravity models (Fontagné and al. (1997); Hejazi and al. 1999). More other works have emphasized the role of the capital human (Lucas 1988) or institutional quality among a variety of other factors to that are supposed to be considered. However, there is no real single theoretical consensus to model the FDI. In their models, several authors take series of variables that may play an important role such as Loewendahl and al. (2001) that has identified more than twenty factors of FDI. These authors classified these factors as economic determinants (economic liberalism, economic performance, infrastructure, etc.), incentives factors related to promotion of the environment (investments facilities, corruption, right properties, etc.) and politic and institutional factors (politic system, attitudes governments towards foreign investors and tensions between socio-economic group, etc.). In this sense, the literature remains widely on the impact of various factors of the attractiveness of FDI in the host countries.

We turn now our view of the empirical literature on the determinants of FDI. Indeed, there are several methodological limits highlighted by authors such as Chakrabarti (2001) and Kamaly (2002). Among these limits, is that many studies employ a number of variables intended to attract FDI without reference to a particular theory. These variables are selected in the first and tested their significances and their impacts on inward investment in the second.

More, there are not sometimes precisions about the expected sign of the effect of some variables. However, it depends often on the interpretation given to the variables. Levasseur (2002), for example, finds that the variable unit cost of labor is negatively associated with FDI if this variable is seen only as an element of cost but this variable may positively related to FDI if it is perceived as a variable reflecting labor productivity and institutional quality.

Overall, the results of different studies on the determinants of FDI are often mixed and inconclusive. One main limitation of these studies is that they are often conducted over short periods and thus may reduce such power of some unit root and co-integration tests. Therefore, they do not consider the problem of structural breaks due to changing economic circumstances (economic crisis) or reforms etc. Another problem with these studies is that they completely ignore the economic links between the different countries receiving FDI. In economic world increasingly integrated, economic relations between countries are growing stronger and can influence the attractiveness of FDI.

The research bearing on FDI determinants in the MENA region are very few. This is due mainly to data that are not generally available for countries and variables macroeconomic. Onyeiwu (2003) have used fixed effects panel regressions to investigate the impacts of institutional and economic fundamentals on FDI in MENA region during the long period (1975-1999). Another study conducted by Hisarciklilar and al. (2006) shows that not only investment decision in a country can influence the volume of investment in another country but also in other host countries. With a spatial error model, they took into account just the linkages between countries. Using the same technique of panel data, recently, Eltayeb Mohamed and Sidiropoulos (2010) have examined the effects of economic and institutional variables in a sample with 12 countries belonging to MENA region between 1975 and 2006. In these studies, the failure to take accounts the effects of structural breaks during this long period can leading to biased results.

Other studies, such as De Vita and Kway (2008) have used panel data to examine the determinants of FDI of thirty-two developing countries during the period 1990-2004. With the test of Pedroni (1999, 2004), they conclude for co-integration relationship between macroeconomic variables and FDI. In this study, the test of co-integration of Pedroni (1999, 2004) cannot consider the structural breaks when they exist but it can only capture the heterogeneity across countries. The combination of these limits leads us to consider simultaneously breaks structural and economic dependencies between countries in our panel data.

### **3. EMPIRICAL EXERCISE**

#### **3.1 Data and empirical specification**

In this section we discuss the empirical analysis of FDI determinants in seven countries belonging to the MENA region (Algeria, Morocco, Egypt, Pakistan, Saudi Arabia, Turkey and Sudan). Our data are provided from the World Bank and UNCTAD (United Nations Conference on Trade and Development) and cover the period 1970-2010. The empirical work conducted with using panel techniques and it limited of availability of data. As previous work, we seek to explain inward investment in countries based on a number of macroeconomic variables such as economic openness, growth rate, inflation and exchange rate. These macroeconomic variables have already been used as factors that may influence the entry of FDI in MENA region.

Following Kamaly (2007), we adopt here a pragmatic approach using the model defined below:

$$\left(\frac{FDI}{GDP}\right)_{it} = \alpha_i + \beta \text{ Open}_{it} + \gamma \text{ Growart}_{it} + \delta \text{ Inlrat}_{it} + \rho \text{ Exchrat}_{it} + \varepsilon_{it} \quad (1)$$

We express the endogenous variable as a percentage of GDP for two main reasons. As noted by Kamaly (2003), the first is to control the size differences between countries and the second is to avoid the possibility of having a non stationary or explosive dependent variable in the regression.

*Open* variable is taken into account in the model to express the economic openness in the country. It is defined by the sum of exports and imports in GDP. Widely used in economic literature (i.e Lim , 2001; Hasen and al., 2007; Jallab and al., 2008), the inclusion of this variable is important in the sense that several countries in the MENA region who have engaged in some economic opening to facilitate the entry of foreign investors in the country. We expect that this variable affects positively the entry of FDI.

*Growart* is the variable that can be interpreted as an expression of the wealth of the host market (growth rate). As we know, since the 90s, economic opportunities in the MENA region have improved and allowed the attractiveness of FDI (De Vita and al., 2008). We anticipate a positive effect of this variable on the growth of FDI inflows.

*Inlrat* variable (inflation rate) as measured by consumer prices index (CPI) is used in many studies as a proxy for economic instability. A high level of inflation rate creates uncertainty for multinational corporations on their assets and liabilities (Abdellah and al., 2011). Schneider and Frey (1985) indicate that firms will be less incentive to invest in a country with high inflation and Garibaldi (2001) found that inflation affects negatively FDI inflows. The expected sign of this variable is negative.

*Exchrat* variable defines the exchange rate in the country and should have a negative impact (here each currency is expressed in dollars). When a host country's currency appreciates, it discourages foreign investment to acquire the assets of the country and vice versa when the currency depreciates of the host country, its assets are very interesting for foreigners.

#### **3.2 Panel unit root tests**

We performed the panel unit root tests proposed by the test of Breitung (2000) and Im and al. (1997) and finally by the test of Carrion-i-Silvestre and al. (2005) with and without structural breaks. We remember that the

latter test takes into account also the hypothesis of dependencies between the countries. The results are summarized in the table 1.

**Table 1: Panel unit root tests with and without structural breaks**

Variables	Breitung (2000) t-test	Im et al. (1997) W-test	Carrion-i-Silvestre et al. (2005)	
			LM( $\lambda$ )-test	
			Without structural Breaks	With structural Breaks
<i>FDI / GDP</i>	-1.109 (0.13)	-1.470 (0.07)	2.461 (0.007) [4.997]	5.016 (0.000) [7.695]
$\Delta(FDI / GDP)$	-2.191 (0.014)	-8.737 (0.000)	-	-
<i>OPENNES</i>	-1.819 (0.034)	-1.293 (0.097)	2.297 (0.011) [4.535]	9.197 (0.000) [11.919]
$\Delta(OPENNES)$	-5.282 (0.000)	-7.807 (0.000)	-	-
<i>INFL.Rate</i>	-2.288 (0.011)	-1.423 (0.077)	2.363 (0.009) [4.515]	4.557 (0.000) [11.882]
$\Delta(INFL.Rate)$	-9.727 (0.000)	-10.063 (0.000)	-	-
<i>Growth.Rate</i>	-6.62287 (0.000)	-6.037 (0.000)	1.512 (0.065) [4.482]	3.064 (0.001) [5.249]
<i>Exchange.Rate</i>	-0.421 (0.336)	-4.425 (0.000)	22.148 (0.000) [5.035]	126.780 (0.000) [19.865]
$\Delta(Exchange.Rate)$	-3.371 (0.000)	-10.822 (0.000)	-	-

Note: For the test of Carrion and al. (2005), the number of breaks points has been estimated using LWZ information criteria allowing for a maximum  $m^{\max} = 5$  structural breaks. The long variance is estimated using the Bartlett kernel with automatic spectral window bandwidth selection as in Andrew (1991). The p-values and bootstrapped critical values are respectively in the brackets.

Given the results of panel unit root tests, we conclude that the first two tests without dependencies and structural breaks (Breitung , 2000 and Im and al. 1997) suggest that our model series are integrated of order one except for the growth rate series in which it appears to be stationary. Moreover, when applying two tests Carrion-i-Silvestre (2005) with and without structural breaks and where the assumption of international economic dependencies is considered among the countries in our sample, we observe that the series are stationary except exchange rate series.

### 3.3 Panel co-integration tests

We will now check if there exists a long-term equilibrium between variables. First we apply co-integration tests in which neither economic dependencies nor structural breaks are taken into account. These tests include the test of Pedroni (1999, 2004) and the Cusum test of Westerlund (2005). Secondly, we apply co-integration tests where dependencies and structural breaks are considered. The results are given in the following table.

**Table 2. Tests of panel co-integration without dependencies and structural breaks**

**1- Co-integration Tests of Pedroni (1999)**

Panel $D$ -statistics	0.062 (0.47)
Panel rho-statistics	-2.242 (0.01)
Panel PP-statistics	-5.212 (0.00)
Panel ADF-statistics	0.602 (0.72)
Group rho-statistics	-0.507 (0.30)
Group PP-statistics	-4.641 (0.00)
Group ADF-statistics	-1.422 (0.07)

Note: The null hypothesis of Pedroni (1999, 2004) tests is no co-integration. Probability values are in brackets.

**2- Co-integration Cusum test of Westerlund (2005)**

Model	FMOLS	DOLS
Model with constant and trend	2.252 (0.012)*	2.169 (0.015)*

Note: The null hypothesis of Cusum test is co-integration (no unit root in residuals). Probability values are in brackets. (\*) indicate the rejection of the null hypothesis at 5% level.

According to Pedroni's co-integration test, we find that the results are mixed. Only 3 tests among 7 tests accept the co-integration hypothesis. Together, these different tests do not confirm that the co-integration relationship between variables is checked. Similarly, the Cusum test of Westerlund (2005) concluded for the same results. The failure of these two types of co-integration tests to find a long-run equilibrium between variables may be due to not taking into account the economic dependencies and the existence of structural breaks. Since 1970, the countries of the MENA region have followed a policy of economic openness and have maintained strong economic relations between them. In addition, from 1970 to 2010, countries in the MENA region have experienced structural changes mainly due to new reforms to attract new investment. Empirically, Westerlund and Edgerton (2008) noted the importance to consider in panel context the economic dependencies and structural breaks when analyzing the co-integration with the macroeconomic and financial data. By following their advice, we give the results of their tests in table 3.

**Table 3. Tests of panel co-integration with dependencies and structural breaks  
Co-integration tests of Westerlund and Edgerton (2008)**

Modèle	$Z_{\tau}(N)$		$Z_{\phi}(N)$	
	Value	P-value	Value	P-value
No break	-2.300	0.011	-3.094	0.001
Level break	-5.401	0.000	-2.812	0.002
Regime shift	-0.360	0.360	-1.504	0.066

Notes: The test is implemented using the Campbell and Perron (1991) automatic procedure to select the lag length. We use three breaks, which are determined by grid search at the minimum of the sum of squared residuals. The P-values are for a one-sided test based on the normal distribution.

Having established the co-integration between the variables, we investigate their impact on the entry of FDI. For this purpose, we propose three techniques for estimating the long-term relationship by the Ordinary Least Squares (OLS), Fully- Modified Least Squares and by Dynamic Least Squares (DOLS). The results are shown in Table 4.

Table 4. Panel long-run estimators

Variables	FMOLS	DOLS	OLS
Openness	0.0155 (3.18)***	0.0684 (6.40)***	0.0122* (1.86)
Inflation Rate	-0.0001 (-1.98)**	-0.0007 (-6.29)***	-0.0002*** (3.12)
Growth Rate	-0.0004 (-1.78)*	0.0019 (3.03)***	-0.0006*** (-2.7)
Exchange Rate	-0.0053 (-2.61)**	-0.0115 (-4.57)***	-0.0043** (-2.44)

Notes: \*, \*\*, \*\*\* denotes statistical significance level respectively at 10%, 5% and at the 1% level. The time effects were included in the model in panel group FMOLS and DOLS (Pedroni co-integration techniques are used).

To sum up, the conclusion from this set of estimation shows that the macroeconomic variables included in the model have long-term impact on inward FDI. However, among the three estimation techniques proposed, the results given by DOLS estimates suggest a strong positive relationship between variables in our model. In the long run, openness and economic growth rate (with an expected sign) appear to play a positive role on the entry of FDI in the MENA region while economic instability and exchange rate have a negative effect.

#### 4. CONCLUSION

In this paper, we examined the impact of macroeconomic determinants of the entry of FDI over 1970-2010 in the MENA region. We considered two hypotheses ignored in economic literature on this subject which are economic dependencies and structural breaks. To do this, we applied the recent techniques in panel that take into account these two hypotheses. Our results show that macroeconomic variables have a long-term effect on the entry of FDI. These results suggest that economic openness and the growth rate increases the entry of FDI in the MENA region. Moreover, economic instability and exchange rates appear to exert a negative effect on the inward FDI flows and can therefore deter foreign investment. Overall, these results confirm our economic intuition.

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**NOTES**