

**Source and host country volatility and FDI: A gravity
analysis of European investment to Middle East and North
Africa**

Dalila Nicet-Chenaf, Eric Rougier

LAREFI Working Paper N°2014-05

2014

<http://lare-efi.u-bordeaux4.fr>

LAREFI
Université de Bordeaux
Bâtiment Recherche Economie – 1^{er} étage
Avenue Léon Duguit – 33 608 Pessac

AUTHORS

Dalila Nicet-Chenaf, LAREFI, Université de Bordeaux

Eric Rougier, Gretha, Université de Bordeaux

NOTICES

LAREFI Working Papers contain preliminary material and research results. They have been peer reviewed. They are circulated in order to stimulate discussion and critical comment; any opinions expressed are only those of the author(s).

Copyright LAREFI. All rights reserved. Sections of this material may be reproduced for personal and not-for-profit use without the express written permission of but with acknowledgment to LAREFI. To reproduce the material contained herein for profit or commercial use requires express written permission. To obtain permission, contact LAREFI at cyril.mesmer@u-bordeaux4.fr.

Sommaire

1. Introduction.....	6
2. Fdi and macroeconomic volatility : Overview of the literature.....	9
3. Model, variables and methods	11
4. FDI and source country volatility	15
5. Volatility, traditional and non-traditional FDI sources.....	18
6. Robustness checks	20
7. Conclusion	25
REFERENCES	27
Annexes.....	31

List of tables

Table 1.	: FDI flows and dispersion: before and after 1995	8
Table 2.	: FDI levels baseline regressions	16
Table 3.	: FDI levels & volatility and alternative FDI sources.....	19
Table 4.	: FDI levels and FDI waves	21
Table 5.	: FDI levels, Eichengreen's correction and RE estimator	22
Table 6.	: FDI levels and 5 year-moving averages	23
Table 7.	: FDI levels and Chow tests.....	25

Abstract

Macroeconomic determinants of FDI are seldom analyzed from the perspective of source countries, priority being generally given to host country characteristics. In a gravity set-up, we analyze FDI flows from European Union to MENA economies. We find that European investment to our MENA host countries is higher, the lower the source country output volatility, thereby supporting the existence of an income effect for European Transnational corporations. In the case of MENA economies, source country output volatility's adverse impact on FDI is counterbalanced by the positive attraction effect of domestic swings of activity. We also find that 1995's Barcelona agreement has reinforced MENA countries' vulnerability to European short- and medium-term macroeconomic cycles. The emergence of non-traditional sources of European FDI is, however, a positive evolution since Eastern and Central European investment to MENA countries is less sensitive to host and source country macroeconomic volatility than traditional Western and southern European sources tend to be. Our results are robust to various changes in estimator, sample composition or measurement of instability.

Keywords : Output volatility, Inflation, FDI, gravity model, source countries, European Union, MENA

JEL codes : F21, F43, F44

1. Introduction

Whereas the domestic determinants of foreign direct investment (FDI) attraction have been extensively studied¹, the empirical literature has, until very recently, tended to disregard external macroeconomic conditions. Those conditions need, however, to be considered as crucial determinants of FDI inflows since, every time there is a global financial crisis, economists and policy-makers are abruptly reminded of just how volatile financial flows can be. Loayza, Rancière, Servén and Ventura (2007) have expressed that need, stressing that the role of trade and FDI flows as shock absorbers or amplifiers has not yet been fully established.

Undoubtedly, external shocks tend to trigger Gross Domestic Product (GDP) volatility for developing economies (Martin and Rey, 2006), the impact of those shocks on activity and employment being channelled, *inter alia*, by huge variations in foreign investment flows (Lensink and Morrissey, 2007). As an illustration, global FDI flows severely dropped in 2009 when western economies and firms were hit by the 2008 financial crisis and the ensuing drastic credit restriction (UNCTAD, 2009). Even though global crises matter to explain brutal swings of FDI inflows to developing economies, we claim in this paper that it would be also fruitful to take the external instability into account at the more disaggregated source country level. Source-related macroeconomic determinants of FDI have, so far, not been studied properly or explicitly in the literature interested in the determinants of FDI inflows to developing economies. Since they generally explain FDI inflows to developing economies without considering their origin, the bulk of the studies that are typically found in the literature are constrained by their framework to use one average measurement of external conditions, thereby failing to address source-related determinants of FDI².

In sharp contrast with this literature, the present paper tests the sensitivity of FDI levels to source country GDP instability in a gravity set-up. The gravity model is generally seen as a relevant approach to explaining bilateral trade flows (Evenett and Keller 2002; de Mello-Sampayo 2009), and this model has also been used recently to explain bilateral flows of FDI (Frenkel, Funke and Stadtmann, 2004; Bevan and Estrin, 2004; Desbordes and Vicard, 2009; Busse, Königer and

¹ See Bloningen (2005) for an overview of that literature.

² A recent illustration is Méon and Sekkat (2012) who proxy external macroeconomic volatility by an aggregate ratio of world FDI to world GDP.

Nunnenkamp, 2010). This framework allows the FDI effect of host countries characteristics to be differentiated according to the degree of instability of the source country, while controlling for a series of distance-related factors. A couple of recent papers have used this gravity set-up in order to identify the specific effects on bilateral FDI flows of various sources of macroeconomic volatility. Cavallari and D'Addona (2012) have examined the role of host and source country nominal and real volatility, but their study is limited to the bilateral FDI flows among 24 OECD economies. Levy-Yayeti, Panizza and Stein (2007) are closer to our concern since they address more explicitly North-South FDI. They place their focus, however, on the source level, and they do not explicitly address the host country determinants of the corresponding FDI inflows that are received by developing economies because of their high level of output volatility.

Our paper focuses on North-South investment and aims at identifying the simultaneous FDI effect of both source and host country nominal instability by studying the impact of European countries' macroeconomic instability on FDI flowing to Mediterranean economies of Middle East and North Africa (MENA)³. There are several reasons why this set-up has been chosen. First, as in many other parts of the world, Mediterranean MENA countries have progressively reformed their institutions and opened their economies up to foreign trade and investment throughout the last two decades (Mina, 2012). However, although MENA countries have enjoyed a steep increase in FDI inflows from the mid-1990s onwards, they have failed to reap the benefits of their efforts in terms of their share of world FDI. They have, equally, suffered from the marked instability of those incoming flows of investment during the last decade (UNCTAD, 2009). Second, FDI sensitivity to macroeconomic outcomes is of vital concern for all those economies that, as highly age-dependent labour-exporting MENA economies, are particularly dependent on sources of foreign investment. As such, they tend to be extremely vulnerable to economic fluctuations in source countries, with dramatic consequences on their own output volatility (Koren and Tenreyro, 2007). Third, Mediterranean MENA economies have been more closely associated, since the mid-1990s, with the European Union via the bilateral Euro-Med trade and exchange agreements, which has made their

³ We consider Morocco, Algeria, Tunisia, Lybia, Egypt, Jordan, Lebanon, Syria and Turkey as our MENA Mediterranean countries. In the econometric part of our work, we have focused on the five biggest FDI receivers as our host country sample: Morocco, Tunisia, Egypt, Lebanon and Turkey. MENA Gulf countries are not considered by our analysis, neither as host nor as source countries, because they are not as closely associated with European trade and investment than the Mediterranean ones.

economies more exposed to external sources of instability⁴. Table 1 shows that, since 1995, FDI instability has been significantly higher for South and Eastern Mediterranean countries than it has been for other developing regions in the world. The MENA Mediterranean countries have become much more subject to external sources of instability coming from Europe, without benefitting from structural transfers flows like those that sustained Central and East European economies during their accession to the European Union. Fourth, GDP volatility is traditionally strong in MENA economies, thereby having significantly reduced domestic investment (Aysan, Pang and Vaganzonès-Varoudakis, 2009)⁵.

Table 1.: **FDI flows and dispersion: before and after 1995**

FDI inflows (US millions dollars)	1987-1995		1996-2009	
	Countries	Annual average levels	Coefficient of variation	Annual average levels
Egypt	863.221	0.425	3,689.557	1.112
Morocco	287.908	1.602	1,540.046	2.663
Tunisia	301.774	0.085	1,086.767	1.102
Turkey	622.111	0.020	6,666.500	0.211
Lebanon	10.452	9.530	2,281.927	0.728
Southern and Eastern Mediterranean Countries	2,613.595	0.316	25,062.096	0.857
Asia	36,913.603	0.670	196,046.140	0.545
Latin America and Caribbean	14,889.762	0.589	102,751.060	0.455

Whereas Cavallari and D'Addona (2012) and Levy-Yayeti, Panizza and Stein (2007) recently found that investors tend to substitute foreign to domestic investment when domestic macroeconomic conditions worsen, we find that European FDI to Mediterranean MENA economies is marked by an income effect, i.e. transnational corporations tend to reduce their foreign investment when macroeconomic instability increases on their domestic market. As a consequence,

⁴ They have also increased regional integration by adopting various free trade agreements (UMA, GAFTA).

⁵ Aysan, Pang and Vaganzonès-Varoudakis (2009) also find a significant adverse effect of external instability, as measured by the debt burden, on private capital formation in the region. They estimate that a more stable external environment would have increased investment decisions on average by 8.4% in Morocco, by 10% in Egypt in the 1980s, by 3.9% in Morocco and by 2.6% in Tunisia in the 1990s. Chan and Gemayel (2004) have also found that the instability of ICRG scores for political, financial and economic risks has an adverse effect on the FDI entering MENA economies, but they do not explicitly address macroeconomic instability.

Mediterranean MENA economies are highly vulnerable to macroeconomic fluctuations in European source countries, via the FDI channel.

The remainder of the paper is organized in four sections. Section 2 discusses the effects of several kinds of macroeconomic instability (internal/external) on FDI inflows. Section 3 presents the indicators of macroeconomic stability (internal/external) retained in the empirical study, as well as the model and the estimation strategy. In Section 4, we first present and then discuss the results of our gravitational model panel data estimation, paying specific attention to source countries and the possibility of cumulative effects. Section 5 shows our estimation results when source countries are differentiated according to their development level. Section 6 develops a series of robustness checks, and Section 7 concludes.

2. Fdi and macroeconomic volatility : Overview of the literature

Though the nominal sources of volatility, essentially price and exchange rate fluctuations, have been frequently analyzed since the early nineties⁶, real output volatility, especially external, has been somewhat downplayed by empirical studies macroeconomic stability. The theoretical effect of output volatility on FDI flowing to developing countries is far from being straightforward, especially when it comes to considering the different sources of macroeconomic instability. As for host country volatility, it may, undoubtedly, increase the entry costs associated with investing abroad, thereby leading to a FDI reduction. This is particularly true when the recorded high levels of real instability indicate host country's excessive macroeconomic vulnerability to domestic or external shocks. Uctum and Uctum (2011) have shown for example that, in the case of Turkey, FDI reacts significantly and adversely to the occurrence of crises in the host country, whereas portfolio investment are most affected by source country instability. But FDI may also be attracted towards highly volatile economies insofar as they generally tend to be also rapidly growing countries. In that case, foreign investment is driven toward highly volatile countries by market opportunities. A marked depreciation

⁶ Frenkel, Funke and Stadtmann (2004), Apergis and Katrakilidis (1998) or Garibaldi *et al.* (2001) have studied the effects of domestic inflation on FDI inflows. As for exchange rate volatility effects on FDI inflows, see Froot and Stein (1991), Bénassy-Quéré, Fontagné and Lahrèche-Révil (2001), Bechri (1999), Kiyota and Urata (2004), Frenkel, Funke and Stadtmann (2004), Schmidt and Broll (2009), Calderón and Didier (2009), Lederman (2011) and Takagi and Shi (2011).

of the exchange rate, or a fall in the value of stocks in host economies, may, equally, increase investment by those foreign firms that look for merger opportunities (Krugman 2000; Aguiar and Gopinath 2005). A recent illustration can be provided by the waves of sector-based consolidations that were reported in the oil and gas sectors, in mining, in the automobile industries or in financial services (UNCTAD 2009), in years of sharp decrease in global FDI flows in 2008 (-15 %) and 2009 (-30%). Hence, host country volatility may theoretically have either a negative or positive on FDI inflows. In the case of European investment in MENA economies, we may reasonably expect that the positive effects will be prevalent, insofar as vertical green-field FDI forms, that are less sensitive to output volatility than to exchange rate instability, tend to be dominant⁷.

When it comes to source country instability, it may have either a negative or a positive effect on FDI flows. When business cycles in the source and host countries are not synchronized, the foreign country undergoing a bust while the domestic country is benefiting from a boom, substituting FDI for domestic investment may become attractive for the firms undergoing high volatility on their origin market. In that case, a positive substitution effect explains that more volatility on the source country may increase FDI flows to other countries. In a gravity model of foreign investment between OECD countries, Cavalleri and D'Addona (2012) have found that FDI tends to increase when host country has higher output volatility, in sharp contrast with the adverse FDI effect of source volatility. They argue that such asymmetry in the behavior of investments in host and source countries is consistent with the view that investors choose between investment options at home and abroad, in relation to the differential of volatility between economies. Likewise, Levy Yeyati, Panniza and Stein (2007) have found on a gravity model of North-South FDI that local and foreign investments tend to move in opposite directions relative to the cycle in the source country.

When business cycles in the source and host country are coordinated, transnational corporations may react to the anticipated fall in their profits and to rising financing costs by holding back on investment projects, and by disinvesting abroad (Aizenman, 2003; Wang and Wong, 2007). Hence, source country volatility may reduce FDI outflow because of an adverse revenue effect undergone by firms. The effect of an external shock on FDI inflows might well worsen by bad internal

⁷ In non-oil MENA countries, the ratio of the number of greenfield operations over the number of M&A is four to five times higher than the world average, and three times higher than that of developing economies [Authors' calculations based on UNCTAD (2009)].

macroeconomic outcomes in the host country (Eichengreen 2000, Kose, Prasad, Rogoff and Wei, 2009). If growth turns out to be less stable, it is likely that the exchange rate instability⁸ will produce even greater negative effects on FDI attraction (Kaminsky, Lizondo and Reinhart 1998). Accordingly, there are only very few chances of a country's recovering its FDI flows when an external shock is combined with bad domestic macroeconomic outcomes (Ishii *et al.* 2002)⁹. Méon and Sekkat (2012) have found that FDI flows to developing economies tend to be reduced in times of global symmetric economic crisis, with generalized bad external macroeconomic conditions tending to outweigh the domestic institutional or structural factors of FDI attraction or repulsion. FDI flows tend, however, to react quite differently to increased macroeconomic risks, depending on whether those investments are sourced in countries whose firms traditionally invest abroad or in economies where foreign investment is less common. Levy Yeyati, Panizza and Stein (2007) had also found that FDI flows tend to be countercyclical when they are sourced in Europe and US, and more pro-cyclical when they are sourced in Japan. Andrès, Busse and Nunnenkamp (2012) have also found that non-traditional sources of FDI are less risk-adverse than traditional ones.

Accordingly, real macroeconomic instability in source country may have both a negative and a positive effect on FDI flows to developing economies. The net effect of source country output volatility depends on the relative magnitude of those income and substitution effects (Cavallari and D'Addona, 2012). The next section explains our approach for identifying which one of these two effects dominates in the case of Euro-Mediterranean FDI flows.

3. Model, variables and methods

In order to identify the sensitivity of FDI inflows to the host and source country's instability, we use a gravity model that links thirty-two source countries of investments to the five largest receiver countries of the MENA region (Egypt, Lebanon, Morocco, Tunisia and Turkey), during the

⁸ For a recent study of the contrasted effects of exchange rate instability on FDI inflows, see Schmidt and Broll (2009).

⁹ As the decision to set up a subsidiary abroad is generally justified by the intention to obtain long-term profits from the selected localization (Caves, 1996), the odds are, however, that the corresponding sunk costs (especially for greenfield projects) will make the FDI less reactive than other forms of capital to a transitory deterioration of macroeconomic conditions. That latter assumption has received empirical support in Fernandez-Arias and Hausman (2001), Levchenko and Mauro (2007) and Levy-Yeyati, Panizza and Stein (2007).

period 1987-2009¹⁰. The standard expression of the gravity model adapted to bilateral flows of FDI can be written as:

$$FDI_{ij} = A \frac{Y_i^{\beta_1} Y_j^{\beta_2}}{D_{ij}^{\beta_3}} \quad (1)$$

where FDI_{ij} is the annual flow of FDI from source country i in host country j , Y_i and Y_j are the annual GDP levels of source and host countries, D_{ij} is an indicator of the distance between the two countries, and A , β_1 , β_2 and β_3 are the parameters to be estimated. When Equation (1) is log-linearized, it gives the following equation:

$$\ln(FDI_{ijt}) = \alpha + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) - \beta_3 \ln(D_{ijt}) + \beta_4 Macro_{ijt} + \beta_5 Controls_{jt} + u_{ij} + v_t + \varepsilon_{ijt} \quad (2)$$

where FDI_{ijt} represents the value in dollars of the inflows of FDI from a country i (country of origin) entering the country j (host country) at time t . So as to control for the multilateral resistance terms identified by Anderson and Wincoop (2003), we have chosen to introduce bilateral country-pair fixed effects u_{ij} since, as stressed by Bergstrand and Egger (2007), sources of multilateral resistance appear to move only slowly, and country-pair fixed effects reduce the omitted variable bias associated with unobserved time-invariant pair-specific heterogeneity¹¹. As the dependent variable is censored, the model has been estimated by using the Tobit method, which includes temporal random effects, in order to circumvent the problem of zeros corresponding to null FDI flows without excluding them¹².

If we now consider the right-hand side of the equation (2), $\ln(GDP_{it})$ and $\ln(GDP_{jt})$ respectively stand for the natural logarithm of GDP levels of the source and origin countries, and β_1 and β_2 take a positive sign if there is a “mass” effect at work in determining bilateral direct investment flows. By extension, higher host country GDP is generally considered to increase horizontal FDI, as the size of the local market is worth being served by a multinational firm’s production subsidiary. The *Difference in GDP* per capita (in log) between the two countries is used as

¹⁰ The country list is given in Appendix. Algeria is excluded because of the size of the FDI related to energy. Turkey is also treated as an origin country for FDI because of its proximity with the European Union.

¹¹ Random effects enable time-invariant factors such as distance or common border to be controlled for. Time dimension is accounted for by random effects because it enables all kinds of dyadic events, not specified in equation (2), such as trade or investment bilateral treaties, to be controlled for.

¹² When there is a significant proportion of zeros for the bilateral FDI flows, using Ordinary Least Squares would result in highly biased estimates and a non-linear model like the Tobit is most appropriate (Eaton and Tamura, 1994; Wei, 2000; Head and Ries, 2008). This is especially so when the model does not suffer from heteroskedasticity (Santos Silva and Tenreyro, 2006), which, because of the extensive size of our sample, is our case.

a proxy for the differences in factor endowments or in the level of economic and technological development of each country. The coefficient takes a positive sign if FDI is pulled by low labour costs, and a negative sign if the FDI-related labour requirements are more skill-intensive. D_{ijt} is the vector of the various concepts of distance controlling for the most typical sources of transaction and transport costs involved in an investment moving from one country to another. The physical bilateral distance (*Distance*) corresponds to the distance between the countries' capitals¹³; FDI is generally taken as lower, the greater the distance is between the two countries involved. When, however, the host country shares a common border, language, or a former colonial link with the origin country, it is generally considered that FDI is higher. *Adjacency* and *Common language* take the value 1 if the origin and host countries respectively share a common border or have a common language; they take the value 0 in the contrary case¹⁴. The variable *Past colonial links* takes value 1 if the source country had colonized the host country, and 0 otherwise¹⁵.

$Macro_{ijt}$ is a vector of macroeconomic determinants of FDI inflows regarding either source country i or host country j , including source and host country characteristics in terms of output volatility (respectively *Instability source* and *Instability host*). The first indicator focuses on output volatility since foreign investment tends to be reduced when the short- and medium-run growth potential of the host economy is afflicted by instability. The point is particularly true of market-led FDI, but is also the case for other categories of foreign investment, every time investors seek out a stable macroeconomic environment. On the contrary, financial difficulties imposed on host country domestic firms by a high degree of growth instability can favour opportunity-led investments of a fire-sale type. In that case, FDI inflows should increase with the extent of host country's growth volatility. From what precedes, we can anticipate that the coefficient for *Instability host* can be either negative or positive, but the opportunity-driven positive effect seems to be plausible for MENA economies, given the nature of the foreign investments they tend to attract. As foreign firms'

¹³ Stein and Daude (2007) have also recently shown that differences in time zones have an adverse effect on the location of investment because time distance increases the transaction costs associated with activities necessitating real-time communication and interaction. Given the concentration of our sample on a limited array of time zones, that aspect has not been included in our model.

¹⁴ Former colonization links, as they have influenced the institutional, linguistic or cultural proximities that ease the building of international network ties, are considered by Bénassy-Quéré, Coupet and Mayer (2007) and Abderrezak (2008) to be key determinants in explaining trade or FDI flows.

¹⁵ It should be noted that *Past colonial links* is a good proxy for legal origin, which appears to be significant in explaining bilateral portfolio investment flows (Lane and Milesi-Ferretti 2008) as well as bilateral FDI flows (Stein and Daude 2007).

investments are conditioned by the extent of their revenue in their origin markets, we also assume that source country GDP growth instability can influence FDI levels. More volatility on European source-markets may well reduce FDI outflows, thereby depressing growth prospect for periphery economies relying on external sources of finance. In that case, foreign investment can possibly act as a transmission channel for growth instability, and source-country higher volatility may reduce FDI inflows to MENA economies.

For each time period, a pseudo-coefficient of variation has been calculated, for both host and source country, using the following formula:

$$Cv_{jt} = \frac{\sigma_{GDP_{jt}}}{\text{Mean}_{GDP_{jt}}} \quad (3)$$

where $\sigma_{GDP_{jt}}$ is the GDP growth rate's standard deviation for the country i at the period t , and $\text{Mean}_{GDP_{jt}}$ is the average rate of growth of the GDP for country i over the same period t . Standard deviation and average values at time t have been computed as a three-year moving average over $t-2$, $t-1$ and t . We have supposed that investors observe short-term past volatility and compare it across different potential destinations. In order to avoid a null average value, we have chosen to compute it in terms of absolute value and to express it in logarithmic form¹⁶.

Controls_{jt} is a vector of additional determinants of bilateral FDI flows. As it is expected that trade openness will alternatively tend to increase inflows of efficiency-led FDI by lowering export costs for TNCs, and tend to decrease market-led FDI motivated by tariff-jumping, we control for the degree of trade openness (Openness_{jt}), measured by the ratio of exports to GDP at time t for the host country j . Dummies for membership in a common regional trade agreement are also included, since integration spurs FDI (Daude, Levy-Yeyati and Stein, 2003), especially that of a North-South nature (Stein and Daude, 2007). As our study uses a sample of both MENA and European countries, we explicitly introduce controls for membership in three regional trade agreements (*GAFTA*, *UMA* and Euro-Med, noted as *MED*). Medvedev (2012) has provided evidence that there is a positive correlation between the size of any two economies bound by a Free Trade Agreement and their

¹⁶ Note that the huge fall in GDP growth rate for Lebanon due to the war has been controlled in estimations by the introduction of a dummy variable taking the value 1 for the war years of our sample (1987 to 1991), and 0 from 1992 onwards. A post-war dummy, taking 1 for the years 1992 to 1995 has also been introduced to control for the ambiguous trends in FDI associated with the first years of reconstruction at the end of the war.

mutual FDI flows. Similarly, it has also been found that bilateral investment treaties have positive effects on FDI inflows to developing economies in general (Desbordes and Vicard, 2009), and to MENA economies in particular (Mina, 2012). Here, we focus exclusively on bilateral trade agreements, as they are often associated with increased FDI flows of export processing by TNCs. Equally, since the investment decisions of transnational corporations generally use a global evaluation of host country property rights (Ali, Fiess and MacDonald, 2012), any empirical assessment of FDI flows requires the introduction of a variable to control for institutional quality¹⁷. The comprehensive indicator that is used here, *Investprofil*, is particularly suitable for capturing the impact of business regulation and property rights enforcement on FDI, since it combines ratings of contract viability, risks of expropriation, profits repatriation and payment delays¹⁸. A dummy variable, *War*, has been added to control for the effect of the Lebanese war on the FDI inflows received by Lebanon. Equally, a dummy variable post-war was introduced to account for the possible specific effect of post-war reconstruction on FDI inflows to Lebanon.

4. FDI and source country volatility

Results of the regressions for FDI levels have been reported in Table 2. The baseline regression (Column 2.1.) is in accordance with the results of the existing literature. *GDP source*, *GDP host* have the expected positive influence on the FDI levels of our five host countries. Of the estimated coefficients for the variables which represent standard proxies for the transaction and transport costs, only one, that of *Common language*, has the expected signs and is significant. *Adjacency* and *Distance*, and *Past colonial links*, on the contrary, are not significant, suggesting that geographical distance does not explain the FDI localization concerning the five MENA economies in our sample. *Difference in GDP* positively explains FDI for our five MENA host countries, meaning that the greater the technological distance, the greater the investment flow. Trade openness also increases FDI levels to MENA economies, with that positive effect of trade being reinforced by regional integration, since *MED* and *AMU* both show a positive and significant coefficient. The significant effect of the Euro-Med dummy (*MED*), moreover, confirms that the reduction in

¹⁷ Anderson and Marcouiller (2002) have previously shown that omitting indexes of institutional quality biases typical gravity model estimates of trade.

¹⁸ The definition, source and descriptive statistics of the variables are reported in the Appendix.

institutional distance increases FDI flows, for European firms, irrespective of the particular colonial history of the origin and destination countries. The positive and significant impact of the quality of institutions (*InvestProfil*) in host countries confirms that minimizing transaction costs is an objective of European firms when they invest in the Mediterranean periphery. It should be noted, however, that participation in regional trade agreements is not always a factor of attraction for FDI: whereas *MED* and *AMU* significantly increase FDI, *GAFTA* has a no effect. This means that trade economic integration of MENA economies with the European Union (*MED*), or the economic integration between Tunisia and Morocco (*AMU*) has contributed significantly to the increase in FDI that each of those countries receives from the others.

Table 2. : FDI levels baseline regressions

	2.1	2.2	2.3	2.4
Openness	6.434 (10.21)***	6.473 (10.25)***	6.231 (9.84)***	6.455 (10.17)***
MED	1.981 (5.04)***	2.034 (5.18)***	1.878 (4.76)***	1.983 (5.03)***
AMU	6.135 (9.08)***	6.062 (9.01)***	6.072 (9.00)***	6.130 (9.07)***
GAFTA	0.290 (0.47)	0.319 (0.52)	0.245 (0.40)	0.304 (0.49)
InvestProfil	3.036 (4.95)***	2.932 (4.79)***	3.163 (5.14)***	2.995 (4.66)***
War	-6.810 (-4.28)***	-6.721 (-4.27)***	-8.200 (-4.86)***	-6.797 (-4.22)***
Post War	-3.996 (-3.54)***	-4.229 (-3.73)***	-4.712 (-4.05)***	-4.021 (-3.55)***
Instability source	-	-0.841 (-3.94)***	-	-
Instability host	-	-	0.870 (2.62)***	0.053 (0.08)
Real exchange rate	-	-	-	3.519 (25.42)***
GDP source	3.520 (25.44)***	3.378 (24.08)***	3.521 (25.38)***	1.804 (9.29)***
GDP host	1.801 (9.29)***	1.803 (9.30)***	1.750 (9.02)***	0.740 (4.27)***
Difference in GDP per capita	0.739 (4.27)***	0.644 (3.71)***	0.734 (4.25)***	-0.238 (-0.93)
Distance	-0.240 (-0.94)	-0.186 (-0.73)	-0.230 (-0.90)	0.296 (0.91)
Adjacency	0.296 (0.91)	0.344 (1.06)	0.301 (0.93)	-1.037 (-1.54)
Past colonial links	-1.044 (-1.55)	-0.882 (-1.31)	-1.068 (-1.59)	3.521 (8.75)***
Common language	3.525 (8.77)***	3.450 (8.60)***	3.525 (8.77)***	-132.325 (-17.79)***
Constant	-132.244 (-18.98)***	-135.016 (-19.10)***	-125.362 (-17.13)***	
Log likelihood	-5040.3203	-5034.3057	-5037.8804	-5041.8735
	Wald $\chi^2(14)=1434.66$ Prob > $\chi^2 = 0.0000$	Wald $\chi^2(15)=1449.98$ Prob > $\chi^2 = 0.000$	Wald $\chi^2(15)=1423.45$ Prob > $\chi^2 = 0.0000$	Wald $\chi^2(15)=1426.39$ Prob > $\chi^2 = 0.0000$

Notes: *, **, *** significant at 10%, 5% and 1% risk.

Number of observations: 3220; Number of years: 23; Number of country-pairs: 28*5=140

Having first examined the standard determinants invoked in the empirical analyses of bilateral FDI flows, we can now proceed to consider the simultaneous effects of our specific variables that focus on macroeconomic instability: host and source country output instability. Column 2.3

shows that host countries undergoing more GDP instability attract significantly higher FDI levels. When all the other determinants of localization are equal, output volatility is not an obstacle to FDI attraction. On the contrary, FDI flows to those economies whose GDP is the most unstable, signalling that those investments are probably more export-oriented than market-led in the case of MENA economies. In what concerns GDP instability in source countries, we find that it significantly reduces FDI flows to our sample of MENA economies (Column 2.2). This result suggests that an increase in output volatility in source country reduces the resources available to potential investors. Our result, therefore, supports the existence of an income effect for European Transnational corporations and of a vulnerability of MENA FDI inflows to European macroeconomic fluctuations. The estimated coefficient suggests that a 1% increase in source country volatility reduces the average amount of FDI outflows by 0.84%, whereas it the same increase in host country volatility tends to increase the average amount of FDI inflows by 0.87%. As results are unchanged when both source and host volatility are included in the regression, we can conclude that source country volatility decreases FDI holding host country volatility fixed, and that of host country volatility increases FDI holding source country volatility fixed. When instability increases for European source countries, investment to the MENA region slows down. When, on the contrary, real instability on their domestic market is lowered, European firms tend to increase their investment toward the most volatile MENA economies.

Our results therefore show that European investors don't arbitrate between investment options at home and abroad, thereby bringing contradiction to the substitution view of Levy-Yayeti, Panizza and Stein (2007) or Cavallari and D'Addona (2012). As our indicator of output instability does not allow differentiating booms and busts, FDI cannot be considered as being strictly counter-cyclical, relative to the source country, and pro-cyclical, relative to the host country¹⁹. These results can be explained by the nature of FDI in the zone, but also by the fact that European firms have been engaged in long-term North-African localization. Our estimations also show that real exchange rate levels have no effect on the FDI levels received by our five MENA economies (Column 2.4), suggesting that fire sales, or Mergers & Acquisitions driven by price-opportunities, are not the dominant form of

¹⁹ Moreover, Host volatility and Source volatility do not have cumulative effect on FDI since their interactive term was not significant (Result not reported).

foreign investment in the countries of our sample. This result is consistent with the significantly higher share of green-field investment in total FDI, which differentiates MENA economies from those in other developing regions. However, their dependence on European FDI makes MENA economies particularly vulnerable to European macroeconomic volatility.

5. Volatility, traditional and non-traditional FDI sources

At this point, it might be objected that the estimation of the coefficient for source country instability could be driven by a selection bias. Firms from more stable countries might invest more in MENA because they are more internationalized than those from more unstable economies. One reason for this could be that those more unstable economies are less developed, which means that their firms are further from the technological frontier than those from more stable and developed economies, which limits their capacity to invest at an international level. The negative coefficient of *Instability source* might then simply reflect the fact that more developed economies are also more stable, and that their firms invest more in less developed countries than is the case for firms from less stable economies. In order to test this hypothesis, the set of source countries has been separated into two subsets in terms of average GDP level. The first subset, labelled *Stable*, is exclusively composed of developed Western European economies²⁰. The second group, labelled *Unstable*, includes less developed and more unstable countries Eastern and Central European, Mediterranean and MENA countries²¹. The average GDP coefficient of variation, computed over the whole period for the *Stable* group, is about twice as low (.001435) as that of the *Unstable* group (.002887), with this mean value being statistically different. Two dummies, *Stable* and *Unstable*, have been generated, with *Stable* taking the value 1 for the countries belonging to the *Stable* group, and 0 otherwise, and *Unstable* taking the value 1 for the countries belonging to the *Unstable* group, and 0 otherwise. Then, *Stable* (or alternatively *Unstable*) is successively interacted with *Instability source* and *Instability host*, with those interactive variables being introduced into estimated models of FDI levels. In accordance with Lensink and Morissey (2006) and Choong and Liew (2009) who have both pointed out that FDI instability has consistent adverse effects on GDP per capita increase, whereas

²⁰ Those of the European Union before Eastern and Central European members' accession, plus Switzerland and Norway.

²¹ Eastern and Central European (Hungary), Mediterranean (Malta) and MENA countries (Egypt, Morocco, Tunisia, Turkey, Lebanon, Syrian Arab Republic, Jordan, Mauritania).

the alleged positive effect of FDI levels is far less robust, we have also tested our gravity equation with standard deviations of FDI inflows as the dependent variable, computed by a three-year moving average. Results are reported in Table 4.

Table 3.: FDI levels & volatility and alternative FDI sources

	3.1 FDI levels	3.2 FDI volatility	3.3 FDI levels	3.4 FDI volatility
Openness	6.851 (10.50)***	0.755 (9.60)***	6.669 (10.11)***	0.737 (9.30)***
MED	2.423 (5.36)***	0.264 (4.87)***	2.347 (5.08)***	0.253 (4.67)***
AMU	6.039 (9.01)***	0.225 (2.80)***	6.033 (8.96)***	0.217 (2.69)***
GAFTA	0.831 (1.29)	0.336 (4.58)***	0.803 (1.24)	0.327 (4.46)***
InvestProfil	3.374 (4.86)***	0.195 (2.31)**	3.539 (5.02)***	0.202 (2.40)**
War	-6.235 (-3.88)***	-0.851 (-4.90)***	-7.769 (4.49)***	-0.980 (-5.18)***
Post War	-4.297 (-3.72)***	-0.791 (-5.54)***	-4.855 (-4.08)***	-0.842 (-5.76)***
Instability source	-0.625 (-2.64)***	0.007 (0.27)	-	-
Instabilité host	-	-	1.119 (3.13)***	0.108 (2.51)**
Stable*Instab source	-0.285 (2.48)**	-0.050 (-3.68)***	-	-
Stable*Instab host	-	-	-0.251 (-2.01)**	-0.046 (-3.14)***
GDP source	3.207 (20.47)***	0.102 (7.71)***	3.382 (21.94)***	0.110 (6.31)***
GDP host	1.925 (9.63)***	0.051 (2.12)**	1.884 (9.34)***	0.047 (1.92)*
Difference in GDP per capita	0.298 (1.30)	-0.041 (-1.59)	0.451 (1.93)*	-0.031 (-1.20)
Distance	-0.204 (-0.80)	0.178 (5.80)***	-0.244 (-0.95)	0.177 (5.76)***
Adjacency	0.425 (1.31)	-0.043 (-1.09)	0.382 (1.17)	-0.045 (-1.13)
Past colonial links	-0.419 (-0.61)	0.195 (2.29)**	-0.658 (-0.96)	0.178 (2.10)**
Common language	3.307 (8.21)***	0.056 (1.14)	3.397 (8.43)***	0.063 (1.30)
Constant	-136.751 (-18.46)***	-8.074 (-9.27)***	-127.834 (-16.36)***	-7.457 (-8.04)***
Log likelihood	-4992.2179	-2547.9097	-4996.7649	-2548.6831
	Wald χ^2 (16)=1383.31 Prob > χ^2 = 0.0000	Wald χ^2 (16)= 477.21 Prob > χ^2 = 0.0000	Wald χ^2 (16)=1362.83 Wald χ^2 = 0.0000	Wald χ^2 (16)= 479.33 Prob > χ^2 = 0.0000

Notes: *, **, *** significant at 10%, 5% and 1% risk.

Number of observations: 3220; Number of years: 23; Number of country-pairs: 28*5=140

Table 3 shows, first, that the coefficient for *Instability source* does not lose its statistical significance, and also keeps its negative sign. Second, the adverse effect of *Instability source* on FDI levels is magnified when limited to the more stable group, which is composed of European economies (Column 3.1). That adverse effect is, however, smoothed when restricted to the more unstable group of less developed Eastern European and MENA source countries. Column 3.2 shows, moreover, that the *Instability source* significantly reduces FDI volatility when it is restricted to the more stable European economies. Thus, FDI flows from more stable Western European economies

are more likely to be reduced when volatility increases in host-countries, and their volatility is more likely to increase in that case. Conversely, FDI from more unstable source economies increases in response to host country output volatility. It should also be noted that FDI instability is higher for those MENA host economies that are more open to trade, and for those which are involved in regional trade agreements with Europe (*Med*) or with other MENA economies (*AMU, GAFTA*). Those countries which have the most attractive institutional environment for foreign investments are also those that experience more FDI instability.

In short, we can conclude that Western European investment to MENA is less likely to trigger volatility than FDI from countries further removed from the technological frontier. Hence, our results, like those of Andrès, Busse and Nunnenkamp (2012), confirm that FDI from traditional sources (developed economies) exhibits different sensitivity to host country conditions than FDI from non-traditional sources.

6. Robustness checks

In this section, we address several issues of robustness of our results.

A first issue is that focusing on a country-level indicator of macroeconomic instability such as the GDP's coefficient of variation could entail a misspecification bias arising from the fact that the real volatility that reduces FDI flows to MENA economies may be global instead of being related to source country characteristics. Méon and Sekkat (2012) have recently provided convincing evidence that global waves of FDI increase can outweigh the most prominent domestic determinants of FDI attraction. In our initial model, global FDI waves were not controlled for. However, as that might lead to overestimating the impact of source country macroeconomic characteristics, an indicator of global waves of FDI, similar to that of Méon and Sekkat (2012) was subsequently introduced, leaving the coefficients for source country and host country instability unchanged (Table 4).

A second issue concerns the choice of our estimation procedure. The tobit Random Effect model, based on maximum likelihood estimation, is considered as a robust approach when dealing with censored data concerning the dependent variable (Eaton and Tamura, 1994; Wei, 2000). An alternative method, the one most commonly used in the literature, circumvents the problem of the

zero for the dependent variables by using a simple transformation of the form $\ln(1+FDI)$, which enables the coefficient to be interpreted as an elasticity when the value of $\ln(1+FDI)$ is approximately equal to the $\ln(FDI)$, which is accepted as a reasonable assumption (Eichengreen and Irwin, 1998)²². Explicitly accounting for zero FDI flows increases the variation of the dependent variable, thereby producing higher values and significance for the estimated coefficients of the various determinants of FDI since it.

Table 4. : FDI levels and FDI waves

	4.1	4.2	4.3	4.4
Openness	6.645 (10.38)***	6.447 (10.08)***	6.763 (10.50)***	6.561 (10.22)***
MED	2.568 (6.06)***	2.507 (5.88)***	2.672 (6.22)***	2.602 (6.02)***
AMU	6.085 (9.03)***	6.095 (9.02)***	6.085 (9.02)***	6.095 (9.00)***
GAFTA	0.818 (1.29)	0.822 (1.29)	0.883 (1.39)	0.877 (1.37)
InvestProfil	4.106 (5.76)***	4.491 (6.30)***	4.269 (4.92)***	4.655 (6.44)***
War	-5.756 (-3.62)***	-7.019 (-4.16)***	-5.661 (-3.57)***	-6.986 (-4.14)***
Post War	-3.804 (-3.34)***	-4.233 (-3.63)***	-3.639 (-3.18)***	-4.075 (-3.48)***
Europe FDI wave	-0.982(-3.40)***	-1.133(-3.97)***	-	-
World FDI wave	-	-	-1.198(-3.73)***	-1.345 (-4.20)***
Instability source	-0.708(-3.25)***	-	-0.726 (-3.36)***	-
Instability host	-	0.849(2.56)**	-	0.880 (2.65)***
GDP source	3.393 (24.28)***	3.514 (25.57)***	3.390 (24.29)***	3.514 (25.60)***
GDP host	1.909 (9.62)***	1.876 (9.46)***	1.952 (9.73)***	1.918 (9.58)***
Difference in GDP per capita	0.696 (3.98)***	0.777 (4.47)***	0.697 (3.98)***	0.779 (4.48)***
Distance	-0.173 (-0.68)	-0.205 (-0.80)	-0.166 (-0.65)	-0.199 (-0.78)
Adjacency	0.331 (1.02)	0.294 (0.91)	0.332 (1.03)	0.294 (0.91)
Past colonial links	-0.758 (-1.13)	-0.899 (-1.34)	-0.735 (-1.10)	0.882 (-1.32)
Common language	3.525 (8.77)***	3.423 (8.52)***	3.364 (8.40)***	3.420 (8.52)***
Constant	-132.244 (-18.98)***	-109.353 (-13.20)***	-117.183 (-13.90)***	-105.854 (-12.40)***
Log likelihood	-5029.8667	-5031.7349	-5029.1201	-5030.7939
	Wald χ^2 (16)= 1467.78 Prob > χ^2 = 0.0000	Wald χ^2 (16)= 1451.71 Prob > χ^2 = 0.0000	Wald χ^2 (16)= 1470.98 Wald χ^2 = 0.0000	Wald χ^2 (16)= 1455.21 Prob > χ^2 = 0.0000

Notes: *, **, *** significant at 10%, 5% and 1% risk.

Number of observations: 3220; Number of years: 23; Number of country-pairs: 28*5=140

Consequently, if applying fixed effects estimator to FDI flows corrected *à la* Eichengreen and Irwin (1998) does not change our results, then we can consider that they are robust and not overvalued by the use of a Tobit estimator explicitly accounting for the zero flows. A first round of estimations was made on Equation 2, with time fixed effects to control for temporal heterogeneity. Then, Equation 2 was estimated with random effects, since unobserved heterogeneity could affect

²² See Stein and Daude (2007: 100-101) for a discussion.

the variance-covariance matrix and, consequently, bias estimations. The χ^2 statistic indicates that the fixed effects model should be preferred to the random effects model at 1%. Because of the presence of country dummies among explaining variables, however, the RE was preferred to the FE. The results reported in Table 5 show that our main findings are robust to a change of estimator.

Table 5.: FDI levels, Eichengreen's correction and RE estimator

	5.1	5.2	5.3
Openness	2.287 (9.04)***	2.315 (9.18)***	2.183 (8.52)***
MED	1.209 (7.03)***	1.231 (7.18)***	1.155 (6.67)***
AMU	2.212 (7.68)***	2.143 (7.46)***	2.171 (7.53)***
GAFTA	-1.102 (-4.57)***	-1.100 (-4.58)***	-1.117 (-4.63)***
InvestProfil	1.369 (5.92)***	1.331 (5.78)***	1.468 (6.26)***
War	-0.110 (-0.27)	-0.121 (-0.29)	-0.618 (-1.33)
Post War	-0.134(-0.39)	-0.190(-0.56)	-0.415 (-1.15)
Instability source	-	-0.470 (-5.12)***	-
Instability host	-	-	0.342 (2.46)**
GDP source	1.348 (27.62)***	1.279 (25.34)***	1.347 (27.63)***
GDP host	0.928 (11.25)***	0.932 (11.34)***	0.901 (10.82)***
Difference in GDP per capita	0.350 (5.12)***	0.307 (4.48)***	0.351 (5.14)***
Distance	-0.322 (-3.68)***	-0.338 (-3.87)***	-0.325 (-3.71)***
Adjacency	0.284 (2.03)**	0.325 (2.32)**	0.287 (2.05)**
Past colonial links	0.103 (0.33)	0.172 (0.54)	0.101 (0.32)
Common language	2.076 (12.47)***	2.062 (12.43)***	2.073 (12.46)***
Constant	-49.648 (-19.12)***	-51.311 (-19.69)***	-46.785 (-16.46)***
R ² within	0.405	0.410	0.406
R ² Between	0.950	0.949	0.950
R ² Total	0.451	0.456	0.452
Fisher Test : MCO vs individual FE	F(139, 3070) = 18.00	F(139, 3069) = 17.72	F(139, 3069) = 17.92
Fisher Test : MCO vs temporal FE	F(22, 3183) = 1.47	F(22, 3182) = 1.50	F(22, 3182) = 1.50
Breusch Pagan $\chi^2_{(1)}$ test : MCO vs individual RE	5519.73***	5365.55***	5494.57***

Notes: *, **, *** significant at 10%, 5% and 1% risk.

Number of observations: 3220; Number of years: 23; Number of country-pairs: 28*5=140)

A third issue is that focusing on three-year moving averages might lead to overestimating the coefficients used to measure the effect of host and source country GDP volatility on FDI. Table 6 shows that when an alternative computation of GDP instability (five year-moving average-based variation coefficients) is used, the results reported in Table 2 are not changed. The coefficients estimated for *source instability* and *host instability* are, thus, robust to a change in the measurement of output volatility.

A fourth source of bias in estimation could result from the likelihood of Lebanon being an outlier because of the war and post-war periods. The war period itself necessarily exacerbated GDP instability in Lebanon, while FDI nose-dived, thereby possibly producing an adverse relation between

host GDP volatility and FDI inflows. As for post-war reconstruction from 1991 onwards, with its context of high GDP growth variation springing from growth and FDI recovery that may have induced a positive relation between GDP host and FDI inflows. As the net effect of the Lebanese war on the estimated impact of GDP volatility on FDI might be contradictory, we introduced a war dummy, taking the value 1 for the Lebanon between 1987 and 1991 and 0 otherwise, and a post-war dummy taking value 1 for the Lebanon from 1992 to 1995, and 0 otherwise. The introduction of the two dummies did not change the coefficient estimated for GDP host volatility, which remained positive and significant in explaining FDI levels. We also checked whether our estimations are robust to change in the sample composition. Estimations of Table 2 were run without incorporating Lebanon, as that country is the most unstable of the five host countries of our sample. As the result regarding source country volatility remained unchanged, this suggests that the estimation based on the whole sample was not driven by the presence of a highly unstable outlier.

Table 6.: FDI levels and 5 year-moving averages

	6.1	6.2	6.3
Openness	7.122 (10.61)***	7.123 (10.58)***	6.847 (9.98)***
MED	1.572 (3.96)***	1.627 (4.11)***	1.477 (3.70)***
AMU	6.151 (9.16)***	6.020 (8.98)***	6.122 (9.14)***
GAFTA	0.357 (0.58)	0.458 (0.74)	0.272 (0.44)
InvestProfil	4.070 (7.46)***	3.966 (7.31)***	4.437 (7.67)***
Post_War	-3.183(-2.87)***	-3.453 (-3.11)***	-3.936 (-3.35)***
Instability source	-	-1.072(-3.93)***	-
Instability host	-	-	0.838(1.89)*
GDP source	3.447 (24.72)***	3.267 (24.74)***	3.448 (24.75)***
GDP host	2.139 (10.73)***	2.129 (10.68)***	2.131 (10.70)***
Difference in GDP per capita	0.737 (4.23)***	0.648 (3.71)***	0.728 (4.19)***
Distance	0.022 (0.09)	0.073 (0.28)	0.019 (0.07)
Adjacency	0.301 (0.92)	0.334 (1.02)	0.302 (0.92)
Past colonial links	-0.665 (-0.98)	-0.478 (-0.70)	-0.705 (-1.03)
Common language	3.328 (8.11)***	3.235 (7.90)***	3.339 (8.16)***
Constant	-142.413 (-19.43)***	-145.205 (-19.53)***	-136.957 (-17.58)***
Log likelihood	-4803.6099	-4796.5649	-4801.5986
	Wald $\chi^2(13)=1374.54$ Prob > $\chi^2 = 0.0000$	Wald $\chi^2(14)=1392.43$ Prob > $\chi^2 = 0.0000$	Wald $\chi^2(14)=1377.61$ Prob > $\chi^2 = 0.0000$

Notes: *, **, *** significant at 10%, 5% and 1% risk.

Number of observations: 2940; Number of years: 21; Number of country-pairs: 28*5=140

A fifth issue is whether our findings are driven by a specific sub-period. Chow tests found a structural break for 1995 in the empirical model used to explain FDI levels. That particular year 1995

corresponds to the Barcelona agreement between European Union and the MENA countries. The results reported in Table 7 show that our main results are driven by the post-1995 period, and not by the pre-1995 period, which includes both the Lebanese war and post-war reconstruction periods. Equally, our results show that prior to 1995, FDI volatility was driven by source country economic conditions, and more specifically by the investment climate and measured by the quality of economic governance. After that structural break, exchange rate crises become highly significant in explaining FDI volatility, as well as source and host country GDP volatility. After the Barcelona agreement, economic governance became less significant, whereas trade openness and regional trade agreements simultaneously became more significant in explaining FDI levels and volatility. FDI inflows proved to be increasingly attracted by price-opportunities, which were probably related to nominal or real volatility in the five MENA economies. Institutional distance started to fall as a consequence of the Euro-Med agreement, while short-term macroeconomic factors of attraction started to outweigh the structural factors that had predominated before 1995. Although regional integration increases FDI levels to developing economies via the reduction of microeconomic transaction costs, it also tends to raise the macroeconomic costs associated with volatility. Trade intensification with Europe has opened new channels of volatility transmission for MENA economies, with FDI being one of those channels.

Table 7.: FDI levels and Chow tests

	7.1	7.2	7.3	7.4
N=3220	First group 1987-1995	Second group 1996-2009	First group Core/Stable	Second group Peripheral/Instable
			1.886 (4.88)***	
Openness	0.742 (2.16)**	3.069 (7.62)***	0.609 (2.37)**	2.105 (6.92)***
MED	1.126 (1.87)*	0.875 (3.96)***	-	1.458 (7.14)***
AMU	0.809 (2.09)**	2.448 (7.42)***	-	1.997 (7.84)**
GAFTA	-	-0.076 (-0.24)	1.614 (4.84)***	-0.363 (-1.74)*
InvestProfil	1.835 (6.46)***	1.224 (2.21)**	-0.365 (-0.62)	1.102 (4.63)***
War	-1.127 (-2.60)***	-	-0.261 (-0.62)	-0.389 (-0.88)
Post War	-1.701 (-4.33)***	-0.446 (-0.74)	-	-0.170 (-0.50)
Inflation	0.375(3.54)***	-0.437(-4.35)***	-0.084 (-0.65)	-
Instability source	-0.138 (-1.15)	-0.874 (-6.57)***	0.500 (2.57)***	-0.214 (-1.98)**
Instability host	0.104 (0.51)	0.323 (1.76)*	2.615 (26.82)***	0.152 (1.00)
GDP source	1.117 (14.29)***	1.337 (20.12)***	1.428 (10.55)**	0.709 (14.59)***
GDP host	-0.077 (-0.44)	1.532 (10.71)***	-0.103 (-0.36)	0.233 (2.24)**
Difference in GDP pc	0.284 (3.51)***	0.474 (4.77)***	-2.575 (-	0.587 (8.53)***
Distance	-0.428 (-4.95)***	-0.187 (-1.89)*	11.00)***	0.220 (3.56)***
Adjacency	0.313 (1.58)	0.215 (1.17)	-1.153 (-4.55)***	-0.644 (-4.30)***
Past colonial links	0.012 (0.03)	0.834 (2.16)**	2.022 (3.81)***	-0.094 (-0.23)
Common language	1.867 (9.03)***	1.828 (7.36)***	0.264 (0.76)	1.132 (6.29)***
Constant	-22.014 (-4.93)***	-67.543 (-16.04)***	-60.417 (-	-28.645 (-8.69)***
			12.06)***	
SCR	38998,016		39082,948	
SCR1	11276,456		18933,795	
SCR2	26322,756		13275,260	
Fisher	6,581		39,996	
Fisher $F_{0,05}$	1,60		1,60	

Notes: *, **, *** significant at 10%, 5% and 1% risk.

Number of observations: 3220; Number of years: 23; Number of country-pairs: 28*5=140

7. Conclusion

In the present paper, we analyze the impact of various combinations of macroeconomic instabilities on FDI localization in Middle East and North African countries within the framework of a gravity model. As such a model allows the reduction of risks and costs associated with distance (geographical, linguistic and legal) to be controlled for, this enables the impact on FDI inflows of macroeconomic sources of risks and cost to be differentiated from the other sources of risks and costs. As a gravity model also allows the impact of various determinants concerning FDI flow origins to be assessed, this enables our paper to accord special attention to source countries and to pinpoint the specific influence of their macroeconomic characteristics on FDI flows.

We consider two indicators of macroeconomic instability: output volatility in both source and host countries, and find evidence of contradictory impact on FDI flows for these two variables. When controlling for bilateral and host country characteristics such as economic and political risk, trade

openness and distance, we find that macroeconomic instability is a major determinant for European firms' location decisions in MENA economies. We show that (1) FDI levels decrease with the extent of output instability in the origin country; (2) countries with a higher level of output instability tend to attract more FDI; and (3) FDI from those peripheral non-traditional sources tends to be less reactive to economic fluctuation in the source country than FDI from core traditional sources.

Hence, the results we obtain for MENA economies confirm recent evidence by Méon and Sekkhat (2012) that FDI varies as much because of what happens in the world economy (waves) as it does because of the of host country risk characteristics. We have found that developing economies, like MENA, that are dependent to foreign investment, can finally suffer from external sources of macroeconomic instability that are not global but, instead, related to the countries where FDI is sourced. However, FDI tends to be less pro-cyclical when it comes from non-traditional sources and, conversely, tends to be more responsive to any source of volatility when it comes from more traditional developed sources. Our results challenge the now common idea that, because FDI is less pro-cyclical than the other forms of financial inflows, it is a more stable source of external financing for developing economies (Fernandez-Arias and Hausmann, 2001; Calderón and Didier, 2009). It also suggests that there is a possible trade-off, for developing economies, between technology and skill-intensive but unstable FDI sourced from more developed economies, and stable but less technology-intensive investments sourced from middle-income peripheral countries. Further analyses of the relative costs-benefits of those alternative sources of FDI need to be undertaken in order to improve the economic and social efficiency of FDI attraction policies that are financially costly for developing economies.

REFERENCES

- Abderrezak, A. 2008. Foreign direct investment in the MENA region: Is there a colonisation memory effect? *The Journal of North African Studies* 13, no. 2: 219-226.
- Aguiar, M., and G. Gopinath. 2005. Fire-sale foreign direct investment and liquidity crises. *The Review of Economics and Statistics* 87, no. 3: 439-452.
- Aizenman, J. 2003. Volatility, Employment and the Patterns of FDI in Emerging Markets. *Journal of Development Economics* 72, no. 2: 585-601
- Ali, F.A., N. Fiess, and R. MacDonald. 2010. Do institutions matter for Foreign Direct Investment? *Open Economies Review* 21, no. 1: 201-219.
- Anderson, J. E., and D. Marcouiller. 2002. Insecurity and the pattern of trade: An empirical investigation. *The Review of Economics and Statistics* 84, no. 2: 342-352.
- Anderson, J. E., and E. van Wincoop. 2003. Gravity with gravitas: A solution to the border puzzle. *American Economic Review* 93, no. 1: 170-192.
- Andrés M. S., P. Nunnenkamp, and M. Busse. 2012. *What drives FDI from non-traditional sources ? A comparative analysis of the determinants of bilateral flows*. Kiel Institute for the World Economy Working Papers No. 1755. Kiel Institute for the World Economy, Kiel, Germany.
- Apergis, N., and C. Katrakilidis. 1998. Does inflation uncertainty matter in foreign direct investment decisions ? An empirical investigation for Portugal, Spain and Greece. *Rivista internazionale di Scienze economiche e commerciali* 45, no. 4: 729-744.
- Aysan, A., G. Pang, and M.-C. Véganonès-Varoudakis. 2009. Uncertainty, economic reforms and private investment in the Middle East and North Africa. *Applied Economics* 41, no. 11: 1379-1395.
- Bechri, M. 1999. *Institutional obstacles, reform uncertainty and Tunisia's integration with the European Union*. ERF/OECD/World Bank: The Dynamics of New Regionalism in MENA: Integration, Euro-Med Partnership Agreements & After, Cairo, February 6th and 7th of 1999.
- Bénassy-Quéré, A., L. Fontagné, and A. Lahrière-Révil. 2001. Exchange-rate strategies in the competition for attracting foreign direct investment. *Journal of the Japanese and International Economies* 15, no. 1: 178-198.
- Bénassy-Quéré, A., M. Coupet, and T. Mayer. 2007. Institutional Determinants of Foreign Direct Investment. *The World Economy* 30, no. 5: 764-782.
- Bergstrand, J. H., and P. Egger. 2007. A knowledge-and-physical-capital model of international trade flows, foreign direct investment, and multinational enterprises. *Journal of International Economics* 73, no. 2: 278-308.
- Bevan, A.A., and S. Estrin. 2004. The determinants of foreign direct investment into European transition economies. *Journal of Comparative Economics* 32, no. 4: 775-787.

Bloningen, B. 2005. *A review of the empirical literature on FDI determinants*. NBER Working Paper No. 11299. National Bureau of Economic Research, Cambridge, MA.

Busse, M., J. Königer, and P. Nunnenkamp. 2010. FDI promotion through bilateral investment treaties: more than a bit? *Review of World Economics* 146: 147-177.

Calderón, C. and T. Didier. 2009. *Will FDI be Resilient in this Crisis?* Mimeo. The World Bank, Washington D.C.

Cavallari L. 2010. Exports and FDI in an endogenous-entry model with nominal and real uncertainty. *Journal of Macroeconomics* 32, no. 2: 300-313.

Cavallari, L., S. D'Addona. 2012. *Nominal and real volatility as determinants of FDI*. Mimeo. University of Roma 3.

Chan, K. K., and E. R. Gemayel. 2004. Risk instability and the pattern of FDI in the MENA region. IMF Working Papers WP/04/139. The International Monetary Fund: Washington D.C.

Choong, C.-K., and V. K.-S. Liew. 2009. Impact of foreign direct investment volatility on economic growth of ASEAN-5 countries. *Economics Bulletin* 29, no. 3: 1829-1841.

Daude, C., E. Levy-Yeyati, and E. Stein. 2003. Regional Integration and the Location of FDI. Working Paper 492. Inter-American Development Bank.

Demekas, D.G, B. Horváth, E. Ribakova, and Y. Wu. 2007. Foreign direct investment in European transition economies: The role of policies. *Journal of Comparative Economics* 35, no. 2: 369–386.

De Mello-Sampayo, F. 2009. Competing-destinations gravity model: an application to the geographic distribution of FDI. *Applied Economics* 41, no. 17: 2237-2253.

Desbordes, R., and V. Vicard. 2009. Foreign Direct Investment and bilateral investment treaties: An international political perspective. *Journal of Comparative Economics* 37, no. 3: 372-386.

Head, K., and J. Ries. 2008. FDI as an outcome of the market for corporate control: Theory and evidence. *Journal of International Economics* 74, no. 1: 2–20.

Eichengreen, B. J. 2000. Taming capital flows. *World Development* 28, no. 6: 1105-1116.

Eichengreen, B. J., and D.A. Irwin. 1998. The role of history in bilateral trade flows. In *The Regionalization of the World Economy*, ed. J. A. Frankel. Cambridge, Mass: National Bureau of Economic Research.

Evenett, S.J., and W. Keller. 2002. On theories explaining the success of the gravity equation. *Journal of Political Economy* 110, no. 2: 281-316

Fernandez-Arias, E., and R. Hausmann. 2001. Is Foreign direct investment a safer form of financing?. *Emerging Markets Review* 2, no. 1: 34-49

Frenkel, M., K. Funke, and G. Stadtmann. 2004. A panel analysis of bilateral FDI flows to emerging economies. *Economic Systems* 28, no. 3: 281-300.

- Ishii, S., K. Habermeier, B. Laurens, J. Leimone, J. Vadasz, and J.I. Canales-Kriljenko. 2002. Capital account liberalization and financial sector stability. IMF Occasional Paper 211. Washington D.C.: The International Monetary Fund.
- Kaminsky, G., S. Lizondo, and C. Reinhart. 1998. Leading indicators of currency crises. *IMF Staff Papers* 5, no. 1: 1-48.
- Kiyota, K., and S. Urata. 2004. Exchange rate, exchange rate volatility and foreign direct investment. *The World Economy* 27, no. 10: 1501–1536.
- Koren, M., and S. Tenreyro. 2007. Volatility and development. *The Quarterly Journal of Economics* 122, no. 1: 243-287.
- Kose, M. A., E. Prasad, K.S. Rogoff, and S.-J. Wei. 2009. Financial Development: A reappraisal. *IMF Staff Papers* 56, no. 1: 8-62.
- Krugman, P. 2000. Fire-sale FDI. In *Capital Flows and the Emerging Economies: Theory, Evidence, and Controversies*, ed. S. Edwards. Chicago, Ill.: The University of Chicago Press for the NBER.
- Lane, P., and G. M. Milesi-Ferretti. 2008. International Investment Patterns. *Review of Economics and Statistics* 90, no. 3: 538-549.
- Lederman, D. 2011. *Large devaluations, foreign direct investment and exports: A speculative note*. Policy Research Working Paper 5619, Washington D.C., The World Bank.
- Lefilleur, J., and M. Maurel. 2010. Inter- and intra-industry linkages as a determinant of FDI in Central and Eastern Europe. *Economic Systems* 34, no. 3: 309-330.
- Lensink, R., and O. Morrissey. 2006. Foreign Direct Investment: Flows, volatility and the impact on growth. *Review of International Economics* 14, no. 3: 478-493.
- Levchenko, A., and P. Mauro. 2007. Do some forms of financial flows help protect against “sudden stops”? *The World Bank Economic Review* 21, no. 3: 389-411.
- Levy-Yeyati, E., and F. Sturzenegger. 2001. Exchange rate regimes and economic performance. *IMF Staff Papers* 47, no. 1: 62-98.
- Levy Yeyati, E., U. Panizza, and E. Stein. 2007. The cyclical nature of north-south FDI flows. *Journal of International Money and Finance* 26, no. 1: 104-130.
- Loayza, N.V., R. Rancière, L. Servén, and J. Ventura. 2007. Macroeconomic volatility and welfare in developing countries: An introduction. *The World Bank Economic Review* 21, no. 3: 343-357.
- Martin, P. and H. Rey. 2006. Globalization and Emerging Markets: With or Without Crash? *American Economic Review* 96, no. 5: 1631-1651.
- Medvedev, D. 2012. Beyond trade: The impact of Preferential Trade Agreements on FDI inflows. *World Development* 40, no. 1: 49-61.
- Méon, P.-G., and K. Sekkat. 2012. FDI Waves, waves of neglect of political risk. *World Development* 40, no. 11: 2194-2205.

Mina, W. M. (2012). The institutional reforms debate and FDI inflows to the MENA region: The “best” ensemble. *World Development* 40, no. 9: 1798-1809

Nicet-Chenaf, D., and E. Rougier. 2011. New exports matter: FDI, export discoveries and growth in MENA countries. *Journal of International Trade and Economic Development* 20, no. 4: 507-533.

Petri, P.A. 2012. The determinants of bilateral FDI: Is Asia different? *Journal of Asian Economies* 23, no. 3: 201-209.

Sadik, A., and A. Bolbol. 2001. Capital flows, FDI and technology spillovers: Evidence from Arab countries. *World Development* 29, no. 12: 2111–2125.

Santos Silva, J., S. Tenreyro. 2006. The log of gravity. *The Review of Economics and Statistics* 88, no. 4: 641–658.

Stein, E., and C. Daude. 2007. Longitude matters: time zones and the location of foreign direct investment. *Journal of International Economics* 71, no. 1: 96-112.

Takagi, S., and Z. Shi. 2011. Exchange rate movements and foreign direct investment: Japanese investment in Asia, 1987-2008. *Japan and the World Economy* 23, no. 4: 265-272.

Uctum, M., and R. Uctum. 2011. Crises, portfolio flows, and foreign direct investment: A application to Turkey. *Economic Systems* 35, no. 4: 462-480.

UNCTAD. 2009. *World Investment Report 2009*. Geneva: United Nations Conference on Trade and Development.

Wang M., and S. Wong S. 2007. Foreign direct investment outflows and business-cycle fluctuations. *Review of International Economics* 15, no. 1: 146-163.

Wei, S.-J. 2000. How taxing is corruption on international investors? *Review of Economics and Statistics* 82, no. 1: 1–11.

Annexes

TABLE A1
Data sources and definitions

<i>Variables</i>	<i>Description of Variables</i>	<i>Data Source</i>
FDI _{ij}	The value in thousands of US dollars of flows of foreign direct investment (FDI) from a country <i>i</i> (country of origin) towards the country <i>j</i> (host country) at time <i>t</i>	OECD, UNCTAD FDI/TNC database Balance of payments of Morocco, Central Bank of Tunisia
GDP host	GDP in thousands of US dollars	CEPII, CHELEM database
GDP source	GDP in thousands of US dollars	
Difference in GDP per capita	Difference in GDP per capita (thousands of US dollars) between origin country <i>i</i> and destination country <i>j</i>	Population data used to measure per capita GDP is collected from IMF International Financial statistics
Distance	Distance in kilometers between origin and destination capitals	CEPII, Geo dataset
Adjacency	Common Border between country <i>i</i> and <i>j</i> (takes the value 1 if the two countries share a common border, and 0 otherwise)	CEPII, Geo dataset
Common language	Common official language for country <i>i</i> and <i>j</i> (takes the value 1 if the two countries share a common language, and 0 otherwise)	CEPII, Geo dataset
Common colonial power	Common colonizer for country <i>i</i> and <i>j</i> (takes the value 1 if the two countries had a common colonizer, and 0 otherwise)	CEPII, Geo dataset
Past colonial links	Country <i>j</i> is colonized by county <i>i</i> (takes the value 1 if the country <i>j</i> was colonized by county <i>i</i> , and 0 otherwise)	CEPII, Geo dataset
Investprof	Score of the risk to FDI not covered by other political, economic and financial risk components. It includes ratings of contract viability, risks of expropriation, profits repatriation and payment delays. Highest score equates X very low risk.	ICRG database
Openness	Ratio of trade openness of country <i>j</i>	Export and import data collected from IMF
Inflation	Inflation rate of country <i>j</i>	World development indicators (WDI)
Exchange rate crisis	Index of crisis exchange of host country (takes the value 1 if the country has experienced a large variation in the value of the real exchange rate or of the foreign currencies reserves, and 0 otherwise)	Authors' calculations on the basis of IMF data
Instability host and Instability source	Volatility of GDP growth for host or source country <i>j</i> reflecting the coefficient of variation of growth	Authors' calculations CHELEM database
War	Dummy variable takes the value 1 for Lebanon war's years (1987-1991) and 0 from 1992 onwards	Authors' calculations
Post_War	Dummy variable takes the value 1 for post-Lebanon war's years (1992-1996) and 0 for other years	Authors' calculations
VagIDE_World	World levels of FDI flows in value	UNCTAD
VagIDE_UE	European Union (UE25) levels of FDI flows in value	UNCTAD
Stable	Dummy variable takes the value 1 if the	Authors' calculations

Unstable

country belongs to the European core (UE15) in 2009, and takes null otherwise.

Dummy variable takes the value 1 if the country does not belong to the European core (UE15) in 2009, and null otherwise.

Authors' calculations

TABLE B1

List of countries in the sample

Algeria	Germany	Libya	Romania
Austria	Great Britain	Malta	Spain
Belgium-Luxembourg	Greece	Mauritania	Sweden
Czech Republic	Hungary	Morocco	Switzerland
Denmark	Ireland	Netherlands	Syria
Egypt	Italy	Norway	Tunisia
Finland	Jordan	Poland	Turkey
France	Lebanon	Portugal	Ukraine

Note: the five main MENA host countries are reported in bold

RECENT LAREFI WORKING PAPERS

For earlier LAREFI Working Papers, please go to <http://lare-efi.org.u-bordeaux4.fr>

All Discussion Papers can be downloaded free of charge

CR14-EFI/04 Djigbenou, M-L., "Determinants of Global Liquidity Dynamics:a FAVAR approach"

CR14-EFI/03 Vaubourg, A-G., "Finance and international trade : A review of the literature"

CR14-EFI/02 Sangaré, I., "Chocs extérieurs et régimes monétaires en Asie du Sud-Est : une analyse DSGE"

CR14-EFI/01 Lacoue-Labarthe, D., "In Search of the Banking Regulator amid U.S. Financial Reforms of the 1930s"

CR13-EFI/06 Coupaud, M., "Contagion des crises de 1997 et 2008 en ASEAN+3 : un modèle VAR structurel"

CR13-EFI/05 Jacob, D., "Quels sont les enseignements de l'histoire du fédéralisme américain pour la zone euro actuelle ?"

CR13-EFI/04 Breton, R., Galanti, S., Hurlin, C, Vaubourg, A-G., "Does the firm-analyst relationship matter in explaining analysts' earnings forecast errors ?"

CR13-EFI/03 Bouët, A., Estrades, C., Laborde, D., "Differential export taxes along the oilseeds value chain : a partial equilibrium analysis"

CR13-EFI/02 Dupuy, M., "Les effets des politiques de Quantitative Easing sur le taux de change : les enseignements de l'expérience américaine"

CR13-EFI/01 Bouët, A., Estrades, C., Laborde, D., "Households heterogeneity in a global CGE model : an illustration with the MIRAGE-HH (MIRAGE-HouseHolds) model"

CR12-GED/172 Gakpa, L., "Réexamen des déterminants de la croissance en Côte d'Ivoire"

CR12-EFI/05 Chiappini, R., , "Les indices composites sont-ils de bonnes mesures de la compétitivité des pays ?"

CR12-EFI/04 Chiappini, R., "Un réexamen de la relation entre commerce et Investissement Direct à l'étranger (IDE) à partir d'un modèle en panel dynamique. Le cas de l'Allemagne, la France et l'Italie"

CR12-EFI/03 Brana, S., Djigbenou, M-L., Prat, S., "Global excess liquidity and asset prices in emerging countries : a pvar approach"

CR12-GED/171 Roca T., "A Methodology for Comparing Governance Database, Institutional Profiles Database Robustness. An example using corruption data, from simple graph representation to advanced econometrics"

CR12-EFI/02 Musson A., "Construire l'attractivité durable régionale : l'exemple de l'Aquitaine"

CR12-EFI/01 Dupuy L., "International Trade and Sustainability : A survey"