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Euro-Mediterranean Partnership, pegging to euro and inward FDI

M. Brzozowski

Faculty of Economic Sciences, Warsaw University

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Micha_ Brzozowski *Euro-Mediterranean Partnership, pegging to euro and inward FDI*

Micha_ Brzozowski is Assistant Professor at The Faculty of Economic Sciences, Warsaw University. He is a holder of Foundation for Polish Science Scholarship. His research interests lie in macroeconomics, theory of innovation and growth and monetary economics.

e-mail: brzozowski@wne.uw.edu.pl

Abstract:

The aim of this paper is to analyze theoretically and empirically the likely impact of the participation in the Euro-Mediterranean Partnership and the possible pegging to euro on the intensity of FDI inflow into the 11 Southern and Eastern Mediterranean countries. Theoretical models give an ambiguous picture of how exchange rate uncertainty and volatility affect direction and magnitude of FDI inflows. The FDI inflows in the 11 Southern and Eastern Mediterranean countries significantly hinges on the host country market growth and its own lagged value. Exchange rate uncertainty negatively influences the decision to locate investment in the these countries. Nominal exchange rate volatility and to some extent inflation do not seem to particularly hamper FDI inflows in the examined countries. One of the possible alternatives is thus to conduct an exchange rate policy within the framework of a crawling peg with a wide band.

JEL classification: F21, F36, C23
Keywords: foreign direct investment, exchange rate uncertainty and volatility, euro, Euro-Mediterranean Partnership

Euro-Mediterranean Partnership, pegging to euro and inward FDI

1. Introduction

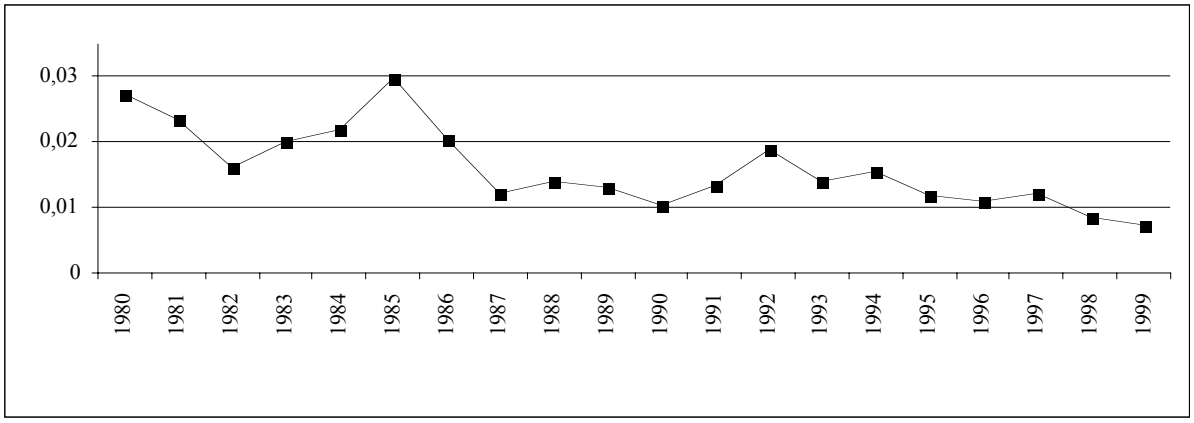
One of the pillars of the Euro-Mediterranean Partnership (EUROMED) agreed between 12 Southern and Eastern Mediterranean (SEM) countries and the 15 Member States of the European Union at the Barcelona Conference is to create an area of shared prosperity through development of economic and financial cooperation. To achieve this objective the participants of the EUROMED agreed to progressively establish a free-trade area through *inter alia* promotion of mechanisms to foster transfers of technology. The participants acknowledged that economic development must be supported both by internal savings and by direct foreign investment which could lead to the transfer of technology and increase production and exports. In fact it is widely recognized that technology transfer via foreign direct investment has played an important role in the development process and in sustaining high rate of economic growth. Raising living standards and reducing poverty in developing countries have been conditioned to a large extent upon attracting inward FDI.

Unfortunately it seems that the SEM countries have not profited enough from the globalization process and the expansion of private investment flows in the 1990s. As Figure 1 illustrates the fraction of world's inward FDI flows located in Algeria, Cyprus, Egypt, Israel, Jordan, Malta, Morocco, Syria, Tunisia and Turkey[1] was in 1999 half as high as it was in1970. Inward FDI in two countries in the group with incomes classified by World Bank as high, mainly Cyprus and Israel have displayed different pattern. Both countries have created a favorable investment climate and attracted in 1970 and 1999 a similar fraction of world's FDI inflows[2].

On top of receiving a slipping fraction of the world's FDI inflows, the SEM countries have not considerably raised their attractiveness as a place where FDI is located in comparison with other low and middle income countries. As Figure 2 illustrates eight SEM countries (Cyprus and Israel being excluded) have not recorded remarkably higher rate of growth of FDI inflows[3] than other low and middle income countries. In fact in the period under investigation the increase (decrease) in inward FDI in Algeria, Egypt, Jordan, Malta, Morocco, Syria, Tunisia and Turkey was higher (lower) than in the remaining low and middle income countries in 12 out of 20 years.

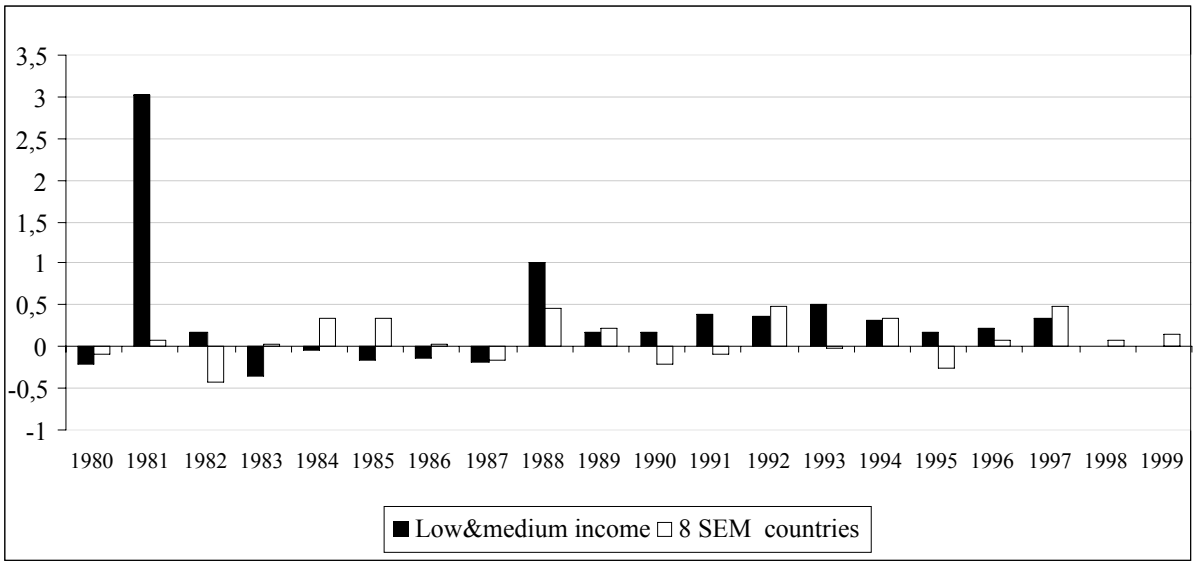
[1] Lebanon and the Palestinian Authority has been excluded due to data limitations.
[2] 0,25 and 0,27 percent respectively
[3] Measured in current USD

Figure 1 FDI inflows into Algeria, Cyprus, Egypt, Israel, Jordan, Malta, Morocco, Syria, Tunisia and Turkey as a fraction of world's inward FDI.



Source: *Author's calculations based on World Bank WDI*, *2003*.

Figure 2 The rate of growth of FDI inflows into low and medium income countries and Algeria, Egypt, Jordan, Malta, Morocco, Syria, Tunisia and Turkey (8 SEM countries)



Source: *Author's calculations based on World Bank WDI*, *2003*.

The data presented in the graphs allows us to sum up by saying that the performance of the SEM countries in terms of attracting inward FDI has been unsatisfactory. Moreover there seems little prospects of the situation improving. In the ranking of 140 countries

according to UNCTAD Inward FDI Potential Index[4] for 1998-2000 Algeria occupies 96th position, Egypt – 66th, Jordan – 60th, Lebanon – 62nd, Morocco 90th, Syria – 54th and Tunisia – 74th. Cyprus, Israel and Malta are ranked, respectively, 34th, 21st and 24th and one has reason for optimism about future FDI inflows into that group of countries. However the problem of low inward FDI into the remaining SEM countries need to be addressed.

The aim of this paper is to analyze theoretically and empirically the likely impact of the participation in the EUROMED and the possible pegging to euro on the intensity of FDI inflow into the 11 SEM countries. The introduction of euro has been the main change in the international monetary situation facing the SEM countries. The most important decision the SEM countries will have to make concerns their exchange rate policy. There is a complete spectrum of possible arrangements, ranging from complete freedom of floating to the completely fixed rates of a currency boards or monetary union in the case of future EU members, i.e. Cyprus and Malta. Hence I focus in this paper on determinants of FDI inflows into Algeria, Cyprus, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, Syria, Tunisia and Turkey and I pay special attention to the role of exchange rate fluctuations.

In the paper I assess the likely benefits of pegging to euro or euro adoption in terms of the magnitude of FDI inflows. To that end I estimate the likely impact of the reduction of exchange rate variability which will be the main alteration of investment conditions in SEM countries following the adoption of euro as a nominal anchor for monetary policy.

I supplement the analysis of the link between exchange rate instability and FDI with the evaluation of likely consequences of free-trade area establishment on the magnitude of FDI inflows. The establishment of free trade area is likely to bring about an increase in trade flows between SEM countries and the Member States of the EU. To assess the importance for attracting foreign investors in SEM countries of the boost to trade flows resulting from free-trade area establishment I estimate the importance of openness to trade on FDI inflows in the group of countries under investigation.

The paper is structured as follows. Section 2 is devoted to the review of pertinent literature dealing with the impact of exchange rate variability on FDI inflows. I deal in section 3 with theoretical and empirical dimensions of the distinction between exchange rate volatility and uncertainty. The main empirical results are presented in section 4. Finally, section 5 concludes.

[4] *World Investment Report 2002: Transnational Corporations and Export Competitiveness*, UNCTAD 2002.

2. Literature survey

The theoretical as well as empirical research into the impact of exchange rate volatility on the flow of FDI is scarce. The existing theoretical literature can de divided among two strands, coping with the consequences of exchange rate volatility in different time horizons. Both approaches provide contradicting results regarding the sign of the relation between exchange rate volatility and FDI inflow.

2.1 Long-run production flexibility

The first approach focuses on the **production flexibility** argument expounded by Aizenman (1992), Darby *et al.* (1999), and Sung and Lapan (2000). In this type of models producers commit to domestic and foreign capacity *ex ante* and commit to employment decisions *ex post*, following the realization of a nominal or real shock. The assumption of *ex post* variable factors of production is more realistic for long horizon. Effects of exchange rate volatility will in this approach generally depend on sunk costs in capacity, competitive structure and the convexity of the profit function in prices.

The key outcome of Aizenman's (1992) analysis is that a fixed exchange rate regime is more conducive to FDI relative to a flexible exchange rate, regardless of the type of shock hitting an economy. For the case of a monetary shocks, the concavity of the production function implies that nominal shocks will reduce expected profits under a flexible exchange rate regime. Fixed exchange rates are capable of isolating the level of employment and production from monetary shocks and are associated with higher expected profits. This in turn stimulates domestic investment and FDI. For real shocks, flexible exchange rates are associated with higher volatility of employment and with lower expected profits. This is due to the fact that a country experiencing a positive productivity shock will tend to experience nominal and real appreciation, which will mitigate the resultant employment expansion. In the fixed exchange rate system positive productivity shock leads to an increase in employment and in expected profits. Therefore in the presence of productivity shocks the flow of FDI will be larger in a fixed than in a flexible exchange rate system.

Darby *et al.* (1999) challenge the conventional wisdom of a negative impact of exchange rate uncertainty on investment. The model is an extended and adapted version of Dixit - Pindyck (1994) and they share the basic structure. Production costs are fixed in local currency and an investor has to incur a sunk entry cost as well as a sunk cost of exit. In face of

uncertainty, firms often find it optimal to wait rather than to commit to a given production capacity. Waiting is a proper alternative to investing or not investing. The option value (invest now or later) then becomes part of the investment costs because, once an irreversible investment is made, the possibility of exercising this option to invest later on has been lost. Therefore the expected discounted value of the investment project has to be compared to the value of waiting, with the option of investing later.

At that stage the analysis leads to a conclusion of a negative relationship between exchange rate uncertainty and FDI. However Darby *et al.* assume that the firm's discount rate is increasing in exchange rate volatility and the opportunity cost of waiting is a difference between the discount rate and the deviation of the exchange rate from its equilibrium path. In other words exchange rate volatility affects FDI in two opposite ways. On the one hand it depresses investment because the firm will only invest it the present value of the expected revenues is higher, by an amount equal to the value of waiting, than the entry sunk cost. On the other hand the opportunity cost of waiting raises with exchange rate volatility and hence boosts investment. Darby *et al.* establish parametric conditions under which the former or the latter mechanism will overwhelm, i.e. exchange rate volatility will reduce or increase foreign direct investment.

The model constructed by Sung and Lapan (2000) is also inspired by Dixit-Pindyck (1994) theory and FDI is viewed as an investment option that allows the firm to defer the decision as to where to produce. The cost of the option is the sunk cost associated with opening the second plant and its value is equal to extra profits earned if the firm opens the foreign plant instead of the home plant. As the variability of exchange rate increases, the firm may find it profitable to either open the foreign plant instead of the home plant or open both plants. In a deterministic setting the firm opens only one plant because each plant exhibits decreasing average cost. However under exchange rate uncertainty firms may wish to open more plants[5] since such a strategy allows to channel the production abroad if the foreign currency depreciates.

As a consequence if sunk costs are relatively large but similar across plants, then for low exchange rate variability, only the home plant will be opened, for intermediate values, only the foreign plant will be opened, whereas for large exchange rate variability, both plants will be opened. If sunk costs are not too large (or are relatively different across plants), then for low exchange rate variability, only the home plant will be opened, whereas for larger

[5] Plant-opening decisions are made prior to exchange-rate realization.

values of exchange rate variability, both plants will be opened. The conclusion that exchange rate volatility boosts FDI is also supported if strategic dimension is added to the model, i.e. the multinational faces a local competitor.

2.2 Short-run risk aversion

The second approach, adopted by Cushman (1985), Goldberg and Kolstad (1995), and Bénassy-Quéré *et al.* (2001), focuses on **risk aversion** with no possibility of *ex post* adjustment of a variable productive factor. Exchange rate risk arises because of the time lag between investment and profits in foreign currency. Cushman (1985) analyzed the effects of real exchange rate risk and expectations on FDI for four different cases, depending on where inputs were purchased, where output was produced, where financial capital was acquired, and where output was sold.

He found that an increase in exchange rate volatility induces a depreciation of the risk adjusted real exchange rate and thus lowers the costs of domestic versus foreign financing of foreign capital which translates into an increase in FDI. In case of foreign production with imported inputs a decrease in exchange rate volatility lowers both factor (foreign labor and capital) costs. However the ratio of wages to rents rises and the usage of capital invested abroad increases. Under the circumstances of domestic production and sale but with foreign subsidiary delivering an intermediate good, lower exchange rate volatility raises the cost of foreign labor while lowering the cost of foreign capital. As a result three outcomes are possible. FDI rises and foreign employment falls or rises (if the increased FDI raises marginal productivity of labor enough to offset the rise in its cost) or both FDI and foreign employment falls (when the decline in the latter reduces the marginal productivity of capital invested abroad enough to offset the fall in its cost). Finally, in case of export production with plant located domestically or abroad, a decrease in exchange rate volatility may again reduce as well as increase FDI. The former result is more likely to occur if price elasticity of foreign demand is relatively high.

Goldberg and Kolstad (1995) argue that exchange rate volatility unambiguously stimulates the share of investment activity located abroad. Under risk aversion the nature of the relationships between exchange rate variability and flow of FDI critically depends on the covariance structure between exchange rate and foreign demand shocks. If both shocks are negatively correlated, a rise in the variability of exchange rates magnifies the share of capacity located offshore, although the overall capacity declines. Therefore the analysis does

not allow to conclude that the absolute level of FDI rises or falls. However, as long as demand is not excessively convex with respect to price, the FDI share increases as the correlation between exchange rate and demand shocks rises.

Finally, Bénassy-Quéré *et al.* (2001) emphasize the role played by the covariance between the exchange rates of currencies used in two alternative locations of inward direct investment. A risk-averse firm contemplates relocating in two alternative foreign locations in order to re-export[6] and therefore transportations costs influence the sensitiveness of FDI to exchange rate uncertainty. It stems from the analysis that regardless of the sign of correlation between the two exchange rates movements, an increase in the volatility of any of the two countries exchange rate leads to a reduction in FDI. Moreover lower volatility of exchange rate in a country increases the sensitivity of output in that country to local costs.

The empirical research mostly finds that increased exchange rate uncertainty has a positive effect on foreign direct investment. Positive effects are found by Goldberg and Kolstad (1995) on bilateral investment flows between the U.S. on the one hand and the U.K., Canada and Japan on the other for 1978-1991, were use was made of quarterly data. Exchange rate variability had a positive and statistically significant effect on four of the six bilateral FDI shares: real exchange rate variability increased the share of total United Sates investment capacity located in Canada and in Japan, and increased the share of Canadian and United Kingdom investment located in the United States. Exchange rate variability entered with opposite to expected sign or was insignificant only in cases where problems (nonstationarity and heteroskedasticity) arose in estimating the regression equations.

Cushman (1985) reports positive effects of exchange rate volatility on annual, bilateral FDI flows from the United States to the United Kingdom, France, Germany, Canada and Japan for the years 1963 through 1978. Alternative measures of variability lead to a conclusion that the exchange rate risk variable's effect is consistently positive for all specifications. However it is insignificant when contemporaneous error correlation is assumed. Since the contemporaneous error formulation outperforms other specifications with respect to remaining variables significance and correct signs, we may conclude that Cushman's results give weak support to a hypothesis of positive link between direct investment and exchange rate volatility.

Bénassy-Quéré *et al.* (2001) test their theoretical model on a panel of 42 developing countries receiving FDI from 17 investing countries over 1984-1996. As expected the authors

[6] FDI and trade are complements.

find that an increase in the nominal exchange rate volatility tends to reduce FDI. More precisely, it is shown that a 1 point increase in exchange rate volatility reduces the FDI stock by 0.63 percent.

3. Volatility vs. uncertainty: theoretical and empirical dimensions

Before we proceed to test the impact of exchange rate variability in the 11 SEM countries it is necessary to carefully disentangle volatility from uncertainty both theoretically and empirically.

3.1 Distinction between volatility and uncertainty on theoretical grounds

All decisions are made in environments which are defined with respect to the individual's perception of the possible outcomes. There are three primary categories of environments that influence the means by which a decision, including decision of investing abroad, is reached. These are classified as "certainty", "risk" and "uncertainty"[7]. A decision is made under conditions of certainty if the state of the world and the outcome of the decision are known in advance. Risk is associated with a decision only if the possible future states of the world and future outcomes together with the assigned probabilities are known in advance. In contrast a decision is made in an environment of uncertainty when not all of the many possible future states of the world and outcomes are known in advance, and their probabilities are unknown or may not exist.

The dividing line between the repercussions of exchange rate volatility and uncertainty in the context of FDI is straightforward to establish. The majority of theoretical models sketched in the preceding section are linked to exchange rate volatility. In a natural way . exchange rate volatility is an appropriate variable to be used for testing theories focusing on investors' aversion to variance of profits. In all three papers by Cushman (1985), Goldberg and Kolstad (1995), and Bénassy-Quéré *et al.* (2001) agents know the probability distribution of the exchange rate and use it to form expectations on future value of profits.

The knowledge of possible future states of the world is as well a feature of the production flexibility story. In Aizenman (1992) the distribution of money supply and labor productivity shocks are known to all agents. Darby *et al.* (1999), drawing from Dixit and

[7] For an in depth discussion of all three concepts see Katzner (1998).

Pindyck (1994), assume that the firm's inverse demand function follows a Brownian process which means that its expected present discounted value is known.

In contrast, the multinational firm in Sung and Lapan (2000) expects that the future exchange rate will be equal to the prevailing exchange rate when the plant-opening decision is made. In other words, any exchange rate innovation is unanticipated. That situation coincides with the definition of uncertainty formulated above. Although most overviewed models emphasize the role of exchange rate volatility I have decided to gauge how strong, if any, correlation exists between FDI inflows and exchange rate uncertainty. To that end I specify empirical attempts to quantify uncertainty in what follows.

Distinction between uncertainty and volatility gains another dimension in the context of choosing the monetary policy strategy that would induce FDI inflows in the SEM counties. A decision of irrevocably fixing an exchange rate totally eliminates uncertainty and volatility. On the other hand, implementing an exchange rate policy of crawling peg or crawling band does reduce exchange rate uncertainty and volatility but does not rule them completely out. Widening a band within which a currency can move means an increase in uncertainty since deviations of the exchange rate from central parity **may** be larger but does not imply an increase in volatility. The latter depends on the realized fluctuations of the exchange rate within the band.

3.2 Measures of volatility and uncertainty

The measure of exchange rate volatility is similar to those used in much of the literature. The volatility variable *VOLAT* is constructed for a given year as a sample "standard deviation" of the change in the logarithm of the nominal average monthly exchange rate[8] (*E*):

$$VOLAT_T = [(1/m)\sum_{i=1}^{m}(E_{t+i+1} - E_{t+1})^2]^{1/2} \qquad (1)$$

where m=11 and T is a yearly time index.

To quantify exchange rate uncertainty I construct sample-based measure of dispersion of unpredictable innovation. It is given by the conditional variance of the innovation constructed using the generalized autoregressive conditional heteroskedasticity GARCH specification of Bollerslev (1986). To be more specific, I estimate using monthly data the following GARCH (4, 4) model:

[8] The price of 1 US dollar in local currency

$$E_t = \alpha_0 + \alpha_1 E_{t-1} + \varepsilon_t \tag{2}$$

$$\sigma_t^2 = \beta_0 + \sum_{i=1}^{4} \beta_i \varepsilon_{t-i}^2 + \sum_{i=1}^{4} \gamma_i \sigma_{t-i}^2 \tag{3}$$

where σ_t^2 denotes the variance of ε_t conditional on information up to period *t*. I estimate the two-equation model (2)-(3) separately for each country for the period extended to include eight months before the starting year of the sample used in the estimation of my main equation. Since for each year I obtain 12 values of σ_t^2, a simple mean of fitted values from Eq. (3) was taken as the measure of uncertainty for a given country in a given year *T*:

$$UNCERT_T = (1/m) \sum_{t=1}^{m} \sigma_{it}^2 \tag{4}$$

where *m*=12.

4. Determinants of FDI in the SEM countries

This section is devoted to empirical analysis of FDI determinants in Algeria, Cyprus, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, Syria, Tunisia and Turkey[9]. The contribution of my econometric analysis is in highlighting the role of exchange rate volatility and uncertainty in foreign investors' decision making.

4.1 Methodology

The basic question I seek to address is whether exchange rate volatility or uncertainty affects FDI inflows into the SEM countries. In order to estimate the impact of the variables of interest, I need to control for the potential influence of other factors shaping the pattern of FDI. Given the data set has both cross-section and time-series dimensions and the international "push factors" behind FDI flows are identical for each country, I choose the following "pull factors" model:

[9] The period under investigation varies but generally years 1970-2001 are included. For details see Table A in the Annex

$$
\begin{aligned}
\mathrm{FDI}_{it} = A_i + \lambda_1 \mathrm{GDP}_{it} + \underbrace{\lambda_2 \mathrm{GDPgrowth}_{it} + \lambda_3 \mathrm{INFL}_{it} + \lambda_4 \mathrm{FISCBAL}_{it}}_{\text{macroeconomic factors}} + \\
\underbrace{\lambda_5 \mathrm{OPEN} + \lambda_6 \mathrm{TARRIF}_{it}}_{\text{trade openness}} + \\
\underbrace{\lambda_7 \mathrm{TELEPH}_{it} + \lambda_8 \mathrm{GDPpc}_{it} + \lambda_9 \mathrm{ILLITER}_{it} + \lambda_{10} \mathrm{TAX}_{it}}_{\text{capital productivity determinants}} + \\
\underbrace{\lambda_{11} \mathrm{VOLAT}_{it} + \lambda_{12} \mathrm{UNCERT}_{it}}_{\text{exchange rate variability}} + \mu_{it}
\end{aligned}
\tag{5}
$$

A large number of variables has been considered in the literature as possible determinants of inward FDI. Not many of them are consistently significant[10]. One variable that is consistently statistically significant is the host country size measured by Gross Domestic Product expressed in US dollars (*GDP*)[11]. In all 17 econometric analysis discussed by Chakrabarti (2001), GDP, representing market size, is a statistically significant dominant variable determining FDI. In the present study I test whether the market-size hypothesis that holds that a large market is necessary for exploitation of economies of scale is acceptable for the SEM countries.

The remaining explanatory variables can be divided into three groups: macroeconomic factors, openness to trade and factors related to capital productivity . There are three variables in the first group: rate of growth of real GDP (*GDPgrowth*), rate of inflation (*INFL*), general government balance as percent of GDP (*FISCBAL*). Macroeconomic stability is viewed as conducive to FDI, hence I expect a negative sign to be associated with the rate of inflation. Low fiscal deficit is also a stabilization proxy and a positive sign should be expected. However large fiscal deficit translates into low domestic savings and a more pronounced need for foreign financing partly met by the FDI inflows. As a result the sign associated with *FISCBAL* is ambiguous. Similarly, GDP growth could be on the one hand regarded as a factor encouraging investment since a growing economy is a prospect of large profits. On the other hand the output decline could be accompanied by the increase in the marginal product of new capital if it is combined with other resources freed from stagnating sectors. I cannot therefore exclude that the estimated coefficient of *GDPgrowth* could be negative.

The second group comprises two potential determinants of FDI. Openness (*OPEN*) measured by the ratio of exports plus imports to GDP may be significant determinant of FDI inflows since most investment projects are directed towards the tradable sector. The effects of

[10] See Chakrabarti (2001) for an extensive Extreme Bound Analysis
[11] The usage of GDP measured in PPP dollars does not alter the results.

the second variable – trade barriers (*TARRIF*) measured by the percentage of tax revenues obtained from import duties – has been widely debated. An hypothesis holds that FDI is undertaken in order to overcome obstacles in trade imposed by a host country. Trade liberalization should therefore bring about a decrease in FDI inflows which would be replaced with an exchange of goods and services. Hence *OPEN* and *TARRIF* are expected to have a positive effect on FDI inflows.

The third group of independent variables is composed of four variables. A proxy for the physical infrastructure used in the estimation is the number of telephone mainlines per 100 inhabitants. *TELEPH* variable should positively affect the FDI inflows since more developed infrastructure raises capital productivity. Per capita GDP (*GDPpc*) is the second variable in this group and is intended to measure labor productivity. High labor productivity is likely to encourage FDI. The problem with the *GDPpc* variable is that it is also an implicit measure of wage rates, since productivity levels are highly correlated with wage rates, as well as with GDP per capita. All other things equal, higher wage rates will discourage inward FDI. As a result one cannot a priori assign a specific sign to *GDPpc* variable. The illiteracy rate *ILLITER* is intended to reflect the level of human capital and is the second variable intended to measure labor productivity. I expect the minus sign to be associated with *ILLITER*. The impact on FDI of the fourth variable in the group of capital productivity determinants is questionable. According to numerous empirical studies FDI is insensitive to tax incentives measured in this paper by the ratio of taxes on income, profits and capital gains to the total of government income. On the other hand Chakrabarti (2001) cites eight papers where a significant negative relationship between FDI flows and the level of the host country corporate taxes was observed.

Finally the set of explanatory variables includes two measures of variability described in the previous subsection, i.e. *VOLAT* and *UNCERT*. The World Bank CD-ROM *WDI* 2003 is the source of the remaining variables.

Panel data techniques are used in regression analysis which has obvious advantages over other estimation methods. The fixed effects model allows us to control for all individual specific variables, potentially affecting inward FDI flows which have not been included in the set of regressors due to data limitation. Specifically the assumption that each cross section unit has its own intercept permits to control for the investment risk specific to each of the SEM countries. In Eq. (5) A_i stands for an intercept for each country and a hypothesis that all cross section units have a common intercept, i.e. $A_i=A$, was tested with the use of F test.

The lagged value of FDI may be an important determinant of the current FDI inflow. The presence of foreign affiliates in a country may be the best recommendation for other investors contemplating placing their capital abroad. It is therefore justified to add the lagged value of FDI to the set of independent variables. The equation to be estimated takes then the form:

$$\begin{aligned} FDI_{it} = {} & A_i + \lambda_1 FDI_{it-1} + \lambda_2 GDP_{it} + \lambda_4 GDPgrowth_{it} + \lambda_5 INFL_{it} + \lambda_6 FISCBAL_{it} + \\ & \lambda_6 OPEN_{it} + \lambda_7 TARRIF_{it} + \lambda_8 TELEPH_{it} + \lambda_9 GDPpc_{it} + \lambda_{10} ILLITER_{it} + \\ & \lambda_{11} TAX_{it} + \lambda_{12} VOLAT_{it} + \lambda_{13} UNCERT_{it} + \mu_{it} \end{aligned} \qquad (6)$$

The presence of lagged dependent variable precludes the use of the standard fixed effects estimator. The conventional approach is based on the difference GMM estimator proposed by Arellano and Bond (1991) which uses the second lag as instrument for the first difference of FDI_{it-1}. First differencing Eq. (6) eliminates the constant term from the set of independent variables.

4.2 Empirical results for the SEM countries

I used a general-to-specific model selection approach in the context of Eq. (5) and (6). In all regressions the value of general government balance as percent of GDP, the growth rate of GDP, the ratio of import duties to tax revenues, the measure of tax incentives and the labor force quality appeared to be statistically insignificant. Consequently the following variables have been excluded from the set of regressors: *FISCBAL*, *GDPgrowth*, *TARRIF*, *TAX*, *ILLITER*. Moreover The analysis of correlation of all variables revealed a strong[12] positive correlation of *TELEPH* and *GDPpc*. It is therefore justified to estimate Eq (5) and Eq (6) separately with each of both correlated variables inserted in turn into regression. Since the estimation results are very similar I decided to report the estimated parameters of the regression on *GDPpc*.

To sum up, after preliminary eliminations the set of regressors in Eq. (5) contains four control variables (*GDP*, *INFL*, *OPEN*, *GDPpc*) and two measures of exchange rate variability (*VOLAT*, *UNCERT*). The lagged value of FDI (*FDI*(-1)) is added to the group of control variables when Eq. (6) is estimated. The results of estimation of Eq. (5) are presented in Table

[12] The correlation coefficient was equal to 0,86

1 and of Eq. (6) in Table 2. Columns 1.1 of Table 1 and 2.1 of Table 2 display results of benchmark regressions without a measure of variability among regressors. The impact of exchange rate volatility on FDI inflows in the 11 SEM countries is examined in columns 1.2 and 2.2. The impact of exchange rate uncertainty is analyzed in columns 1.3 and 2.3. Finally, the relative importance of uncertainty and volatility in explaining the magnitude of FDI inflows into the SEM countries is scrutinized in columns 1.4 and 2.4.

Table 1 Determinants of FDI in the 11 SEM countries: volatility and uncertainty of exchange rate. OLS estimates.

Dependent variable: FDI

Variable (t-statistic)	(1.1)	(1.2)	(1.3)	(1.4)
GDP	.803189E-02 (6.53986)	.803780E-02 (6.59597)	.725425E-02 (7.61095)	.724968E-02 (7.57976)
INFL	-.224492E+07 (-2.46149)	-.257984E+07 (-2.31175)	-.206746E+07 (-2.4486)	-.200530E+07 (-2.2326)
OPEN	.433541E+07 (2.28336)	.426578E+07 (2.3425)	.279011E+07 (2.30913)	.279595E+07 (2.3127)
GDPpc	48074.1 (2.84756)	48184.9 (2.85009)	51555.0 (3.09729)	51550.2 (3.09237)
VOLAT	… …	.859168E+09 (.718351)	… …	-.157422E+09 (-.227549)
UNCERT	… …	… …	7.68729 (30.2233)	7.7217 (25.0056)
N. of observ.	297	297	297	297
R-squared adj.	.465564	.465286	.541914	.540331
F test of $A=A_i$	F(11,282)= 6.4552	F(11,282)=8.138	F(11,282)= 11.14	F(11,282)=8.265

Source: Author's calculations.
Method of estimation: OLS, fixed effects panel model
t-statistic computed with the use of White heteroskedastic-consistent standard errors

Table 2 Determinants of FDI in the 11 SEM countries: volatility and uncertainty of exchange rate. GMM estimates.

Dependent variable: FDI

Variable (t-statistic)	(2.1)	(2.2)	(2.3)	(2.4)
FDI(-1)	.88819 (3.30)	.8904318 (3.36)	.8481757 (3.09)	.8600288 (3.22)
GDP	1.97e-09 (1.08)	1.96e-09 (1.09)	1.53e-09 (0.88)	1.49e-09 (0.88)
INFL	-.9847964 (-1.28)	-.8973551 (-0.86)	-.8539509 (-1.27)	-.286605 (-0.47)
OPEN	2.972715 (1.59)	2.976384 (1.61)	1.372097 (1.03)	1.350904 (1.04)
GDPpc	.0228615 (1.89)	.0226485 (1.94)	.0268731 (2.12)	.0257449 (2.17)
VOLAT	… …	-210.4413 (-0.14)	… …	-1359.876 (-2.16)
UNCERT	… …	… …	7.06e-06 (22.46)	7.36e-06 (20.04)
N. of observ.	275	275	275	275

Source: Author's calculations.
Method of estimation: Arellano-Bond GMM dynamic panel data model
t-statistic computed with the use of White heteroskedastic-consistent standard errors.

It stems from regression results reported in Table 1 that market size (*GDP*), inflation rate (*INFL*), openness to trade (*OPEN*) and real per capita GDP (*GDPpc*) are significant explanations for FDI inflows. The coefficients of *GDP* and *OPEN* as expected have a positive sign whereas the coefficient of inflation (*INFL*) is statistically significant and negative. The sign associated with *GDPpc* is positive that corroborates the hypothesis of a strong correlation between that variable and the level of labor productivity.

FDI inflows into the 11 SEM countries do not seem particularly vulnerable to exchange rate volatility. The sign associated with that measures of exchange rate variability is positive in column 1.2 and negative in column 1.4. On top of that, the estimated coefficient of *VOLAT* is statistically insignificant only in Table 1.

In contrast, exchange rate uncertainty seems to significantly boost FDI inflows into the 11 countries under investigation. In both columns 1.3 and 1.4 a t-Student statistics attains a very high level, which allows us to regard the results of estimation as robust. Moreover, when

an attempt is made, in column 1.4, to test the relative importance of exchange rate volatility and uncertainty in shaping foreign investors' decisions *UNCERT* remains highly significant. I therefore end up with a conclusion that in the sample of the 11 SEM countries exchange rate uncertainty has a strong, positive impact on FDI inflows whereas exchange rate volatility does not affect it at all.

It is noteworthy that the results reported in Table 1 provide us with a firm conclusion regarding the optimal monetary policy strategy in the SEM countries. To spur FDI inflows into the SEM countries it seems necessary to reduce inflation and increase exchange rate uncertainty. The best way to achieve both results is to pursue an exchange rate policy of crawling peg with a wide band around the central parity. This would help to curb inflation and build up central banker's credibility without imposing a low level of uncertainty about exchange rate movements.

On the basis of results reported in Table 1 it is reasonable to conjecture that the establishment of a free-trade area with the EU would encourage FDI inflows into the SEM countries. The ratio of exports plus imports to GDP is expected to rise as a result of the abolishment of the barriers to trade and the coefficient of *OPEN* is consistently significant and positive in Table 1.

The widening of the set of independent variables to include the lagged value of FDI inflows modifies the inferences made from the estimation of fixed effects model. As results presented in Table 2 demonstrate *FDI*(-1) is a major factor which determines FDI inflows into the SEM countries. The coefficient on the lagged value of FDI is highly significant and its value means that a country attracts in the current year over 80 percent of previous year FDI inflows regardless of the evolution of other variables that influence foreign investors' decisions.

The size of domestic market and inflation does not significantly impinge on FDI inflows. The level of GDP per capita remains a significant variable, whereas openness does not affect FDI inflows in an unquestionable manner despite the fact that the coefficient on the latter was marginally statistically significant in few specifications (columns 2.1 and 2.2).

A conclusion that exchange rate volatility does not heavily impinge on FDI inflows is partly supported in Table2. A coefficient on *VOLAT* is negative and statistically significant in one specification[13]. On the other hand, exchange rate uncertainty is one of the main stimuli to FDI inflows in the SEM countries – a coefficient of *UNCERT* is significantly positive

[13] See column 2.4.

throughout Table 2. The detrimental effect on FDI inflows of exchange rate volatility should be regarded as less pronounced than a firmly positive impact of exchange rate uncertainty. Besides the fact that a measure of exchange rate volatility is insignificant in all but one specification, a t-statistics associated with the coefficient of *UNCERT* is tenfold the corresponding coefficient of *VOLAT*. It is therefore justified to recommend a crawling bend as the best exchange rate policy designed to intensify FDI inflows into the SEM countries.

It stems from the analysis of Table 1 and Table 2 that the lagged value of FDI, the level of per capita GDP and exchange rate uncertainty play a dominant role in explaining FDI inflows in the SEM countries. The dependence on the size of domestic market and openness is weaker but statistically significant in a few specifications. The remaining variables are statistically insignificant.

To sum up, FDI inflows in the 11 SEM countries are contingent on the host country market growth and a prior presence of foreign investors. This study provides firm evidence that exchange rate uncertainty has a beneficial effect on FDI inflows into the 11 SEM countries. Since the fixed exchange regime rules out exchange rate uncertainty it could be expected to bring about a decline in FDI inflows originated in the EMU member states. This paper provides evidence that from the viewpoint of a country attractiveness to foreign investors local currencies of the SEM countries should be pegged to euro and move within an exchange rate band of a considerable width.

5. Conclusions

I have made an empirical investigation of the relation between FDI and nominal exchange rate uncertainty and volatility for the 11 SEM countries during the period of 1970-2001. I have employed two methods pertinent to data set with time-series and cross-section dimensions: fixed effects OLS and GMM Arellano-Bond models. The main findings can be summarized as follows.

The FDI inflows in the 11 SEM countries significantly hinges on the host country market growth and its own lagged value. Exchange rate uncertainty negatively influences the decision to locate investment in these countries. Nominal exchange rate volatility and to some extent inflation do not seem to particularly hamper FDI inflows in the examined countries.

Thus, the key contribution of this paper is in emphasizing the negative influence that fixing an exchange rate is likely to exert on FDI inflows in SEM countries. However it should be noted that inflation has a detrimental effect on inward FDI and some kind of nominal

anchoring should be implemented. One of the possible alternatives is thus to conduct an exchange rate policy within the framework of a crawling peg with a wide band.

In this paper the favorable role of the establishment of a free-trade area for the inflow of FDI into the SEM countries is documented. This is the direct channel through which Euro-Mediterranean Partnership is likely to stimulate FDI inflow. In brief, the FDI enhancing effect of low inflation and wider openness to trade is likely to reinforce the positive impact of GDP expansion and overall risk reduction due to the new phase of cooperation between the EU and the SEM countries launched at the Barcelona Conference.

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Annex

Table A List of countries and period included in the analysis.

Country	Investigated period
Algeria	1970-2001
Cyprus	1976-1999
Egypt	1970-2001
Israel	1970-2000
Jordan	1976-2001
Lebanon	1989-1994
Malta	1970-2001
Morocco	1970-2001
Syria	1970-2001
Tunisia	1984-2001
Turkey	1970-2001