THE DETERMINANTS OF FOREIGN DIRECT INVESTMENT IN MENA COUNTRIES: AN EXTREME BOUNDS ANALYSIS

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Imad A. Moosa *

* Address: Department of Economics and Finance, La Trobe University, Victoria 3086, Australia. Fax: (3) 9479 1654. E-mail: i.moosa@latrobe.edu.au. Work on this paper was financed by a grant from the Economic Research Forum, which I am grateful for.

Abstract

The determinants variables of FDI inflows are examined by applying extreme bounds analysis to a cross-sectional sample encompassing data on 18 MENA countries. With the GDP growth rate serving as the free variable, eight others are tried as the variables of interest in combination with three other variables. The results reveal that only one variable is robust when traditional EBA is used. However, when restricted EBA is used, the results based on the 60 per cent of the regressions with the highest R^2 reveal three more robust variables. Some explanations for the results are put forward.

Introduction

A lesson has been learnt from the Asian crisis of the 1990s is that foreign direct investment (FDI) is a more reliable source of capital than portfolio investment. Lipsey (1999), for example, argues that that FDI has been the least volatile source of international investment for host countries, with the notable exception of the U.S. He also argues that FDI has been the most dependable source of foreign investment for developing countries. For this and other reasons, many countries have adopted policies aimed at creating stronger incentives for foreign investors who are potentially capable of providing FDI flows.[1] Understanding the determining factors of FDI inflows and unveiling the reasons why some countries are more successful than others in attracting FDI may provide policy makers with useful guidance for future policy prescription.

A large number of studies have been conducted to identify the determinants of FDI but no consensus view has emerged, in the sense that there is no widely accepted set of explanatory variables that can be regarded as the "true" determinants of FDI. Chakrabarti (2001) attributes the lack of consensus to "the wide differences in perspectives, methodologies, sample-selection and analytical tools". The results produced by studies of FDI are typically sensitive to these factors, indicating a lack of robustness. For example, factors such as labour costs, trade barriers, trade balance, exchange rate and tax have been found to have both negative and positive effects on FDI. Chakrabarti (2001) concludes that "the relation between FDI and many of the controversial variables (namely, tax, wages, openness, exchange rate, tariffs, growth and trade balance) are highly sensitive to small alterations in the conditioning information set". What complicates matters is that the underlying theory does not provide a definite prediction for the direction of the effect of a particular variable on FDI.

While the unavailability of a widely accepted set of explanatory variables is due to the absence of a consensus on a theoretical framework to guide empirical work on FDI, it has to be noted that Chakrabarti (2003) has made an attempt to develop a theoretical model of FDI. To facilitate the empirical analysis of FDI, Chakrabarti proposes a structural model designed to assess the role of various potential determinants of the spatial distribution of FDI in terms of its potential determinants, allowing FDI to serve both the host country market and the export market. The model allows for product differentiation between final products by brand name as well as the country of origin, taking into account an environment that is subject to uncertainty in the appropriation of the potential revenue.

The objective of this paper is to examine the determinants of FDI inflows in (predominantly Arab) MENA countries, which have been remarkably unsuccessful in attracting FDI. For example, Onyeiwn (2000) asserts that "the Arab world has continued to receive the least stock of FDI in the world despite its robust resource endowments and oil wealth". Likewise, the United Nations (2004) reported that Middle-Eastern countries "continue to suffer from low levels of FDI flows in comparison with other developing countries", pointing out that "in 2002, the region's share of FDI was lower than that of South Africa". As a result of this unpleasant *status quo*, Middle Eastern countries have in recent years taken a number of measures aimed at stabilising overall economic policy and improving legislative frameworks to enhance FDI inflows". The UN report identifies as barriers to FDI inflows to the region some "economic factors" as well as institutional factors, bureaucracy, financial corruption and lack of infrastructure particularly outside urban areas. According to the report, "further problems are caused by the centralisation of government decision making and the multiplicity of parties with which a foreign investor must deal. In this paper an attempt is made to identify the economic factors that determine FDI inflows. This, of course, is a prerequisite for designing policies to boost the ability of Middle Eastern countries to be more successful at attracting FDI.

The Determinants of Inward FDI: Theory and Evidence

The literature examines a large number of variables that have been put forward to explain FDI. Some of these variables are encompassed in formal hypotheses or theories of FDI, whereas others are suggested because they make sense intuitively. In this section we examine these variables.

[1] According to the *World Investment Report* of the UNCTAD (2002), 208 changes in FDI laws were made by 71 countries in 2001. Of these changes, 194 (93 per cent) created a more favourable climate in an effort to attract more FDI.

Moosa (2002) surveys the theories of FDI, identifying the implied explanatory variables in the process, as well as variables that cannot be readily related to any of these theories (which may be classified under "theories based on other factors"). Table 1 lists these variables, indicating the theoretical and empirical directions of effect on FDI (0 implies statistically insignificant effect). As we can see, some variables may be listed under more than one hypothesis (for example, the growth rate). Most of these variables appear in the UNCTAD's (2002) classification of the determinants of inward FDI, as shown in Table 2.

Irrespective of the underlying hypothesis or the classification of these variables, existing empirical studies have considered different combinations of these variables with mixed results, not only with respect to the importance or otherwise of these variables (statistical significance) but in terms of the direction of the effect, as can be seen from Table 1. More importantly perhaps is that existing results lack robustness in the sense that they are sensitive to model specification and other factors. While many potential determining variables may be found to be statistically significant in cross-sectional studies, the estimated relationships typically depend on which variables are included in the regression equation. Chakrabarti (2001) puts forward the following examples to illustrate this point:

- Most of the studies reporting a significantly negative coefficient on the wage rate (labour cost) combine it with the growth rate, inflation and trade deficit. Those reporting a positive coefficient combine wages with taxes and openness.
- The growth rate has been found to have a significantly positive effect on FDI if it is combined with inflation, trade deficit and wages.
- Tariffs have a positive effect on FDI if they are combined with the growth rate and openness, but they produce a negative effect when combined with wages.
- The real exchange rate produces a positive effect when it is combined with openness, domestic investment and government consumption. When domestic investment is excluded, the effect becomes negative.

The problem is that there is no theoretical reason for a particular combination of variables to produce coefficients of a particular sign. After all, these relationships represent reduced form models, which cannot be used to trace out the effect from one variable to another within the system (the so-called "black box" problem). Moreover, even if some theoretical reasoning is valid for a particular country or group of countries, it may not be valid for all countries, which may explain the typically poor goodness of fit of studies based on cross-sectional data.

Hence, there is a big question mark on the reliability of the results of existing studies, particularly their robustness and sensitivity to model specification (the variables included in and excluded from the underlying regression equation). In this study we use the technique of extreme bounds analysis (EBA), which is designed specifically to deal with this problem.

Methodology: Extreme Bounds Analysis

Cross-sectional studies of the determinants of (inward) FDI are typically based on a regression of the form:

$$FDI_i = \alpha_0 + \sum_{j=1}^{n} \alpha_j x_{ji} + \varepsilon_i \qquad (1)$$

where FDI_i is inward foreign direct investment flows into country *i* and x_{ji} is the jth explanatory variable of country *i*. These studies report a sample of regressions, including a certain set of explanatory variables.[2] The problem is that theory (particularly the theory of FDI) is not adequately

[2] Economists are notorious for estimating 1000 regressions, throwing 999 in the bin and reporting the one they like. While true scientific research should be based on a quest for the "truth", it is unfortunate that the endeavour is usually for proving a pre-conceived idea. We often come across statements like "…unfortunately, the results turned out to be disappointing". Gilbert (1986, p 288) casts significant doubt on the validity of the practice of assigning 999 regressions to the waste bin, because they do not produce the anticipated results. Because of this problem, Leamer (1983) suggested that "econometricians confine themselves to publishing mappings from prior to posterior distributions rather than actually making statements about the economy".

explicit about the variables that should appear in the "true" model.[3] The following problem is often encountered: x_1 may be significant when the regression includes x_2 and x_3, but not when x_4 is included. So, which combination of all available x_j's do we choose? Most, if not all, of the existing studies report the most "appealing" or convenient regression or regressions after extensive search and data mining, typically to confirm a pre-conceived idea.

To estimate our model and test the importance of various explanatory variables in determining FDI, while circumventing the problem of choosing the explanatory variables in an arbitrary manner, we employ extreme bounds analysis as developed by Leamer (1983, 1985) and extended by Granger and Uhlig (1990). This technique is used to identify the robustness of the determinants of the dependent variable. Hussain and Brookins (2001) argue that the usual practice of reporting a preferred model with its diagnostic tests, which is what was invariably done in previous studies of FDI, need not be sufficient to convey the degree of reliability of the determinants (the explanatory variables). However, EBA enables the investigator to find upper and lower bounds for the parameter of interest from all possible combinations of potential explanatory variables. The technique provides a useful method for assessing and reporting the sensitivity of estimated results to specification changes. Leamer and Leonard (1983, p 307) argue that the extreme values of the coefficient on the variable of interest delineate the ambiguity in the inference about the coefficient induced by the ambiguity in choice of model (i.e., model uncertainty). The relationship between the dependent variable and a given explanatory variable is considered to be robust if the estimated coefficient remains statistically significant and maintains the same sign when the set of explanatory variables are changed.

EBA is applied to a linear regression that is used to explain FDI. The model takes the form

$$FDI_i = \alpha_0 + \sum_{j=1}^{n} \delta_j X_{ji} + \beta Q_i + \sum_{j=1}^{m} \gamma_j Z_{ji} + \varepsilon_i \qquad (2)$$

where X_j is an important explanatory variable, as indicated by previous studies, that is included in every regression, Q is the variable of interest whose robustness is under examination, and Z is a potentially important variable. The X's are called the free variables, whereas Q is called the variable of interest.

The technique centres around the estimated values of the coefficient on the variable of interest, Q. An exhaustive number of regressions are run to estimate the value of this coefficient, such that each regression contains the free variables (X), the variable of interest and a combination of a fixed number of Z variables, chosen from a predetermined pool.[4] The procedure involves varying the set of Z variables included in the regression to find the widest range of coefficients on the variable of interest, β, that standard hypothesis tests do not reject. By running a large number of regressions for each variable of interest, we identify the highest and lowest values of β that cannot be rejected at a particular significance level. If the extreme values remain significant and of the same sign, then one can infer that the result (and hence, the variable of interest) is robust. Otherwise, the variable is described as being "fragile".

One problem with EBA is that it may introduce multicollinearity, which inflates standard errors. Leamer (1978) points out that the multicollinearity problem really reflects a weak-data problem. Levine and Renelt (1992, p 944) support this view by arguing that "multicollinearity is not a procedural problem but it rather represents an inability to identify a statistical relationship that is insensitive to the conditioning set of information". To give the results more credibility, Levine and Renelt (1992) restrict their EBA in three ways. First, they use three Z variables only, hence restricting the number of explanatory variables in each equation. Second, they choose a small pool of variables

[3] This would be the case if, for example, the final model specification is derived by solving a theoretical optimization problem.

[4] A large number of regressions is required because of the large number of possible combinations of the Z variables used with each variable of interest. Naturally, the number of regressions increases with the number of Q and Z variables. For example, Sala-i-Martin (1997) ran almost two million regressions. In the original version of his paper (Sala-i-Martin, 1996), he ran about four million regressions.

from which the three *Z* variables are chosen. Third, for every variable of interest, they restrict the pool of variables from which the *Z* variables are chosen by excluding variables that, *a priori*, might measure the same phenomenon. They argue that these restrictions make it more difficult to implicate past findings as fragile.

EBA has also been criticised as being too stringent a test of robustness, in part because, under its criteria, a variable is considered "fragile" if even one regression out of many thousands causes a change in the sign of a coefficient. This is the problem of "one rotten apple" to which McAleer et al (1985) refer when they talk about "families of models". Sala-i-Martin (1997) noted that if one keeps trying different combinations of control variables comprised of samples drawn with some error from the true population, then one is virtually guaranteed to find a model for which the coefficient of interest becomes insignificant or even changes sign. As a result, one may conclude either that no variables are robust or that the test of robustness is difficult to pass. Likewise, McAleer et al. (1985) argue that without knowing the full set of characteristics of models generating extreme bounds, one cannot rely on EBA to test the robustness of any variable.

A number of attempts have been made to refine the robustness criteria in order to reduce the probability of unreasonable extreme bounds (for example, Granger and Uhlig, 1990). As a result, a reasonable EBA test has been developed to estimate the extreme bounds on the coefficient of interest by eliminating models with poor goodness of fit as measured by R^2. Granger and Uhling proposed this refinement of EBA by imposing a condition on the level of goodness of fit such that all models with a very low R^2 are irrelevant for the calculation of extreme bounds. This criterion is represented by

$$R_{\phi}^2 \geq \left[(1-\phi)R_{\max}^2 + \phi R_{\min}^2\right] \qquad (3)$$

where $0 < \phi < 1$, such that if $\phi = 0$ then the extreme bounds will be drawn from one model only, the one with the highest R^2, while if $\phi = 1$, then all models are relevant for the determination of the extreme bounds. Any other value means that extreme bounds are determined by models with an R^2 in the top ϕ per cent of the $(R_{\max}^2 - R_{\min}^2)$ range. Levine and Renelt (1992, p 945) show that a recognition of the McAleer et al. problem may be accommodated by showing that changes in the *X* variables do not alter the overall conclusions. This modification results in the so-called restricted extreme bounds analysis (REBA).

The discussion so far leads to the question as to the proclaimed superiority of the results obtained by employing EBA as opposed to conventional, predominantly cross-sectional, analysis typically used to examine the determinants of FDI. EBA is arguably a procedure that provides sensitivity analysis, thus producing robust results. Leamer and Leonard (1983) argue strongly against the conventional reporting of empirical results (reporting the best estimated model or models out of tens or hundreds), which is typically the procedure used in the empirical studies of FDI, particularly because of the lack of a comprehensive theoretical model, as explained earlier. They assert, referring to the conventional procedure, that "the reported results are widely regarded to overstate the precision of the estimates and probably to distort them as well". As a consequence, they argue, "statistical analyses are either greatly discounted or completely ignored". They further argue that the conventional econometric methodology (or "technology" as they call it) "generates inference only if a precisely defined model were available, and which can be used to explore the sensitivity of inferences only to discrete changes in assumptions".

The problem with the conventional reporting of econometric results on the determinants of FDI (which arguably can be circumvented by using EBA) is that the availability of many potential explanatory variables that are unrelated by a cohesive theoretical model effectively means the availability of many models that can serve as a basis for data analysis. Consequently, this means that many conflicting inferences can be drawn from a given data set. According to Leamer and Leonard (1983), this "deflects econometric theory from the traditional task of identifying the unique inferences implied by a specific model to the task of determining the range of inferences generated by a range of models". To circumvent this problem they suggest that researchers should indulge in identifying "interesting families of alternative models", summarising the range of inferences implied by each of the families. Whether or not the results produce useful conclusions depends on the range of inferences relative to that of the corresponding family of models. If the former is narrow while the latter is wide, the conclusions will be useful, and vice versa. EBA facilitates the task proposed by Leamer and Leonard, who argue that the extreme values, $\beta_{\min}$ and $\beta_{\max}$, delineate the ambiguity in the inferences about β induced by the ambiguity in choice of model. If the difference between $\beta_{\max}$ and $\beta_{\min}$ is small in comparison to the sampling uncertainty, the ambiguity in the model may be considered irrelevant since all models lead to essentially the same inferences (Leamer and Leonard, 1983, p 307).

We have to admit, however, that EBA suffers from shortcomings apart from what has been mentioned so far. The first of these "additional" shortcomings is that the procedure concentrates on the point estimation problem while neglecting hypothesis testing and interval estimation. However, it is arguable that EBA can be extended by reporting the fragility of the t values. Then there is the problem that the procedure creates the incentive to find a family of models, all of which lead essentially to the same inference. While this may give the impression of robustness, any minor change in the model in a different direction would lead to a significant change in inference. Finally, this procedure is not suitable for some tasks such as choosing a proxy variable and selecting a data subset.

The preceding paragraph outlines the problems acknowledged by the proponents of EBA. But there is more, as suggested by McAleer et al (1985) who argue that "EBA does not go very far in removing the con from econometrics" and that "it can actively distract a researcher from asking important questions about an econometric model". Specifically, they argue that the mere provision of bounds is not adequate and that more information is needed to find out if the bounds are meaningful. The most serious problem with EBA, according to McAleer et al (1985), is that "unless extreme bounds are presented for all possible classifications of variables as doubtful and free, an observer cannot be certain that the selection does not constitute a con job". EBA, the argument goes, provides a reporting style that is not better than the conventional procedure because it replaces (arbitrary) regression selection with (arbitrary) variable partition. They conclude that "EBA cannot de-con econometrics", while suggesting another "de-conning" procedure: econometrics comprising "a clear and full disclosure of the process whereby a preferred model was selected, and the requirement that a thorough evaluation has been made of the prospects of such a specification".

Data and Description of the Variables

The empirical results presented in this study are based on a sample of cross-sectional data on 18 Middle-Eastern countries reported by the UNCTAD.[5] The dependent variable (FDI) is the dollar value of inward FDI flows. Other variables were also considered, including FDI as a percentage of GDP and as a percentage of domestic gross fixed capital formation. However, exploratory regressions and model selection tests revealed that the dollar value of FDI inflows works better with the set of explanatory variables used in this study. Most of the data on the explanatory variables are reported in UNCTAD (2002), Table A.11 (pp 276-279).[6] Table 3 lists the explanatory variables and the reasons for their inclusion in the data set.

The next issue is the selection of the *X*, *Q* and *Z* variables out of those appearing in Table 3. The *X* variables are characterised by a general acceptance in past studies both for theoretical plausibility and supportive empirical evidence. Two of the variables on the list satisfy this description: the level and growth rate of gross domestic product (GDP and GDG), which have typically been found to have a positive effect on FDI. While Bergoa and Sanchez-Robles (2003) prefer GDP because it is a proxy for market size, some economists argue against this choice. For example, Chakrabarti (2001) points out

[5] Data were obtained primarily from the 2002 *World Investment Report* and supplemented from the UNCTAD's website. The countries included in the sample are Algeria, Bahrain, Egypt, Iran, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, Turkey, UAE and Yemen.

[6] The raw data on the variables measured in their original units are also reported, but our choice fell on the scores because they are more appropriate for the definition of the dependent variable. Estimating the regression equation from raw data did not change the results qualitatively.

that it is appropriate to scale GDP by population, given the various country sizes. Moreover, Root and Ahmed (1979) point out that total GDP is a relatively poor indicator of market potential for the products of foreign investors, particularly in many developing countries, since it reflects the size of the population rather than income (see also Moosa and Cardak (2005) whose study covers 138 countries).

Both GDP and GDG can be plausibly used to represent the market size hypothesis, but the choice between them depends on whether, from a purely theoretical perspective, FDI flows are attracted by a large market or a growing market. Although both can be used as *X* variables, one of them only is chosen because both of them are taken to represent the market size hypothesis. To resolve this issue, we decided to let the data speak for itself by choosing the free variable on the basis of non-nested model selection tests. The results of these tests will be presented in the following section.

Now that the free variables have been selected, the *Q* and *Z* variables are selected from the remaining eight variables. The procedure followed for this purpose is as follows. Each of the remaining eight variables is selected as the variable of interest, *Q*, in turn. For a given *Q* variable, three *Z* variables are selected from the remaining six, which gives a total of 35 regressions for each *Q* variable, or a total of 245 regressions to be estimated.

Empirical Results

The first set of results to be reported in this section is the results of model selection tests to choose the free variable as one of GDP and GDG. For this purpose we tested two simple regression models against each other: M1 (in which the explanatory variable is GDP) and M2 (in which the explanatory variable is GDG). Two model selection tests are used: (i) the *N* test, which is originally due to Cox (1961, 1962) and derived in Pesaran (1974; and (ii) the encompassing test due to Deaton (1982), Dastoor (1983), and Mizon and Richard (1986). The associated test statistics have t and F distributions, respectively. Moreover, we use two information criteria to choose between M1 and M2: Akaike's information criterion (*AIC*) and the Schwartz Bayesian information criterion (*BIC*).

The results which are reported in Table 4, show that when M1 is tested against M2 the *N* test statistics is significant, but when M2 is tested against M1 it is not. This means that we can reject M1 against M2 but we cannot reject M2 against M1. The encompassing test statistic is insignificant in both cases, implying that there is no difference between M1 and M2 (both are valid). However, both information criteria favour M2. Hence, it seems that the results of non-nested model selection tests indicate that the free variable should be GDG rather than GDP. In economic terms, the results show that FDI inflows are attracted by growing markets more than by large markets.

The results of traditional EBA are reported in Table 5. The table shows the range of values assumed by the coefficient on the variable of interest, $\beta_{\max} - \beta_{\min}$, together with the respective t statistics and the percentage of significant coefficients (at the 5 per cent level). The only robust variable, based on these results, is TER, whose coefficient ranges between a minimum of 0.1010 and a maximum of 0.3070, turning out to be significant in all of the 35 regressions. All of the other variables seem to be fragile, although RAD and CRK turned out to be significant in almost three quarters of the regressions. The only variable that turned out to be insignificant in any of the regressions is EXP. If we employ restricted EBA, using only regressions with the highest 80 per cent and 60 per cent of the R^2's, three more variables turn out to be robust: RAD, CRK and GCF (when the regressions with the 60 per cent highest R^2 are used). Thus, out of the four robust variables two have positive effect on FDI (RAD and TER) and two have negative effect (CRK and GCF). Following the arguments put forward by McAleer et al (1985) and Sala-i-Martin (1997), we adopt the results of restricted EBA. So, what is the interpretation of these results?

The results show that FDI is attracted to countries that pay attention to education and to research and development. The providers of FDI can in this case make use of the local labour force and technology, which may be cheaper than the alternative of importing them from the country of origin. And while the negative effect of country risk on FDI is easily explainable, the negative effect of domestic investment is not straightforward and requires some elaboration.

Some economists believe that FDI and domestic investment should be related positively because of the “crowding in” effect of FDI on domestic investment (for example, Borensztein et al, 1995). A study of Arab countries presented in the UNCTAD’s 1999 *World Investment Report* detects crowding in effect in Oman and Saudi Arabia and neutral effects in Morocco, Tunisia, Egypt and Jordan. No crowding out effect was detected in any country. However, the possibility of crowing out and hence negative relation between FDI and domestic investment is theoretically plausible, given that they are substitutes, particularly in the presence of absorptive capacity constraints. In fact, a negative relation is implied by the dual gap model, which postulates that FDI helps developing countries to fill the saving-investment gap and the foreign exchange gap. One implication of the dual gap model is that capital tends to flow to countries with small capital endowments, high marginal product of capital and high rates of return on capital. Some MENA countries seem to have these characteristics and hence a negative relation should come as no surprise.

The second problem is measurement errors. The UNCTAD (2002, p 34) acknowledges measurement problems with respect to the dependent variable. In particular, it is acknowledged that there is “imperfect reporting and non-inclusion of certain items in FDI data by some countries”. Other problems arise on account of the current importance of M&As as a mode of FDI. Furthermore, M&As “may also distort the relationship between FDI inflows as reported in balance-of-payments (or financial) terms and the real resource flows expected to accompany them”. A related issue is the use of a three-year period (1998-2000) in calculating the dependent variables (why three years, and would the results change if two or four years are used instead?). Measurement errors are also likely in explanatory variables. For example, it is arguable that the variable TEL, a measure of infrastructure, should be re-defined to include road and railway networks. The UNCTAD (2002, p 36) highlights the importance of these variables (because they determine the cost of transporting goods and people) but admits that there is a “lack of data for a number of countries”.

Conclusions

By applying extreme bounds analysis to a sample of cross-sectional data covering 18 countries, the empirical results presented in this study show that FDI can be explained in terms of the GDP growth rate, enrolment in tertiary education, spending on research and development, country risk and domestic investment. In general terms the results tell us that countries that are more successful in attracting FDI are those countries that have growing economies, that pay attention to education and research, that have low country risk and that have high return on capital die to the lack of domestic investment in fixed capital. This seems to be a reasonable description of the countries that are successful in attracting FDI.

While the problems associated with the procedure used in this paper (EBA) are acknowledged, we still feel that on balance EBA is a better procedure to study FDI than the alternative of selecting for reporting purposes the most favourable set of results. EBA enables us to enlarge the search and requires us to report the most favourable and the least favourable outcomes. Writing this paper was motivated by the desire to investigate the determinants of FDI as a quest for the truth rather than to prove a preconceived, ideologically-driven idea, and for this reason EBA was used. The technique removes a significant portion of the subjectivity surrounding the findings of research on FDI.

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Table 1: Variables Affecting Inward FDI

Variable	Theory/ Hypothesis	Direction of Effect	Empirical Findings	Examples
Market size (GDP or per capita GDP)	Market size hypothesis	+	+	Tsai (1994), Shamsuddin (1994), Billington (1999), Pistoresi (2000), Cheng and Kwan (2000), Tunman and Emmert (1999), Wang and Swain (1995), Love and Lage-Hidalgo (2000)
Wages	Location hypothesis	+/-	+/-/0	Wheeler and Mody (1992), Pistoresi (2000), Tsai (1994), Cleeve (2000), Lunn (1980), Culem (1988), Bolingen and Feenstra (1996), Cheng and Kwan (2000), Moore (1993), Yang et al (1993)
Trade barriers	Other	-	+/-/0	Lunn (1988), Culem (1988), Bolingen and Feenstra (1996)
Growth rate	Differential rates of return, diversification, internal financing	+	+/0	Billington (1999), Tsai (1994), Martin and Ottaviano (1999), Sin and Leung (2001)
Openness	Other	+	+/0	Kravis and Lipsey (1982), Pistoresi (2000), Wheeler and Moody (1992), Gyapong and Karikari (1999), Sin and Leung (2001)
Trade deficit	Other	?	+/-	Tsai (1994), Shamsuddin (1994), Pisoresi (2000)
Exchange Rate	Currency Areas hypothesis	+/-	+/-/0	Edwards (1990), Blonigen and Feenstra (1996), Tuman and Emmert (1999)
Tax	Other	-	+/-/0	Swenson (1994), Billington (1999), Porcano and Price (1996), Wei (2000), Schoeman et al. (2000), Hines (1996)
Country risk	Other	-	-	Lehman (1999), Ramcharran (1999), Tuman and Emmert (1999)
Incentives	Other	+	+	Ihrig (2000)
Corruption	Other	-	-	Wei (2000)
Labour disputes and unionisation	Location hypothesis	-	+/-	Moore (1993), Tcha (1998), Yang et al. (2000), Leahy and Montagna (2000b), Zhao (1995, 1998)
Cost of capital	Location hypothesis	-	+	Love and Lage-Hidalgo (2000)
Inflation	Other	-	-	Schnieder and Frey (1985), Bajo-Rubio and Sosvillo-Rivero (1994), Yang et al. (2000)

Table 2: The UNCTAD's Classification of FDI Determinants

Determining Variables	Examples
Policy variables	Tax policy, trade policy, privatisation policy, macroeconomic policy
Business variables	Investment incentives
Market-related economic determinants	Market size, market growth, market structure
Resource-related economic determinants	Raw materials, labour cost, technology
Efficiency-related economic determinants	Transport and communication costs, labour productivity

Table 3: A List Explanatory Variables

Variable	Definition	Reasons for Inclusion
GDP	Real GDP	Captures demand for goods and services Provides a representation of the market size hypothesis
GDG	Growth rate of GDP over the previous ten years	A predictor of the future size of the host country's market. Indicates rising productivity and profitability Has been found to be highly correlated with the growth rate of FDI
GDC	Real GDP per capita	A measure of the economic development of the host country Captures the size and sophistication of the demand for goods and services Indicates the availability of developed institutions and living conditions A measure of size adjusted for population
EXP	Exports as a percentage of GDP	Indicates the degree of international exposure A measure of openness of the economy Represents the FDI-exports relationship Most FDI is directed towards the traded goods sector
TEL	Telephone lines per 1000 inhabitants	Part of the infrastructure needed to conduct international business Availability and cost of telecommunications is important for multinationals to co-ordinate cross-border activity
ENR	Commercial energy use per capita	A proxy for the availability and use of energy Energy is particularly important for efficiency-seeking FDI
RAD	R&D expenditure as a percentage of gross national income	Indicates the technological capabilities of the host country Indicates innovative capacity
TER	Students in tertiary education as a percentage of total population	A measure of the skills of the labour force
CRK	Country risk	A major element in international capital budgeting
GFC	Domestic gross fixed capital formation	Indicates growth of capital stock in host country Indicates the availability of infrastructure Provides a representation of the dual gap model.

Table 4: Results Non-Nested Model Selection Tests*

	M1 vs M2	M2 vs M1
N	-2.46	-0.91
E	1.11	0.32
AIC	-0.44 (favours M2)	
BIC	-0.44 (favours M2)	

* The *N* test statistic has a t distribution. The encompassing test statistic is distributed as F(1,16).

Table 5: Results of Traditional EBA

Variable of Interest	$\beta_{\max}$	t	$\beta_{\min}$	t	Signifiant $\beta's$ (%)
GDC	-0.0230	-0.83	-0.704	-1.38	28.6
EXP	-0.0002	-0.04	-0.0070	-1.25	0.0
TEL	0.0062	2.53	-0.0018	-0.24	2.9
ENR	0.00023	0.97	0.00001	0.33	5.7
RAD	0.5130	2.35	0.273	1.66	71.4
TER	0.3070	2.78	0.101	2.10	100.0
CRK	-0.0006	-1.28	-0.035	-2.69	74.3
GCF	-0.0010	-1.57	-0.0240	-2.95	54.3

Table 6: Results of Restricted EBA

Variable of Interest	**Top 80%**				**Top 60%**			
	$\beta_{\max}$	**t**	$\beta_{\min}$	**t**	$\beta_{\max}$	**t**	$\beta_{\min}$	**t**
GDC	-0.024	-0.91	-0.201	-3.15	-0.201	-3.15	-0.025	-0.97
EXP	-0.0002	-0.04	-0.0070	-1.25	-0.0002	-0.04	-0.0070	-1.25
TEL	0.0062	2.53	-0.0018	-0.24	0.0062	2.53	-0.0009	-0.40
ENR	0.00023	0.97	0.00001	0.34	0.00011	0.46	0.00001	0.34
RAD	0.513	2.35	0.352	1.84	0.513	2.35	0.352	1.98
TER	0.307	2.78	0.101	2.10	0.307	2.78	0.101	2.10
CRK	-0.0060	-1.46	-0.035	-2.69	-0.0160	-2.03	-0.0350	-2.69
GCF	-0.0010	-1.57	-0.0240	-2.95	-0.0010	-2.19	-0.0240	-2.95