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**Determinants of bilateral foreign direct  
investment flows in the OECD, with a closer  
look at the former communist countries**

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**DETERMINANTS OF BILATERAL FOREIGN DIRECT  
INVESTMENT FLOWS IN THE OECD, WITH A  
CLOSER LOOK AT THE FORMER COMMUNIST  
COUNTRIES**

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## **Abstract**

The main purpose of this paper is to study the determinants of bilateral foreign direct investment (hereafter FDI) flows in OECD countries. Special emphasis is placed on the new Central and Eastern European members (Hungary, the Czech Republic and Poland) in order to assess whether they differ from those of the OECD on the whole. Our theoretical framework is based on the OLI paradigm (ownership, location, internalization) developed in Dunning (1974, 1980 and 1993). The panel data estimation takes into account the ideas suggested in Zhang and Markusen (1997). According to our findings the variables that can best explain the bilateral FDI flows within the OECD are: on the one hand, the technological superiority of the investor vis-à-vis the host and, on the other, the relative abundance of physical capital, the endowments of human capital, transport infrastructure, and the size of the host countries, which clearly act as a factor of attraction for FDI.

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## 1. INTRODUCTION

Since the collapse of communism the former communist countries of Central and Eastern Europe (hereafter CEECs), in particular Hungary, the Czech Republic and Poland, have been forging strategies to attract foreign direct investment (hereafter FDI) as a way of achieving intense and sustained economic growth within the framework of their recent incorporation in the OECD and their expected entry into the European Monetary Union<sup>1</sup>. Transition involves institutional change and learning processes and, at its best, FDI can support these by transferring technologies, managerial and labor skills, marketing channels and a market-based business culture. In addition, it is often believed that substantial amounts of FDI are needed to supplement domestic savings in order to catch up with living standards in the West. Consequently, it is important to understand what drives the patterns of FDI.

The objective of this paper is to explore -by estimating an econometric model and using new own elaborated data- the determining factors in bilateral FDI flows in OECD countries (including the recent CEEC members) during the past decade and, on this basis, the extent to which the new market economies of OECD exhibit a different pattern.

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<sup>1</sup> For an idea of the most salient features of FDI flows in these former communist countries see UN (various issues).

The paper is structured in the following way. Section 2 briefly describes the theoretical framework, which as in most of the applied studies of FDI is the “eclectic theory” or the “OLI paradigm” developed in the work of Dunning -see Dunning (1974, 1980, 1993)- in an attempt to combine the available evidence. Section 3 explains, first, the equation to be estimated and the meaning of the variables included -which in some cases required a great degree of elaboration- and, second, it justifies the strategy used in the econometric estimation and presents the main findings. Lastly, in Section 4, there are some concluding remarks.

## 2. THEORETICAL FRAMEWORK

Although the economic literature on FDI and multinational companies is relatively extensive, it still fails to provide an adequate explanation. The very complexity of these phenomena has produced a multitude of research efforts, theoretical and empirical, that in the vein of the pioneering work of Hymer (1960) have given rise to a broad range of explanatory hypotheses and models, all of which fall short of the mark<sup>2</sup>.

In any event, the most widely used theoretical base in studies of an empirical nature is what is known as the OLI (ownership, location, internalization) paradigm. It postulates that FDI -and, by extension, the transnationalization of

firms- is explained by the advantages of owning property, which companies acquire by generating some type of intangible asset vis-à-vis the firms in the host country, along with the exploitation of the advantages of location and, in sum, the benefits of internalization, when -as is usually the case- there are imperfections in international markets.

The advantages of ownership can generally be characterized as “knowledge capital”, ranging from proprietary products and know-how to brand image and trademarks. Thus, they are a kind of intangible, firm-specific asset which confers some valuable market power to the firm that is sufficient to outweigh the disadvantages of doing business abroad.

Concerning the location-related factors, the OLI paradigm signals a long list of variables: natural resources endowments, lower labor costs, fiscal incentives, labor skills, infrastructure facilities. Unfortunately, the OLI theory does not provide precise knowledge of the relative significance of each of these factors. In the more recent theories, after the publication of Krugman’s important book “Geography and Trade” (1991), the interest in aspects related to the location of production has grown and the role of external economies associated with the spatial concentration of productive activity -generally referred to as economies of

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<sup>2</sup> For an idea of the state of the issue see Dunning (1993), Froot (1993), Markusen (1995) and Caves (1996).

agglomeration- has been emphasized<sup>3</sup>. In this respect, a particularly interesting model is found in Zhang and Markusen (1997) which focuses on the multinational's needs for local skilled labor.

Finally, the internalization advantages are those factors, generally related to market failures, which make foreign manufacturing the best way of exploiting an intangible, firm-specific asset in a foreign market (better, for example, licensing a foreign firm to do it). Internalization is largely a matter of international economics of information. The basic consideration working against the arm's-length alternative is the fact that in order to sell its information -such as technological knowledge or the ability to manage or to organize some specific endeavor- at its full value, the firm must convincingly indicate what it has to sell, thereby losing, at least in part, its monopoly advantage (the usual problem of asymmetric information). Internalization may also be associated with the vertical multi-plant scale economies that -as stated in Markusen (1995)- seem to emerge in activities such as R&D and advertising, which allow for the generation of advantages in intangible assets.

### 3. ECONOMETRIC ANALYSIS

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<sup>3</sup> In fact, if externalities of this type are not acknowledged, it proves very difficult to explain a general pattern observable in the geographical structure of FDI: the predominance of relatively capital-intensive countries not only for the FDI outflows -as would be expected- but also in relation to the inflows (see Julius,



In attempting to advance in our knowledge of the determinants of the bilateral FDI flows between OECD countries<sup>4</sup> over recent years we perform an econometric analysis using as regressors the most notable factors in the OLI model according to previous studies. Our sample period comprises the years 1987 to 1995.

More specifically, the equation we will estimate is the following:

$$bdi_{it} = \mathbf{b}_0 + \mathbf{b}_1 \text{tadv}_{it} + \mathbf{b}_2 \text{tapoph}_i + \mathbf{b}_3 \text{devpoph}_{it} + \mathbf{b}_4 \text{rfe}_{it} + \mathbf{b}_5 \text{hkh}_i + \mathbf{b}_6 \text{tiff}_{it} + \mathbf{b}_7 \text{dist}_i + \mathbf{e}_{it}$$

where the meaning of the variables included in the equation are as follows<sup>5</sup>:

$bdi_{it}$  = 3-year moving average of the bilateral direct investment flow from the source country to the host country.

$tadv_{it}$  = technological advantage of the source country with respect to that of the host.

$tapoph_i$  = temporal average of the population of the host country.

$devpoph_{it}$  = deviation of the temporal average of the host country's population.

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1990; Hummels and Stern, 1994, and UN, 1994, 1995, for a closer examination of these findings).

<sup>4</sup> We consider the current 28 members.

<sup>5</sup> The information about the statistical sources and the procedure used in the elaboration of variables is provided in an appendix.

$rfe_{it}$  = relative factor endowment of the host country with respect to that of the source country.

$hkh_{it}$  = human capital stock of the host country.

$tifh_{it}$  = transport infrastructure facilities in the host country.

$dist_i$  = distance between the source and the host countries of the bilateral direct investment flow.

The first regressor,  $tadv$ , attempts to approximate the advantages of ownership, more specifically the investor country's technological advantages with respect to the country which receives the investment flows. Since it is defined as the ratio of the stock of technological capital of the source to that of the host country, it is likely to show a positive sign.

The variables  $tapoph$  and  $devpoph$  are used to test the influence that the countries' size, proxied by the population, has on the volume of direct investment which they receive. In this respect, we are interested in testing the influence of both the level and the trend of population. The effect of  $tapoph$  is expected to be positive for two reasons. First, sunk costs make market size important; second, the smaller the host market the larger the possibility of incurring in higher transport costs (those associated with shipping back their output to the parent company or other subsidiaries). As for  $devpoph$ , the expected sign is, however, rather ambiguous. In sum, although the size of the host

market seems to be positively related to FDI inflows, it does not follow that the relationship is proportional.

The variable  $rfe$  allows us to evaluate two alternative hypotheses which figure prominently in recent theories of multinationals. The first one, which appears in numerous models of vertical multinationals, developed as a refinement of the conventional framework of comparative advantages, emphasizes the benefits of labor division, through relocating the unskilled labor-intensive stage to foreign countries where wages of unskilled labor are relatively low and, consequently, suggests a positive link between the FDI inflows and the relative labor abundance (Helpman and Krugman, 1985). But,  $rfe$  is also used to test the opposite view contained in other recent models (see Zhang and Markusen, 1997 and references), which stress the importance of other factors such as human capital and infrastructure and argue that they may well outweigh labor cost advantages, suggesting, therefore, a negative relationship between inward FDI and relative labor abundance. In fact, we guess that the latter hypothesis is more likely to occur for the case of OECD countries, and it is also more consistent with the rest of the explanatory factors in our empirical model.

Thus, in accordance with the above reasoning, we include the variables  $hkh$  and  $tifh$  (human capital and infrastructure of the host country, respectively) to evaluate the significance of what, as suggested in the models by Zhang and Markusen (1997) and others, are two essential factors in the location strategies of

multinational firms, at least within the framework of the developed countries. Both appear to lie at the basis of the likely economies of agglomeration (or thick-market externalities) that seem to drive multinational companies to concentrate in the developed countries. So, in both cases a positive sign is expected.

The variable *dist*, which denotes the distance between the source and host countries, was introduced for the purpose of exploring the impact of the transport and transaction costs associated with the international investment project and related to distance. Accordingly, we expect this variable's relationship with investment flows to be negative. Lastly, we assume that the structure of the error term includes three components: idiosyncratic shocks, unobservable individual effects which are invariant over time, and aggregate shocks which vary over time but affect all countries equally. To control for aggregate shocks, we will include time dummies in the estimation. This said, let us go on to explain the estimating method and comment on the results.

In the presence of time-invariant unobservable individual effects, which are correlated with the explanatory variables, both OLS and GLS estimates will be inconsistent. However, it is possible to apply the within-groups (WITHIN) estimator, which removes the individual effects and is consistent even if there exists a correlation between the individual effects and the regressors. The existence of such correlation can be tested by mean of the Hausman test, which compares the GLS and the WITHIN estimates. If the Hausman test rejects that

the individual effects are correlated with the explanatory variables, GLS would be consistent and more efficient than both WITHIN and OLS estimates. If, on the contrary, the Hausman test does not reject such a correlation, it is better to consider the WITHIN estimates. Thus, in preparing table 1, we present the results estimated under the two estimators in order to illustrate more clearly the strategy used in the estimation.

[table 1, around here]

Given that, as shown, the GLS estimation is not consistent (it does not pass the Hausman test), we will consider the results obtained under the WITHIN estimation because, although it eliminates all time-invariant variables, it produces consistent estimates. Then, since we are also interested in the unknown coefficients of the time-invariant variables, we will recover them following the procedure suggested in Hausman and Taylor (1981). From the examination of the table we can appreciate the significance of all the variables but one: *dist* (geographical distance between the source and the host countries of the FDI flows). This lack of significance of the distance is rather surprising and hard to interpret. Our suggestion is, however, that it may be at least partly due to the conjunction of two factors: the increasing diffusion of radical innovations in the field of communications and the growing share of services in the distribution of FDI flows by sectors. Thus, both facts point to a likely reduction of costs of trade

of either intermediate or final products implied by foreign production and, therefore, to a declining importance of distance.

So, according to our estimates, the main variables that explain the bilateral FDI flows within the OECD are, basically, the following. The technological superiority of the investor vis-à-vis the host; the relative abundance of physical capital; the endowments of transport infrastructure, human capital and the size of the host countries, which clearly act as a factor of attraction for FDI. Therefore, it appears that the location factors which have governed the FDI flows in the OECD in recent years have more to do with those behind thick-market externalities and increasing returns in capital suggested in the modern theory of FDI than with the traditional comparative-advantage perspective, which would predict larger FDI flows into the countries with greater relative labor abundance.

Now that we have a reasonable explanation for the determining factors of bilateral FDI flows among OECD countries as a whole, we can attempt to ascertain the extent to which the case of the new Central and Eastern European members (Hungary, the Czech Republic and Poland) differs from the general pattern. Unfortunately, however, the shortcomings in the data available for those countries prevent us from estimating a specific equation. But, for an idea of the issue, we have calculated and compared the average impact of every significant explanatory factor of FDI on the OECD and the former communist countries. As reflected in table 2, FDI in the Central and Eastern European countries is

relatively more influenced by the technological advantage of the investor and the human capital endowments of the host country. On the contrary, the size of the country and its relative physical capital abundance seem to play a less important role.

[table 2, around here]

We are aware that our approach does not allow a satisfactory characterization of the FDI patterns in the new OECD members, since it does not capture the probably greater influence of some location advantages of Central and Eastern European countries, such as their favorable geographical location and lower labor costs, in attracting FDI<sup>6</sup>. Nevertheless, as mentioned, the likely influence of these and other specific determining factors of FDI in the case of the former communist countries is hard to assess with the scant data available for these economies.

#### 4. CONCLUDING REMARKS

This paper is an empirical contribution to the knowledge of the factors that have driven the bilateral flows of FDI between the OECD countries in recent years. In this respect, it provides reasonable estimates that support the

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<sup>6</sup> According to the results from a survey of investors conducted in the framework of a research program of the EBRD, the availability of cheap skilled labor is the

conventional idea -since Hymer's 1960 dissertation- about the importance of technological advantages, and provides new evidence about the dominant factors in attracting FDI inflows, which have not always been so strongly emphasized in previous theoretical and empirical studies, namely: the stock of human capital and infrastructure facilities, in conjunction with the relative abundance of physical capital *vis-à-vis* labor. In addition, our results prove to be consistent with one of the most salient features observed in the geographical patterns of FDI throughout the world: the overwhelming proportion absorbed by developed countries not only in outward but also in inward FDI flows.

However, we must admit that our contribution to the understanding of the particular case of the new Central and Eastern OECD members -Hungary, the Czech Republic and Poland- is not very conclusive. In effect, the paucity of data on the geographical origin of the FDI flows received by these countries has prevented estimating a specific equation for them. Thus, we only were able to ascertain the differences between the average impact of every significant explanatory factor of FDI on the OECD as a whole versus that exhibited by the former communist countries.

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single most important motivating factor in FDI in the CEECs (see Lankes and Venables, 1997, for a summary of results from this survey).



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## APPENDIX

Definition of variables and their statistical sources:

*bdi* = 3-year moving average of the bilateral direct investment flow from the source to the host country. Data were drawn from the OECD's publication *International Direct Investment Yearbook*, which gives data of FDI flows from the standpoint of both the investor country and the host, which can be positive, negative or nil. Given the glaring disparities between the data at source and in the receiving country, a laborious task of cleaning the statistics was required. Due to the lack of data, we could not include either the outflows from the Czech Republic, Hungary, Mexico, Greece, Ireland, Poland, Iceland, Turkey, Australia, New Zealand, Austria and Korea (before 1991) or the inflows to the Czech Republic (before 1992) and Poland and Hungary (before 1991).

*tadv* = technological advantage of the source country with respect to that of the host. Given the lack of data on the technological stocks, we had to estimate them on the basis of the Perpetual Inventory Method which is usually applied in the estimates of physical capital stocks, with data obtained from OECD: *Main Science and Technology Indicators, Basic Science and Technology Statistics, Research and Development Expenditure in Industry* and UNESCO: *Statistical Yearbook*

*tapoph* = temporal average of the population of the host country. The statistical source was OECD: *National Accounts*.

*devpoph* = deviation of the temporal average of the population of the host country. The statistical source is the same as for *tapop*.

*rfe* = relative factor endowment, defined as the ratio of physical capital/labor in the host in relation to the source country. The stock of physical capital had to be estimated on the basis of the Perpetual Inventory Method (see OECD, 1993). The statistical sources were: OECD: *National Accounts*, *Labour Force Statistics*, United Nations: *Statistical Yearbook*, World Bank: *World Tables* and IMF: *International Financial Statistics. Yearbook*.

*hkh* = human capital stock of the host country in the year *t*. The human capital of each country was calculated on the basis of the weighted sum of the number of students enrolled at all academic levels between 1950 and the year for which the stock of human capital was estimated, divided by the total population fitted to all available census for the intermediate years. We have followed a similar methodology to Barro and Lee (1993). The weights are the average expenditure per student at each educational level in every country, divided by the total cost of educating a university student in the European Union. The statistical sources were UNESCO: *Statistical Yearbook*, OECD: *Education at a glance* and

EUROSTAT: *Education across the European Union. Statistics and Indicators.*

*tifh* = transport infrastructure facilities in the host country in the year *t*.

The variable related to the country's transport infrastructure facilities was constructed as the simple average of the infrastructure indicators per unit of area and per inhabitant. The infrastructure indicator was estimated as the weighted sum of the number of kilometers of each category of roadway. As a weighting element, it was assumed that one kilometer of national roadway offers one-fourth the equivalent service of a highway, and that a regional roadway offers one-eighth and that a kilometer of a local or urban roadway provides one-sixteenth of the service of a highway. Also, each of the two indicators (per area and per inhabitant) were standardized by dividing by the simple average of that of the 28 countries in question. The data were obtained from United Nations: *Annual Bulletin of Transport Statistics for Europe and North America, Statistical Yearbook for Asia and the Pacific and Anuario Estadístico de América Latina.*

*dist* = distance between the source and the host countries of the bilateral direct investment flow. It was obtained from the program *PC Globe*.

**TABLE 1. RESULTS FROM WITHIN (FIXED EFFECTS) AND GLS ESTIMATES**

variable	WITHIN	GLS
constant	-	-331.646 (-3.07)
tadv	8.996 (3.57)	3.441 (1.92)
tapoph	-	8.000 (8.94)
devpoph	-39.968 (-6.45)	-34.420 (-5.95)
rfe	270.792 (3.60)	103.744 (1.95)
hkh	2.221 (2.61)	2.596 (3.62)
tifh	3.207 (3.37)	1.060 (2.26)
dist	-	-9.034 (-0.91)
<hr/>		
adjusted R <sup>2</sup>	0.833	0.806
Hausman Test	(5) 38.960	
number of individuals	486	
number of observations	3420	

**RECOVERING OF THE COEFFICIENTS OF THE TIME-INVARIANT  
VARIABLES**

variable	GLS	GLS
constant	-843.160 (-11.43)	-850.412 (-14.33)
tapoph	7.852 (8.24)	7.828 (8.31)
dist	-1.711 (-0.17)	-
<hr/>		
adjusted R <sup>2</sup>	0.822	0.822
number of individuals	486	
number of observations	3420	

**TABLE 2. IMPORTANCE OF THE DETERMINING FACTORS OF FDI IN THE CZECH REPUBLIC, HUNGARY AND POLAND (CHP COUNTRIES) RELATIVE TO ALL OECD COUNTRIES**

Variable	All OECD countries		CHP countries		Relative explanation (b)/(a)
	Temporal average	Percentage explanation (*) (a)	Temporal average	Percentage explanation (*) (b)	
bdi	327.570		65.127		
tadv	8.508	6.55	10.277	13.57	2.07
tapoph	38.295	25.65	20.424	23.46	0.91
devpop h	0	-	0	-	-
rfe	0.942	21.83	0.393	15.61	0.72
hkh	40.641	7.73	29.718	9.69	1.25
tifh	139.355	38.24	80.045	37.67	0.99
dist	4.784	-	2.546	-	-

(\*) excluding the constant term.