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**Eastern Enlargement of the European Union and Foreign Direct
Investment Adjustments**

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Eastern Enlargement of the European Union and Foreign Direct Investment Adjustments

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Abstract

The purpose of this paper is to examine the changes that have occurred in the course and in the geographical structure of direct investment in the present and future members of the EU during the nineties and trying to explain their determining factors. To this end, a gravitational model is estimated incorporating the ideas developed recently in the Economic Geography models. In view of the fact that a process of liberalisation of the investment flows between the Fifteen and candidates has taken place during these years - in the framework of the Association Agreements - it may be contended that the explanation for what has happened so far represents key information for predicting the adjustments that may occur in the coming years, when the candidates become full members of the Union.

JEL: F02, F2, F21

Key words: European Integration, Foreign Direct Investment, Central and Eastern European Countries (CEECs)

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1. Introduction

As decided at the *Copenhagen Council Meeting* of December 2002, in May 2004 the fifth and most important episode of European Union (EU) enlargement will take place with the accession of eight Central and Eastern European countries (CEECs) - Poland, Hungary, Czech Republic, Slovakia, Slovenia, Estonia, Latvia and Lithuania – besides Malta and Cyprus. And another two CEECs, Bulgaria and Romania, will very probably join in 2007. Amongst other changes in the framework in which their economic relations take place with the present members of the EU, the accession of these countries will mean the removal of all barriers to trade and to the mobility of capital and labour in the EU of the Twenty-seven.

In this respect, it may be claimed that enlargement represents an opportunity for the creation of new export markets and direct investment projects for the companies of the Fifteen. However, at least from the viewpoint of Spain and other less advanced members of the EU (15), we should also bear in mind that the exports of the CEECs may eventually represent a serious threat for their capacity to export to the Community market, inasmuch as the multinationals based in them may use them as production and exporting platforms. Likewise, we should not rule out the possibility that there could be a shift in direct investments towards the candidates in detriment to those received by the present members, in particular by Spain and the other Cohesion Countries.

In this context, the aim of this paper is to help to foresee the nature of the likely adjustments that may be brought about by EU enlargement in the flows of direct investment within the EU of the Twenty-seven. In this sense, our intention is to make further headway in the results obtained in two recent studies: (Martín et al. 2002) and particularly in Martín and Turrión (2003), where we made an assessment of the likely impact of the accession of the CEECs on trade flows in the enlarged EU, and where we precisely obtained that trade adjustments seem to be largely influenced by the strategies of the multinationals.

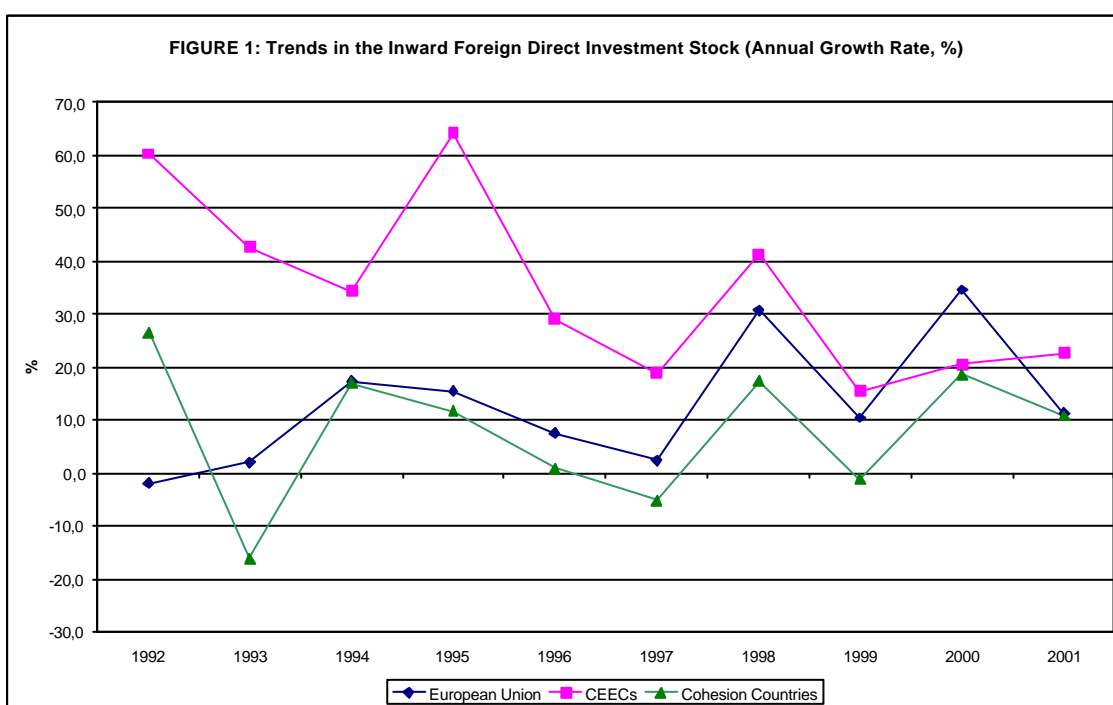
Consequently, our purpose in this study is to examine the changes that have occurred in the trend and geographical structure of direct investment in the present and future members during the nineties and to explore their determining factors. For this purpose, we estimate a gravitational model that incorporates the ideas developed in the last few years in the area of economic geography. In this respect -and bearing in mind that during the 90s a process of liberalisation of the investment flows between the Fifteen and the candidates has taken place, in the framework of the Association Agreements¹- it may be argued that the explanation for what has happened in these years is crucial for forecasting the adjustments that may be seen in the coming years, after the candidates become full members of the European Union.

The paper is structured in the following way. In section 2 we conduct a brief descriptive analysis of the structure and trends in the direct investment of the members and the candidates. In section 3 we offer a synopsis of the most significant ideas put forward in the recent literature on the issue and these are related to the features observed in the dynamics of direct investment in the countries studied. On this basis, in section 4 we postulate an empirical model in which the dependent variable is the bilateral investment stocks of these countries over the period in question, and we proceed to its estimation by means of panel data techniques, for all the countries and segmenting the sample between the present members and the candidates. We then go on to comment on the results. Finally, in section 5 we present the main conclusions of the study and we make some more general observations on their implications for the future development of the EU. The study also comprises an APPENDIX, where the variables incorporated in the model are defined and the statistical sources and the procedure used in its elaboration are explained.

¹ To learn the nature of these agreements and for an analysis of their implications for the Spanish economy, see Martín (1995).

2. The course and recent structure of direct investment

After the fall of the Berlin Wall and, above all, since the processes of liberalisation of foreign direct investment flows, accorded in the Association Agreements signed between the EU and the CEECs, were set in motion in the early nineties, most of the candidates have been receiving an enormous flow of foreign direct investments. The result is, as may be seen in FIGURE 1, that the foreign capital stock of the CEECs has grown at a very fast rate, above that of the average of the Fifteen and, what is more, that of the Cohesion Countries². This has meant that, in barely ten years, the CEECs have attained levels of foreign capital penetration in relation to the GDP similar to those of the average of the Fifteen. Furthermore, as underlined in FIGURE 1, in the case of some of the candidates, specifically: Estonia, Hungary and the Czech Republic, the presence of foreign capital amply surpasses the average of the Union.



² Cohesion Countries are the members of the EU that have a per capita income level of less than 90% of the average for the Union and, therefore, are beneficiaries of the Cohesion Fund. There are currently three such countries: Greece, Portugal and Spain, as, even though Ireland continues to receive these funds, it will only do so temporarily because its per capita income level has amply exceeded that of the average for the Union.

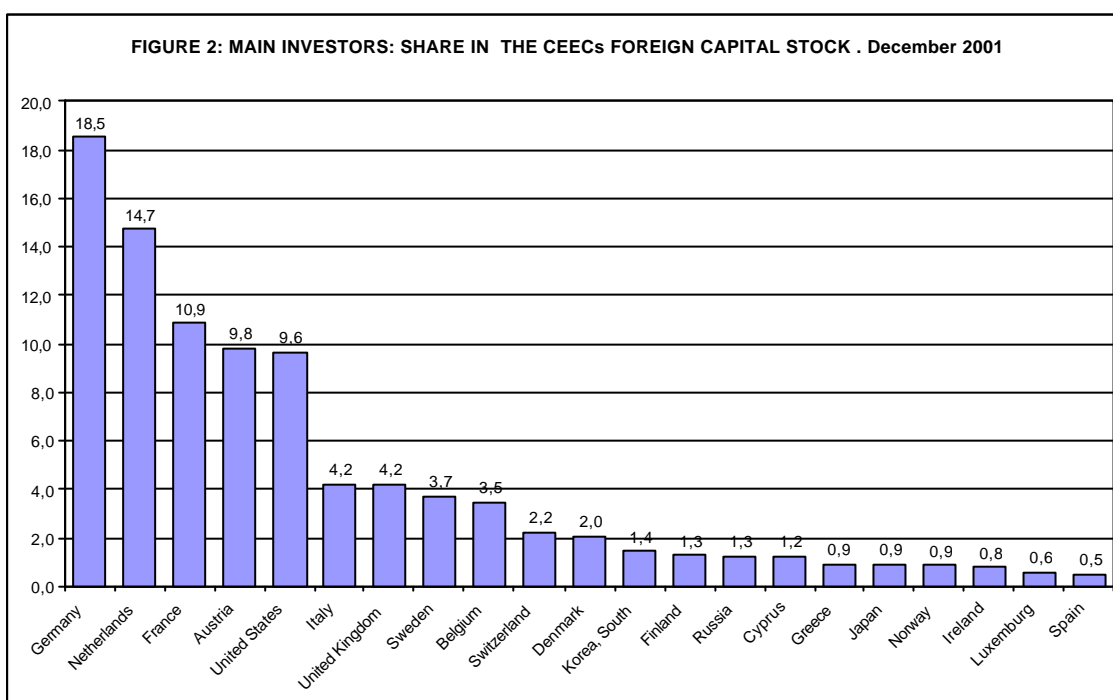
In addition, it should be pointed out that, in contrast to the dynamism that has marked the entry of direct investment in the CEECs, some of the EU countries, including Spain, Greece and Portugal, have suffered a drop in their relative position within the Union as recipients of foreign investment. Moreover, as is shown in this same TABLE 1, it is precisely in these three Cohesion Countries where there has been less growth in the foreign capital stock since the early nineties, both in absolute terms and in relation to the GDP. These facts are therefore in line with the results of other studies, in that enlargement is likely to bring about a diversion of direct investments towards the new members in detriment to those received by the less developed countries of the Fifteen (see Braconier and Ekholm , 2001 and Martín et. al., 2002)

TABLE 1: Inward Foreign Direct Investment Stock over GDP in EU countries and CEECs. 1992-2001 (%)

| | 1992 | 1999 | 2001 | Acumulated Growth Rate 1992-2001 (%) | |
|-----------------------|-------------|-------------|-------------|--------------------------------------|-------------|
| | | | | FDI Stock / GDP | FDI Stock |
| European Union | 10,3 | 20,7 | 33,6 | 14,0 | 14,1 |
| Austria | 5,9 | 11,2 | 18,2 | 13,4 | 13,3 |
| Belgium & Luxembourg | 31,4 | 68,6 | - | 11,8 | 22,8 |
| Denmark | 9,8 | 23,7 | 39,9 | 16,9 | 18,1 |
| Finland | 3,4 | 14,3 | 21,7 | 22,9 | 24,4 |
| France | 9,5 | 17,0 | 23,8 | 10,8 | 10,4 |
| Germany | 6,4 | 14,2 | 26,0 | 16,8 | 15,6 |
| Greece | 10,2 | 12,6 | 12,0 | 1,9 | 3,7 |
| Ireland | 11,6 | 43,2 | 72,1 | 22,5 | 31,9 |
| Italy | 3,9 | 9,2 | 9,9 | 10,8 | 9,3 |
| Netherlands | 22,3 | 48,3 | 74,4 | 14,3 | 16,1 |
| Portugal | 15,2 | 20,4 | 29,7 | 7,7 | 9,1 |
| Spain | 17,3 | 19,4 | 27,2 | 5,2 | 4,8 |
| Sweden | 5,5 | 30,2 | 38,7 | 24,2 | 21,5 |
| United Kingdom | 16,1 | 26,4 | 34,9 | 8,9 | 12,4 |
| CEEC's | 5,0 | 22,4 | 30,1 | 22,1 | 31,4 |
| Bulgaria | 2,4 | 17,4 | 30,9 | 32,6 | 38,2 |
| Czech Republic | 9,7 | 32,1 | 47,6 | 19,3 | 28,1 |
| Estonia | 5,8 | 47,6 | 58,0 | 29,1 | 47,4 |
| Hungary | 9,2 | 40,2 | 45,6 | 19,5 | 23,9 |
| Latvia | 13,2 | 27,0 | 29,7 | 9,4 | 32,1 |
| Lithuania | 5,6 | 19,3 | 22,2 | 16,7 | 43,0 |
| Poland | 1,6 | 16,8 | 23,5 | 34,6 | 46,4 |
| Romania | 5,4 | 15,5 | 19,3 | 15,1 | 24,5 |
| Slovak Republic | 2,3 | 14,6 | 30,6 | 33,4 | 41,5 |
| Slovenia | 6,7 | 13,2 | 17,3 | 11,1 | 16,2 |

Source: UNCTAD, European Comision and EEG

The analysis of the origin of the high stocks of foreign capital that have been accumulated by the CEECs shows that a substantial proportion comes from the EU. Within the Fifteen Germany is by far the largest investor in the area, followed by Holland³, France and Austria. To the contrary, as is shown clearly in FIGURE 2, Greece and, even more so, Spain and Portugal play an insignificant role.



3. Possible determining factors for the patterns of direct investment: brief theoretical overview

In order to explore the determinants of the patterns observed in direct foreign investment made in the present members and in the candidates for accession to the Union, it is wise to start off by considering the hypotheses postulated by the models that endeavour to explain company internationalisation strategies. In this respect, it may be stated that, within the abundant literature

³ Note that the data for Holland may be overestimated, as the highly favourable taxation that this

available on the issue, the OLI paradigm, developed by Dunning (see Dunning, 1974, 1993 and 2000) continues to be a useful theoretical framework. Thus, the OLI paradigm – the name of which refers to the acronym of the three types of variables: Ownership, Location and Internalisation, used to try and explain direct investment – provides a wide range of economic, social and political features that apparently exert an influence on the choice of the place of location of direct investments and, therefore, on the territorial expansion strategies of the multinational companies. The set of location advantages that may be offered by the different countries ranges from those affecting installation costs (price of land, legal formalities entailed in the establishment or purchase of companies by foreign investors) to those which (like taxes on returns on investment or regulations governing the repatriation of profits of companies owned by foreign capital) affect profits, through the whole gamut of factors (wages and salaries, labour legislation, infrastructure, trade barriers, etc.) that affect to the productive and commercial activity of foreign investors.

However, despite its usefulness, it may be argued that the OLI framework does not cease to be a kind of taxonomy, more appropriate for the description of the patterns observed in direct investments than for explaining their determining factors⁴. In this respect, we believe that the economic geography models that have reappeared in the last few years stimulated by the work of Krugman (1991a), which combine the traditional factorial endowment variables with geography, may be of greater help in understanding the patterns of location of direct investments.

Indeed, in these models (a good overview of which may be obtained in Ottaviano and Puga, 1998; Puga, 2002 and Fujita, Krugman and Venables, 2001) it is claimed that the presence of growing returns to scale and economies of agglomeration –defined as positive externalities associated with the concentration of economic activities in the territory– along with the existence of

country applies to foreign investors encourages their use as an investment platform.

⁴ Bevan and Strin (2000) analyse the determinants of direct foreign investment, focusing solely on the framework of the OLI theory and using a gravitational model too.

transport costs make the geographical location of countries a decisive factor in their ability to attract international investment projects. This factor may eventually counteract the trends in the mobility of the productive factors –and therefore in the location of investments– guided by the differences in the factorial endowments of the countries.

This means that in this framework it is possible to understand the existence of processes of polarisation of domestic and foreign investments in certain territories, whether at country or regional level. The reasons that are used to explain the existence of polarisation processes are varied. Thus, for instance, Krugman (1991b) suggests that the mobility of the workers attracted by the higher salaries and supply of goods offered in the areas where companies are concentrated is the mechanism which feeds the processes of cumulative causation that lead to the spatial concentration of economic activity. Venables (1996), however, upholds that the real driving force of the polarisation trends is the intermediate consumption exchanges – i.e. input-output transactions – that take place between companies and which are fostered by the lower transport costs resulting from geographical proximity. On the other hand, Puga (1999) postulates the influence of both factors and contends that the barriers to the mobility of workers – as happens in the case of Europe – may weaken the processes of spatial concentration of investments to the extent that, if workers cannot move freely to the areas that concentrate activity and offer higher wages and salaries, wage differentials will tend to be perpetuated, thereby discouraging the accumulation of further investments in the area.

In short, even though the new economic geography models do not provide a clear explanation of the location of the investments, they do shed light on the variables that affect it and on the complex interrelations that may be established between them, in particular between factorial endowments and geographical location. This, in our view, is in line with the complexity that we observe in the patterns of investment location in the international scene, in general, and in Europe, in particular.

Accordingly, as an initial approach to the analysis of the factors determining the dynamics exhibited by direct investment in the countries of the future enlarged Union, we will carry out a simple correlation analysis between the stocks of foreign capital of each of these countries and some of the explanatory variables that are suggested in these models: the different productive factor endowments: human capital, technological capital, the physical capital/labour ratio, and a road transport infrastructure indicator, as well as geographical location⁵. The value of these variables for each of the countries and the respective correlation coefficients are set out in TABLE 2. As was to be expected, all the factors considered are related positively to the foreign capital stock that the countries possess, with the exception, naturally, of the variable that reflects the distance to the “economic centre of gravity of the EU”.

⁵ The definition of these variables and the explanation of the method and sources used in their preparation are set out in the APPENDIX, with the exception of the variable “geographical location”, which is calculated as the mean of the distance from the capital of each country to Paris and Berlin, weighted by the population of both.

Chart 2: Inward Foreign Direct Investment stocks in the European Union and the CEECs and some possible determining factors. 1999

| | Inward FDI Stock over GDP | Geographic Situation | Human Capital | Technological Capital | Physical Capital/Employment | Transport Infrastructure Facilities |
|----------------------------------|------------------------------|-------------------------|------------------|--------------------------|--------------------------------|---|
| | % | Km | Years | UE (27) = 100 | Miles of \$ / employees | UE (27) = 100 |
| European Union | | | | | | |
| Austria | 11,2 | 720 | 10,9 | 117,5 | 160,2 | 150,6 |
| Belgium & Luxembourg | 68,6 | 491 | 10,8 | 118,7 | 156,6 | 275,5 |
| Denmark | 23,7 | 615 | 12,5 | 157,4 | 152,4 | 136,6 |
| Finland | 14,3 | 1414 | 11,4 | 152,1 | 142,5 | 81,6 |
| France | 17,0 | 543 | 10,8 | 161,5 | 148,9 | 152,1 |
| Germany | 14,2 | 334 | 13,2 | 184,1 | 155,9 | 160,2 |
| Greece | 12,6 | 1914 | 9,9 | 13,6 | 81,4 | 58,0 |
| Ireland | 43,2 | 1114 | 11,6 | 68,0 | 111,5 | 96,5 |
| Italy | 9,2 | 1159 | 10,1 | 67,2 | 137,9 | 116,6 |
| Netherlands | 48,3 | 520 | 11,3 | 150,3 | 131,4 | 207,0 |
| Portugal | 20,4 | 1983 | 7,1 | 15,7 | 60,0 | 83,2 |
| Spain | 19,4 | 1555 | 8,9 | 32,4 | 109,2 | 122,8 |
| Sweden | 30,2 | 1097 | 12,0 | 249,4 | 128,3 | 106,3 |
| United Kingdom | 26,4 | 706 | 13,1 | 139,5 | 100,1 | 82,7 |
| CEECs | | | | | | |
| Bulgaria | 17,4 | 1489 | 9,5 | 4,0 | 8,6 | 34,9 |
| Czech Republic | 32,1 | 512 | 11,8 | 19,7 | 32,8 | 144,2 |
| Estonia | 47,6 | 1357 | 9,7 | 8,4 | 62,6 | 132,3 |
| Hungary | 40,2 | 920 | 13,4 | 10,1 | 29,2 | 39,9 |
| Latvia | 27,0 | 1177 | 9,9 | 3,8 | 38,0 | 153,0 |
| Lithuania | 19,3 | 1162 | 9,3 | 3,9 | 27,6 | 169,1 |
| Poland | 16,8 | 853 | 11,9 | 4,3 | 18,1 | 64,8 |
| Romania | 15,5 | 1527 | 9,3 | 7,4 | 12,8 | 24,0 |
| Slovak Republic | 14,6 | 760 | 8,5 | 27,5 | 44,9 | 44,6 |
| Slovenia | 13,2 | 817 | 10,9 | 21,6 | 52,9 | 115,6 |
| Correlation Coefficients* | | | | | | |
| European Union | | -2,8 | 23,1 | 35,6 | 25,8 | 21,8 |
| CEECs | | -7,5 | 17,7 | 22,8 | 20,2 | 13,3 |
| Total | | -1,9 | 17,7 | 27,3 | 19,6 | 16,6 |

* Simple correlation coefficient among all bilateral foreign capital stocks between countries in the sample in the period 1992-1999

Source: OECD, EUROSTAT, UNESCO, IMF, UNCTAD and EEG

4. Estimation and results

On the basis of the consideration of the variables specified in the OLI paradigm and, more justifiably, in the economic geography models, and after carrying out an initial assessment of their relationship to the direct investment data, we may formulate an equation to examine their explanatory capacity in greater depth. The equation proposed is as follows:

$$fdi_{ijt} = a_{ij} + b_1 ta_{ijt} + b_2 rfe_{ijt} + b_3 hc_{jt} + b_4 tif_{jt} + b_5 dist_{ij} + e_{ijt}$$

where the variables are expressed in logarithms and the meaning of them is as explained below:

fdi_{ijt} : Foreign direct investment stock of the investor country in the host country as a share of its GDP.

ta_{ijt} : Technological advantage of the investor country over the host.

rfe_{ijt} : Relative factorial endowment of physical capital/labour of the investor country in respect of the host.

hc_{jt} : Human capital endowment of the host country.

tif_{jt} : Transport infrastructure facilities of the host country.

$dist_{ijt}$: Distance between capitals of the home and host countries.

The subindices i, j and t refer to the investment home country, the host and the year, respectively.

The sample is made up of the fifteen countries of the present European Union and the ten countries of Central and Eastern Europe that will foreseeably have joined the European Union in 2007. The analysis is done for the sample as a whole and for its segmentation between the current and future members. The time period in question is that lying between 1992 and 1999.

The first of the regressors incorporated into the equation, ta , is an approach to the advantages of ownership, the first group of the trilogy put forward by the OLI paradigm in order to explain direct investment. Specifically, it is the investor's technological advantages in relation to the recipient. Naturally, the sign expected in the estimation is positive. The second of the regressors, rfe , the relative physical capital/labour endowment of the investor country in relation to the recipient's, tries to measure the influence of the factorial endowments of the countries in the determination of the structure of direct investment. Accordingly, a positive sign is to be expected here also, since this would be indicative of the fact that, as with the traditional model, investments come from

the countries that have a relatively abundant capital endowment and are directed towards ones that are comparatively better endowed in terms of labour. For their part, the variables *hc* and *tif*, which measure the human capital and road transport infrastructure stock endowments, respectively, are included in order to detect the influence that is exerted on the configuration of the pattern of direct investment by two of the location advantages postulated in the OLI paradigm – advantages which, furthermore, have sound empirical backing in prior studies on the determinants of direct investment, in particular that of human capital. It is therefore to be expected that in the estimation of the equation both show a positive sign, which endorses their role as factors that attract the location of direct investment projects. Finally, through the variable *dist*, the distance between the countries of origin and destination of direct investment, the aim is to detect the negative association that is postulated in all the economic geography models between distance and intensity of economic transactions –including direct investment ones– which are established between the countries.

For the estimation of the model, panel methodology is followed for two reasons. The first of these is the probable existence of individual country effects not included in the estimation –different legislations, cultural aspects, etc.– which could generate a problem of omitted variables. The second of the reasons is the possibility that such individual effects, where applicable, could cause a problem of inconsistency if correlated with the other explanatory variables. However, as is common knowledge, this problem can be detected and overcome by estimating with panel techniques and through the use of Hausman’s test (Hausman and

Taylor, 1981). In fact, when estimating the model in this way, it has been found that the value obtained for this test rejects the null hypothesis of absence of correlation between the fixed effects and the explanatory variables in each of the sub-samples. Therefore, the best idea is to use the within estimator, the only one that proves consistent in such circumstances.

Although, in principle, this estimator has the drawback of the loss of the invariant time variable coefficients, these may be recovered by following the methodology proposed in Arellano and Bover (1990), which basically consists of carrying out a regression of the invariant time variables on the residues obtained in the within estimation.

The results of the estimation are set out in TABLE 3. Specifically, the first column shows those referring to the whole sample (the enlarged EU) and the results of the fifteen members of the EU and the CEECs, respectively, appear in the next two columns.

Now, as may be seen, the estimation of the equation provides a reasonable explanation of the dynamics exhibited by the bilateral direct investment stocks of the countries of the future enlarged EU over the last few years, in which the candidate countries have opened up to direct investment and trade with the Fifteen, in the framework of the Association Agreements. All the regressors show positive signs and are significant, apart from a few exceptions for the case of the CEEC sub-sample.

The results supply additional evidence in favour of the proposed economic geography models, which assert the importance of geography, since, as may be seen, proximity is a key variable for explaining the trend and changes in the structure of bilateral direct investment stocks, especially in the area of the CEECs. As is also postulated by these models, this fact represents no impediment for the differences in the factorial endowment of the countries to go on being a significant variable for the understanding of the patterns of direct investment. In this respect, our results suggest that, in fact, this variable has exerted a greater influence on the determination of investment in the CEECs than in the present members, which have higher levels of economic development⁶. In addition, the values obtained for the variable that measures human capital endowment clearly underline its importance as a factor of attraction of direct investment projects towards a territory and support the essential role that it appears to have played in the swift influx of abundant foreign capital that the CEECs experienced in the nineties. On the other hand, and in keeping with the candidates' poor road transport infrastructure (see BERD, 2000), this variable is not significant in the estimation referring to this set of countries, even though it is in the area of the Fifteen.

⁶ These results are in line with those obtained in other studies (Lankes and Venables, 1997; Landesmann, 2000; BERD, 2000 and 2001 and Martín and Turrión, 2003), which find that the multinationals have set up in the CEECs with the preferential strategy of capitalising on their advantageous wages and salaries and geographical location by using them as production centres and exporting platforms.

| TABLE 3: RESULTS OF THE WITHIN ESTIMATOR | | | |
|--|-------------------------|-------------------------|-------------------------|
| Dependent variable: Inward FDI Stock over GDP | | | |
| 1992-1999 | | | |
| | SAMPLE | EU | CEECs |
| Constant | - | - | - |
| TECHNOLOGICAL ADVANTAGE of the home country in respect of the host country (TA) | 0,203942 (3,73288) | 0,161276 (3,15787) | 0,156391 (1,84448) |
| RELATIVE FACTOR ENDOWMENTS of the home country in respect of the host (RFE) | 0,615112 (11,1745) | 0,150975 (2,94636) | 0,729784 (9,44789) |
| HUMAN CAPITAL STOCK of the host country (HC) | 8,7546 (28,0581) | 6,17186 (22,7927) | 9,30405 (12,6748) |
| TRANSPORT INFRASTRUCTURE FACILITIES in the host country (TIF) | 0,855512 (2,70359) | 0,999029 (3,60197) | 0,030352 (0,038834) |
| DISTANCE (DIST) | - | - | - |
| Hausman Test (CHISQ(5)) | 40,916 | 70,333 | 27,924 |
| Number of individuals | 816 | 476 | 340 |
| Number of observations | 6528 | 3808 | 2720 |
| Recovery of the invariant time variable coefficients | | | |
| Constant | -27,5794 (-61,7346) | -23,4194 (-39,7361) | -26,3741 (-42,4163) |
| DISTANCE (DIST) | -0,398199 (-6,88191) | -0,132625 (-1,75610) | -0,682563 (-8,41280) |
| Number of individuals | 816 | 476 | 340 |
| Number of observations | 6528 | 3808 | 2720 |

5. Conclusions and final considerations

In this paper we have analysed one of the main economic effects of EU enlargement: the adjustments that may take place in the flows and, consequently, in the foreign investment stocks of the present and future members. In this respect, here we have considered the ten Central and Eastern European countries (CEEC) which will foreseeably have joined the Union in 2007. More specifically, taking as a theoretical reference the OLI paradigm and, fundamentally, the ideas put forward by the recent economic geography models, as a first step we proceeded to the statistical analysis of the trends and changes in the geographical structure of direct investment in the countries of the future enlarged Union. Then, we used panel data techniques to estimate an empirical

model in order to examine the factors determining the patterns observed previously.

The results obtained in this study suggest that the steep and fast growth that has taken place in the foreign direct investments received by the CEECs during the nineties – while some countries of the Fifteen, including the Cohesion ones, declined as the destination for foreign direct investment – is explained, amongst other factors, by their relative labour abundance and the resultant advantages in manpower costs, their good human capital endowment and their geographical proximity to the more developed countries of the EU. These factors, besides the transport infrastructure endowment, also prove significant in explaining the investment patterns of the Fifteen over the same period.

Now, since the accession of the CEECs as full members Union will represent the culmination of the process of investment liberalisation that has taken place in these years, it is reasonable to think that the patterns observed in investment and the factors that apparently determine them will continue to operate in the coming years. In this respect, there are grounds for believing that if the investment pattern exhibited in the nineties is prolonged, the Cohesion Countries could see their relative position decline even further as recipients of foreign investments in the enlarged EU, as a consequence of the deviation of investment flows towards the new members.

Appendix. Model variables and sources used in their elaboration

Foreign Direct Investment Stock (DFI): The data for the EU countries are obtained from the OECD publication *International Direct Investment Yearbook*. For the other countries (the CEECs) the data come from their national banks and investment agencies.

As these data can be obtained from a dual standpoint: both the home country's and host country's, and in view of the differences observed between them, we have taken the mean of the resultant data in each case.

Technological advantage (TA): The technological advantage of the investor country in respect of the host is defined as the ratio of their respective technological capital stock ($SKTi/SKTr$). For the preparation of this variable we have calculated technological capital stocks on the basis of the Perpetual Inventory Method with data obtained from publications of the OECD (*Main Science Technology Indicators, Basic Science and Technology Statistics, Research and Development Expenditure in Industry*), EUROSTAT (*R&D and innovation statistics in candidate countries and the Russian Federation*) and the UNESCO (*Statistical Yearbook*).

Relative Factorial Endowment (RFE): This variable is defined as the physical-labour capital ratio in the host country in relation to the investor country's. For the calculation of the physical capital stock the perpetual inventory method was applied. The statistical sources used for its preparation are: OECD: *National Accounts, Labour Force Statistics*; EUROSTAT: *Employment and labour market in Central European countries*; United Nations: *Statistical Yearbook*; IMF: *International Financial Statistics Yearbook*

Host country's Human Capital Stock (HC): It is defined as the mean number of years' education of the working age population. It is obtained from census data regarding the maximum level of schooling attained by the working age

population, taking into account the average duration of the educational cycles. This indicator is similar to that used by Barro and Lee (1993). The statistical sources used for its preparation are UNESCO: *Statistical Yearbook*, OCDE: *Education at a Glance* and EUROSTAT: *Education Across the European Union*

Transport Infrastructure Facilities (TIF): This variable is calculated as a simple mean of the kilometres of motorway equivalent per inhabitant and per square kilometre. In turn, the kilometre of motorway equivalent is obtained by means of the weighted sum of the different road networks: motorways, national – which have a weighting of ¼ in respect of motorways -, provincial -1/8- and local and urban roads -1/16-. In addition, this indicator is standardised in accordance with the total of the countries of the sample.

Specifically, the formula for calculating this indicator is as follows:

$$TIF_{p,t} = 0,5 \frac{\frac{\sum_{i=1}^4 c_i km_{i,p,t}}{pob_{p,t}}}{\frac{\sum_{i=1}^4 c_i km_{i,UE(27),t}}{pob_{UE(27),t}}} + 0,5 \frac{\frac{\sum_{i=1}^4 c_i km_{i,p,t}}{sup_p}}{\frac{\sum_{i=1}^4 c_i km_{i,UE(27),t}}{sup_{UE(27)}}}$$

where c is the weighting given to each type of road, km is the number of kilometres of each type of road, pob is the population, sup is the area, and the subindices i , p and t refer to the type of road, the country and the time, respectively.

The statistical sources used for the preparation of this variable are: UN: *Annual Bulletin of Transport Statistics for Europe and North America*, *Statistical Yearbook for Asia and the Pacific*; OECD: *National Accounts for OECD Countries. Main Aggregates*.

Distance (Dist): Distance in kilometres between the capitals of the investment issuing and host countries. These data have been obtained from the PC-Globe program and from the Internet address www.indo.com/distance/.

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