Does Foreign Direct Investment Replace Trade? Empirical Evidence for the European Union

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ABSTRACT: International trade and foreign direct investment (FDI) have grown at fast paces during the last decades. At this point, however, it is not clear whether trade and investment are regarded by firms as complementary ways of accessing other markets, or, instead, if they are employed as alternative strategies. This paper examines this issue empirically, for the particular case of Europe, an area in which commercial and economic integration has gained remarkable momentum since 1996. More specifically, we test whether the reduction of trade barriers over time among the members of the European Union has increased not only trade flows but also FDI within those countries. We estimate a gravity model for intra Europe FDI and, separately, for FDI coming to the EU members with origin in third countries. In addition to trade integration measures, we also analyze the potential role of other traditional determinants of FDI, as the market size of the host country and the cost differential among home-host economies. Our results suggest that trade and FDI reinforce each other, thus being complements rather than substitutes in Europe. This effect is apparent for the intra-EU flows and also for FDI inflows from countries outside EU. Cost differentials are not as relevant as the possibility of gaining market share which leads us to conclude that in the EU the FDI pattern follows a horizontal strategy rather than a FDI vertical model.

1.- INTRODUCTION AND BACKGROUND

During the second half of the XXth century and the first decade of the XXIst the world economy has been immersed in an accelerated process of internationalization and globalization. The increasing competition and rivalry in markets have changed the pattern of goods production and distribution, intensifying international linkages and deepening economic inter-dependence among areas. In this scenario, commercial transactions and foreign investments have gained significant momentum. Global trade, which amounted to 27% of world GDP in 1970, was more than 55% in 2010. The evolution of FDI is even more impressive: the ratio FDI/GDP was 6 times higher in 2010 (30.5%) than in 1980 (5.5%).

On a priori grounds, it is not straightforward to state whether FDI and trade have been considered by firms as complementary or alternative ways of serving foreign markets. Empirical evidence in this regard is ambiguous: while a number of studies suggest a relationship of complementarity between trade and FDI at the aggregate level, other studies, usually working at a more disaggregated level, are inconclusive. Brainard (1997) and Di Mauro (2000) report a positive relationship between international trade and FDI; they justify this effect by the fact that FDI and trade share common determinants. Alguacil *et al*. (2002) and Cuadros *et al*. (2004) find a causal relationship from FDI to exports for Mexico and Latin America, respectively. Brenton *et al*. (1999) and Egger and Pfaffermayer (2004) suggest a complementarity relationship between trade and FDI in the European Union and Central-Eastern European Countries (CEECs). Neary (2009) finds evidence in favour of the export-platform FDI hypothesis, whereby firms locate plants in one nation as a way of covering a larger area. Goldberg and Klein (1999) analyse American outward FDI to Latin American countries and find different results for alternative host countries and industries. Blonigen (2001) and Head and Ries (2001) report a substitution relationship between exports and FDI for the United States and Japan in the automotive, automotive spare parts and electronic sectors. Fillat-Castejón *et al*. (2008) analyse the service sector; they find a relationship of complementarity at the aggregate level but a substitution effect for transport and construction services.

There are still questions that are relevant for policymakers and remain unsolved by the empirical literature. Commercial integration –as characterized by the reduction of tariff (TBs) and nontariff barriers (NTBs)– has often been captured in the empirical literature by using dummy variables which represent the existence of Bilateral Trade Agreements (BTAs) or Regional Integration Agreements (RIAs) (Brenton *et al*. 1999, Di Mauro, 2000; Egger and Pfaffermayer, 2004a, 2004b, among others). In this paper we propose an alternative measure of commercial integration, based, in turn, on some findings from the literature on the border effect or home bias. In this paper we want to address the connexion between trade integration and FDI in the context of a highly integrated area, such as the EU.

The remainder of the paper is organized as follows. In section 2 we describe the model and data used to measure the border effect. Section 3 discusses the trade integration-FDI nexus and presents the empirical results; in section 4 other measures of EU trade integration (country's European trade openness and the average intra-European trade openness) are used in order to test the robustness of the results obtained in section 3; finally in section 5 we present some concluding remarks.

2.- THE MEASURE OF THE BORDER EFFECT

2.1. Specification

The border effect captures the relative size of intra-national trade when compared to international trade for a specific country. Its detection and study may be traced back to McCallum (1995) and Helliwell (1996). These authors estimated a gravity model for trade both between Canadian provinces and between Canadian provinces and the US states. They found out that trade between two Canadian provinces was about 22 times larger than trade between a Canadian province and a US state, after controlling for size and distance. Although subsequent studies (as Anderson and Van Wincoop ,2003 and Liu *et al.*, 2010) argued that McCallum estimates were biased due to the effect of omitted variables and that is the reason they found a smaller size border effect than previous studies. The aforementioned papers of McCallum and Helliwell prompted an active area of research which intended to quantify and understand the phenomenon (Wei, 1996; Nitsch, 2000; Wolf, 2000; Head and Ries, 2001; Helliwell and Verdier, 2001; Hillberry and Hummels, 2002; Chen, 2004; Gil-Pareja et al, 2005; Qian, 2007; Dias, 2010 and 2011, among others).

The gravity equation has been widely and successfully used to explain bilateral trade flows and to investigate the potential existence of the home bias. Although initially the gravity equation lacked theoretical foundation, Anderson (1979) and Helpman and Krugman (1985) developed a theory to justify the gravity model by using a differentiated product framework and increasing returns to scale. Bergstrand (1985 and 1989) found evidence in favour of the gravity equation from a Dixit-Stiglitz

(1977) monopolistic competition model. Even the Heckscher-Ohlin international trade model admits easily interpretations that can be applied to the gravity equation (Deardorff, 1995).

In its simplest form, the gravity equation states that the volume of trade between any two countries is positively correlated with the economic size of these countries and negatively correlated with the geographic distance between them (Tinbergen, 1962). Therefore, the gravity model offers a plausible framework to estimate the border effects in trade and allow us to construct a variable capable of measuring the degree of commercial integration. In order to achieve this, the following specification has been used:

$$\ln X_{ijkt} = \alpha + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln Dist_{ij} + \beta_4 Adj + \beta_5 Lang + \\ + \beta_6 Home_{1995} + \ldots + \beta_{17} Home_{2006} + u_{ijkt} \quad (1)$$

where X_{ijkt} are the *k*-sector bilateral exports from country *i* to country *j* in year *t*. Y_i and Y_j are the Gross Domestic Products (GDPs) of the exporter and importer countries, respectively. $Dist_{ij}$ stands for the distance between country *i* and country *j*. Adj and Lang are dummy variables which take value 1 if two countries share a common border and the same language, respectively, and 0 otherwise. $Home_{1995,\ldots,2006}$ are dummy variables which take the value 1 for intra-national trade and 0 otherwise for a certain year. u_{ijkt} is assumed to be a log-normally distributed error term.

The key parameters in equation (1) are those corresponding to the dummies for $Home_{1995}$ to $Home_{2006}$ since we can recover the border effects for each year from their point estimates. The border effect for a particular year can be computed as the exponential of the point estimate associated to the Home dummy for that year.

2.2. Data and methodology

Data on bilateral trade and GDP (in real terms and 2005 US dollars) come from the Structural Analysis (STAN) and National Account Databases published by the OECD Statistical Office. We have worked with data disaggregated by industries to obtain more accurate estimations[1]. Since our purpose is to compare the relative volumes of intra-national and international trade, the dependent variable includes observations of both international and intra-national trade flows. These databases, however, do not provide data for domestic trade (or, in other words, countries' imports from themselves). As in Wei (1996), Nitsch (2000), Head and Mayer (2000) and Chen (2004), we have computed domestic trade for each country as the difference between its total production of goods and its exports to the rest of the world.

Data on bilateral and intra-national distances are provided by the *Centre d´Etudes Prospectives et d´Informations Internationals* (CEPII). Intra-national distances are crucial since the estimated border effect is very sensitive to this measure (Wei, 1996). In this paper, domestic distances are calculated using the area-based formula proposed by Head and Mayer (2000)[2]. Language and adjacency dummies are also supplied by the CEPII. We employ data on bilateral trade for 23 sectors of activity among 19 European countries[3] over the period 1995 to 2006, leading to 89,424 potential observations[4]. This deep disaggregation of data allows us to construct a

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[1] Hillberry (2002) argues that the degree of preference for domestic goods may differ according to the type of commodity considered. Hence, it is preferable to work with data disaggregated by industries.

[2] $D_{ii} = 0.67 \times \text{sqrt}(area/\pi)$.

[3] Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Belgium-Luxembourg, Poland, Portugal, Spain, Slovakia, Sweden and the United Kingdom.

[4] 23 (sectors) x 18 (exporting countries) x 18 (importing countries) x 12 (years).

more accurate variable that reflects the reduction in trade variables how it could affect the so called home bias effect.

We suggest a measure of European commercial integration based on the evolution of the estimated yearly border effect –in the spirit of Qian (2007): The estimation technique employed is the Hausman-Taylor (HT) estimation. This procedure has, in our opinion, several advantages. First, the HT model provides parameter estimates of time-invariant variables such as distance, language and adjacency. The fixed effects model, although consistent, does not supply such estimates. Furthermore, and in contrast to the traditional random effects model, the HT model eliminates the bias in parameter estimates stemming from endogenous unobserved effects. Finally, it is more efficient than the fixed effects estimator.

2.3. The magnitude and evolution of the border effect

The estimation of equation (1) by the Hausman-Taylor procedure allows us to asses the annual average border effect for the 19 countries and 23 industries in our sample. Table 1 shows the results in this respect. Standard gravity variables, such as economic sizes and distances, display the expected signs and are statistically and economically significant. The GDP coefficients range from 0.6 for the exporter country to 1.8 for the importer country. This means that an increase of one point in the exporter's GDP raises trade flows by around 0.6. Similarly, a one point increase in the distance between the two partners decreases trade by about 1.5. Language and adjacency dummies are positive and statistically significant. Sharing a common language and/or being adjacent to the trade partner reduce transaction costs and therefore enhance trade flows.

TABLE 1. GRAVITY EQUATION WITH BORDER EFFECTS

Dep. variable	Real Bilateral Exports form country *i* to country *j*
Y_i	0.612*** (0.121)
Y_j	1.831*** (0.352)
$Dist_{ij}$	-1.561*** (0.222)
Adj	0.233*** (0.029)
Lang	0.108*** (0.016)
$Home_{1995}$	2.715*** (0.843)
$Home_{1996}$	2.670*** (0.884)
$Home_{1997}$	2.611*** (0.693)
$Home_{1998}$	2.532*** (0.745)
$Home_{1999}$	2.502*** (0.772)
$Home_{2000}$	2.433*** (0.622)
$Home_{2001}$	2.366*** (0.657)
$Home_{2002}$	2.309*** (0.693)
$Home_{2003}$	2.216*** (0.567)
$Home_{2004}$	2.136*** (0.607)
$Home_{2005}$	2.089*** (0.633)
$Home_{2006}$	2.010*** (0.688)
# Observations	85 845
Pseudo–R^2	0.482
Sargan-Hansen Test for the validity of instruments	0.232

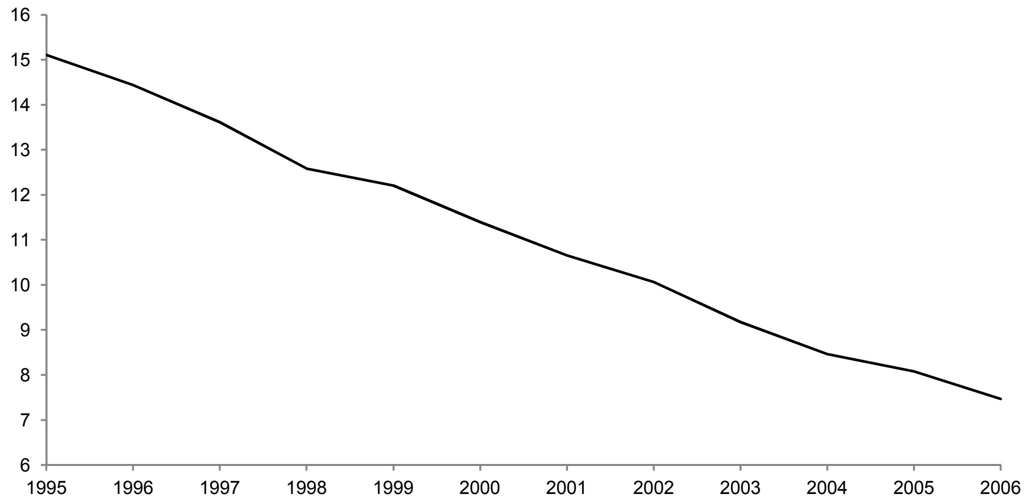
Source: own elaboration

Notes: *** represents significance at the 1% level. Robust standard errors in parenthesis. Dependent variable, Y_i, Y_j and $Dist_{ij}$ are in natural logarithms. The Hausman statistic rejects the null hypothesis of no correlation between unobserved individual effects and explanatory variables in all cases. Sargan-Hansen over-identification tests are *p*-values. Fixed effects for source and destination countries are included (Feenstra, 2002).

The key parameters in table 1 are those corresponding to the dummies for $Home_{1995}$ to $Home_{2006}$ since we can recover the border effects for each year from their point estimates. The border effect for a particular year can be computed as the exponential of the point estimate associated to the Home dummy for that year. Thus, the border effect for 1995 can be obtained as: exp(2.715) = 15.105; this figure means, in turn, that a EU-19 country's intra-national trade in 1995 was 15.1 times larger than its trade with a European partner, after controlling for gravity variables.

As it can be seen in figure 1, border effects decline continuously over the period analysed, experiencing a 50% reduction from 1995 to 2006. This means that intra-national trade become less important in terms of international trade and therefore, that a commercial integration process is taking place among the 19 European countries considered.

FIGURE 1. EVOLUTION OF THE BORDER EFFECT IN THE EUROPEAN UNION



Source: own elaboration

The evolution of the home bias effects is clearly negative, what means a favorable and deep evolution into the integration process. The figure that shows the change of the intra-European trade openness rate (see figure A1 in the appendix) shows fluctuations that are correlated with episodes of crisis. It can be distinguished three periods: until 2001, where there is little change with slight negative evolution motivated for the higher growth of GDP relative to exports and imports. From 2002 until 2007, period that is coincident with the economic expansion, trade experienced a deep expansion; and after 2008 where it seems that the economic crisis has influenced the degree of openness (both imports and exports have decreased substantially in Europe). The idea is that the openness measure that is used in most studies shows a high sensitivity to economic fluctuations; therefore, it seems more adequate to use the evolution of the home bias effect as a proxy for integration.

We now turn to the construction of the variable proposed in the paper to measure commercial integration, based on the estimation of the border effect. It is well known in the economic literature that the magnitude of the border effect is crucially affected by the measure of intra-national distance employed. In addition, although distance affects the magnitude of the border effect, it has no influence on its evolution (rate of growth)[5]. Therefore, in order to avoid the potential distortion because of magnitudes, we generate an index where the border effect in 1995 equals one and then, we compute the inverse of the indexed border effect and compute the evolution of the variable, with the aim of making easier the interpretation of results. This is, we construct a variable where higher values stand for higher commercial integration (see, column 5 and last column in table 2).

TABLE 2. BORDER EFFECTS (DETAILED)

Year	$Home_t$ Coeficient (β_n)	Border Effect $\exp(\beta_n)$	Border Effect RoG (%)	Border Effect Index (BEI) (1995 = 1)	Commercial Integration $(BEI)^{-1}$
1995	2.715	15.105	--	1.000	1.000
1996	2.670	14.440	-4.40	0.956	1.046
1997	2.611	13.613	-5.73	0.901	1.110
1998	2.532	12.579	-7.60	0.833	1.201
1999	2.502	12.207	-2.96	0.808	1.237
2000	2.433	11.393	-6.67	0.754	1.326
2001	2.366	10.655	-6.48	0.705	1.418
2002	2.309	10.064	-5.54	0.666	1.501
2003	2.216	9.171	-8.88	0.607	1.647
2004	2.136	8.466	-7.69	0.560	1.784
2005	2.089	8.077	-4.59	0.535	1.870
2006	2.010	7.463	-7.60	0.494	2.024

Source: own elaboration

[5] See Wei (1996), Nitsch (2000) and Chen (2004) among others.

3.- EUROPEAN COMMERCIAL INTEGRATION AND FDI

As mentioned before, the gravity equation is one of the most often applied empirical techniques to analyze bilateral trade. However, in the last fifteen years it has been applied to the empirical analysis of foreign direct investment (Brenton, 1996; Eaton and Tamura, 1996; Brainard, 1997; Brenton *et al*. 1999; Di Mauro, 2000; Markusen and Maskus, 2002; Egger and Pfaffermayer, 2004; Braconier *et al*. 2005, among others). In fact, the gravity model has proved to be empirically successful in explaining sales of foreign affiliates of multinational firms and recently it has been provided with a theoretical foundation (Kleinert and Toubal, 2010).

Once we have analysed the evolution of the EU border effect and proposed a variable of commercial integration, the next step is to test whether European commercial integration, captured by using the home bias evolution variable, has had an influence on FDI coming to EU countries. In order to explore this relationship we work with two different samples. First, we focus on intra-European FDI, i.e. foreign investments which have their origin and destination in an EU country. Next, we take into account FDI coming from outside the European Union[6].

We can observe, in figure A2 in the appendix, a positive trend for both types of FDI, however, intra-European investments present a stepper trend, and so, the rate of growth is larger and also much more significant than EU FDI from third countries, even relevant is not as significant as the other.

3.1. Specification

We consider three different econometric specifications for the determinants of FDI, based, respectively, on Markusen and Maskus (2002, MM thereafter), Braconier

[6] Investor countries considered are Korea, Japan, Norway, Switzerland and United States. It would have been interesting to include China (or Hong-Kong) but the lack of available data did not make it possible. These five countries account for about 42% of world FDI positions. They represent the main investors from abroad in the EU; between 15% (Korea) and 55% (Norway) of their investments are established in the European Union.

et al. (2005, BNU thereafter) and Kleinert and Toubal (2010, KT thereafter). MM and BNU models represent the new approach to FDI models, that allow for the existence of horizontal and vertical motivations, although, what is more important, these models integrate both horizontal and vertical FDI to come up with a new hybrid model named knowledge-capital.. KT paper provides the theoretical underpinnings of the gravity equation applied to the analysis of multinational production determinants. Precisely, they derive the gravity equation form three different models of multinational firms. The first one based on the monopolistic competition model proposed by Brainard (1997). The second one close to the monopolistic competition framework of Helpman *et al.* (2004), and finally, they also derive the gravity equation from a version of a two-country factor-proportions model of fragmentation based on Venables (1999). The empirical equations to be estimated are as follows:

Markusen and Maskus (2002):

$$\ln FDI_{ijt} = \alpha + \beta_1 \, Integration_t + \beta_2 \ln Dist_{ij} + \beta_3 \ln (Y_{it}+Y_{jt}) + \beta_4 \ln ((Y_{it}+Y_{jt})^2) + \\ + \beta_5 \ln DifSkill_{ijt} + \beta_6 \, TC_{it} + \beta_7 \, TC_{jt} + \beta_8 \, CPI_{jt} + u_{ijt} \quad (2)$$

Braconier et al. (2005):

$$\ln FDI_{ijt} = \alpha + \beta_1 \, Integration_t + \beta_2 \ln Dist_{ij} + \beta_3 \ln (Y_{it}+Y_{jt}) + \beta_4 \ln Size_{it} + \\ + \beta_5 \ln SizeQ_{it} + \beta_6 \ln Skill_{ijt} + \beta_7 \, TC_{it} + \beta_8 \, TC_{jt} + \beta_9 \, CPI_{jt} + u_{ijt} \quad (3)$$

Kleinert and Toubal (2010):

$$\ln FDI_{ijt} = \alpha + \beta_1 \, Integration_t + \beta_2 \ln Dist_{ij} + \beta_3 \ln Y_{it} + \beta_4 \ln Y_{jt} + \beta_5 \ln (Y_{it}+Y_{jt}) + \\ + \beta_5 \ln RFE_{ijt} + \beta_6 \, TC_{it} + \beta_7 \, TC_{jt} + \beta_8 \, CPI_{jt} + u_{ijt} \quad (4)$$

where FDI_{ijt} are the bilateral investment flows from country *i* to country *j* in year *t*. $Integration_t$ is a measure of the commercial integration variable proposed in the paper. Y_i and Y_j are the Gross Domestic Products (GDPs) of the home and host countries, respectively. $Dist_{ij}$ stands for bilateral distance. $Size_{it}$ captures the economic size of the home country relative to the host country. $SizeQ_{it}$ is the squared of $Size_{it}$.

The factor endowment is measured using different definitions in each of the models. In MM $DifSkill_{ijt}$ is defined as the difference in the relative skilled-labour endowments between country *i* and *j*. BNU define $Skill_{ijt}$ as the proportion between skilled and unskilled labour in the home country. Finally, KT characterizes RFE as the skilled-labour endowment relative to the total labour endowment for the host country.

TC_{it} and TC_{jt} are control variables intended to capture the market protection of the home and host countries. They are computed as the inverse of the trade freedom index from The Heritage Foundation. CPI_{jt} stands for the inverse of the Corruption Perception Index reported by Transparency International. It is used as a proxy of the investment costs in the host country.

3.2 Data, methodology and sample

The dependent variable for the three models presented is the sum of the bilateral FDI flows among countries *i* and *j* until date *t*. It is expressed in real terms and US dollars published by the OECD Statistical Office and UNCTAD. GDP (in real terms and 2005 US dollars) and bilateral distances come from the OECD's National Account Databases and the *Centre d´Etudes Prospectives et d´Informations Internationals* (CEPII), respectively.

Factor endowment variables are constructed using data on skilled and unskilled labour, obtained from the International Labour Office (ILO) and grouped according to the International Standard Classification of Occupations (ISCO-88). Following Markusen and Maskus (2002), the skilled-labour endowment is measured as the sum of workers in categories 1 (legislators, senior officials and managers), 2 (professionals) and 3 (technicians and associate professionals) from ISCO-88.

As in section 2, we consider that the Hausman-Taylor estimation technique for panel data gives an adequate framework to study the relationship between commercial integration and FDI and circumvent the possible endogeneity of variables and the fact of adding time-invariable determinants.

In the next sub-section we have distinguished two different scenarios. In the first one, we analyze the relationship between European commercial integration and intra-European FDI to study the relationship between the new variable obtained and also to control for other determinants that affect foreign investment. In the second, the approach is different; we have only included FDI from economies that do not belong to the EU. More specifically, we analyse FDI with origin in Korea, Japan, Norway, Switzerland and the United States[7] assuming that the FDI and the commercial integration relationship could be different and also driven by other factors when focusing on third countries out of the integration zone.

The intra-European sample includes 18 home and host countries (Belgium and Luxembourg are considered jointly) over 12 years (1995-2006) leading to 3,888 potential observations. The outer-European sample includes the 5 home countries mentioned above and 18 EU host countries over the period 1995-2006 (1,080 potential observations).

3.3. Results

Table 3 presents the outcomes for the intra-European FDI sample while table 4 reports the results for the second sample. The Sargan-Hansen test suggests that the models are correctly specified and that the instruments are valid.

[7] See note 6 for a justification.

Regarding the impact of commercial integration on FDI, our estimates reveal a positive and highly significant effect, both for the intra-EU and the FDI from third countries, and for total and non-services FDI alike. In other words, results suggest a relationship of complementarity between trade and foreign investment, in line with previous studies Brainard (1997), Brenton *et al*. (1999), Di Mauro (2000) or Egger and Pfaffermayer (2004). The point estimates of the integration effects, as conveyed by table 4, reinforce the export-platform FDI hypothesis (Neary, 2002 and 2009; Eckholm *et al*. 2003; Grossman *et al*. 2004 and Bergstrand and Egger, 2006). In other words, commercial integration of an area increases its appeal for foreign firms intending to serve the area.

Distance represents an obstacle not only to trade but also to foreign direct investment. Although point estimates are negative in both tables and for all the models considered, figures are noticeably smaller for the intra-EU FDI. They are only marginally significant (at the 10 per cent significance level).

TABLE 3. COMMERCIAL INTEGRATION AND INTRA-EUROPEAN FDI

	TOTAL FDI						NON-SERVICES FDI					
	(KT)		(BNU)		(MM)		(KT)		(BNU)		(MM)	
Integration	1.404***	(0.221)	1.548***	(0.213)	1.714***	(0.166)	1.492***	(0.231)	1.571***	(0.202)	1.693***	(0.168)
$Dist_{ij}$	-0.848*	(0.453)	-0.696*	(0.361)	-0.736*	(0.407)	-0.920*	(0.474)	-0.741*	(0.421)	-0.753*	(0.451)
Y_i	0.310***	(0.094)					0.244**	(0.101)				
Y_j	0.176**	(0.089)					0.866**	(0.427)				
$Size_{ij}$			0.671**	(0.287)					0.667**	(0.303)		
$SizeQ_{ij}$			-0.037*	(0.019)					-0.041**	(0.021)		
$(Y_i + Y_j)$	0.122***	(0.033)	0.356***	(0.066)	0.276***	(0.039)	0.799***	(0.262)	0.337***	(0.059)	0.278***	(0.038)
RFE_{ij}	0.548	(0.583)					0.539**	(0.254)				
$Skill_{ij}$			-0.126	(0.434)					0.652*	(0.386)		
$DifSkill_{ij}$					0.856	(1.126)					0.114*	(0.060)
$(Y_i - Y_j)^2$					-0.044**	(0.022)					-0.036**	(0.017)
TC_i	-0.122**	(0.054)	-0.124**	(0.053)	-0.139**	(0.054)	-0.817	(0.547)	-0.900*	(0.542)	-1.023*	(0.550)
TC_j	0.119	(0.264)	0.076	(0.507)	0.080	(0.533)	0.274	(0.527)	0.380	(0.528)	0.397	(0.537)
CPI_j	-0.349*	(0.204)	-0.324**	(0.152)	-0.326**	(0.165)	-0.290**	(0.121)	-0.266***	(0.010)	-0.272***	(0.096)
# Observations	2480		2480		2480		2480		2480		2480	
Pseudo- R2	0.462		0.481		0.405		0.447		0.452		0.410	
Sargan-Hansen Test for the validity of instruments	0.278		0.390		0.330		0.271		0.341		0.302	

Source: own elaboration

Notes: ***, ** and * represent significance at the 1%, 5% and 10% level, respectively. Robust standard errors are documented in parenthesis. Dependent variable: Outward FDI Stocks (in real terms and 2005 US dollars). The dependent variable, Y_i, Y_j, Y_i+Y_j, $(Y_i - Y_j)^2$, $Skill_{ij}$, $DifSkill_{ij}$, RFE_{ij} and $Dist_{ij}$ are expressed in natural logarithms. The Hausman statistic rejects the null hypothesis of no correlation between unobserved individual effects and explanatory variables in all cases. The outcomes from the Sargan-Hansen over-identification tests are *p*-values. Fixed effects for source and destination countries are included (Feenstra, 2002).

Economic sizes of the home and host countries, as captured by GDP, have a positive effect on bilateral FDI. This result is well documented by the economic literature (Nelson y Phelps, 1966; Balasubramanyan *et al*. 1996; Borensztein *et al*., 1998; De Mello, 1999; Bengoa y Sánchez-Robles, 2003). As reported by these contributions, one of the main drivers of horizontal FDI is the search of large markets, in which scale economies may be present. In this regard, a bigger host market, a larger global market (as proxied by the sum of the home and host GDPs) and similar characteristics of host and home markets are supposed to be correlated with FDI. According to tables 3 and 4, these effects are present in the data, except in the case of non-service FDI from outside the EU.

Variables measuring factor endowments capture potential vertical motivations of FDI. According to the economic literature, vertical firms separate the different stages of the production process over countries depending on factor intensities, placing phases intensive on skilled-labour in places where this input is relatively abundant. Results in this respect, however, suggest two different situations. For total FDI, variables capturing relative factor endowments are not statistically significant, and they are even negative in some instances (table 4 and BNU model of table 3). For non-services FDI, however, factor endowments variables exhibit positive signs –consistently with economic theory– and are statistically significant at the 10% level.

Finally, the cost of investing in a particular country, proxied by the Corruption Perception Index of the host country, has a negative and statistically significant influence on bilateral FDI, in all the models and samples analysed in this paper. Meanwhile, control variables relative to market protection show different signs and significance levels depending on the sample and the specification.

TABLE 4. COMMERCIAL INTEGRATION AND EUROPEAN FDI FROM ABROAD

	TOTAL FDI						NON-SERVICES FDI					
	(KT)		(BNU)		(MM)		(KT)		(BNU)		(MM)	
Integration	0.278***	(0.098)	0.487***	(0.105)	0.422***	(0.083)	0.334***	(0.110)	0.404***	(0.101)	0.394***	(0.092)
$Dist_{ij}$	-2.415***	(0.289)	-2.242***	(0.457)	-1.967***	(0.231)	-1.631***	(0.372)	-1.773***	(0.400)	-1.563***	(0.292)
Y_i	1.875***	(0.534)					0.803	(0.627)				
Y_j	1.167**	(0.317)					0.866**	(0.372)				
$Size_{ij}$			0.337	(0.355)					0.401	(0.316)		
$SizeQ_{ij}$			-0.170	(0.224)					-0.026*	(0.015)		
$(Y_i + Y_j)$	0.482	(0.660)	1.883***	(0.311)	2.134***	(0.197)	0.145***	(0.035)	0.161***	(0.029)	0.168***	(0.024)
RFE_{ij}	-0.323	(0.455)					0.308*	(0.173)				
$Skill_{ij}$			-0.298	(0.295)					0.241*	(0.133)		
$DifSkill_{ij}$					-0.249	(0.692)					0.131*	(0.068)
$(Y_i - Y_j)^2$					-0.062**	(0.030)					-0.067**	(0.030)
TC_i	0.143***	(0.033)	0.148***	(0.033)	0.143***	(0.033)	0.135***	(0.033)	0.135***	(0.034)	0.136***	(0.034)
TC_j	0.747***	(0.266)	-0.725***	(0.263)	-0.745***	(0.269)	-0.817***	(0.271)	-0.823***	(0.272)	-0.850***	(0.272)
CPI_j	-0.210**	(0.095)	-2.040**	(0.953)	-2.320**	(0.959)	-1.902**	(0.965)	-1.984**	(0.982)	-1.997**	(0.979)
# Observations	831		831		831		831		831		831	
Pseudo- R2	0.431		0.457		0.398		0.447		0.482		0.406	
Sargan-Hansen Test for the validity of instruments	0.310		0.374		0.289		0.356		0.428		0.384	

Source: own elaboration

Notes: ***, ** and * represent significance at the 1%, 5% and 10% level, respectively. Robust standard errors are documented in parenthesis. Dependent variable: Outward FDI Stocks (in real terms and 2005 US dollars). The dependent variable, Y_i, Y_j, Y_i+Y_j, $(Y_i - Y_j)^2$, $Skill_{ij}$, $DifSkill_{ij}$, RFE_{ij} and $Dist_{ij}$ are expressed in natural logarithms. The Hausman statistic rejects the null hypothesis of no correlation between unobserved individual effects and explanatory variables in all cases. The outcome from the Sargan-Hansen over-identification tests are *p*-values. Fixed effects for source and destination countries are included (Feenstra, 2002).

4.- ROBUSTNESS TESTS

The commercial integration variable proposed in this paper has shown its explanatory power in the FDI model suggesting that, in general, greater trade integration favours foreign investment. However, since the integration variable used is constructed from estimates obtained in a regression –the robustness of which might create problems[8]– we decided to use other variables commonly accepted in the literature as measures of trade relations or trade integration. To this end, we present the results obtained after replacing the integration variable, constructed from the estimates in Table 1, for other measures of trade integration.

Two alternative measures have been used in this regard. The first one is the degree of trade openness of the host countries with the rest of Europe. This variable is calculated, for each country *j*, as the sum of exports from country *j* to the EU countries plus the sum of imports from the EU countries to country *j*, divided by GDP of country *j*. In other words, we are considering the level of integration of the host country with the rest of Europe. We also construct this variable for the home country (*i*). The second alternative measure is the average degree of intra-European trade openness, computed as the weighted average[9] of the European trade openness of the host countries mentioned before[10].

Tables 5 and 6 summarize the findings. (The tables only display estimates of the alternative trade integration variables since the rest of the coefficients show the same sign and level of significance than those in tables 3 and 4)[11].

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[8] Pagan (1984) alerts of the potential problems derived from the use of estimated regressors obtained from previous estimations.

[9] Relative economic size is used as weight ($GDP_i/GDP_{EU\text{-}19}$).

[10] See note 3.

[11] Full tables are available from the authors upon request.

TABLE 5. ROBUSTNESS TESTS (INTRA-EUROPEAN FDI)

	TOTAL FDI						NON-SERVICES FDI					
	(KT)		(BNU)		(MM)		(KT)		(BNU)		(MM)	
Integration	1.404***	(0.221)	1.548***	(0.213)	1.714***	(0.170)	1.492***	(0.231)	1.571***	(0.202)	1.693***	(0.168)
# Observations	2480		2480		2480		2480		2480		2480	
Pseudo–R^2	0.462		0.481		0.405		0.447		0.452		0.410	
Sargan-Hansen Test for the validity of instruments	0.278		0.390		0.330		0.271		0.341		0.302	
European trade openness	2.755***	(1.005)	3.366***	(0.970)	4.565***	(0.953)	4.786***	(1.020)	5.431***	(0.980)	6.367***	(0.965)
# Observations	2480		2480		2480		2480		2480		2480	
Pseudo–R^2	0.462		0.481		0.447		0.463		0.469		0.437	
Sargan-Hansen Test for the validity of instruments	0.317		0.361		0.302		0.277		0.388		0.342	
Trade openness$_i$	-0.464	(0.693)	-0.082	(0.683)	-0.208	(0.693)	0.644	(0.708)	0.951	(0.704)	1.212*	(0.701)
Trade openness$_j$	2.076***	(0.612)	2.158***	(0.622)	2.368***	(0.613)	2.242***	(0.623)	2.385***	(0.633)	2.538***	(0.624)
# Observations	2470		2470		2470		2470		2470		2470	
Pseudo–R^2	0.461		0.470		0.447		0.459		0.465		0.439	
Sargan-Hansen Test for the validity of instruments	0.366		0.410		0.379		0.277		0.330		0.306	

Source: own elaboration

Notes: ***, ** and * represents significance at the 1%, 5% and 10% level, respectively. Robust standard errors in parenthesis. Dependent variable: Outward FDI Stocks (in real terms and 2005 US dollars) in natural logarithm. The Hausman statistic rejects the null hypothesis of no correlation between unobserved individual effects and explanatory variables in all cases. Sargan-Hansen over-identification tests are *p*-values. Fixed effects for source and destination countries are included (Feenstra, 2002).

TABLE 6. ROBUSTNESS TESTS (EUROPEAN FDI FROM ABROAD)

	TOTAL FDI						NON-SERVICES FDI					
	(KT)		(BNU)		(MM)		(KT)		(BNU)		(MM)	
Integration	0.278***	(0.098)	0.487***	(0.105)	0.422***	(0.083)	0.334***	(0.110)	0.404***	(0.101)	0.394***	(0.092)
# Observations	831		831		831		831		831		831	
Pseudo–R^2	0.431		0.457		0.398		0.447		0.482		0.406	
Sargan-Hansen Test for the validity of instruments	0.310		0.374		0.289		0.356		0.428		0.384	
European trade openness	1.285***	(0.496)	1.600***	(0.506)	1.815***	(0.495)	1.714***	(0.510)	2.046***	(0.511)	2.089***	(0.504)
# Observations	831		831		831		831		831		831	
Pseudo–R^2	0.415		0.474		0.426		0.423		0.460		0.401	
Sargan-Hansen Test for the validity of instruments	0.331		0.375		0.342		0.319		0.355		0.375	
Trade openness$_i$	-0.081	(0.352)	-0.138	(0.354)	-0.243	(0.342)	0.621*	(0.357)	0.822**	(0.362)	0.763**	(0.350)
Trade openness$_j$	1.123***	(0.297)	1.152***	(0.301)	1.181***	(0.300)	1.104***	(0.304)	1.069***	(0.307)	1.084***	(0.306)
# Observations	829		829		829		829		829		829	
Pseudo–R^2	0.420		0.477		0.484		0.437		0.462		0.404	
Sargan-Hansen Test for the validity of instruments	0.314		0.427		0.391		0.289		0.358		0.332	

Source: own elaboration

Notes: ***, ** and * represents significance at the 1%, 5% and 10% level, respectively. Robust standard errors in parenthesis. Dependent variable: Outward FDI Stocks (in real terms and 2005 US dollars) in natural logarithm. The Hausman statistic rejects the null hypothesis of no correlation between unobserved individual effects and explanatory variables in all cases. Sargan-Hansen over-identification tests are *p*-values. Fixed effects for source and destination countries are included (Feenstra, 2002).

As it can be seen in these tables, estimates show a clear positive influence of the degree of trade integration of the host country on foreign investment. This can be observed for the estimates of the average European trade openness but also for those relative to the European trade openness of the host economy. However, the evidence is weaker in the case of the home country trade openness: this indicator presents different signs and is not always statistically significant. It presents a negative sign for the total FDI samples, both the intra-European FDI and that coming from abroad. In these cases the estimates are not statistically significant. For the case of non-services FDI, values of trade openness for the investor country show a positive sign and they are significant when it comes to explain the FDI coming from outside the EU.

5.- CONCLUDING REMARKS

The empirical analysis discussed here suggests that commercial integration and FDI to the European Union during the period from 1995 to 2006 display a relationship of complementarity. In order to capture this link we have employed a new measure of commercial integration based on the evolution over time of border effects. For the European case, and as a consequence of the trade integration process fostered by the European Union and, more in particular, the Single Market Act of 1986, these border effects have experienced a continuous decline of around 50%, on average, from 1995 to 2006.

We have tested the robustness of the results obtained using alternative measures of trade integration. These tests reinforce the previous conclusion and highlight an unequivocal complementarity relationship between trade integration and foreign direct investment. Our findings point out that the motivation of FDI changes depending of the type of investment and does not show a unique pattern of allocation. Focusing on aggregate FDI, variables relative to factor endowments differences –which correspond to vertical motivations– do not appear to have a statistically significant effect on firm decisions, neither in the case of the intra-European FDI nor in the instance of those coming from outside the EU. This is not the case for the non-services FDI, where differences in factor endowments seem to influence the decision to investments abroad. Horizontal motivations –captured by market size variables– however, do have a positive influence on FDI flows in both samples.

This paper suggests that commercial integration and attraction of FDI exhibit a positive correlation. Therefore, and in the light of these findings, it seems that further consolidations of the European Single Market will have positive effects, not only as regards the commercial performance of the EU but also helping attract FDI to the area.

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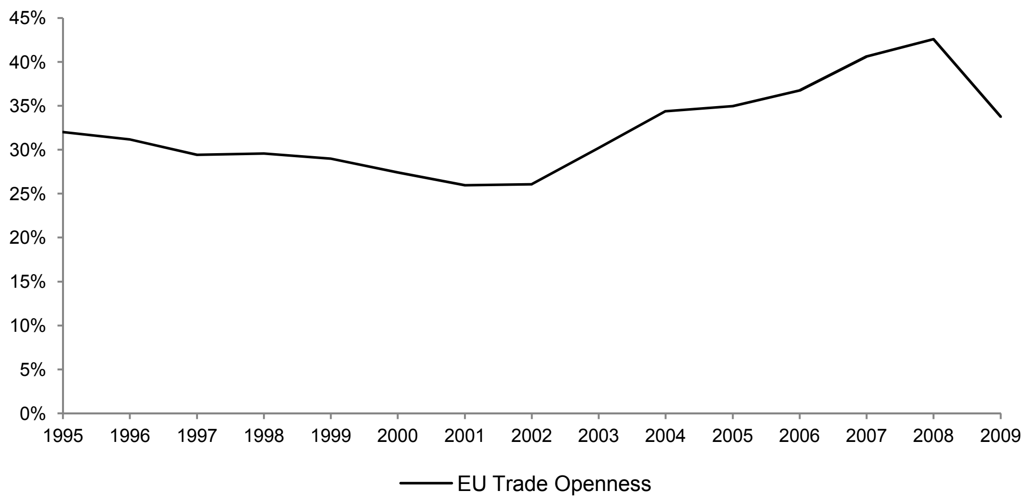
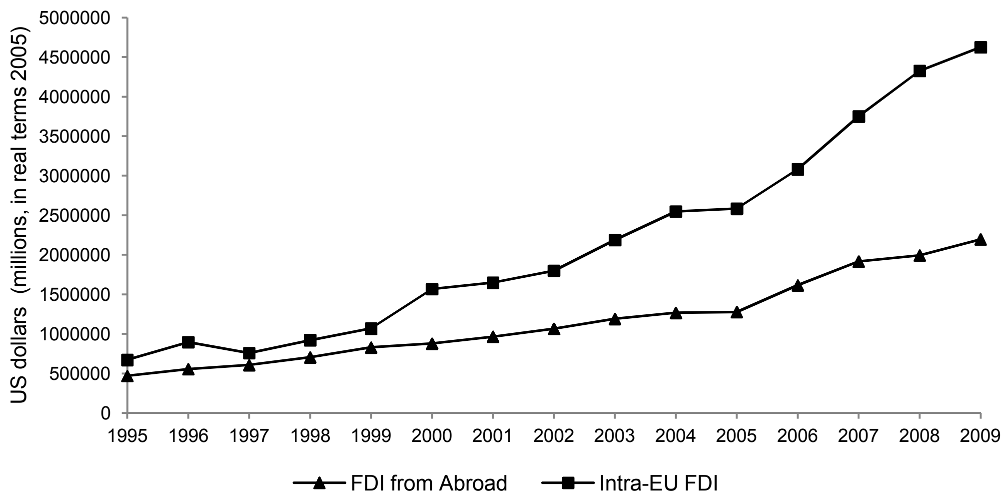
APPENDIX

FIGURE A1. INTRA-EUROPEAN TRADE OPENNESS RATE
(WEIGHTED AVERAGE FOR THE EU-19)



Source: own elaboration

FIGURE A2. OUTFLOWS FDI STOCK TO THE EUROPEAN UNION



Source: own elaboration