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ORIGINAL PAPER

The pattern of EU FDI in the manufacturing industry: What role do third country effects and trade policies play?

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Abstract The aim of this paper is to assess the impact of "third country effects" and trade policies on the outward stocks of FDI of the EU. We estimate a model based on the knowledge-capital theory of the multinational enterprise over the period 1995–2008 by using a sample of five EU countries and 24 partner countries. Explanatory variables include an index of applied bilateral tariffs, a dummy to capture the presence of bilateral investment treaties (BITs) and a variable to take into account the impact of the participation of host countries to free trade agreements (FTA) with other than EU countries. The paper checks the third country effects by testing whether there is spatial lag dependence in bilateral FDI. The results show that trade costs play a key role in explaining the pattern of FDI in the manufacturing sector as a whole and in four out of six disaggregated industries. The impact of tariffs varies across industries, suggesting the predominance of horizontal FDI in some industries, and the existence of export-platform FDI in others. BITs and the participation of the host country in other FTAs positively affect the outward stock of EU FDI, while we find no empirical evidence to support the hypothesis of spatial lag dependence in bilateral FDI.

JEL Classification F15 · F21 · F23 · C21

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1 Introduction

Growing attention has been given in recent international trade literature to the important role of trade costs as a determinant of Foreign Direct Investments (FDI). Theoretical models of the multinational enterprise, such as the knowledge-capital model (Markusen 2002; Bergstrand and Egger 2007), suggest that trade costs may have different impacts depending upon the nature of FDI. In the two-country knowledge-capital model, trade costs positively affect horizontal FDI, while they exert a negative impact on vertical FDI. More recent literature has expanded the basic multinational firm model to the three-country case, by emphasising the role that third country markets and trade policies may exert on the integration strategies of the multinational firm; indeed, third country trade policies and characteristics may help to explain more complex types of FDI, such as the surge of export-platform FDI. With export-platform FDI, the subsidiary located in the host country serves third countries by exporting. The reduction of trade costs between the host and the third country, by means for example of a free trade area, may thus stimulate export-platform FDI (Ekholm et al. 2007).

In the empirical literature, the importance of trade costs has been considered by including in the explanatory variables the usual gravity ones (Blonigen and Piger 2011): geographical and cultural distances are used as a proxy for the transportation costs and the additional costs faced by firms when operating in a foreign country. As for the home and host trade policies, dummies are generally used to capture the impact of regional agreements, while an index of the openness to trade has often been included to measure the degree of protection of the host country. A direct measure of protection, such as the bilateral applied tariff, has been also used to capture the impact of trade policies when different preferential schemes are used, as in the case of the EU (Cardamone and Scoppola 2012). While variables measuring bilateral trade policies are generally included in the models, third country trade policies have been not explicitly considered to date. A number of papers have recently estimated the so-called "third country effects" (e.g., Blonigen et al. 2007; Baltagi et al. 2007, 2008; Chou et al. 2011), that is, the impact that neighbouring third countries FDI and characteristics may exert on the FDI in a host country and found that these factors may contribute to explain more complex types of FDI. These papers, however, do not include an explicit variable for third countries trade policies.

The aim of this paper is to assess the impact of bilateral and third country trade policies and third country FDI on the pattern of the outward FDI of EU countries. The reason behind interest in third country FDI is that firm decisions on FDI are often interdependent across host countries. In addition, agglomeration externalities may also arise for FDI. The omission of third country effects in the estimation of the determinants of bilateral FDI may lead to biased estimates.

Our contribution to the literature is twofold. First, the focus of this paper is the industrial pattern of FDI of European countries with countries outside the EU. While there is a considerable amount of work examining the impact of trade costs on the pattern of the US FDI, studies focusing on the EU are few and consider, by and large, intra-EU FDI (Baltagi et al. 2008). We focus on the extra-EU FDI by analysing the pattern of the EU outward FDI with various non-EU countries, including developed, developing and transition economies. As will be shown, by analysing the pattern of

extra-EU FDI with 24 extra-EU countries, a considerable variability in the applied bilateral tariffs can be found, while this would not be the case with EU members only, candidate countries and/or other European countries that have signed free trade agreements with the EU. In addition, we do not use aggregated data, but rather focus on the manufacturing sector only, disaggregated into six manufacturing industries. This is because the type of FDI varies greatly from one industry to another, and hence, the impact of trade policies on FDI is likely to be industry specific.

Second, we take into account the potential impact, on the one hand, of the presence of FDI in third countries and, on the other hand, of host countries participation in free trade agreements (FTA) with non-EU countries. In our model, as in the papers by Chou et al. (2011) and Blonigen et al. (2007), the existence of third country effects has been considered by testing whether there is spatial lag dependence in bilateral FDI. We include in our model a variable for the participation of host countries in FTA with third countries, which is aimed at capturing the impact that duty free access to a third country market may have on the EU FDI in the host country.

Overall, taking into account both bilateral and third country trade policies provides a larger and more complex picture of the determinants of EU FDI. Our results show that trade policies play a key role in explaining the pattern of EU FDI in the manufacturing sector as a whole and in four out of six disaggregated industries; as expected, the impact of bilateral tariffs varies widely across industries. While the participation of the host country in FTA with countries different from the EU positively affects EU FDI in the manufacturing industry, we do not find evidence in favour of a spatial lag model. Hence, though our results suggest that host country FTA influence FDI, there is no evidence of third country FDI effects.

The paper is organised as follows. The next section offers an overview of the main facts about EU outward FDI based on the data used in the estimations. The third section illustrates the empirical specification of the model, while the fourth deals with the data and the econometric issues. The fifth section discusses the results while the final one offers some concluding remarks.

2 The pattern of EU FDI: some stylised facts

The data set here used includes five EU countries (France, Germany, Netherlands, Italy and UK) for which outward FDI stocks data disaggregated at the industry level during the considered period, that is 1995–2008, are for the most part available. Outward stocks of FDI come from the Eurostat database, which reports data on bilateral FDI from the balance of payments statistics disaggregated both at the country and industry level. We have selected 24 partner countries[1] following two main criteria. First, the availability of data: as mentioned before, FDI data at country and industry level are not always available, especially for small developing countries, often because they are considered confidential. Second, the need to use data including a significant variability

[1] These are: Australia, Argentina, Brazil, Bulgaria, Canada, Chile, Czech Republic, Egypt, Estonia, Hungary, Israel, Japan, Latvia, Lithuania, Mexico, Morocco, Norway, Poland, Romania, Slovakia, Slovenia, Switzerland, USA and Uruguay. Countries that joined the EU have been excluded from the database starting from their date of entry.

of EU trade policies: indeed, our sample includes partners who face MFN tariffs, as well as countries that benefit from different levels of EU preferences in the considered period within the various preferential schemes and free trade agreements.

Besides the manufacturing sector as a whole, six manufacturing industries - obtained by aggregating industries defined at the two-digit level of the NACE classification - have been selected on the basis of the availability of FDI stock data. Overall, these six industries account for 87 % of the outward FDI of the manufacturing sector in the period 2004–2006.

Figure 1 reports average outward stocks of FDI, in the manufacturing sector considered as a whole, by group of partner countries for the periods 1995–1997 and 2004–2006. The geographical pattern of the outward FDI of the five EU countries differs considerably. The "Developed countries" group—which includes ten advanced economies (Australia, Canada, Czech Republic, Israel, Japan, Norway, Slovakia, Slovenia, Switzerland and the US)—accounts for about the 86 % of the total FDI of the five EU countries, but with important differences between them. While for the UK and France, the share of FDI hosted by these advanced countries is higher than 90 %, this is not the case for Italy and Germany. A major part of the German stock of FDI is hosted by the countries which joined the EU in 2004 and 2007 and by other extra-EU countries.

Table 1 reports, for each industry, the share of FDI hosted by developed and by developing countries in our sample. As expected, developed countries account for a major share of the five EU countries outward FDI in all industries; developing countries are more important in the vehicles and petroleum industries (15 and 12 %,

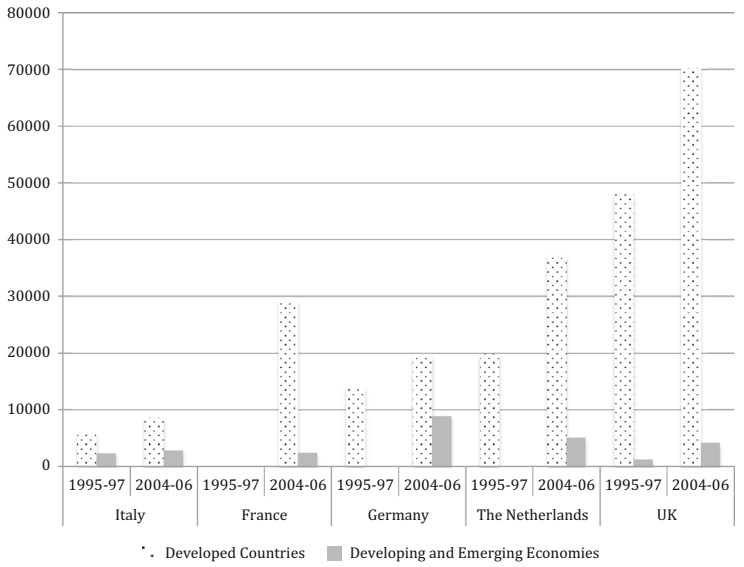

Fig. 1 Average stocks of outward FDI by EU country in the manufacturing sector (millions US dollars). *Source*: authors' computations on Eurostat data

Table 1 The average outward stocks of FDI by industry and partner country (millions US dollars and %; 2004–2006)

	Food products	Textiles and wood activities	Petroleum, chemical, rubber, plastic products	Metal and mechanical products	Office machinery, computers, RTV, communication equipment	Vehicles and other transport equipment
Italy	643	770	947	5280	0	1583
Developed	65.89	97.88	51.23	92.20		60.40
Developing	34.11	2.12	48.77	7.80		39.60
France	17,301	708	6570	1339	367	17,255
Developed	98.49	92.19	91.19	95.37	96.47	94.28
Developing	1.51	7.81	8.81	4.63	3.53	5.72
Germany	213	760	10,067	4887	723	6045
Developed	55.80	95.13	77.43	80.54	100.00	48.43
Developing	44.20	4.87	22.57	19.46	0.00	51.57
The Netherlands	10,038	3937	20,382	5030	99	2.58
Developed	86.23	100.00	89.65	98.62	96.30	100.00
Developing	13.77	0.00	10.35	1.38	3.70	0.00
UK	12,952	1691	19,988	9520	251	5785
Developed	96.51	98.76	93.29	97.93	100.00	100.00
Developing	3.49	1.24	6.71	2.07	0.00	0.00
Five EU countries	41,147	7866	57,954	26,056	1439	30,670
Developed	94.14	98.35	88.33	93.51	98.87	84.57
Developing	5.86	1.65	11.67	6.49	1.15	15.43

Source: authors' computation on Eurostat data

respectively), while their role is negligible in the textile and office machinery industries. An important share of the outward FDI of Italy and Germany in the vehicle, petroleum and food industries is hosted by developing countries, while this is not the case for important EU investors, such as France, UK or the Netherlands, in these industries.

The industrial pattern of the outward FDI is highly differentiated across the five EU countries, as shown in Fig. 2. The vehicle industry plays a major role for France and Germany, and a negligible one for the Netherlands. On the contrary, the "Petroleum chemicals and plastics industry" is quite important for the Netherlands, UK and Germany, much less for France and Italy. The "Metal and mechanicals" industry accounts for a relevant share of the outward stock of Italy (57 %), but it is less important for France, the Netherlands and the UK. The food industry accounts for a considerable share of the outward FDI in France, the Netherlands, UK and, to a lesser extent, Italy.

Figures 3 and 4 report the values of the average tariffs applied by the EU and by the host countries, respectively, in two periods, 1995–1997 and 2004–2006,[2] which show

[2] Details on the data and the methodology used to compute the average tariffs are provided in Sect. 4.

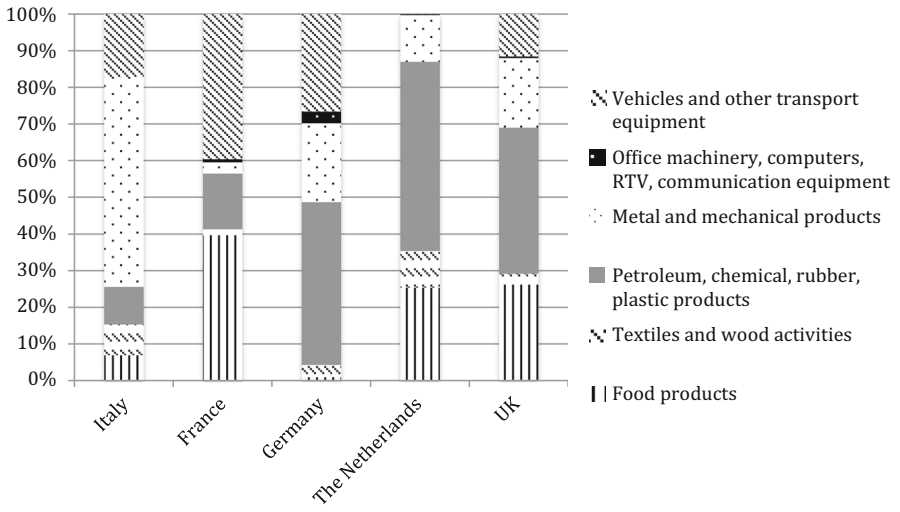

Fig. 2 Average stocks of outward FDI by industry (2004–2006). *Source*: authors' computations on Eurostat data

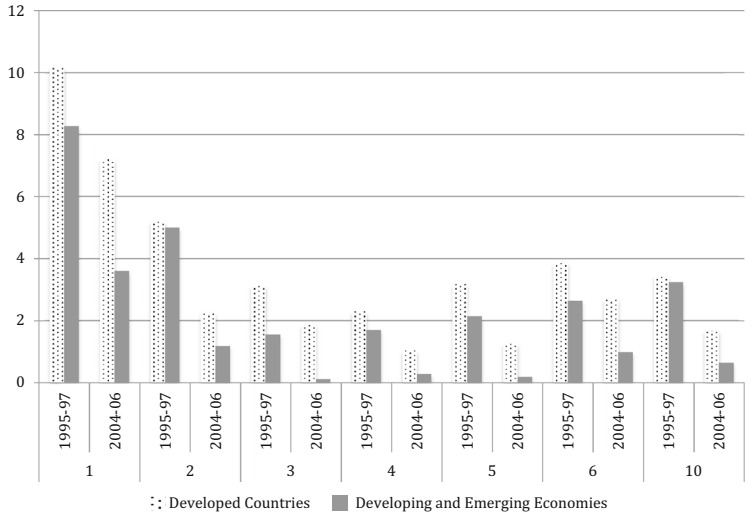

Fig. 3 Average tariffs applied by EU to host countries products. *Source*: authors' computations on WITS data, World Bank. *Note*: *1* food products, *2* total textiles and wood activities; *3* total petroleum, chemical, rubber, plastic products; *4* total metal and mechanical products, *5* total office machinery, computers, RTV, communication equipment and *6* total vehicles and other transport equipment, *10* total manufacturing

three main facts. First, tariffs applied by the EU to imports from developing countries, as expected, are considerably lower than the tariffs faced by the European firms in the host developing countries here considered; as for developed countries, EU tariffs, on average, are higher than host country tariffs only in two industries (food and office

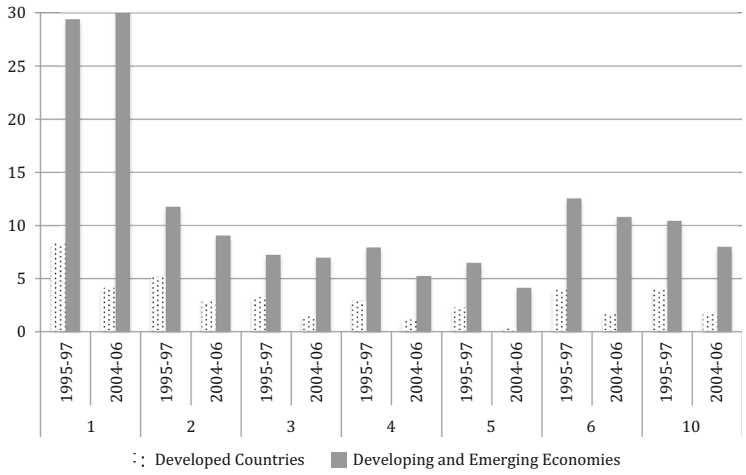

Fig. 4 Average tariffs applied by host countries to EU products. *Source*: authors' computations on WITS data, World Bank. *Note*: *1* food products, *2* total textiles and wood activities; *3* total petroleum, chemical, rubber, plastic products; *4* total metal and mechanical products, *5* total office machinery, computers, RTV, communication equipment and *6* total vehicles and other transport equipment, *10* total manufacturing

machinery), while for the whole manufacturing sector EU applies lower tariffs than those faced by EU firms in developed economies. Second, tariffs have, by and large, decreased during the period 1995–2006 across all industries; only tariffs applied by developing countries to EU food products have increased between the two periods here considered. Third, the pattern of EU tariffs across industries is rather similar to that of the host country tariffs. Industries where tariffs are higher—both for the EU and the host countries—are food, textiles and vehicle, while tariffs are particularly low in the computer sector, both in the EU and in the host developed countries, but not in developing countries.

Preliminary exploration of the data suggests that the pattern of FDI varies significantly across the five EU countries, both from a geographical and an industry point of view; this evidence calls for careful consideration in our empirical model of the possible determinants of FDI that may help explain such variability across countries and industries.

3 The model

The empirical literature on the determinants of FDI has used a wide variety of specifications. Blonigen and Piger (2011) point to the fact that 47 different independent variables have been included in eight recent empirical studies on the pattern of FDI, most of which are included in one study only. Using Bayesian statistical techniques, the authors found that only a small number of the considered variables are likely to be determinants of FDI; these include the traditional gravity variables, distance, parent and host country GDP, relative labour endowments and trade agreements. Their

findings support the view that any explanation of FDI needs to consider three key sets of explanatory variables: market size of parent and host country, relative labour endowments and trade costs. These determinants are also included in the empirical specification of the knowledge-capital theory of the multinational enterprise as originally proposed by Carr et al. (2001) and Markusen and Maskus (2002). These studies confirm, by and large, the main predictions of the theoretical model, that is, horizontal FDI is likely to prevail if countries are similar in size and in relative endowments and trade costs are high, while vertical FDI occur when countries differ in factor endowments, the country abundant in skilled labour is small, and trade costs are low.

Few empirical papers have considered the determinants of more complex types of FDI (Blonigen et al. 2007; Baltagi et al. 2007, 2008; Chou et al. 2011), i.e. export-platform FDI and the so-called fragmented (or complex) vertical FDI, the latter occurring when the production process is fragmented in more than two countries. They used spatial econometric techniques to assess the impact of third country characteristics on bilateral FDI. Blonigen et al. (2007) have found evidence of spatial lag interdependence for US outward FDI, while Chou et al. (2011) obtained a positive effect of the spatial lag variable for Chinese outward FDI. In addition, while there is no evidence of a significant impact of third country market potential on the Chinese outward FDI (Chou et al. 2011), Blonigen et al. (2007) and Baltagi et al. (2007) found evidence of a negative impact of the third countries market potential on bilateral FDI, which is an unexpected result. Indeed, third country market size is expected to positively affect export-platform FDI and not to affect fragmented-vertical FDI. Finally, Baltagi et al. (2007, 2008) found that the effect of third country FDI determinants are important and support the presence of fragmented-vertical FDI.

In this paper, we focus on two basic features of third countries which could affect the pattern of EU FDI: first, the presence of regional trade agreements between the host and the third country; second, by estimating a spatial lag model, we check whether FDI in the host country are influenced by FDI in (third) neighbouring countries.

Our basic specification includes the usual bilateral variables, i.e. market size, similarity and differences in the labour endowments, as control variables, together with trade costs, which is our main variable of interest.

As regards trade costs, previous studies have used the degree of openness (Blonigen et al. 2007) or an index of the overall trade costs perceived by firms (Carr et al. 2001; Markusen and Maskus 2002; Braconier et al. 2005; Ekholm et al. 2007) and dummies to capture the impact of regional trade agreements (Baltagi et al. 2008; Stein and Daude 2007). We use the applied tariffs to represent the bilateral trade policies, and a dummy for the participation of the host country in FTA with third countries. A further bilateral policy variable included in the model is the presence of bilateral investment treaties (BITs) between the host and the EU country; previous studies have shown that BIT may exert a positive effect on FDI (Egger and Pfaffermayr 2004; Egger and Merlo 2007; Busse et al. 2010). Traditional gravity variables, i.e. distance and common language, have been included provided that they have been found to be important determinants of FDI (Blonigen and Piger 2011). Dummy variables for EU countries aim at capturing home country fixed effects.

The dependent variable used in this model is the stock of FDI, which is among the most used measures of FDI in the literature. More accurate measures of FDI, such as

the affiliate sales, are generally unavailable for the EU countries at the country/industry level.

In order to reduce the incidence of missing observations in the bilateral stock of FDI, we have used 3-years data.[3]

The basic specification we use is thus the following:

$$\begin{aligned}\ln\left(\mathrm{FDI}_{ijkt}\right) = {} & \beta_0 + \beta_1 \ln\left(\mathrm{sumGDP}_{ijt}\right) + \beta_2 \mathrm{relGDP}_{ijt} + \beta_3 \mathrm{skilldiff}_{ijt} \\ & + \beta_4 \mathrm{host\,tariff}_{jkt} + \beta_5 \mathrm{EU\ tariff}_{jkt} + \beta_6 \mathrm{BIT}_{ijt} \\ & + \beta_7 \mathrm{FTA}_{jt} + \beta_8 \ln\left(\mathrm{dist}_{ij}\right) + \beta_9 \mathrm{commlang}_{ij} + \delta_1 D\_\mathrm{Germany}_i \\ & + \delta_2 D\_\mathrm{Italy}_i + \delta_3 D\_\mathrm{Netherlands}_i + \delta_4 D\_\mathrm{UK}_i + u_{ijkt} \end{aligned} \quad (1)$$

where subscripts i ($i = 1, \ldots, 5$) and j ($j = 1, \ldots, 24$) refer to the home and the host country, respectively, k is the industry and t indicates 3-year periods ($t = 1, \ldots, 5$), u_{ijkt} is the error term and *D_Germany, D_Italy, D_Netherlands* and *D_UK* are dummies which allow us to take into account EU country fixed effects.[4] FDI indicates the bilateral stock of FDI, *sumGDP* is the sum of GDP of the home and host country and measures the market size of countries; market similarity is taken into account through the variable *relGDP* which is ratio home-to-host GDP; *skilldiff* is the difference in skilled labour endowment between the home and the host country; *host tariff* indicates the tariff applied to the EU exports by the host country, while *EU tariff* indicates the tariff applied by the EU, to imports from the host country. *BIT* is a dummy variable equal to one if a bilateral investment treaty is signed and zero otherwise. *FTA* is equal to one if the host country participates in FTA with third countries and zero otherwise;[5] *dist* is the distance between the home and the host country capitals, while *commlang* is a dummy equal to one in the case of common official of primary language in the two countries.[6] It is worth noting that the specification used in this paper is more parsimonious than the one originally proposed by Carr et al. (2001) and Markusen and Maskus (2002) to test the knowledge-capital theory. The basic cross-sectional specification for the knowledge-capital model generally includes interaction terms between

[3] In more detail, we have computed the 3-year period mean value of FDI, GDP, skilled labour endowments and tariffs, where data in value were in constant 2000 dollars, while the dummies BIT and FTA are equal to one if there is a BIT or a FTA in at least 1 year over each 3-year period. Five periods are here considered: 1995–1997, 1998–2000, 2001–2003, 2004–2006 and 2007–2008.

[4] Even though there could be some unobservable heterogeneity due to specific effects for each host country, we have not included host country fixed effects, because their inclusion raises multicollinearity problems and the coefficients of most regressors become not significant.

[5] For robustness check, estimations have been run by considering an alternative FTA variable, based on the count of the number of FTA in force for each host country during the considered period. Results, which are available upon request, do not substantially change.

[6] The relative GDP is here in level rather than in logarithm. The reason is that the correlation between the log of the relative GDP and the log of the sum of GDPs in the six industries is, in absolute value, higher than 0.7. Following Baltagi et al. (2008), also the differences in the skilled labour endowments are included in level. Finally, because of the zero values, in our final specification, we have not considered tariffs in log; indeed, this would determine the loss in the estimations of 19 observations for total manufacturing and 184 observations for the six industries. The inclusion of tariffs in log, however, does not substantially change the results.

Table 2 The expected impact of the independent variables

	FDI horizontal	FDI pure vertical	Export platform FDI	Fragmented-vertical FDI
SumGDP	+	0	0	0
RelGDP	−	0	0	0
Skilldiff	0	+	+	+
EU tariff	0	−	0	0
Host tariff	+	0/−	0/−	0/−
Common language	+	+	+	+
Distance	+	−	−	−
BIT	+	+	+	+
FTA	+	0	+	0
Spatial lag	0	−	−	+

skilled labour relative endowments and other explanatory variables, such as the differences in GDP and trade costs. However, the inclusion of these variables could lead to the multicollinearity of regressors in the case of data with a time dimension, such as panel data (Egger and Merlo 2007).[7]

On the basis of the theoretical and empirical literature, we expect horizontal FDI to be positively correlated with market size, as the latter is crucial in determining whether to exploit plant economies of scale; the larger the size of the markets, the easier it is to cover the plant costs (Table 2). Horizontal FDI are also expected to be positively influenced by market similarity; therefore, we expect a negative sign for the coefficient of the variable *relGDP*. Differences in factor endowments explain vertical FDI, while they are unlikely to affect horizontal FDI. Distance is expected to influence horizontal FDI positively and vertical FDI negatively (Egger 2008). Common language, by decreasing the cost of operating abroad, is likely to positively affect FDI, as confirmed by previous empirical studies (Tekin-Koru and Waldkirch 2010; Blonigen and Piger 2011). Tariffs may have a different impact depending upon the nature of FDI. Host country tariffs positively affect horizontal FDI, while they are expected to have no effect on vertical FDI, or a negative impact if subsidiaries in the host country use intermediate goods imported from the home country. Conversely, home country tariffs are expected to negatively influence vertical FDI, as input or intermediate goods produced in the low-cost partner country are to be shipped back to the home country.

BIT are expected, in general, to have a positive impact, although the empirical evidence to date is rather ambiguous, with different findings depending upon the nature and number of countries considered. Evidence of a significant positive impact of BIT on FDI has been found for OECD countries (Egger and Merlo 2007), while for developing countries Hallward-Driemeier (2003) found little evidence of a positive influence; however, Neumayer and Spess (2005) and Busse et al. (2010), using a

[7] Equation (1) has been also estimated with the inclusion of interaction terms between tariffs and the (squared) differences in skilled labour endowment, but the coefficients are mostly not significant.

larger sample of host and source countries, found that BITs do support FDI towards developing countries.

We expect that the impact of FTA between host and third countries differs according to the type of FDI. FTA are expected to exert a positive effect on EU FDI in the host country, if FDI is of the export-platform-type; the elimination of trade frictions stimulate exports, instead of FDI, from the host to the third countries (Ekholm et al. 2007). An FTA is also likely to positively affect horizontal FDI; the reason is that it increases the size of the host market and this reduces the burden due to fixed costs. Finally, FTA between host and third country are not likely to influence "pure" vertical FDI and fragmented-vertical FDI.

As aforementioned, to check potential "third country FDI" effects, i.e. that EU FDI in each host country are affected by FDI in neighbouring countries, we have estimated a second model in which a spatial lag of the dependent variable is included in Eq. (1). The estimated model is the following:

$$\mathbf{y} = \lambda \mathbf{W}\mathbf{y} + \mathbf{X}\boldsymbol{\beta} + \mathbf{u} \tag{2}$$

where $\mathbf{y}$ indicates the vector of the dependent variable, which in our case is the log of the bilateral stock of FDI, $\boldsymbol{X}$ is a matrix standing for all the regressors included in Eq. (1), $\boldsymbol{\beta}$ is the vector of the coefficients and $\mathbf{u}$ is the vector of the error term.$\mathbf{W}$ is a spatial weighting matrix based on the distances between capital of each host country-pair. Following Baltagi et al. (2007), we have computed $\mathbf{W}$ by using a row standardised inverse distance matrix based on the latitude and longitude coordinates of the capitals of each host country (provided by CEPII).[8] As in Baltagi et al. (2008), the specific weighting scheme here adopted implies that there is only spatial dependence as regards the hosts, while there is no such interdependence across home countries or time periods.

If the coefficient λ is significantly different from zero, then FDI in third countries located nearby affect FDI in the host country j. The expected sign of λ varies with the type of FDI (Blonigen et al. 2007; Chou et al. 2011). With horizontal FDI, no spatial relationship between FDI in host and neighbouring countries is expected. Indeed, in this type of FDI, the decision to invest is based on the size of the host country trade costs relative to the fixed costs of building a plant abroad; this choice is independent from decisions concerning other markets. Hence, in principle, there is no reason for a spatial relationship between horizontal FDI in host and third countries and λ in this case is not expected to be significant. Conversely, λ is expected to be negative when FDI are of the vertical-type or of the export-platform-type. The reason is that FDI in the host country, from which products are exported either back to the home country or to third countries, are in fact at the expenses of FDI in third countries. However, if production is fragmented in more countries, FDI in neighbouring third countries may positively affect vertical-type FDI; this is because the presence of FDI in neighbouring countries may stimulate the location of vertically related plants.

[8] We have used the STATA commands *spmat* and *spreg* to compute haversine distances and carry out estimations, respectively (Drukker et al. 2013a, b).

4 Data and econometric issues

Data on the EU countries outward FDI stock are from the balance of payment data provided by Eurostat, while those on GDP are from the World Bank–World Development Indicators (WDI). The skilled labour endowment of each country is measured by the (percentage of) enrolment in tertiary education provided by the World Development Indicators, while the distances and the dummy equal to one in the case of common language are those provided by CEPII. The dummy BIT has been built by using the UNCTAD database on Bilateral Investment Treaties, while the variable FTA has been compiled on the basis of the WTO database of regional trade agreements.

Bilateral applied tariffs are from the WITS database, which provides information on bilateral tariffs disaggregated at the ISIC-four digit level for each pair of countries. The weighted average of tariffs has been computed following the MacMap procedure (Bouët et al. 2008). Countries have been split into five groups on the basis of their level of development. Then, the weighted average of tariffs has been obtained by using as weights the share of imports of each country from the group the exporter belongs to. In this way, the endogeneity bias due to the use of bilateral imports in the weighting procedure is reduced (Cipollina and Salvatici 2008).

In particular, our sample should include 510 observations for each two-digit industry. However, EU bilateral data of FDI stock at the industry level show a considerable number of missing values. For the manufacturing sector as a whole, we count 244 missing values in the outward FDI vector. The share of missing values at the country and industry level is, as expected, rather high. However, a preliminary exploration of the data suggests that the probability to find missing values is unlikely to be systematic and correlated with the FDI.[9]

Table 3 provides the main descriptive statistics for some of the variables included in the model. The sample has been split in two different groups of countries, according to the classification used by the IMF (2010): 10 developed and/or high-income partner countries, and 14 transition and developing countries.

As already discussed in Sect. 2, the EU FDI directed to advanced countries is, on average, much higher than those directed towards developing countries. Differences in the skilled labour endowment and in GDP between EU and host countries are higher if we consider developing host countries. Furthermore, developing countries apply, on average, higher tariffs on EU exports than the developed countries, while EU tariffs are on average higher for the advanced countries. Finally, BIT with the EU are mainly signed by developing countries, while the participation in FTA with non-EU countries seems to be slightly higher for the developed countries group.

Equation (1) is estimated by considering a Pooled OLS. Estimates of the spatial lag model in Eq. (2) are based on the two stage least square (2SLS) estimator with

[9] We have performed the Verbeek and Nijman (1992) test for attrition bias applied to cross-sectional estimates, similarly to that performed by Nese and O'Higgins (2007) for several waves of survey firm data. Test results reject the hypothesis of attrition bias for both the manufacturing sector as a whole and data disaggregated for the six industries.

Table 3 Descriptive statistics

	All host countries		Developed countries		Developing countries	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
FDI—manufacturing	3537	(9588.18)	6046	(12583.47)	664	(980.78)
FDI—six industries	746	(2293.06)	1100	(2829.57)	153	(314.84)
SumGDP	2,164,227	(2,416,235.0)	3,153,885	(3,377,349.0)	1,413,453	(572,384.6)
RelGDP	30.87	(53.91)	11.70	(19.59)	45.41	(65.85)
Skilldiff	8.23	(19.06)	−2.84	(17.18)	16.63	(15.87)
Host tariff—manufacturing	6.91	(6.38)	2.72	(2.4)	9.96	(6.65)
Host tariff–-six industries	9.85	(27.86)	3.34	(4.27)	14.60	(35.73)
EU tariff—manufacturing	2.08	(1.47)	2.37	(1.51)	1.86	(1.39)
EU tariff—six industries	2.87	(2.81)	3.53	(3.09)	2.37	(2.46)
BIT	0.60	(0.49)	0.20	(0.4)	0.90	(0.31)
FTA	0.60	(0.49)	0.64	(0.48)	0.57	(0.5)
Total observations—manufacturing	510		220		290	
Total observations—six industries	3060		1320		1740	

Standard deviations in parenthesis; value data in millions US dollars
Source: authors' computation

standard errors robust to heteroskedasticity. To carry out the 2SLS estimation of the spatial lag model, **X**, **WX** and $\mathbf{W}^2\mathbf{X}$ have been used as instruments.[10]

5 Results

Table 4 presents the results obtained by estimating Eqs. (1) and (2) for the manufacturing sector as a whole and for the six industries we have selected.

As regards OLS results on control variables, the coefficients of the joint size of the home and host country markets (*sumGDP*) and of the relative GDP are both significant and with the expected signs, while the coefficient of the skilled labour endowments variable is not significant. Trade costs considerably influence the manufacturing sector, but not the six selected industries when considered as a whole. Host tariffs negatively influence FDI in the manufacturing sector; this outcome is consistent with the preva-

[10] For robustness check, we estimated the spatial model also with the maximum likelihood estimator using the STATA command *spatreg* provided by Pisati (2001); results do not substantially vary from those obtained by using 2SLS.

Table 4 Estimation results

Variables	OLS§		Spatial lag model	
	Total manufacturing	Six industries	Total manufacturing	Six industries
Ln (sumGDP)	1.069***	1.284***	1.055***	1.297***
	(0.206)	(0.167)	(0.119)	(0.108)
RelGDP	−0.0235***	−0.0186***	−0.0233***	−0.0187***
	(0.00453)	(0.00390)	(0.00406)	(0.00325)
Skilldiff	−0.000254	−0.0112	0.000790	−0.0114***
	(0.00827)	(0.00733)	(0.00555)	(0.00440)
Host tariff	−0.0536**	0.0170	−0.0569***	0.0171*
	(0.0227)	(0.0130)	(0.0191)	(0.00903)
EU tariff	0.585***	0.000403	0.614***	−0.000963
	(0.0953)	(0.0492)	(0.0821)	(0.0315)
BIT	0.810**	0.876***	0.782***	0.900***
	(0.366)	(0.284)	(0.271)	(0.225)
FTA	1.214***	0.943***	1.229***	0.948***
	(0.301)	(0.294)	(0.248)	(0.206)
Ln (dist)	−0.723***	−0.390***	−0.720***	−0.404***
	(0.128)	(0.146)	(0.0923)	(0.0790)
Commlang	1.140***	1.436***	1.140***	1.434***
	(0.309)	(0.384)	(0.218)	(0.189)
d_Germany	0.733**	1.513***	0.746***	1.505***
	(0.336)	(0.351)	(0.225)	(0.199)
d_Italy	−0.230	0.480	−0.229	0.484**
	(0.374)	(0.436)	(0.231)	(0.230)
d_Netherlands	1.789***	2.196***	1.778***	2.199***
	(0.458)	(0.412)	(0.263)	(0.257)
d_UK	0.696**	1.238***	0.704***	1.236***
	(0.301)	(0.304)	(0.213)	(0.195)
Constant	−5.643*	−13.42***	−5.100**	−13.66***
	(3.260)	(2.875)	(2.010)	(1.719)
Spatial lag			−0.0686	0.0317
			(0.0891)	(0.0941)
Observations	259	807	259	807
R-squared	0.72	0.369		
F test	33.24	29.99		

Dependent variable: outward stocks of FDI (in logarithm)
Robust standard errors (§ clustered at country-pair level) in parenthesis. ***, **, * indicate significance at 1, 5 and 10 % level, respectively

lence of FDI involving trade of input or intermediate goods between the parent firm and the subsidiaries located in the host country. This hypothesis is also confirmed by the negative impact that distance exerts on EU FDI: indeed, distance is expected to

harm multinationals that trade inputs and intermediate products. EU tariffs positively affect FDI in manufacturing sector; therefore, EU outward FDI seems to be attracted by countries facing high EU tariffs, which is an unexpected result.[11] Indeed, EU tariffs are expected to exert no influence on all types of outward FDI, with the exception of the pure-vertical FDI, which should be negatively affected by EU tariffs (Table 2). In the lack of previous empirical studies on the impact of EU tariffs on the outward FDI in the manufacturing sector to compare our results, our strategy was to get more insight on this issue by considering the impact of tariffs specified at the industry level, as shown below (Table 6).

The FTA variable shows a considerable positive impact on EU FDI. Hence, EU FDI are attracted by countries where the size of the market potentially increases with FTA; this may be explained by the presence of EU firms subsidiaries exporting the final product in FTA member countries, and not on EU markets. Overall, our results for the manufacturing sector are consistent with the prevalence of export-platform FDI: inputs or intermediate goods are probably exported from the EU towards the foreign subsidiaries (which explains why host tariffs and distance exert a negative impact on outward FDI), while goods produced by the foreign subsidiaries are sold on the markets of third countries (which explains the significant positive impact of FTA) and are not shipped back to the EU. Our results also confirm the significant impact that common language exerts on FDI, as found by previous studies (e.g. Tekin-Koru and Waldkirch 2010).

The six industries we selected show rather different patterns. Tariffs in this case do not influence EU FDI. Similarly to results obtained for the manufacturing sector, host country FTA exerts a positive impact, while distance has a negative effect on FDI.

The presence of BIT has a significantly positive influence on FDI both for the manufacturing sector as a whole and for the six industries. This result supports the evidence found in previous studies (Egger and Pfaffermayr 2004; Egger and Merlo 2007; Busse et al. 2010). In both estimations, the inclusion of EU country dummies confirms the existence of country fixed effects, which capture all unobservable country-specific features affecting FDI; indeed, the coefficients of the EU country dummies are all significant except for the dummy referring to Italy.

Table 4 reports the results of the estimation of model (2) also. As for the control and policy variables, it is worth noting that the coefficients are very similar to those obtained by estimating model (1) (Table 4). As for the spatial lag variable, the coefficient λ is not significant: the p-value relative to the test on significance is equal to 0.44 if total manufacturing is considered, and to 0.74 if we consider data disaggregated in the six industries. Hence, we found no evidence in favour of the spatial lag model as in Eq. (2); this means that EU FDI is not affected by FDI in neighbouring third countries.

Estimations have also been run by splitting tariffs in advanced economies and other countries (Table 5) in order to verify whether home and host tariffs have a different impact on the outward FDI depending on the income level of the host country.

[11] As already mentioned, we checked the robustness of our results by using different specifications. We estimated the model (1) also with the inclusion of tariffs in logarithm rather than in level and interacted tariffs with the (squared) difference of skills. This result seems to be robust for all the different models.

Results reported in Table 5 confirm the importance of trade cost as a determinant of FDI in the manufacturing sector taken as a whole: the coefficients of tariffs, distance and host country FTA are all significant, even though the impact of tar-

Table 5 Estimation results

Variables	OLS[§]		Spatial lag model	
	Total manufacturing	Six industries	Total manufacturing	Six industries
Ln (sumGDP)	1.268***	1.313***	1.263***	1.342***
	(0.184)	(0.166)	(0.112)	(0.109)
RelGDP	−0.0231***	−0.0180***	−0.0230***	−0.0182***
	(0.00433)	(0.00372)	(0.00396)	(0.00305)
Skilldiff	−0.00160	−0.0137*	−0.00116	−0.0141***
	(0.00736)	(0.00716)	(0.00533)	(0.00444)
Host tariff	−0.0821***	0.0206	−0.0831***	0.0209*
	(0.0197)	(0.0165)	(0.0176)	(0.0116)
EU tariff	1.004***	0.0439	1.011***	0.0426
	(0.0996)	(0.0903)	(0.0921)	(0.0664)
Host tariff *DC	0.132*	−0.0733	0.135*	−0.0759**
	(0.0758)	(0.0497)	(0.0690)	(0.0322)
EU tariff *DC	−0.726***	0.000827	−0.725***	0.000824
	(0.127)	(0.107)	(0.117)	(0.0789)
BIT	0.214	0.866***	0.206	0.917***
	(0.315)	(0.295)	(0.273)	(0.232)
FTA	1.210***	0.861***	1.218***	0.871***
	(0.308)	(0.288)	(0.251)	(0.205)
Dist	−0.702***	−0.394***	−0.701***	−0.422***
	(0.129)	(0.147)	(0.0914)	(0.0790)
Commlang	1.238***	1.469***	1.236***	1.465***
	(0.304)	(0.386)	(0.212)	(0.191)
d_Germany	0.692**	1.495***	0.697***	1.478***
	(0.317)	(0.353)	(0.214)	(0.200)
d_Italy	−0.228	0.501	−0.227	0.509**
	(0.328)	(0.422)	(0.216)	(0.226)
d_Netherlands	1.955***	2.237***	1.950***	2.246***
	(0.438)	(0.418)	(0.256)	(0.260)
d_UK	0.680**	1.253***	0.682***	1.249***
	(0.270)	(0.300)	(0.204)	(0.194)
Constant	−8.267***	−13.78***	−8.077***	−14.29***
	(2.969)	(2.826)	(1.944)	(1.729)
Spatial lag			−0.0242	0.0667
			(0.0858)	(0.0942)
Observations	259	807	259	807

Table 5 continued

Variables	OLS§		Spatial lag model	
	Total manufacturing	Six industries	Total manufacturing	Six industries
R-squared	0.748	0.375		
F test	32.51	31.94		

Dependent variable: outward stocks of FDI (in logarithm)
Robust standard errors (§ clustered at country-pair level) in parenthesis
DC developed countries
***, **, * indicate significance at 1, 5 and 10 % level, respectively

iffs varies between developed and developing countries. Host tariffs negatively affect FDI in developing countries, while they positively impact FDI towards developed economies.[12] On the contrary, the coefficient of EU tariffs is confirmed to be positive for both groups of countries. The six industries here selected confirm a rather different pattern from manufacturing as a whole. Trade costs in general terms do not play a significant role in determining the pattern of FDI, either in developed or developing economies.

As for model (1), Table 5 also reports results obtained estimating the spatial lag model by splitting tariffs in advanced economies and other countries. As can be seen, coefficients are similar to those obtained with model (1) and in all estimations λ is never significant.

In order to gather further insights on the impact of tariffs on FDI at the industry level, we have split the home and host tariffs into six groups, according to the aggregations previously used. Table 6 reports the results of these estimations. As robustness check, we have run three different estimations. In the first model (column a), we have split home tariffs only, in the second one (column b) we have considered host tariffs disaggregated by industry only, while in the third model (column c) we have split both EU and host tariffs. The coefficients of market size and similarity are significant, while it is confirmed that skilled labour endowment does not affect EU FDI. As in Table 4, BIT, FTA and common language positively affect EU FDI, while distance exerts a significantly negative role.

Results confirm, as expected, that the responsiveness of EU FDI to tariffs varies greatly from one industry to another.[13] Only in the "Food" and "Total vehicles and other transport equipment" industries do tariffs play no role in determining the pattern of FDI. For two industries, "Total textiles and wood activities" and "Total office machinery, computers, RTV, communication equipment", the coefficient of the host tariff is almost always significant and negative, while those of EU tariffs are mainly not significant. This pattern is consistent with the prevalence of vertical FDI: high tariffs

[12] However, the effect of host tariffs on EU FDI in developed countries is not significant.

[13] In Table 6, *ind1* indicates "Food products", *ind2* is "Total textiles and wood activities"; *ind3* refers to "Total petroleum, chemical, rubber, plastic products"; *ind4* stands for "Total metal and mechanical products", *ind5* is "Total office machinery, computers, RTV, communication equipment" and *ind6* indicates "Total vehicles and other transport equipment".

Table 6 Estimation results

Variables	OLS[§]			Spatial lag model		
	(a)	(b)	(c)	(a)	(b)	(c)
Ln (sumGDP)	1.273***	1.290***	1.266***	1.260***	1.310***	1.244***
	(0.168)	(0.169)	(0.165)	(0.102)	(0.106)	(0.101)
RelGDP	−0.0184***	−0.0197***	−0.0188***	−0.0183***	−0.0199***	−0.0186***
	(0.00407)	(0.00461)	(0.00436)	(0.00334)	(0.00386)	(0.00357)
Skilldiff	−0.00850	−0.0107	−0.00848	−0.00834**	−0.0109**	−0.00816*
	(0.00723)	(0.00758)	(0.00769)	(0.00424)	(0.00434)	(0.00443)
Host tariff	0.0170			0.0170*		
	(0.0127)			(0.00907)		
Host tariff *ind1		0.00590	0.0144		0.00597	0.0146*
		(0.0117)	(0.0115)		(0.00875)	(0.00855)
Host tariff *ind2		−0.118***	−0.0602		−0.118***	−0.0623
		(0.0337)	(0.0589)		(0.0272)	(0.0485)
Host tariff *ind3		0.0980***	0.0431		0.0984***	0.0425
		(0.0349)	(0.0317)		(0.0310)	(0.0280)
Host tariff *ind4		0.124***	0.0971**		0.123***	0.0972***
		(0.0337)	(0.0378)		(0.0277)	(0.0289)
Host tariff *ind5		−0.132***	−0.0964***		−0.133***	−0.0965***
		(0.0336)	(0.0329)		(0.0359)	(0.0355)
Host tariff *ind6		0.0249	0.0191		0.0253	0.0184
		(0.0290)	(0.0354)		(0.0228)	(0.0259)
EU tariff		0.0693			0.0671**	
		(0.0520)			(0.0336)	
EU tariff *ind1	0.0590		0.0730	0.0606*		0.0754**
	(0.0509)		(0.0534)	(0.0325)		(0.0343)
EU tariff *ind2	−0.0904		0.0245	−0.0872*		0.0328
	(0.0612)		(0.0998)	(0.0469)		(0.0786)
EU tariff *ind3	0.600***		0.605***	0.605***		0.615***
	(0.107)		(0.111)	(0.0747)		(0.0745)
EU tariff *ind4	0.407***		0.359**	0.415***		0.375***
	(0.144)		(0.151)	(0.110)		(0.115)
EU tariff *ind5	−0.299*		−0.181	−0.292**		−0.169
	(0.171)		(0.167)	(0.132)		(0.128)
EU tariff *ind6	0.117		0.137	0.120**		0.143**
	(0.0914)		(0.107)	(0.0582)		(0.0661)
BIT	1.160***	0.852***	1.172***	1.144***	0.890***	1.147***
	(0.311)	(0.280)	(0.321)	(0.213)	(0.227)	(0.227)
FTA	1.179***	0.845***	1.149***	1.177***	0.854***	1.149***
	(0.299)	(0.286)	(0.295)	(0.195)	(0.206)	(0.202)

Table 6 continued

Variables	OLS§			Spatial lag model		
	(a)	(b)	(c)	(a)	(b)	(c)
Ln (dist)	−0.502***	−0.435***	−0.522***	−0.493***	−0.455***	−0.505***
	(0.155)	(0.153)	(0.158)	(0.0752)	(0.0844)	(0.0794)
Commlang	1.437***	1.436***	1.450***	1.439***	1.432***	1.454***
	(0.385)	(0.395)	(0.394)	(0.173)	(0.187)	(0.175)
d_Germany	1.459***	1.468***	1.423***	1.465***	1.456***	1.432***
	(0.350)	(0.364)	(0.352)	(0.186)	(0.193)	(0.184)
d_Italy	0.328	0.329	0.266	0.324	0.335	0.259
	(0.442)	(0.439)	(0.435)	(0.222)	(0.226)	(0.220)
d_Netherlands	2.180***	2.190***	2.174***	2.176***	2.196***	2.166***
	(0.395)	(0.423)	(0.403)	(0.239)	(0.247)	(0.236)
d_UK	1.167***	1.189***	1.110***	1.166***	1.187***	1.108***
	(0.315)	(0.320)	(0.325)	(0.180)	(0.189)	(0.180)
Constant	−12.95***	−13.21***	−12.72***	−12.72***	−13.58***	−12.33***
	(2.800)	(2.845)	(2.787)	(1.641)	(1.691)	(1.622)
Spatial lag				−0.0269	0.0486	−0.0462
				(0.0864)	(0.0901)	(0.0852)
Observations	807	807	807	807	807	807
R-squared	0.461	0.419	0.473			
F test	32.22	26.58	31.44			

Dependent variable: outward stocks of FDI—six industries (in logarithm)
Robust standard errors (§ clustered at country-pair level) in parenthesis
ind1, food products; ind2, total textiles and wood activities; ind3, total petroleum, chemical, rubber, plastic products; ind4, total metal and mechanical products; ind5, Total office machinery, computers, RTV, communication equipment and ind6, total vehicles and other transport equipment
***; **, * indicate significance at 1, 5 and 10 % level, respectively

in the host countries harm EU (vertical) FDI. Results of estimations indicate a different pattern of FDI for the last remaining two industries "Total petroleum, chemical, rubber, plastic products" and "Total metal and mechanical products". The coefficients of host tariffs are almost always significant and positive, which is consistent with the prevalence of horizontal-type FDI in these industries. Further, we also found robust evidence of a significant unexpected positive impact of EU home tariffs. Hence, in these industries, high tariffs in the host countries stimulate EU horizontal FDI and, at the same time, EU firms concentrate plants in countries facing high EU tariffs. In other words, two-way trade costs positively affect EU outward FDI. Two facts may contribute to explain this finding. First, the limits of our database: in our sample, FDI in these industries are mostly concentrated in developed countries (about 94 and 89 % in the "Total petroleum, chemical, rubber, plastic products" and "Total metal and mechanical products", respectively), which are also the countries facing higher EU tariffs (Fig. 3). Second, within the developed countries group, EU FDI are located in

countries whose multinational firms are the major investors in the EU market. In other terms, home tariffs positively influence outward FDI in industries where two-way FDI prevail. In the literature on the multinational firm, this two-way pattern of FDI has been explained by the presence of the so-called "strategic FDI" (e.g. Graham 1978, 1996; Casson 1987): especially when trade barriers are high, (two-way horizontal) FDI may represent an exchange of threat between rival firms originating in different countries. In this perspective, it is maybe not so surprising to find that EU outward FDI are higher the greater the EU trade protection.

Also in this case, spatial lag model results confirm the absence of spatial dependence in FDI among host countries. These findings suggest that, unlike previous studies dealing with US and Chinese outward FDI, in the case of our sample of EU outward FDI, there is no evidence of third country FDI effects: outward FDI from the EU is neither complementary with, nor a substitute for FDI in third countries.

6 Concluding remarks

Recent evidence of more complex strategies of multinational firms emphasises the need of a shift in the empirical analyses from a two-country to a three-country perspective. This paper aims at contributing to the analysis of the determinants of FDI by focusing on the impact that trade policies and "third country effects" may have on the EU outward FDI. Although the trade policy is considered as an important factor explaining FDI, there is relatively little empirical evidence on the impact of both EU and non-EU trade policies on the pattern of EU FDI. Further, the potential existence of "third country" effects, that is, that EU FDI in each host country is affected by FDI in neighbouring countries, to date has been not examined as for the EU FDI.

Our sample consists of five EU countries and 24 partner countries, and the data are disaggregated both at the country and industry level: we first analyse the manufacturing sector as a whole; then six manufacturing industries have been considered. An empirical specification based on the knowledge-capital model is estimated over the period 1995–2008. Bilateral tariffs have been used to measure bilateral trade policies, while a dummy captures the possible positive impact on EU FDI of the participation of a host country to a FTA with third countries. To assess the role of "third country effects", we have tested whether there is a spatial dependence in FDI across host countries.

As for the control variables, our findings, which are in line with previous studies related to different countries and with our own expectations, are robust for all estimations: the coefficients of market size and similarity turn out to be significant and of the expected sign, while there is no evidence that differences in skilled labour endowments affect EU outward FDI. The results for our variables of interest, that is, trade costs and third country effects, help clarify some elements of a rather complex picture. Trade cost is a significant determinant of FDI in the estimations for the manufacturing sector taken as a whole. Host tariffs and distance negatively affect EU FDI, while BIT and FTA affect it positively. This pattern is particularly clear for FDI hosted by developing countries. These results could be consistent with the prevalence of export-platform-type FDI. An unexpected and somehow puzzling result, obtained when the

manufacturing sector as a whole is considered, is that EU tariffs positively affect FDI. Conversely, our findings suggest that trade costs play a minor role for the six industries when the trade cost variables are considered jointly.

Estimations run by disaggregating tariffs by industry have provided useful insights on the impact of bilateral tariffs on FDI. Results have confirmed our *a priori* expectation of an industry-specific responsiveness of FDI to tariffs. While in two industries (Food and Vehicles), no evidence is found of an impact of tariffs on EU FDI, in two other industries (Textile and Computers) host tariffs negatively affect FDI, which suggests the prevalence of vertical-type FDI. Conversely, in the Petroleum and Mechanical industries both host and EU tariffs exert a positive impact. The EU tariff coefficient is positive and significant in industries where host tariffs also exert a positive effect, i.e. when horizontal FDI are likely to prevail. One possible explanation for this puzzling result is the concentration, in our sample, of FDI in developed countries, which are those facing the higher EU tariffs; the existence of strategic two-way horizontal FDI may offer a further possible explanation of this result.

As for third country effects, we have found that FTA between host and third countries overall exert a positive impact on EU FDI; this result is quite robust across all estimations. Conversely, and unlike other papers (e.g. Blonigen et al. 2007; Chou et al. 2011) using a similar methodology, we found no empirical support for the spatial lag model. Our results show that FDI in neighbouring countries does not influence EU FDI, either in the manufacturing sector estimations or in the estimations run with the disaggregated industries. To the best of our knowledge, this is the first paper estimating third country FDI effects on the EU outward FDI, and hence, our results cannot be compared with previous findings. As for the sample of partner countries here considered, our findings are rather robust and suggest that EU multinational firms decisions are not interdependent across host/third countries, unlike in the case of US or Chinese firms.

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