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The interaction between Export and FDI: Central-Eastern Europe and EU15

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Abstract

Historically, FDI's have long been considered as an alternative means for firms to internationalize. According to this line of thought, a substitution relationship between exports and FDI's would be expected. However, recent developments in new trade theory, emphasize that exports and FDI's can be positively correlated. On the home country side, the relevant question is whether national share of exports towards destination markets has been affected by FDI's undertaken in the same, in other words whether outward FDI raises or lowers home country exports. Taking into account that the prevalent type of FDI seems to be horizontal, we would expect that a substitution relationship prevails in empirical findings. This study adds to previous work presenting a review of the existing theoretical and empirical studies and underlining the discrepancy between the two. Finally, it tests the relationship between FDI and exports bilateral flows from EU15 towards CEEC countries using an extended gravity approach that includes labour costs. The results support the complementarity' hypothesis.

Keywords: FDI, Multinational enterprises, Gravity Model, Europe.

JEL Classification: F15, F21, F23, O52

Direct investment activities have grown hugely over the last twenty years thanks to the removal of tariff barriers and the reduction in the transport and communication costs, which have provided an incentive for ever-growing vertical and horizontal production. These factors have given rise to a global theatre of operations positively influencing commercial flows, so much so that, in 2005, a conspicuous quota of international trade was represented by intra-firm commercial exchanges of multinational

enterprises. This rapid growth of FDI and the adoption of ever expanding de-localization strategies has recently led to a heated debate on their effects on the investing country in terms of productive system wealth reduction, rising unemployment and decrease of export flows. Indeed, in the traditional literature (models based on perfect competition), exports and FDI have long been treated as different and alternative ways of penetrating foreign markets. FDI represent a substitute for the exports of the home country and so determine a re-location of production and employment towards other countries. More recently “New Trade Theory”, while still setting de-localized productive activity within general equilibrium models, has modified the basis of neoclassical theory, substituting its hypotheses with those of increasing returns to scale, product differentiation and imperfect competition, and thus emphasizing that FDI determine an increased flow of exports. A complementary relationship would be determined, on the one hand in as much as the parent company would create new commercial flows (export of intermediate goods), leaving the production phase to the foreign affiliates and provide organization, technical and marketing services. On the other hand, the generation of spillover effects among various industries will reinforce the complementary relationship.

The empirical works have not identified a systematic relationship between FDI and exports because the nature of the relationship depends on the FDI type. Theoretically, there are reasons that suggest both substitution and complementarity effect, consequently the precise nature of this relationship is a controversial subject making it necessary to conduct ad hoc studies for each case. Taking into account that the prevalent type of FDI seems to be horizontal, we would expect that a substitution relationship prevails in empirical works. However, empirically, the results almost always point to a positive relationship. In this respect, empirical analyses carried out at varying aggregation levels have had divergent outcomes. On the one hand at the microeconomic level the presence of both types of relationship is emphasized, while, at a macroeconomic and industrial level, the emphasis on complementary relationships prevails. The relationship between FDI and exports is complex since there are several aspects that must be taken into account. Firstly, home exports can be substituted by the affiliates’ sales in the host country, but foreign production can use inputs imported from the parent firm. Secondly,

inter-firm trade (between the home and host country) can also change. To these bilateral effects, we can add a reduction of the exports from the home country to third countries. Therefore, in a wider perspective, the relationship becomes even more multifaceted. These outcomes show that the impact of production relocation can differ according to whether it is to exploit natural resources, access to local markets or is simply part of the international division of labour within the firm (Cantwell, 1994). In addition the strong complementarity showed up in the empirical works can, at least in part, be explained by the multi-product nature of the firm (which means that demand complementarities and/or vertical production relationships can exist between the products of the firm), as well as by the existence of sources of positive spurious relationships between FDI and trade.

The value added of this work consists in combining a wide literature review with an empirical estimation that involve an extended gravity approach.

This work presents in section I a survey of the theoretical literature on the relationship between FDI and exports. Section II contains a review of the empirical studies on the subject. Section III discusses the various types of FDI and their effects on commercial flows, in order to allow for an easier interpretation of the results. In section IV the characteristics of the gravity model are exemplified and in section V the model used for empirical analysis is introduced. Section VI illustrates the results of the analysis, while section VII discusses some brief conclusions.

I. Exports and FDI: substitution relationship or progressive involvement in foreign markets?

The relationship between direct investments and exports has been examined by the theories of international trade and FDI. Both theories have had an independent evolution; however, over the last 20 years some scholars attempted at unify these theories. Indeed, a part of the literature has concentrated on the factors which explain how economic agents choose between the two forms of internationalization, underlining the existence of a substitution relationship. The other has concentrated on the common determinants, emphasizing the complementary link. The interpretation according to which export and FDI are perfect substitutes (which implies that the latter is probably

accompanied by a reduction in exports from the country of origin to the country of destination), is the traditional view held, initially, by the neoclassical theory of international trade, which emphasises the concept of comparative advantages as determinants of trade patterns. In this context, R. Mundell (1957), on the base of H-O-S¹ model (two countries, two factors, two goods), demonstrated the existence of a substitution relationship between international trade and factors mobility, stating that the presence of tariff barriers has an effect on the factors mobility and as a result, obstacles to the factors mobility have an effect on trade. In other words, trade, determined by the international factor price differences between countries, tends to act as a substitute for the international factors, affecting their relative scarcity to the point of equalizing both the relative and the absolute prices. However, once the capital moves (capital mobility is considered as a physical movement of resources) towards the country where it is scarce, attracted by relatively high prices, the differences between nations are reduced and trade based on different factors endowments is discouraged and substituted completely. This analysis, however, displays many limits. The first is that the relationship of substitution between FDI and exports at an aggregated level occurs only if there are no distortions in the market, or if those present do not exceed the differences in factors endowments. In other words, this theory assumes perfect competition; a hypothesis which does not reflect real world dynamics, such as the presence of economies of scale, non homogeneous production factors (for example qualified labour versus non-qualified labour), transport costs, international differences in technology and in the preferences of economic agents. The second constraint lies in the fact that Mundell's analysis refers essentially to final goods (Schmits e Helmberger, 1970), while in reality a large proportion of world trade (as of the FDIs associated to it), concern intermediate goods. In a perfectly competitive world such as the one considered by these models, firms have no reason to operate abroad, since they have the same access to technology and markets (Graham, 1995); consequently, multinational companies and the advantages that justify their type of managerial organization do not have a specific function.

¹ The Heckscher-Ohlin-Samuelson model states that the difference in factors endowment is fundamental in determining comparative advantages. A country will benefit from international trade by exporting goods made through the relative abundant production factors, and importing those goods that would require a higher quantity of less abundant factors .

The progressive growth of FDI and multinationals during the mid seventies, brought about, quite aside from the theory of international trade, the theory of FDI (Hymer 60, 70), in which the firm assumes a key role in the analysis. According to this theory, it is stated that the multinational enterprise is based on market imperfections and on the presence of transaction costs, that make it profitable for businesses to substitute external transactions with internal production. Firms invest abroad by virtue of oligopolistic advantages they own (technological innovation, imitation capacity, skills, financial or managerial ability) that can be transferred abroad at a low cost. These *ownership advantages* allow the firms to overcome the natural disadvantages that typically affect local competitors, due to a insufficient knowledge of the market, to hostilities from institutions and national operators. The degree of transferability of an advantage through exports or direct investments depends, nevertheless, on its particular nature influencing the choice between FDI and exports. Expansion abroad is nothing but a stage in the process of firm development in a geographical sense and along horizontal or vertical growth patterns.²

Frequently, however, the advantages a firm has are dynamic and determine a primary sequence of exports, which is followed by direct investments that typically replace trade. Vernon (66), on the basis of the dynamics of technological progress and the product life cycle, has identified a specific oligopolistic mechanism for an innovating firm to grow internationally, passing through multiple stages, from the creation of a new

² This idea has been pursued in detail by Kindleberger (69) and Caves (71, 74) who offer an interpretative model of FDI as resulting from firms controlling exclusive competitive advantages, in terms of product, production process and management of both tangible or intangible nature. Basically these theories interpret FDI as the result of a series of consecutive oligopolistic reactions between interconnected businesses. These repetitive chain reactions cause the intensification of intra-industrial FDI that determines a mutual invasion mechanism. This means that for every FDI flow there is a counter FDI flow, increasing the internationalization of the world economy and causing the concentration of markets.

Although some developments have tried to interpret the strong increase of the process of crossed investments implemented by businesses in industrialized countries in the respective markets, the key point of the theory rests, even in its developments, on FDI providing a means to counteract or anticipate the strategy of an oligopolistic rival. The most notable proponents of this theory are Knickerbocker (73) e Graham (74, 78). The former proposed a model in which an oligopoly's initial investment in a foreign market can cause a cluster of FDI to be induced by an imitative process, causing non coordinated acts of penetration to the market; the latter proposed more complex models, based on game theory, in which the oligopolies use investments on the foreign market as a deterrent against any aggressive policies in their own market. (It must be made clear that Graham's model does not distinguish exports from FDI: in many cases the oligopolistic reaction may not require the use of direct investment, even though it appears more effective as a stable threat or a deterrent to the competitor.

product in a given country, to its export, and finally to its production abroad. In the initial phase the product is new, and the production techniques belong only to the innovating firm, which has a monopolistic advantage on the internal market. Subsequently, the product and the production processes are developed by the innovating firm, which by maintaining a monopolistic advantage (the imitation process being difficult) manages to guarantee profit through exports despite transport costs and tariff barriers. In the third phase, the size of markets grows, allowing efficient on-site production, while the imitative process makes it possible for local producers to enter the market. The innovating firm will need to defend itself from potential competitors in order to maintain its market share. Therefore, because competition is reduced by growing costs, it will replace exports with production in foreign markets, transferring both technologies and production line abroad. Finally, in the last phase, the product and its technology mature becoming standardized and, consequently, accessible to local imitators that thanks to lower labour costs, can become strong international competitors. In this case, the flow of foreign trade may be reversed. The original innovating firm may re-locate production further into host countries and re-import products to the parent company, or abandon the market enacting an innovative strategy that offers new products allowing the same cycle to repeat itself, based on oligopolistic advantages. Kojima (73, 85) examines Vernon's model from the standpoint of an industry, rather than a single product, stressing that FDIs in innovative sectors replace trade flows. On the other hand, FDIs create trade in labour intensive manufacturing sectors in which the advantage of the country of origin is declining. When the country of origin invests in sectors in which the destination country has a comparative advantage, this investment presents itself as welfare-improving and trade-creating in as much as it promotes trade in both countries. This type of FDI (defined as *export-oriented*) by bringing about a re-location of production is supposed to have an optimizing effect both for the country of origin (which develops a re-structuring process), and for the host-country, which develops a process of *export-oriented*³ industrialization. According to other opinions (Buckley and Casson 76, 79, 81), the choice between export

³ Kojima compares the USA FDIs to the Japanese FDIs highlighting that the latter is almost completely trade oriented and responds to the principles of comparative advantage. Otherwise, the USA FDIs are mostly implemented in an oligopolistic market structure, making it anti-trade oriented; in the long run this is a disadvantage both for the country of origin and for the destination country.

and direct investment is the outcome of an alternative strategy based on the presence of two further types of advantages: internalization and localization. The idea of the internalization advantage derives from Coase's (37) contribution in which a firm is defined as an efficient organization which, under certain circumstances, replaces the market by internalizing the financial transactions and achieving lower internal costs compared to the market prices. The multinational organization is thus considered by Williamson (75,79,81) as a centralized managerial hierarchy governed by a single strategy, such that internalization is activated when the external market proves inefficient. From the viewpoint of the transaction costs, the organization of international trade will depend on the comparison among different forms of incentives or disincentives, associated to different forms of governance, with a trade-off for the firm between production and transaction costs. One significant contribution in this regard comes from Buckley and Casson (76, 79, 81) as they apply the concept of internalization both to vertical integration for the primary control of resources, and to the market of scientific knowledge and technological know-how. Their suggestion is that for relatively low sale volumes (reduced transport costs), firms prefer exporting to avoid the high fixed costs associated with local production, while they will prefer foreign production for high sale volumes. The advantages of localization (natural resources, availability, cost and quality of labour, infrastructure, scientific and technological potential, geographical distance and institutional inputs) introduced by Dunning (77) in his eclectic approach, favor the decision to supply the foreign market through the on-site creation of production units (FDI), rather than through exports. This approach also presents exports and FDIs as substitutes for each other in the sense that, on the basis of existing conditions, the firm will choose one or the other form of internationalization. Starting in 1980, in a context of growing multinationalization (and concentration of multinational activity in industries with high levels of intangible and knowledge based assets) a new theory was developed: the "New Trade Theory". The new models abandoned the old concepts of H-O-S, and combined the advantages of ownership and localization to integrate FDI into international trade theories. The New Trade Theory has elaborated models of imperfect competition, thus explaining not only situations in which trade is generated by differences in factor endowments, as was postulated in the H-O model, but also, given similar factor

endowments, by differences in production technology and in scale economies. In these models, the activities of firms appear divided into two categories. The first includes parent companies activities: engineering and financial or managerial services that can be transferred at no cost to distant locations. This type of activity is called knowledge capital. The second type of activity consists in the production process, which may be further subdivided into intermediate and final goods, respectively considered to be capital-intensive and labour-intensive. If we assume no transport costs for parent companies services and increasing returns to scale in the production process, firms can geographically separate production from the parent company, but tend to centralize it in order to achieve scale economies. These studies, therefore, recognize multi-plant, multi-product and multi-stage production with horizontally or vertically integrated firms, depending on the cases, in which the horizontal⁴ FDIs consist of the duplication of the entire production process, while the vertical ones (consist) of the geographical separation of the various stages in the chain of added value. In the context of New Trade Theory, a new set of contributions have underlined that when the productive process is divided into separate stages in different countries (vertical FDI), the most likely relationship is not one of substitution, but rather a complementary one, with FDIs and exports of intermediate goods growing simultaneously. The arguments in favor of vertical fragmentation in multinational production (vertical FDI) derive from the opportunity of separating the corporate activities, based on ownership advantages and subject to increasing returns to scale (e.g. management, marketing, R&D), from the production activities. These, in turn, permit the internalization of the above mentioned advantages, resulting from costs differences between countries. On the basis of the models developed by Helpman (1984), Helpman-Krugman (85) Krugman (1991) Ethier e Horn (90), which assume absence of transaction costs, (thus making horizontal FDIs redundant), vertical FDI would generate complementary commercial flows of finished products from the affiliates to the parent company and an intra-firm transfer of intangible services from the parent company to the

⁴ The first New Trade Theories (Markusen, 84, Horstman and Markusen, 87) were based on Hymer's (76) advantage approach suggesting that horizontal FDIs (there would be no reason for fragmenting vertically because these theories assume that different activities will use a single factor or multiple factors in the same proportions) are substitutes for trade because the establishment of a foreign subsidiary will reduce exports to that market.

foreign affiliate. Additional phases in the production and distribution would strengthen the chance of intra-firm or intra-industry trade of intermediate or finished goods, leading to a complementary relationship. For Ethier (82) and Markusen (95) also, factors mobility increases the export volumes. In the presence of comparable factor endowments, trade is determined, according to Ethier (82) by the existence of scale economies, while Markusen (95) suggests that it is stimulated by differences between production technologies. The relative factor prices, given differences in their profitability, will not be the same between countries. However, once the factors mobility is adopted, countries will start to diverge in their factor endowments and, if the specialization effects exceed those derived from comparative advantage, the complementary relationship will prevail. In this case, factor mobility is a necessary condition for efficiency, since free trade is no longer sufficient. Factors mobility results in a divergence in factors endowment, in as much as each country will have a relatively abundant endowment of the factor employed intensively in its export industry. The resulting difference in the respective factors endowment will increase the volume of trade (in accordance with the H-O model).

By subdividing the production activity into one or more intermediate stages, Brainard (93) argues that FDIs are accompanied by an increase in trade. She explains the existence of a complementary relationship between FDI and commercial flows on the basis of *proximity advantages*. This term underlines how local production may have strong effects on demand through decreasing variable costs, facilitated marketing and customer loyalties. In the absence of differences in factor endowments, the scope of transport costs and the size of scale economies at the level of single units will determine the location of production. The decision to expand abroad through trade is thus based on the trade-off between proximity and concentration, which is maximized by the concentration of production in a single location. This trade-off explains the horizontal expansion abroad considering market access rather than scale economies. The *proximity versus scale model* (Brainard, 93) can be extended to the various production stages, each of which is characterized by a different trade-off between proximity or concentration advantages, and generates intra-industry trade of intermediate goods.

Analysing the determinants of both horizontal and vertical FDI, a complementary relationship between FDI and export flows has been identified in the models proposed by Markusen, Venables, Konan and Zhang (1996), Markusen (1997) Markusen and Maskus (01). Assuming that different production activities use qualified and non-qualified labour in different proportions, it is argued that both horizontal and vertical FDI are undertaken, in accordance with the characteristics of the country and the level of trade costs. Their models, known as *knowledge capital*, state that the separation of the R&D services from the production activities, give rise to vertical multinationals which fragment production and localize production on the basis of factor costs and market size. The fact that services based on technology assume the character of a “joint input” (since they can be transferred to other production units at low cost), gives rise to horizontal multinationals which produce the same goods and services in different locations. On the one hand, vertical FDI, undertaken when factor costs are different between countries, scale economies are greater at single plant level and trade costs are relatively low, would generate inter-industry export flows. On the other hand, horizontal FDI, carried out in countries similar to those of origin both in size and factor endowments, would induce larger intra-firm commercial flows in the presence of high transactions costs (consumer proximity prevails).

The creation of complementary export flows, even in the presence of production in foreign markets, according to the *reciprocal dumping trade* model developed by Brander and Krugman (83), is caused by rivalry between oligopolistic firms. A firm will accept a smaller gap between price and marginal costs in markets where it sells less, because sales in such markets are associated with a reduced revenue depression. The model shows how such a rivalry naturally gives rise to cases of “dumping” (of the production) and also shows how such “dumping” is reciprocal, and creates bi-directional commerce of the same product. Analogous forces to those driving trade in the Brander-Krugman (83) “reciprocal dumping” model drive bidirectional FDI in the model proposed by Baldwin and Ottaviano (98). The model is based on crossed horizontal FDI that generate reciprocal trade in differentiated finished products. In contrast with the proximity versus scale model (Brainard 93), in which different firms supply a certain type of good exclusively for the local market, this model considers cases

in which units located in different countries produce various types of product, which are then sold in all countries. Although not all types of product are sold in all nations, the range of products available in each nation exceeds the range of locally produced goods by a large margin. The point is that each product is supplied to many nations from one or two units which are not necessarily located in the home country. Similar phenomena are observed in industrial sectors like the food and the car industry. The decision of how many varieties of goods to produce is a trade-off between direct effects (profits deriving from a new type of good) and an effect of revenue depression (called *cannibalization* since each new variety of product “devours” the sales of the existing variety of products). By analogy with the Brander-Krugman model, multiproduct firms are prepared to accept lower revenue for new products in foreign markets, when these are associated with a reduced cannibalization effect. For this reason, firms find it optimal to produce some of their variety abroad, if trade barriers protect some of the home produced variety from the effect of cannibalization of the foreign produced variety, and vice versa. So, in view of product differentiation, establishing a foreign production plant results in increased commercial flows.

II A review of the empirical studies

The approaches adopted to analyze the relationship between exports (trade) and FDI can be grouped into three types: microeconomic, macroeconomic and sectoral studies. Each level of analysis has strengths and weaknesses. In fact, as suggested by Blonigen (01), while the use of aggregate data consent to capture spillover effects among industries in the sense of additional export flows on the part of other firms, by contrast following Markusen (00), a fine disaggregation data level allows to take into account the nature of FDI and examine its effect more in depth.

With regards to the microeconomic analysis, among the first studies on the impact of FDI on trade were that carried out by Bergsten, Horst e Moran (78) who suggested that the growth of foreign subsidiary companies in the USA has a significant positive effect on the increase of exports from the parent companies, but also specify that the relationship varies between one of complementarity to one of substitution if the degree of

internationalization increases and operations in host countries become more competitive. A few years later, Lipsey and Weiss (1981) found that outgoing USA FDI's were associated with a growth in exports. In a later study (84) the same authors examined the foreign production and the exports of 14 industries in the USA manufacturing sector and identified a positive and significant relationship in 11 of these. During the period, Swedenborg (79) analysing Swedish outgoing FDI's, highlighted that the resulting exports of intermediate goods positively counterbalanced the substitution effect on the export of finished products. Re-examining this study Swensson (96) argued that the complementary relationship identified by Swedenborg seemed reversed in 1980.

This reversal which was not detectable in the bilateral trade between parent company and affiliate firms in host country, became evident when comparing the substitution of the exports from the country of origin to third markets, with the exports of the affiliates to the same markets. In 1988, Blomstrom, Lipsey e Kulchyck, studied the effect of foreign production of the Swedish affiliate firms on the export of Swedish manufactured goods and found that an increase in the production of the affiliates was positively linked with increased exports (for the 6 categories of industries considered). Pearce (82) found that trade between affiliates in different host countries will gradually replace trade between the home country and the affiliates, thus marginalising the role and the development of the home base. Later, in another study (90), he examined the exports and the foreign production of 458 of the world's largest multinationals, for the year 1982, and found that increased foreign production was, in general, positively linked with increased exports. In the 1994, a work carried out by the OECD and by the French Ministry of Industry reached the conclusion that foreign subsidiary firms in the USA and in France export as much as the parent companies, but have much higher import rates. Even though local production replaces some previous exports, it nevertheless requires inputs, largely from the parent company or other affiliates of the same group. Consequently, as a result of the investment, trade between host and third countries can be diverted since the latter may lose market quota in the host country to the benefit of the investing country. A complementary relationship between FDI's and exports was also identified by Sachs e Shatz (94), who examined the bilateral trade of the USA with 40 other countries as a function of the commercial partner's GDP, of its population and geographical distance.

Even though some of the analyses at firm level show that FDI's replace exports, this result does not seem to be necessarily confirmed by studies at a wider aggregation level since FDI's can also generate spillover effects among different industries, in the sense of additional export flows on the part of other firms . Thus, the general impact on trade will be modified by general equilibrium effects so that what may be interpreted on the scale of a single firm as a substitution relationship between FDI's and exports is, in fact, a complementary relationship when examined on a wider scale. For what concerns sectoral level analyses, the complementary relationship appears dominant. In 1997, an OECD investigation, identified a complementary relationship between exports and FDI's, having controlled for common determinants of the two forms of internationalization, such as market size, GDP, and scale economies. Fontagnè (99) presents empirical evidence, at industry level for three countries France, USA, and the United Kingdom in order to illustrate the differences that exist among countries and the complementary nature of the relationship between FDI's and exports.

As in sectoral studies, the complementary relationship appears dominant also in macroeconomic analyses. Eaton e Tamura (94) using a model that controls for country specific determinants, clarify both the export and FDI bilateral flows between Japan and USA and about 100 other countries during the interval 1985-1990. Each variable (exports, imports, inward and outward FDI's) is explained by the population of the partner country, by its per capita income, by its human capital allocation, and by dummies which take into account "natural regions" of integration. The result of this analysis is a clear positive correlation between outward FDI's and exports, both in the case of Japan and the USA. The OECD (1998) provides a clear idea of the volume of trade flows induced by the FDI's by comparing the simulated bilateral trade flows (corresponding to a world without FDI) with the observed bilateral trade flows for 21 countries for 1980-1995. Graham (96) applies a multiplying gravity model to USA' data (40 countries accounting for 90% of exports and FDI's in three different years 1983, 1988, 1991) and to Japan's data (36 countries accounting for 90% of the Japanese exports and FDI's in the same years). The model is used to estimate the effects of FDI's and exports determinants such

as the GDP of the host country, the size of the market (measured as total population) and the distance between the host and the home country. The residuals of each estimate (exports and FDI as functions of the three variables) are regressed against one another showing a complementary relationship between exports and FDIs for these countries. Pain and Wakelin (97) explore the relationship between FDI and exports of 11 OECD countries in the period 1971-95 using a standard export demand model. The result is that inward FDI has a positive effect on exports. Brenton e Di Mauro (98) having Graham's study as benchmark, estimate two gravity equations for exports and for FDI bilateral flows from some European countries (France, Germany and United Kingdom) and the USA as a function of GDP, population size and geographical distance including dummy variables representing preferential relationships that stimulate the flows of FDIs. The residual are regressed against each other identifying a complementary relationship. Complementarity appears also in studies that have estimated a standard or extended gravity model for transition economies. These works are generally at macro level because of the difficulties in finding more disaggregated data series. In this regards, Bevan et al. (00) estimate a gravity model for the period 1994-1998. using panel data on bilateral FDI flows from the EU-14, Korea, Japan, Switzerland and the U.S. towards the CEEC. The authors use dummy variables to control for the influence of EU accession. Bos et al (04) compare FDI outflows from Netherlands towards 10 EU accession economies to FDI towards other regions in order to detect a catch-up effect. They adopt a gravity approach controlling for heterogeneity, non linearity and omitted variable problems. The results show no evidence of trade crowding out.

Although the complementary relationship may appear dominant, the heterogeneous results of the studies considered may be attributed to the fact that the nature of the relationship is also influenced by the aim of the FDI (serving the local market, transferring production phases to low cost countries, guaranteeing access to resources) on which it is worthwhile to make some further observations, to complete our analysis.

III. Typology and determinants of FDI and their effects on trade flows

In order to evaluate the effects of FDI on export flows it appears useful to remind types and determinants of direct investments. A firm decides to make a direct investment for three main reasons that give rise to different FDI typologies:

- directly supplying foreign markets (market seeking FDI)
- rationalizing and integrating production, on an international scale, through outsourcing or delocalization of productive processes to countries where low cost factors are available (Efficiency seeking FDI)
- Acquiring scarce resources (raw materials, immaterial goods such as licenses, patents etc.) (Resource seeking FDI).

More specifically:

- the market seeking FDI aimed at the production and sale on foreign markets is usually described as horizontal, in as much as the units installed to supply different geographical locations double the production process output. The decision to undertake this sort of investment is influenced not only by factors such as the size of the local market (in other words the possibility of reaching scale economies), but also by considerations relating to the GDP, the growth rate of the country in question and its position in relation to regional markets. Other factors which are also considered in determining this type of FDI are the existence of tariff barriers (*tariff jumping investment*), or strategies of oligopolistic rivalry between multinationals.
- The efficiency seeking FDI, aimed at rationalizing production, is defined as vertical. This implies fragmenting the production chain and partial or total de-localization of production into one or more markets where low cost factors are available; this de-localization can be more or less aimed at re-import the partially transformed products to the parent company for the final stages of manufacture or for its sale. The de-localization may not only regard production activities of mature industries in developed countries towards transitional or developing countries that are endowed with qualified or unqualified cheap labour but also towards other industrialized nations where there are more work flexibility, better infrastructures, major fiscal benefits or availability of human capital .

- Resource seeking FDI designed for the acquisition of scarce resources is also defined as a vertical FDI.

From what has been discussed, it emerges that market oriented FDI (horizontal) may crowd out exports of the investing country. This is the case when the entire production process is carried out in the host country, while a trade creation effect (exports of intermediate goods, and capital goods) occurs when the production is separated from the final assembly of the product, which take place in the home country. It is therefore not clear whether there is a substitution or complementary relationship. FDI aimed at serving the national markets from a foreign (vertical) base generate an increase of imports on the part of the investing country, which, however, can be more than compensated by the growth in exports of finished goods which have become more competitive thanks to the de-localization of intermediate manufactured goods. Resource seeking FDI (vertical FDI) can determine an increase in exports of the investing country as a result of a strengthening in the competitiveness of firms. The choice of which country to invest in, using either type of FDI, rests not only on these considerations, but also on a series of other factors, for example: the political and social stability of the country; the existing regulations in place affecting the multinationals' access to the market and their operations; the conditions applied to foreign subsidiaries; the fiscal and commercial differences and any incentives for investment adopted by the country. The FDI effects on trade flows, therefore, depend on the determinants of a certain type of FDI. However, it must be stressed that the sector to which the FDI is channeled is also relevant, because it can determine different effects (for example in the case of services, it generates much less trade because most services are not tradable). These considerations suggest that a case by case empirical study is necessary.

IV. The empirical analysis

The gravity approach

The gravity approach with the greater importance ascribed to economic geography in determining trade patterns, permits the analysis of bilateral trade flows simply by taking into consideration few selected statistical data: the GDP; the

geographical distance⁵ and a group of qualitative variables designed to capture specific aspects relative to geography and to commercial integration of the countries considered. The most original characteristic of the gravity model lies in its explicit consideration of the geographical dimension of the countries considered. Traditional theory did not consider the main protagonists of international trade as having defined borders, but rather as operating within the geographical space with no precise physical collocation. The gravity approach on the other hand, taking into account the determinants of the international trade such as market size, transport costs (distance from home country) and factor endowment, looks at it as an interaction between a supply and demand localized in different geographical areas. This methodology can also be applied to international capital flows when they fall under the definition of FDI, in as much as they aim to take advantage of a different localization of productive activity and present themselves as long term investments, rather than portfolio investments. The volume of investment flows towards a country, in fact, tends to increase with higher GDP and elevated tariff barriers. The total and relative size of the markets are important determinants in (horizontal) FDIs, since return for these investments is dependent on the scale economies at plant level, while the factor endowments determining the comparative advantage of each country in exports, influence the level of implementation of the vertical⁶ FDI.

The model

The empirical analysis applies a gravity model (Brenton, 96, Brenton et al, 98) to a panel data of FDI and exports bilateral flows from the EU15 towards 10 Central Eastern European Countries (CEEC, now members of the EU) for the period 1999-2005. The choice of the period is due to the nearly absolute absence of data about FDI in CEEC

⁵ Leamer (1994) describes the paradox of the model that gives the best empirical results, thanks to the distance variable, which is still missing from international economics textbooks that still privilege “the hypothesis that countries can be infinitely distant from the view point of the inputs and infinitely close from the point of view of trade”.

⁶ The role of the factor endowments in determining vertical FDIs is emphasized by Helpman (1984) and Helpman and Krugman (1985). Furthermore, in a gravity framework, the relative endowments of physical and human capital, supply information on differentiated goods that are usually skill and capital intensive (Evenett e Keller, 1998).

before 1999.⁷ The choice of this group of host countries was made according to three types of criteria:

1. Firstly, for the strong presence of the EU 15 in the markets of these countries both as a commercial partner and as a direct investor;
2. Secondly, because of the attractiveness of CEEC markets, that in the process of joining the European Union, have offered and continue to offer today considerable investment opportunities;
3. Thirdly, because of the concern advanced by some EU15 members (including Italy) about a reduction in the rate of growth of exports towards these countries.

The time series data-sets for the empirical analysis were collected from different sources. The data relating to GDP and per capita GDP (at constant prices) are from the Eurostat database; the data on bilateral export flows and the data on the exchange rates stem from the External Trade Database (Eurostat); the data on bilateral stocks of FDIs from EU15 towards PECO countries come from WIIW database on direct investments. The distances are calculated through the site www.michelin.com. Labour cost data are collected from the Ameco database (Eurostat). We employ country level data since, first of all, in this way, it is possible to capture spillover effects among different industries in the sense of additional export flows on the part of other firms; secondly because this choice was forced by the fact that firm or sectoral level data are not available for these countries.

We have tried to control for the endogeneity problem (due to the fact that the determinants of FDI and export often coincide) estimating two equations simultaneously one for FDI and one for export and then looking at the correlation between the residuals. We look also for different FDI proxies such as the cost of investing abroad or the affiliates' employment level to control for endogeneity but they are not available. The model is, thus, made up of two equations. In the first, the dependent variable is represented by the export flows from country i to country j (X_{ijt}), while in the second the flows of FDIs from country i to country j (FDI_{ijt}) is the dependent variable. The explanatory variables included in the two equations are: the relative market size (SIZE),

⁷ They started to gather statistical data after the fall of Berlin wall.

the economic similarity of the countries (SIMIL), the difference in factor endowment (ENDO), the distance (DIST) and the labour cost (LABCOST). Therefore, the gravity equation is presented as follows:

For the estimate of export flows:

$$\ln X_{ijt} = \alpha_{ij} + \beta_1 \text{SIZE}_{ij} + \beta_2 \text{SIMIL}_{it} + \beta_3 \text{ENDO}_{jt} + \beta_4 \text{DIST}_{it} + \beta_5 \text{LABCOST}_{it} + \varepsilon_{ijt} \quad (1)$$

For the estimate of FDI flows:

$$\ln \text{FDI}_{ij} = \alpha_{ij} + \beta_1 \text{SIZE}_{ij} + \beta_2 \text{SIMIL}_{ij} + \beta_3 \text{ENDO}_{ij} + \beta_4 \text{DIST}_{ij} + \beta_5 \text{LABCOST}_{it} + \varepsilon_{ij} \quad (2)$$

In both equations:

The SIZE variable (a measure of the relative market size) is represented by the logarithm of the GDP at constant prices of country i normalized for the GDP of country j :

$$\text{SIZE}_{ijt} = \ln \text{GDP}_{it} - \ln \text{GDP}_{jt}$$

The economic similarity of countries (SIMIL) is measured by the absolute value of the difference (in logarithm) between the two GDP per capita at constant prices to proxy differences in consumer preferences:

$$\text{SIMIL}_{ijt} = (|\text{GDPPC}_{it} - \text{GDPPC}_{jt}|)$$

The difference in factor endowment (ENDO), in other words the unobservable capital-labour ratio, is measured by the difference between the ratios: gross fixed capital formation/ employment⁸ of the two countries:

$$\text{ENDO}_{ijt} = (\ln \text{GFCF}_{it}/\text{EMP}_{it} - \ln \text{GFCF}_{jt}/\text{EMP}_{jt})$$

The distance (DIST_{ij}) as a proxy for transport costs is measured as the absolute distance between the countries (more specifically between the capital cities, which are considered the center of economic activity).

LABCOST_{ijt} is the relative unit labour cost expressed like a ratio between the unit labour costs in the country j and the country i :

⁸ More precise measures might be the GDP per worker or the proportion of qualified labour as maintained by Wood (94), but often these indicators are not available.

$$LABCOST_{ijt} = LABCOST_{jt} / LABCOST_{it};$$

where the unit labour cost is computed as $LABCOST_{ijt} = (W_{ijt} / D_{ijt}) / (GDP_{jt} / E_{ijt})$ with W_{ijt} the average monthly gross wage, D_{ijt} the employees, GDP_{ijt} (in PPS) the gross domestic product in millions of euro and E_{ijt} the total employment.

Finally, ε_{ijt} represents the error term.

The expected sign of the SIZE coefficient is positive in both equations since the wider is the market the bigger will be the volume of exports or the greater will be the investments because of the scale economies. With regards to the SIMIL variable, a negative sign in both equations is coherent with a trade or investment model for differentiated goods (intra-industry), in which flows augment in economies with similar preferences, as it is suggested by Helpman and Krugman's theory, favouring the development of scale economies at the plant level. While a negative coefficient of ENDO variable, in the export equation, shows that intra-industry trade is prevailing, in line with new trade theory; a positive sign indicates instead that differences in factor endowments are determinants, as suggested by the Heckscher-Ohlin theory (inter-industry trade). The sign of the ENDO variable coefficient, in the case of FDI equation, cannot be predicted *a priori* because if the factors endowment are very different, a vertical FDI is to be expected and the sign will be positive. But if, on the other hand, the countries have similar factor endowments, the horizontal FDI is to be expected and the sign will be negative. With regards to the distance coefficient (DIST), the sign is expected to be negative for exports (the more distant the destination market is from the country of origin, the higher the transport costs and the less likely is export) and undetermined in the case of FDIs. On the one hand, a positive sign can be hypothesized, because the bigger the distance, the greater the incentive to invest in a foreign affiliate will be (so FDIs replace exports). On the other hand, a negative coefficient will indicate that the bigger the distance the greater the costs in maintaining contacts between the parent company and the affiliate (this means that FDIs are diverted to closer markets). As a result there are no strong hypotheses regarding the sign of this coefficient. Finally, in terms of labour costs (LABCOST), a positive sign in the export equation and a negative one in the FDI equation are coherent with the hypothesis that trade and international production depend on factor remuneration differences among countries.

The residuals of the two equations are then regressed against each other so that, once the influence of the common factors is removed, the residual correlation should show the relationship between exports and FDIs, which cannot be explained by the factors included in the gravity equation. A positive correlation would therefore indicate a complementary relationship so that direct investments generate, through spillover effects, export flows of intermediate goods from other industries of the investing economy. A negative correlation would indicate that exports are replaced by investments with a employment reduction in the home country.

VI. Results of the empirical analysis

The results of the estimates on both export and FDI equations are presented respectively in tables 1.1 and 1.2

TAB. 1.1 Estimates (est. param., (std.err) and t-stat) (Pooled EGLS – Cross Section Weights)

EGLS independent variables	<i>Dependent variable</i>	
	<i>Exports</i>	<i>IDE</i>
SIZE	1.40** (0.57) 2.43	2.00 (1.71) 1.16
SIMIL	2.72*** (0.45) 5.97	0.54 (1.26) 1.37
ENDO	- 0.59*** (0.14) - 3.94	- 0.87** (0.43) - 2.00
DIST	-0.02*** (0.00) -11.8	0.05*** (0.00) 7.14
LABCOST	0.29*** (0.10) 2.93	1.15*** 0.37 3.08
R²	0.35	0.17

Note:.. *** significant at 1% level; ** significant at 5% level; * significant at 10% level

In the case of exports the SIZE variable is positive and significant, confirming the initial hypothesis. The similarity (SIMIL) in size of countries exercises a positive influence, in

accordance with Helpman and Krugman’s theory, indicating the prevalence of intra-industry trade confirmed also by the negative and significant coefficient of the ENDO variable. The transport costs (DIST) have a negative influence on exports as expected.

In the case of the FDI estimate, the SIZE variable has a positive sign as the SIMIL coefficient suggesting that direct investment is guided by the differences in factor endowment and that cost reduction and search for efficiency are important determinants for FDIs; however they are not significantly different from zero. The ENDO variable appears significant and negative, suggesting that part of the FDIs (as appears from the smaller coefficient compared to the SIMIL one) aims to access these markets with similar preferences. Regarding distance, the coefficient is significant and negative in the export equation and appears to have a greater effect on these flows, as predicted by the theory. In the FDI equation, the positive sign leads to the assumption that the incentive to invest becomes greater the more distant is the affiliate from the parent company. With regards to the LABCOST variable, the sign is as expected. It appear positive and significant in the FDI estimate (as in the case of export) suggesting that, in the years examined, FDI in these countries is sensitive to low wages.

The results of the regression on the residuals of each gravity equation, aimed to removing the influence of common factors and identifying the residual correlation between exports and FDIs, are illustrated in table 1.2.

TAB. 1.2 Complementarity vs substitution: regression of the residuals .
Period 1999-2005 (est. param., (std.err) and t-stat).

<i>Dependent variable: EXP</i>	
independent variables	EGLS
FDI	0.33*** (0.10) 3.36
R²	0.03

Note:.. *** significant at 1% level; ** significant at 5% level; * significant at 10% level

The coefficient for the FDI is positive and highly significant, suggesting the existence of a complementary relationship, in line with the initial hypothesis. However, the diagnostic

test indicates that the relationship is not linear or that there is some other important variable not considered in the model.

Conclusions

The level of exports and FDI have both risen over time due to general economic growth in the world economy. However, foreign direct investments can alter the volume and also the range of the goods and services produced within an economy. Since theory offers relatively little guidance as to what might be expected, significant differences might be observed across countries or industries. Such heterogeneity is reflected in empirical findings. Econometric evidence can help in investigating the relationship between FDI and exports.

In this study, a gravity approach has been used to directly analyse the impact of FDI on export flows from EU15 towards CEEC countries. According to the predictions of the theory, the export flows are positively influenced by the size of the market, by the similarity in size and negatively by distance, which implies higher transport costs. They are, however, negatively impacted by differences in factor endowment suggesting mainly the presence of intra-industry trade. The FDI flows towards CEEC countries are coherent with an investment model for differentiated goods (intra-industry), in which flows augment in economies with similar preferences; thus, as it is suggested by Helpman and Krugman's theory, it is favoured the development of scale economies at the plant level.

They are also positively affected by the distance that signals a greater incentive to invest. With regards to the labour costs, we can say that FDI is sensitive to low wages although, probably, better results would come out when considering the interactions between wages and productivity. In sum, results suggest that Foreign Direct Investments in these countries appear to generate additional exports flows from investing countries implying the existence of a complementary relationship. Certainly these findings should be explored further, taking into account other variables to obtain more robust results.

A future direction for research could be that of examining the relationship between FDIs and exports on a sectoral level, even though databases of this kind are available only for a few countries.

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