

# Regional economic integration and the location of multinational enterprises

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## Abstract

A theoretical model of international location choice is analyzed in a context of regional economic integration in which, consistently with the most recent evidence, countries conclude multilateral free trade agreements. Controlling for individual country and industry characteristics, it is found that in such a setup both vertical and horizontal multinational firms benefit from positive profit opportunities, with the interested region experiencing a parallel evolution of trade and FDI flows. After providing some empirical evidence of this finding, the model is tested through a probit panel estimation of FDI determinants in Central and Eastern Europe over the 1990-1998 period.

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# 1 Introduction

In one of the most recent and comprehensive books on Multinational Enterprises (MNEs) James Markusen reports, among the main stylised facts on foreign direct investment (FDI), evidence that “FDI is positively related to the existence of trade barriers” (Markusen, 2002, p. 7). But the recent spectacular growth of FDI<sup>1</sup> has actually taken place in parallel with the surge of Regional Integration Agreements (RIAs), in which barriers to trade between member countries are progressively reduced: more than 150 RIAs are currently in force, 130 of which set up in the last decade (WTO, 2000). This remarkably similar world pattern of foreign direct investment and trade is analysed in Baldwin and Ottaviano (2001). They report extensive evidence of the phenomenon and contrast, through a reciprocal-dumping model, the conventional proximity versus concentration trade-off faced by MNEs (Brainard, 1997), in which, instead, FDI and trade are considered as substitutes. However, the same model of Baldwin and Ottaviano (2001), where MNEs simultaneously engage in intra-industry FDI and trade, does not explicitly take into account the effects of a decrease in trade barriers on FDI; rather, the persistence of positive obstacles to trade seems to be crucial for some of their results. And yet, the most recent policy developments urge to shed some light on the relationship between FDI and economic integration.

The last generations of RIAs, in fact, tend to have a multilateral nature, since they combine the traditional ‘hub and spokes’ bilateral pattern of integration<sup>2</sup> with arrangements in which the ‘spokes’ enjoy free trade among themselves. As a result, firms located in a ‘hub’ (like the United States or the European Union) can now exploit through FDI the locational advantages of ‘spokes’ countries without suffering a reduction in the market size that can be served from these locations. In a few years, this will be the case for US foreign investments once the project of an Asian-Pacific Economic Cooperation (APEC) initiative or the project for a Free Trade Agreement of the Americas (FTAA) will be in place. A similar scenario is going to be faced by European corporations if the project of a Euro-Med Free Trade Area will be completed as expected by 2010<sup>3</sup>.

European MNEs who have invested in the Central and Eastern European Countries (CEECs) are already experiencing such a situation: in this region, in fact, the existing bilateral Europe Agreements between the EU and each of the CEECs have been progressively

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<sup>1</sup>The UNCTAD *World Investment Report 2002* states that foreign affiliates of MNEs recorded “sales of almost \$19 trillion, more than twice as high as world export in 2001, compared to 1990 when both were roughly equal; and the stock of outward FDI increased from \$1.7 trillion to \$6.6 trillion over the same period.” (Overview, p. 1).

<sup>2</sup>‘Hub and spokes’ agreement give one country (the ‘hub’) a better access to other countries (the ‘spokes’) than these have to each other. Examples of these arrangements are the agreements concluded in the 90s between the European Union and each of the Central and Eastern European countries or each of the South Mediterranean countries.

<sup>3</sup>Along the same lines, the 2002 Annual Report of the IADB discusses in detail a ‘new regionalism’ currently taking place in Latin America (IADB, 2002).

complemented with the creation of CEFTA, the Central European Free Trade Agreement (see the Statistical Annex for a description of the timing of these agreements).

Notwithstanding these policy developments, the economic literature on the subject seems still inconclusive with respect to the relationship between FDI and economic integration: in the two country setup traditionally studied, *ceteris paribus* a decrease in trade barriers would in fact generate (Carr et al., 2001; Markusen and Venables, 1998 and 2000) an increase in trade flows but a decrease in FDI of “horizontal” type (firms that produce the same goods and services in multiple countries) since in these models horizontal FDI tend to be ‘tariff-jumping’ and arise when countries are similar in size and trade costs are relatively high<sup>4</sup>. Only if FDI are of a “vertical” type (i.e. firms which geographically fragment their production by stages located in different countries to exploit locational advantages) FDI and trade flows will increase in parallel once trade barriers are removed<sup>5</sup>. The theoretical net effect on the relationship between FDI and economic integration is therefore ambiguous.

Motta and Norman (1996) analyse the effects of economic integration on oligopolist multinationals in a three country setup: two integrating (host) countries member of a RIA, and a country source of FDI which is external to the same RIA. They distinguish between the effects of market accessibility (the extent of a reduction in intra-regional tariff and non-tariff barriers to trade) and the impact of individual country size. Their results are consistent with the evidence of parallel trade and FDI flows. In particular, they show how economic integration, by improving market accessibility, will induce *outside* firms to invest in the integrated regional bloc, generating intra-regional platform FDI from the external country, then leading to increased trade volumes between the integrating countries<sup>6</sup>. Their result, however, assuming a country source of FDI which is external to the same RIA, still hinges on the ‘tariff-jumping’ attitude of horizontal MNEs.

In order to encompass in the analysis of RIAs also a country source of FDI, Puga and Venables (1997) extend to a multy-country case a core-periphery model. Among other findings, they conclude that in a ‘hub and spokes’ arrangement of trade liberalisation, like the one between the European Union and each of the CEECs, firms will tend to concentrate in the ‘hub’, since firms located in ‘spoke’ countries are penalised from a lower demand by both consumers and firms in other spokes, as compared to that enjoyed by hub firms. This particular result however contrasts sharply with the almost exponential increase of European

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<sup>4</sup>The much studied cases of horizontal FDI from Japanese or American MNEs in the European Union are an example of the ‘tariff-jumping’ attitude of MNEs with respect to RIAs. The case of European FDI to Mercosur or NAFTA would be another equivalent example.

<sup>5</sup>In the paper the distinction between “horizontal” vs. “vertical” FDI is used as a synonym of the traditional classification of MNEs strategies as “market-” vs. “efficiency-seeking” (Dunning, 1992).

<sup>6</sup>This general outcome is consistent with a previous result they obtained exploring MNEs’ strategies in the context of the creation of the Free Trade Area within the CEECs (see Norman and Motta, 1993). The importance of a developing country’s preferential access in a RIA as a means of attracting FDI flows is also stressed by Ethier (1998).

FDI in the CEECs in the last decade<sup>7</sup>.

Given the non conclusive predictions of the literature, the aim of the paper is to understand whether the new patterns of regional integration previously discussed can be responsible for the recorded parallel evolution of FDI flows and trade liberalisation. At this purpose, Section 2 and 3 discuss and develop a theoretical model assessing the profit opportunities arising in different locations as a result of a process of economic integration for a potential MNEs; in Section 4 the results of the theoretical model are matched with an empirical analysis of European MNEs having invested in the CEECs over the last decade: this region has in fact already evolved over time from a ‘hub and spokes’ bilateral pattern of integration to a multilateral RIA. Section 5 performs an econometric exercise of the identified relationship between FDI location and regional integration dynamics, while Section 6 concludes.

## 2 Regional integration, FDI and trade

According to the standard analysis, once “horizontal” FDI are considered, the establishment of a RIA can generate a FDI creation effect: the local demand that can be served by external MNEs investing in a given location increases due to the elimination of trade barriers among the  $n > 1$  markets participating to the RIA. Hence, external firms will now have a greater incentive to locate in the area “jumping” the tariffs that protect the RIA through the undertaking of FDI. If MNEs also aim at creating export-platforms FDI for the area, a parallel increase in trade flows will also result (Norman and Motta, 1996). On the other side, for FDI potentially arising from countries already belonging to the RIA under formation, the tariff-jumping argument is by definition void: hence, there might be a tendency to concentrate / rationalise the location of production plants across the region, with markets served through exports and the central region as a favorite location for production (Puga and Venables, 1997). However, if FDI have a more “vertical” nature, the creation of a RIA might also secure free access to alternative locations that offer better comparative advantages, with FDI taking place in order to exploit them (IADB, 2002).

These results suggest that for horizontal MNEs the traditional proximity vs. concentration trade-off (Brainard, 1997) takes on a multi-dimensional nature once it is applied to a context in which several countries are mutually reducing their trade barriers. More specifically, this is equivalent to consider the “distance” between any two locations in the area not only exogenous and constant (physical distance), but also a function of market accessibility, i.e. the number of free trade agreements concluded among the  $n + 2$  considered countries. In fact, when horizontal MNEs operating in multilateral RIAs are considered, the abolition of tariffs (a greater market accessibility) increases the advantages of concentrating production

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<sup>7</sup>A similar result of substitution between FDI and trade flows is also found in a recent paper by Ludema (2002), which uses a model of horizontal multinational enterprises to explore the relationship between transport costs and trade agreements in a multi-country setup.

in one location but it does not eliminate the physical distance between locations, especially for RIAs that involve several countries. As a result, gains from proximity to the markets (and hence the presence of FDI) are still possible even when tariffs tend to zero. The increasing existing evidence of markets served not from the original home country of the MNEs, but from FDI used as an export platform is revealing of this phenomenon<sup>8</sup>. Still, the idea that in a multi-country setup one has to consider the shape of the economic space in which the various sources of demand are located is by no means new to the economic literature: the concept was labeled as *market potential* by Harris (1954), who suggested that the actual demand faced by firms in a given location is not only determined by the size of the local economy, but also by the sum of the market sizes of bordering countries, weighted through a measure of accessibility to all locations, itself a function of both commercial barriers and geographical distance. The idea has recently been revisited by several authors within the new economic geography literature (Hanson, 1998; Fujita et al., 1999). In particular, Head and Mayer (2002) have applied the idea of market potential to the case of footlose international manufacturers.

When vertical MNEs are considered within a multilateral RIA, instead, the abolition of tariffs magnifies profit opportunities. In fact, investing in a ‘spoke’ country allows to exploit local competitive advantages without hindering access to the regional market (as it is instead the case for the traditional ‘hub and spokes’ setup): as a result, FDI and two-way trade flows in intermediates and final goods are likely to be generated by a reduction in trade barriers.

The arguments above hence solve, for both horizontal and vertical MNEs, the ambiguity in the relationship between FDI and economic integration in favour of a parallel increase of FDI and trade flows, consistently with the most recent empirical evidence. This is the intuition developed and tested in the paper.

### 3 The model

The model explores the profit opportunities available in different locations to a firm based in a ‘hub’ country potential source of FDI (e.g. the European Union, the United States), when the same country enters in a multilateral RIA. As summarised in Figure 2.1, with respect to the cases insofar analysed in the quoted literature and of which empirical evidence exists, the dynamics of economic integration the potential MNE faces have a double dimension: on the one side, there are bilateral agreements signed between the country source of FDI and the (potential) host countries, following a ‘hub and spokes’ pattern; on the other side, the ‘spokes’ countries are at the same time experiencing a process of economic integration, i.e. some or all of them benefit from reciprocal free trade agreements similar to the ones they

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<sup>8</sup>UNCTAD (2002) provides a series of case studies in which MNEs have contributed to increase the export competitiveness of host countries, showing how “regional integration continues to influence the location of export-oriented activities” (p. 194).

have with the ‘hub’. Geography matters, in that the potential locations might share or not a common border with the ‘hub’ or among themselves, and are unevenly distributed across space, therefore being in principle characterised by different market accesses.

[Figure 2.1 about here]

The locations available to the potential MNE can be thought as  $z$  alternative RIAs (A and B in Figure 2.1), each of them made up of  $N^z$  different heterogeneous countries  $j^z = 1, \dots, N^z$ , with  $N^z - 1$  ‘spokes’ and one ‘hub’, and where country heterogeneity is defined with respect to both economic (e.g. market size, labor cost) and spatial (market access) characteristics. In order to keep the analysis focused on the relationship between economic integration and FDI flows, foreign investments are supposed to arise only once positive profit opportunities are available in some locations (the traditional ‘locational advantages’ identified in the international business literature *à la* Dunning, 1992)<sup>9</sup>.

Market conditions are supposed to differ between the ‘hub’ and the ‘spokes’: in the former, market rules ensure free entry and exit of firms leading to a zero-profit condition, while in the latter national rules on FDI partially restrict/delay the entry of foreign firms and hinder the full equalisation of the production costs across locations within each RIA. In addition, it is supposed there are no processes of economic integration among the alternative RIAs, i.e. regionalism rather than multilateralism prevails on the international scene.

The model draws in its first part on the results obtained by Head and Mayer (2002). The utility of a representative consumer in each country  $i$  belonging to a generic RIA  $z$  is a C.E.S. function depending on the quantity of each variety  $h = 1, \dots, n_j$  consumed of a differentiated good produced in country  $j \in z$  (i.e. in the same country  $i$  or in another  $j$  one within the same region). In particular, the utility function can be written as

$$U_i = \left( \sum_{j=1}^N \sum_{h=1}^{n_j} (q_{ijh})^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} \quad \text{with } \sigma > 1 \quad (1)$$

where  $q_{ijh}$  denotes the quantity consumed in each country  $i$  of the  $h$  variety produced in country  $j$  with no preference weight given to the different varieties. The production of each variety is subject to increasing returns and monopolistic competition on the same variety. In particular, the technology is characterized by a single factor of production, labour; in every RIA the marginal production cost in each country  $j$  is denoted  $\phi_j w_j$ , where  $w$  is the wage and  $\phi$  is the inverse of labour productivity, with increasing returns deriving from fixed costs in

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<sup>9</sup>In other words, the model does not deal with the choice between exports and foreign investment accruing to a firm, but rather with the profit opportunities that arise in different locations within a RIA. More specifically, two hypotheses are developed and tested: first of all, that profit opportunities increase as a result of a process of economic integration; second, that such an increase in profit opportunities entails a higher probability of undertaking a foreign investment in a given location.

labour  $w_j F$ . In order to sell its products in country  $i$  a MNE which has located its production plant in country  $j$  has to pay an additional trade cost  $\tau_{ij}$  which takes the usual iceberg form. The budget constraint is given by the expenditures of country  $i$  on all  $k$  varieties<sup>10</sup> produced in all  $j$  countries (including country  $i$ ) belonging to  $z$ , i.e.  $k = \sum_j n_j$ . In particular, denoting  $p_{ij}$  as the C.I.F. price of goods imported in country  $i$  from country  $j$  and  $m_{ij}$  as the value of imports from  $j$  to  $i$ , the budget constraint for a representative variety  $q_{ij}$  produced in country  $j$  and consumed in country  $i$  can be written as  $M_i = \sum_k m_{ik} = \sum_k q_{ik} p_{ik}$ .

Following Head and Mayer (2002) it can be shown that the total profit accruing to a firm which would decide to serve all the  $N$  countries belonging to the considered NIA from a plant located in country  $j \in z$  is:

$$\pi_j = \frac{(\phi_j w_j)^{1-\sigma}}{\sigma} \sum_{i=1}^N \frac{1}{\sum_k n_k (\phi_k w_k \tau_{ik})^{1-\sigma}} \tau_{ij}^{1-\sigma} M_i \quad (2)$$

Such a profit is a decreasing function ( $\sigma > 1$ ) of the production costs  $(\phi_j w_j)$  in the same country  $j$ , a decreasing function of the intensity of competition with rivals  $[\sum_k n_k (\phi_k w_k \tau_{ik})^{1-\sigma}]$ , itself increasing with the number of rivals  $n_k$  and decreasing with the production costs  $(\phi_k w_k \tau_{sk})$  they face, and finally an increasing function of the *market potential*  $(\sum_{i=1}^N \tau_{ij}^{1-\sigma} M_i)$  of country  $j$ , i.e. the total demand that is accessible from a production plant located in country  $j$ <sup>11</sup>.

The country-specific expression (2) discussed by Head and Mayer (2002) can be used without loss of generality in order to assess the potentiality of a multilateral RIA as a host of MNEs, given the assumption of free entry and exit of firms, and hence a zero-profit condition, in the ‘hub’ country source of FDI. Clearly, in a general equilibrium setup the market potential of the  $j$  country in which the firm is located would be partly endogenous with respect to the firm’s positive profits, via the channel of increased wages/expenditures of the workers/consumers. However, the size of MNEs’ profits can be assumed to be negligible with respect to each country’s total demand. In alternative, MNEs can always be assumed to repatriate fully or in part their profits, a liberalisation regime typically associated with the setup of RIAs. Hence, it is possible to consider the market potential faced by individual firms as exogenous with respect to their profits, and therefore retain the original partial equilibrium setup of the model. Another feature of the model is that, given the hypothesis of national rules hindering MNEs’ entry in the ‘spokes’ (host) countries, in the short run positive profit opportunities can arise in these locations, until the progressive entry of competitors brings them to zero.

The aggregate potential profit  $\Pi$  of a generic RIA, is given by the sum of all profits  $\pi_j$

<sup>10</sup>Note that in general for any  $z$  region it is  $k = k(z)$ .

<sup>11</sup>As already noted by Head and Mayer (2002), imposing  $\tau_{ij}^{1-\sigma} = 1/d_{ij}$ , i.e. proxying the transport costs with the distance from  $j$  to  $i$ , one would obtain the market potential index originally proposed by Harris (1954).

obtainable in different locations  $j$  belonging to the RIA. Hence

$$\Pi = \sum_{j=1}^N \left[ \frac{(\phi_j w_j)^{1-\sigma}}{\sigma} \sum_{i=1}^N \frac{1}{\sum_k n_k (\phi_k w_k \tau_{ik})^{1-\sigma}} \tau_{ij}^{1-\sigma} M_i \right] \quad (3)$$

The expression (3) can be rearranged as:

$$\Pi = \sum_{j=1}^N \frac{1}{\Theta} \Gamma_j \Psi_j \quad (4)$$

with  $\Gamma_j = \frac{(\phi_j w_j)^{1-\sigma}}{\sigma} \sum_{i=1}^N [1/\sum_k (\phi_k w_k \tau_{ik})^{1-\sigma}]$  a measure of the comparative advantages of country  $j$  with respect to the other  $N$  countries of the region,  $\Theta = n_k$  representing the total number of firms (varieties) operating in the RIA (recalling  $k = \sum_j n_j$ ) and  $\Psi_j = \sum_{i=1}^N \tau_{ij}^{1-\sigma} M_i$  measuring the market potential of country  $j$ . According to equation (4), a given RIA might hence be characterized by higher profits than a rival location when, *ceteris paribus*, the region is characterized by a larger increase in the market potential  $\Psi_j$ , itself induced by a greater reduction in trade barriers (the term  $\tau_{ij}$ ) among member countries, in line with the original intuition of Norman and Motta (1996).

Equation (4) can also be conveniently used to study the dynamics of the process of economic integration. Taking logs and adding a time component yields the potential profits of a given RIA at time  $t$ :

$$\pi_t = \sum_{j=1}^N \gamma_{jt} + \sum_{j=1}^N \psi_{jt} - \vartheta_t \quad (5)$$

where  $\gamma_{jt}$  refers to the (log)comparative advantages of country  $j$  with respect to the other  $N$  countries of the region at time  $t$ , the term  $\psi_{jt}$  captures the  $j$ -th country's (log)market potential, and  $\vartheta_t$  indicates the (exogenous) number (in logs) of rival firms operating in the area, always at time  $t$ .

Equation (5) is a simple, estimable measure of the profitability of each RIA with respect to the dynamics of economic integration. For the purposes of this paper, one main working hypothesis can be derived from it: the greater the degree of trade integration in a given RIA, the larger is the increase in each RIA's market potential and hence the higher are the profits obtainable by relocation production through FDI. Corollary of this conjecture is that once RIAs are established FDI and trade tend to follow a parallel pattern.

The remaining of the paper is devoted to the validation of these conjectures.

## 4 The empirical evidence

Within the RIA created between the European Union and the Central and Eastern European Countries (see the Statistical Annex for details) there is a strong evidence of a parallel

increase of trade and FDI flows taking place during a process of economic integration.

[Table 3.1 and 3.2 about here]

In Table 3.1 it can be noticed how trade flows between the EU and the CEECs have increased by almost 600 per cent in a decade, passing from 15.5 billion of US dollars in 1990 to 94.1 in 2000; of the same magnitude has been, in proportion, the increase in internal trade flows within the CEECs, which increased from 2.5 to 15.2 billion of US dollars over the same period. Parallel to these achievements, FDI to the CEECs have increased by a factor of 70 in the decade<sup>12</sup>, with yearly FDI inflows averaging more than 20 billions of US dollars in the last years. The third row of Table 3.1 is based on the PECODB dataset a firm-specific dataset registering 4,200 FDI operations in the CEECs in the period 1990-1998<sup>13</sup>; in particular, it shows the dramatic increase in the total number of MNEs operating in the area in the last decade, with 1999 values being 20 times larger than 1990 ones.

The remarkably parallel behaviour of EU-CEECs trade, internal trade in the CEECs, FDI inflows and the number of MNEs is also confirmed by their correlation coefficients, all above 0.9 and significant at the 1 per cent level, as reported in Table 3.2.

A first test of the positive relationship between increased profit opportunities generated by a process of economic integration and the presence of FDI can be performed calibrating Equation (5) through the use of actual trade and FDI data. At this purpose, economic integration among countries is measured as the sum of bilateral trade flows weighted by geographical distance. Formally, denoting as before  $m_{ij}$  as the value of country  $i$ 's imports from country  $j$  within a generic RIA, and  $d_{ij}$  the (geodetic) distance between the two countries, the degree of integration of country  $i$  at time  $t$  in the RIA (its 'market access'  $MA$ ) is measured as

$$MA_{it} = \sum_j \frac{m_{ijt}}{d_{ij}} \quad (6)$$

Figure 3.1 (top) shows the result of Equation (5) calibrated on data retrieved from the EU-CEECs RIA, ruling out changes in comparative advantages across countries (see the Methodological Annex for the details of the calibration). The reduction in the RIA's internal trade barriers (or, in other words, the significant increase in the overall market access of the region) is evident in the reported Figure. The integration dynamics of the region, in turn, have entailed an increase in the RIA's overall market potential and hence they have led to positive profit opportunities for MNEs, sustained over time due to the imperfect nature of entry.

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<sup>12</sup>Various estimates by Eurostat and UNCTAD show that the European Union is the origin of at least 70 per cent of these inflows.

<sup>13</sup>In terms of validation, the dataset is able to account for almost 80 per cent of the region's total FDI inward stock as registered by official statistics. Descriptive statistics of the dataset are available on request.

The middle and bottom graphs of Figure 3.1 evaluate the power of the calibrated model with respect to actual FDI inflows. In particular, the predicted growth rates of theoretical profits are compared with the actual growth rates of FDI in the CEECs, measured through both firm-specific data (PECODB dataset) and official FDI statistics (UNCTAD, FDI database), taking 1991 as the starting year.

[Figure 3.1 about here]

Given the similarity of the reported patterns, it seems that the theoretical model is able to reproduce fairly well the FDI dynamics of the area, and in particular the "burst" of foreign investments experienced by the considered RIA in the mid-90s in parallel with the evolution of trade flows. When employing official statistics on FDI inflows (bottom chart), it is also evident the bias arising from the use of balance of payments' volumes of FDI and not numbers of multinationals: in the former data, sector specific considerations related to the average dimension of the investments arise.

In general, these findings seem consistent with the conjecture previously formulated: the ongoing removal of tariffs within the integrating region stimulates trade among all the member countries and, via the associated increase in the overall market potential of the RIA, generates profit opportunities in 'spokes' countries exploited through the undertaking of FDI from the 'hub'. Because of this reason, FDI and trade flows tend to follow a parallel pattern<sup>14</sup>.

However, the reported evidence has to be checked against a series of potential biases. First of all, individual countries' characteristics have to be taken into account (comparative advantages have been supposed constant insofar). Second, the industry-specific bias emerged in Figure 3.1 (bottom) has to be controlled for. Third, a spurious correlation due to the impact of unobserved variables positively correlated with both trade and FDI flows has to be ruled out. Finally, it has been assumed insofar that bilateral trade flows discounted by distance are an unbiased proxy of a process of economic integration (see Equation 6 and Methodological Annex): however, this very same relationship might be biased and has to be validated. I start tackling the latter concern first.

#### 4.1 A gravity-type specification of economic integration

The measure of market access (6) on which Figure 3.1 is based relies directly on bilateral trade flows. However, it might well be the case that the increase in trade flows is not originated by a process of economic integration, but rather depends from a set of external

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<sup>14</sup>Note how this empirical result, of which a tentative theoretical explanation is provided, contrasts sharply with the finding of both the proximity versus concentration trade-off and the tariff-jumping argument for FDI. In both models, in fact, a reduction in tariff barriers is associated with a decrease, rather than an increase, of FDI flows.

variables (e.g. economic growth, changes in comparative advantages) positively affecting trade, but not necessarily deriving from a reduction in trade barriers. In order to control for this possible spurious correlation, I have constructed an indicator of economic integration based on the traditional ‘gravity’ specification of the trade equation<sup>15</sup>:

$$\ln(m_{ijt}) = a + \beta_0 y_{it} + \beta_1 y_{jt} + \beta_2 \delta_{ij} + \beta_3 \delta_{ij} T + border_{ij} + fta_{ijt} + \varepsilon_{ijt} \quad (7)$$

In equation (7) the bilateral trade flows between country  $i$  and country  $j$  at time  $t$  depend positively from the country masses, as proxied by their (log)GDP  $y_i$  and negatively by their distance taken in logs,  $\delta_{ij}$ . At this purpose, I have considered the bilateral trade flows across the entire RIA: among the eight CEECs (see the Statistical Annex) and between these ‘spokes’ and the ‘hub’ (EU), for the period 1990-2000, thus yielding a total of 9x8 country observations for eleven years, i.e. 792 data points.

Following Redding and Venables (2000) the degree of integration of country  $i$  in the area (its market access) can be calculated from the estimated coefficients in the gravity equation as  $MA'_i = \sum_j d_{ij}^{\hat{\beta}_2}$ . In order to obtain unbiased coefficients, however, one has not only to include a geographic variable (*border*) that measures the fact that two countries share a common border (McCallum, 1995), but it is also important to control for unobserved country-specific heterogeneity (Anderson and van Wincoop, 2003). At this purpose, Table 3.3 reports in Column (1) the results of the econometric estimation of (7) for the EU-CEECs area, using country-specific fixed effects and a control for the border effect. As it can be seen, all the variables are significant and correctly signed.

In order to assess the creation of a RIA, Column (2) adds to the benchmark specification a measure of economic integration, namely a dummy (*fta*) that takes value 1 if the pair of considered countries shares a free trade agreement in year  $t$ , and 0 otherwise. The dummy is significant and correctly signed, and consistently with the theoretical priors its inclusion increases the fit of the model and lowers the value of the coefficient of distance, reflecting the idea that, if countries have entered in a process of economic integration, distance tends to measure only pure transport costs (physical distance), being the trade barriers component affecting less and less the coefficient<sup>16</sup>.

Having assessed the (partial) endogeneity of the coefficient related to distance with respect to the process of economic integration, it is possible to obtain a dynamic measure of economic integration employing a specification of the gravity equation where a time dummy  $T$  is interacted with distance. This yields  $T + 1$  coefficients: the (main) one related to the

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<sup>15</sup>Among others, Anderson and van Wincoop (2003) show in a recent paper the link existing between the gravity equation (7) and the demand equation derived in a model of monopolistic competition *à la* Dixit-Stiglitz.

<sup>16</sup>This finding is consistent with the previously discussed intuition of the nature of the distance variable not only as purely exogenous (physical distance), but also as an endogenous function of the number of free trade agreements signed by any pair of countries.

impact of distance on trade flows, and  $T$  coefficients, one for each year  $t = 1990, \dots, 1999$ , measuring the marginal yearly effect of the process of economic integration on the same distance coefficient, an effect entirely captured by the static dummy  $fta$  in the previous specification. As it can be seen in Column (3), all the yearly coefficients of distance are significant and decreasing over time, consistently with the empirical evidence of a process of economic integration taking place in the considered region, while the signs and significance of the other gravity variables are robust to this model specification<sup>17</sup>. Hence, an alternative time-varying measure of market access can be constructed as follows

$$MA'_{it} = \sum_j d_{ij}^{\hat{\beta}_2 + \hat{\beta}_3(t)} \quad (8)$$

Figure 3.2 presents a comparison of the two different measures of market access, calculated for the aggregate RIA summing them over the  $i$  countries. The first measure ( $MA_{it}$ ) is the one retrieved from Equation (6), while the latter ( $MA'_{it}$ ) comes from Equation (8), and it is computed through the coefficients reported in Column (3) of Table 3.3. As it can be seen, the two measures present virtually the same behaviour over time, indicating an overall increase of the degree of economic integration of the area, consistently with the available evidence. However, equation (8), being it derived from a gravity specification that controls for individual countries' characteristics, should rule out spurious country-specific correlation effects between trade flows and the process of economic integration.

[Table 3.3 and Figure 3.2 about here]

The next section will attempt to further strengthen these empirical findings through an econometric estimation able to control for the remaining potential problems previously listed.

## 5 Econometric analysis

Insofar, the analysis has developed what seem to be relatively robust measures of economic integration among countries in a RIA. A calibration of the theoretical model also shows that, through the use of the same measures of economic integration, it is possible to reproduce fairly well the actual FDI dynamics in the considered region (see Figure 3.1 and 3.2). However, the main tenet of the paper, i.e. the link existing between higher levels of economic integration

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<sup>17</sup>Technically, it is possible to estimate the model considering only internal trade flows among the CEECs, hence without including the EU in bilateral trade flows. The results obtained, available on request, are similar, i.e. a decreasing and significant yearly coefficient of distance. This is in line with the reported evidence of the implementation of the CEFTA agreement within the CEECs in the period considered. However, since the CEFTA agreement evolves in parallel with the implementation of the bilateral liberalisation agreements between each CEEC and the EU, if trade flows between the EU and each of the CEECs are not considered in the estimation, this omitted variable (the 'dark mass' of the EU in the gravity analogy) would bias the results.

and the probability of attracting FDI via an increase in the RIA’s market potential, has not been statistically tested yet. Hence, there is the risk that the result obtained in Figure 3.1 might be itself the outcome of a spurious correlation between trade and FDI flows. At this purpose, a test able to rule out this potential bias can be conveniently performed constructing a probit econometric model, in which the probability of undertaking a FDI at time  $t$  in a given country  $j \in z$  is related to covariates driving the MNEs’ profits in a given location, among which the changes in market potential generated by a process of economic integration.

The most straightforward way to perform such an exercise is to use the variables on the left-hand side of Equation (5) as covariates, hence directly testing the theoretical model previously developed. In order to remove some of the restrictive assumptions employed in the calibration of Equation (5), and namely the fact that changes in comparative advantages across countries have been ruled out, it is convenient to directly include in the estimation the country-specific covariates  $\psi_{jt}$  and  $\gamma_{jt}$  of Equation (5), rather than their aggregate values employed in the calibration. Such a country-specific design allows to simultaneously model the probability of undertaking an investment for both ‘horizontal’ MNEs (more influenced by the evolution of a country’s market potential  $\psi_{jt}$ ) and ‘vertical’ ones (relatively more affected by the the value of each country’s comparative advantages  $\gamma_{jt}$ ), in line with the original intuition of the paper. Enriching the model with a third, industry-specific dimension, in addition, should control for the previously discussed evidence of a mismatch between the growth rates of FDI measured through firm-specific numbers vs. balance of payments data.

As a result, the dependent variable of the model  $y_{j\xi t}$  takes the value 1 if an investment is registered in industry  $\xi$  within a given country  $j \in z$  at time  $t$ , and 0 otherwise, an information retrieved from the PECODB dataset. The total number of  $j = 1, \dots, 8$  CEECs,  $t = 1990, \dots, 1998$  years and  $\xi = 1, \dots, 48$  industries (all reported in the Statistical Annex) considered in the model yields therefore a three-dimensional balanced panel of 3,456 observations. Since the aim of the estimation is to link the probability of undertaking a FDI to the profits arising in the different locations (countries), it is convenient to hold years as the time dependent variables in the panel and industries as the cross-sectional groups, modelling inter-country variability.

Using country-level regressors, the term  $\gamma_{jt}$  of equation (5) is proxied in the estimating equation as the ratio of the labour costs of country  $j$  with respect to the average of the region at time  $t$ <sup>18</sup>. Exploiting the hypothesis of symmetry of firms typical of monopolistic competition models, the number of rivals faced by a perspective MNE is measured as the cumulated number of incumbent MNEs in each industry  $\xi$  at time  $t$ , hence  $\Theta_{\xi t} = \sum_j n_{j\xi t}$ . The hypothesis is that MNEs face competition from all the other foreign firms active in the same industry across the entire RIA, an intuition not unrealistic given that the higher the

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<sup>18</sup>The data employed are average monthly gross wages in manufacturing for each country and year, as retrieved from the WIIW Database on Countries in Transition.

degree of economic integration across the RIA, the easier it is to serve a location  $i$  from other locations  $j \in z$ . MNEs however do not face competition from domestic firms, an assumption not implausible in transition countries given the initial competitive disadvantage of local producers<sup>19</sup>.

As far as market potential is concerned, in order to control for the robustness of the relationship between the degree of integration of a given region and its attractiveness for FDI, several measures are confronted, all varying within the  $j$  countries and the  $t$  years. A first measure, denoted as  $\Psi(GDP)_{jt}$ , assumes local markets to be segmented at the country level, simply proxying local demand conditions through the GDP of a country  $j$  in each year  $t$ . A second indicator, measured as  $\Psi(H)_{jt} = \sum_{i=1}^N M_{it}/d_{ij}$ , is the traditional definition of market potential reported by Harris (1954), calculated as the sum of the GDP of the  $i$  countries in the region discounted by their bilateral distances.

Finally, the last measure of market potential, denoted  $\Psi_{jt}$ , is specifically based on the theoretical model, interacting the size of the neighbouring markets  $M_{it}$  at each year  $t$  with transport costs between country  $j$  and the other  $i$  countries, always at time  $t$ . This yields the definition of market potential employed in the paper, i.e.  $\Psi_{jt} = \sum_{i=1}^N \tau_{ijt}^{1-\sigma} M_{it}$ . Recalling the calibration presented in the Methodological Annex, transport costs  $\tau_{ij}$  can be considered the reciprocal of the market access measures previously considered: the higher is the degree of integration, the lower are the transport costs of serving country  $i$  from a production plant located in country  $j$ . In order to explore the dynamics of integration, it is convenient to normalize the market access at time  $t$  with respect to its initial value in  $t_0$ : as market access grows larger over time, the measure of transport costs tends to zero and therefore adding one retrieves the original iceberg formulation of transport costs. Hence transport costs can be calculated as<sup>20</sup>:

$$\tau_{ijt} = 1 + \left( \frac{MA'_{it}}{MA'_{it_0}} \right)^{-1} \quad (9)$$

where this last variable exploits the dynamic measure of market access  $MA'_{it}$  derived from the gravity specification in Equation (8), in order to minimise the distortions in measuring a process of economic integration through bilateral trade flows. The variable  $\Psi_{jt}$  is then constructed substituting the values  $\tau_{ijt}$  so calculated for  $t = 1990, \dots, 1998$ , taking  $\sigma = 5$  for each year  $t$  and proxying  $M_{it}$  with the GDP of each country  $i$  in year  $t$ .

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<sup>19</sup>Konings (2001) among others reports empirical estimates on the effect of MNEs on local firms in transition countries. To the best of my knowledge, no evidence for transition countries exists instead of competition effects going from local firms to MNEs.

<sup>20</sup>When  $i = j$  it has been set  $\tau_{jj} = 1$  in all estimations, i.e. the GDP of the considered  $j$  country has not been discounted for internal distances. Preliminary estimates employing the  $0.376\sqrt{A_j}$  discount factor for internal distances (see Head and Mayer, 2001) where  $A_j$  is the area of the country (considered circular), did not however yield significantly different results.

Therefore, the estimating equation of the model takes the form:

$$\begin{aligned} y_{j\xi t} &= 1 \quad \text{if } y_{j\xi t}^* > 0 \\ y_{j\xi t} &= 0 \quad \text{if } y_{j\xi t}^* \leq 0 \end{aligned}$$

with

$$y_{j\xi t}^* = \mathbf{x}'_{j\xi t-1} \beta + u_{j\xi t}$$

In line with the theoretical model, the (lagged) vector of independent variables  $\mathbf{x}_{j\xi t}$  includes the (log) market potential  $\Psi(\cdot)_{jt}$ , the (log) degree of competition  $\Theta_{\xi t}$ <sup>21</sup>, and the (log) comparative advantages  $\gamma_{jt}$ . If industry-, country- and time-specific dummies are included in the estimation, it is possible to decompose the error term  $u_{j\xi t}$  so that its joint distribution can be assumed normal, leading to a random effects probit model<sup>22</sup>. More important for the robustness of the analysis, the inclusion of this set of dummies serves the purpose of ruling out potential problems of spurious correlations between the process of economic integration and FDI inflows, due to an unobservable country or industry-specific FDI determinant also positively correlated with bilateral trade flows (e.g. a country's geographic position). Time dummies are also employed, to control for the process of economic transition and restructuring experienced by the CEECs in the considered period. Finally, all the independent variables have been lagged one period with respect to the measurement of FDI to rule out simultaneity problems.

The specification of the model discussed insofar contains data related only to the 'spokes' countries (the CEECs). Given the previous assumptions, and in line with the available evidence of no FDI outflows from the CEECs to the EU, these are in fact the countries in which profit opportunities likely to induce FDI are supposed to arise. However, consistently with the intuition of the paper, the country-specific characteristics of the 'hub' country indirectly enter in the estimation, since the size of the 'hub' affects the calculation of the market potential of the 'spokes' countries considered<sup>23</sup>. The latter is a crucial feature of the model, because limiting the computation of market potential to the 'spokes' country is equivalent to consider the 'hub' (normally a source of FDI) as external to the integrating

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<sup>21</sup>For a matter of convenience the term  $\Theta_{\xi t}$  enters in the estimating equation as  $\Theta_{\xi t} + 1$ .

<sup>22</sup>Technically, with country-, industry- and time-effects the panel level variance component is captured by the set of dummies, and hence the random effects probit panel estimator is not different from the pooled probit estimator.

<sup>23</sup>Along the same lines, the comparative advantages of the CEECs should be computed including the EU labor costs in the region's average costs. But, while for all the CEECs in the period considered it was possible to retrieve homogeneous measures of labour costs (gross monthly wages in manufacturing), no similar figure was available for the EU. However, for comparison matters Eurostat provides data on monthly gross earnings of full-time employees in industry and services for both the EU and other countries, including most of the CEECs. These data show that the ratio of the CEECs labour costs ranges between 16 and 18 per cent of the EU average and is constant over time. As a result, excluding the EU data from the employed measure of comparative advantages is equivalent to discount the same measure by a constant, and hence does not affect the explicative power of the model.

region, as in the original framework of Norman and Motta (1996), hence ruling out the effect of ‘vertical’ FDI that instead might play a key role in increasing the probability of undertaking foreign investments within RIAs.

At this purpose, Columns (1) to (3) of Table 4.1 refer to the three measures of market potential calculated without including the size of the ‘hub’ country, which is considered as external to the area, as in the middle chart of Figure 2.1. Columns (4) and (5) report instead the results when the size of the ‘hub’ country (in this case the EU) is included in the calculation of each country  $j$ ’s market potential. In order to distinguish the last two measures, the relevant variables have been denoted in Table 4.1 as  $\Psi_{jt}(H - RIA)$  for the market potential of a country  $j$  calculated according to the traditional Harris’ definition, i.e. discounting neighbouring market sizes (this time including the EU ‘hub’ market size) by geographical distance; and  $\Psi_{jt}(RIA)$  for the market potential of a country  $j$  calculated discounting neighbouring market sizes (always including the EU ‘hub’) through the measure of transport costs (9). Consistently with the theoretical framework, the two latter model specifications should be able to measure the effects on FDI when the integrating region is shaped as a “multilateral” RIA (the last chart of Figure 2.1), i.e. with profit opportunities potentially accruing to both vertical and horizontal FDI strategies.

The results seem to confirm the original intuition of the paper. All the different specifications of the demand variable  $\Psi(\cdot)_{jt}$  are positively signed and significant, while relative labour costs  $\gamma_{jt}$  are significant and negatively signed, according to standard results in the literature on international investment. The degree of competition  $\Theta_{\xi t}$  is negatively signed, consistently with the theoretical priors, although not significant. Country-, industry- and time-specific dummies have always been found significant and jointly different from zero. In particular, comparing Column (3) with Columns (1) and (2), the original result of Norman and Motta (1996) is confirmed: when the increase in market accessibility driven by a process of economic integration is explicitly taken into account in the measure of demand, the probability of undertaking a FDI originating from an external source country (the size of the ‘hub’ is not included in these model specifications) increases due to the emergence of higher potential profits exploitable by horizontal MNEs. However, the important point to notice is the dramatic change in the demand coefficient that takes place when the size of the ‘hub’ country is included in the estimation (Columns 4 and 5), and hence the region is shaped as a multilateral RIA: the probability of undertaking a FDI increases almost twofold, with the effect maximum when the indicator of market potential  $\Psi_{jt}(RIA)$ , which explicitly includes the effects of economic integration, is considered<sup>24</sup>. In this case, in fact, the model considers

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<sup>24</sup>It is worth recalling that in a probit model the  $\beta$  coefficients do not measure marginal effects; rather, a unit increase of the independent variable  $\mathbf{x}_{j\xi t}$  is such that the score  $\mathbf{x}'_{j\xi t}\beta$  increases by  $\beta$  standard deviations. In order to report marginal probabilities, the change in probability calculated at the mean has to be computed. In the estimated model of Table 4.1, this yields an increase in the probability of undertaking a FDI of 39 per cent for a unit increase in each country (log) GDP. The probability increases to 45 per cent when the measure of market integration reported in Column (3) is considered, and to 72 per cent when the entire

the entire relevant demand accruing to all types of MNEs (both vertical and horizontal) potentially investing in the area, and hence all possible profit opportunities generated from a process of economic integration are duly taken into account.

[Table 4.1 about here]

In terms of specification test, the log-likelihood of the restricted model (dummies and constant only) is -1260.3, significantly larger than any of the log-likelihood values reported for the unrestricted model<sup>25</sup>; hence, it is possible to rule out the hypothesis that the variables postulated by the theoretical model are jointly zero.

Table 4.2 presents a model specification employed to counter a criticism outlined by Baldwin and Ottaviano (2001): if eventual common shocks affecting a given country (such as the implementation of a more liberal FDI legislation, typical of RIAs) are not controlled for in the estimation, this might result in a spurious positive correlation between a trade-based indicator of market access and FDI flows. Although fixed country characteristics have already been taken into account in the gravity-derived measure of trade integration, it is however interesting as a robustness check to include in the estimations a time-varying, country-specific index measuring the quality of the business environment (*ori*), already employed in the calibration of the theoretical model (see the Methodological Annex). The presence of this variable, significant and positively signed, does not seem however to affect the validity of the results derived in the original estimation, as reported in Columns (1) to (5) of Table 4.2.

[Table 4.2 about here]

## 6 Conclusions

The analysis has suggested that the dynamics of FDI inflows tend to be associated with positive changes in the degree of economic integration for a given configuration of regional integration agreements, in which both ‘hub’ and ‘spokes’ countries mutually liberalize trade (what has been called a “multilateral” RIA). In such a setup, progressively prevailing worldwide, a parallel evolution of FDI and trade flows is not a puzzle, but rather it is to be expected. The proposed theoretical model, the empirical evidence and the econometric analysis consistently state that the mechanism seems to work through a change in the profit opportunities available to potential MNEs in a given location as a result of a process of multilateral economic integration. In fact, if the ‘hub’ country, source of FDI, shares free trade agreements with ‘spokes’ countries that are as well experiencing an integration process

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market potential of the multilateral RIA (Column 5) is taken into account in the model.

<sup>25</sup>In particular, as shown in Table 4.1, the  $\chi^2_{(3)}$  statistic of the LR specification test is comprised between 212.9 and 208.2 for all the different model specifications, being it significantly larger than the .99 per cent critical value of 11.34.

among themselves, both horizontal and vertical MNEs are likely to benefit from the reduction in trade barriers, and hence the FDI creation in the area is likely to be systematically higher than the FDI concentration/rationalization effect.

More in detail, the setup of a free-trade agreement increases intra-regional market access, enhancing a location's overall market potential and creating positive, and sustained over time due to the imperfect nature of entry, profit opportunities for both vertical and horizontal MNEs. This generates in turn a flow of FDI from the 'hub' country until the entry of new firms and the associated raise in the degree of competition offset the positive effects of the increased market potential, leading the economy to a new equilibrium characterised by a higher stock of foreign capital.

Clearly, several refinements need and can be addressed with respect to the present model. From a theoretical point of view, the model should be extended to let MNEs arise endogenously in a general equilibrium setup. This would help to bridge the current gap existing between the "new trade theory" models of international trade, the literature on international location choices, and the theory of economic integration. In addition, measuring competition as in the model (the number of incumbent MNEs operating in the area in the year before the investment was undertaken) might actually capture also possible agglomeration effects arising among MNEs. In fact, the presence of multinationals in the same sub-sector (final products or intermediates) might induce a competitive effect, but the presence of MNEs in a complementary sector might induce agglomeration through backward and forward linkages. The combination of both effects is likely to be responsible for the weakly significant estimates obtained in the model. Finally, the model should be applied to prospective multilateral RIAs different from the EU-CEECs one. The future Euro-Mediterranean free trade area, or the FTAA project are ideal candidates to test the validity of the findings in another geographical and historical context.

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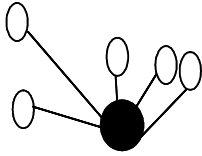
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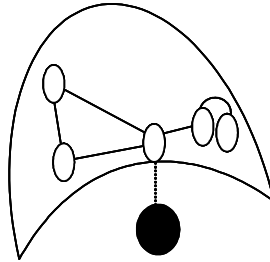
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Figure 2.1. Patterns of Regional Integration Agreements

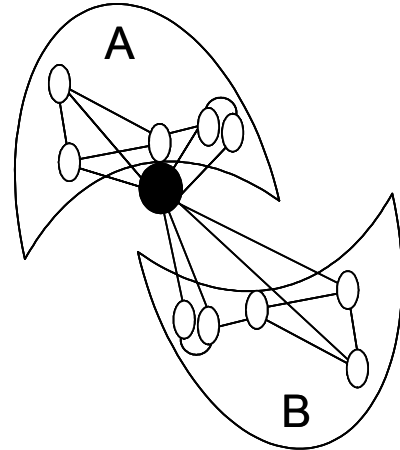
**Hub and Spoke pattern**



**Tariff-jumping and RIAs**



**Multilateral RIAs**



*Puga and Venables (1997)*

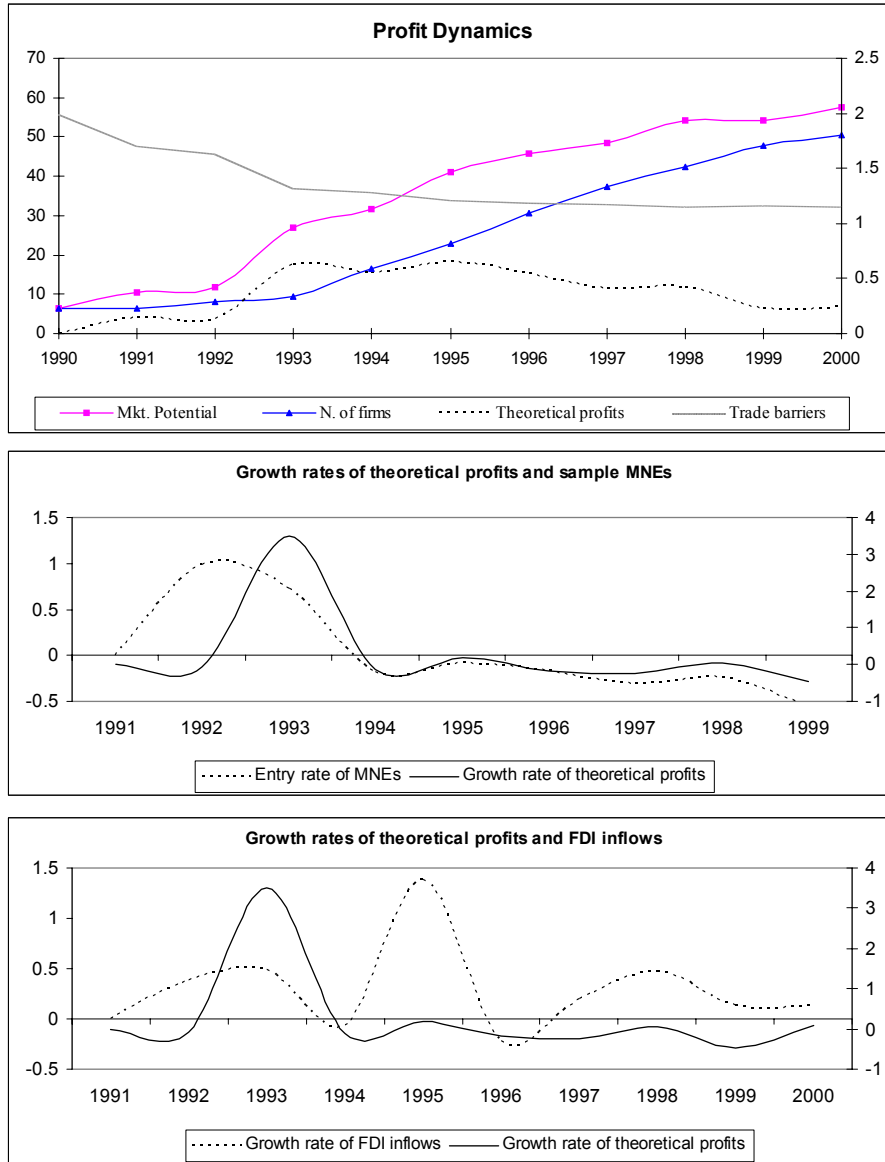
Europe Agreements  
Euro-Med Agreements

*Motta and Norman (1996)*

EU vs. Mercosur  
US / Japan vs. the EU

EU: Enlargement (2004)  
EU: Euro-Med FTA (2010)  
US: APEC (2010)  
US: FTAA (2005)

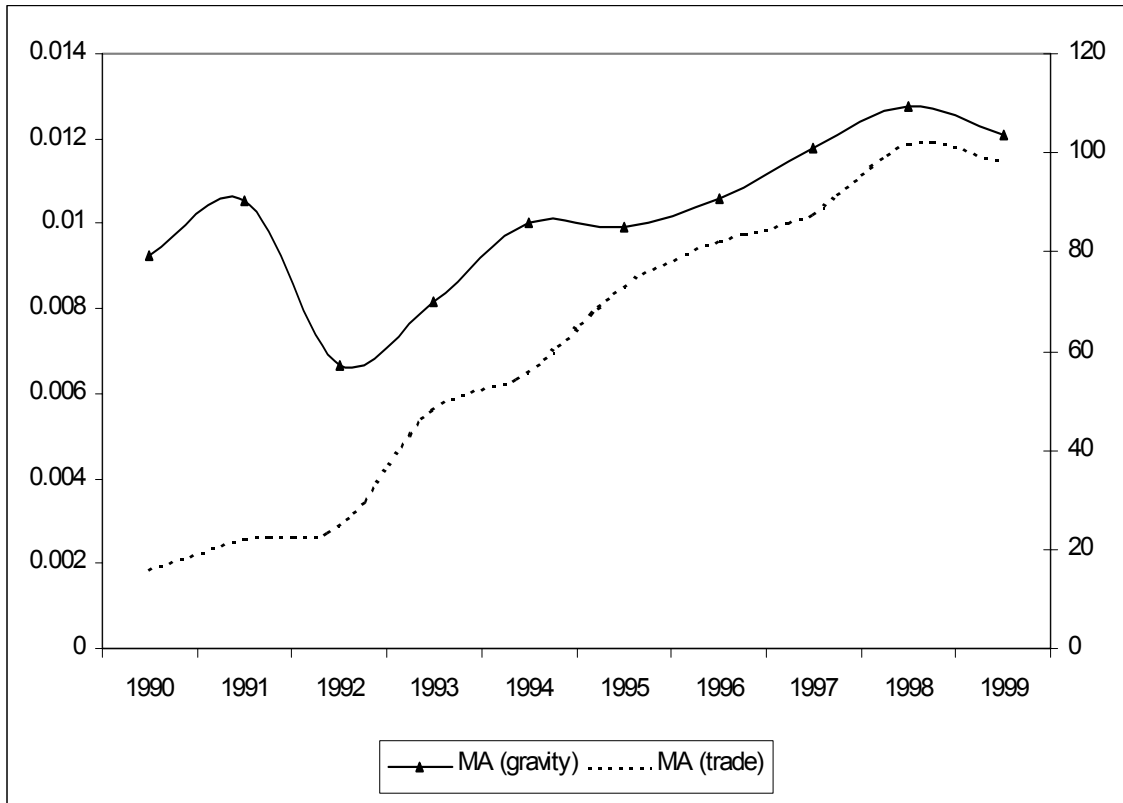
**Figure 3.1. Predicted FDI dynamics in the CEECs**



*Sources of data*

The top graph is generated through the calibration of Equation (5) as reported in the Methodological Annex. In the middle graph, the entry rate of MNEs is retrieved from the PECODB database, recording data until 1999. In the bottom graph, the growth rate of FDI inflows is retrieved from Annex Table B.1 in UNCTAD, World Investment Report, various years (1996 ed. for data concerning 1990; 1997 ed. for data 1991-1994; 2002 ed. for data 1995-2000). Both series are matched with the growth rate of theoretical profits as derived from the top graph.

Figure 3.2. Measures of market access for the EU-CEECs



$MA(trade) = \sum_i MA_{it}$ , where  $MA_{it} = \sum_j \frac{m_{ijt}}{d_{ij}}$  (Equation 6), with  $m_{ijt}$  equal to the bilateral trade flows as retrieved from IMF Direction of Trade Statistics.

$MA(gravity) = \sum_i MA'_{it}$ , where  $MA'_{it} = \sum_j d_{ij}^{\hat{\beta}_2 + \hat{\beta}_3(t)}$  (Equation 8), as retrieved from the gravity coefficients of Table 3.3.

**Table 3.1. FDI and trade flows EU-CEECs (\*)**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
FDI inflows <sup>a</sup>	299	2449	3572	5342	4889	11757	9169	10963	16200	18273	20636	20441
Percentage <sup>b</sup>	0.9	5.8	6.0	6.3	4.5	10.4	6.0	5.7	8.6	8.1	8.7	10.0
Number of MNEs <sup>c</sup>	210	446	913	1719	2376	2977	3477	3820	4079	4193	na	na
Internal trade CEECs <sup>d</sup>	2541.5	2786	2767	7816	8460	11314	11640	12707	13875	13272	15177	na
EU-CEECs trade <sup>e</sup>	15571	23345	26481	36554	44892	58300	68617	75272	91040	89483	94155	na
Imports from EU <sup>e</sup>	0.86	0.89	0.91	0.82	0.84	0.84	0.85	0.86	0.87	0.87	0.86	na

(\*) The CEECs do not include Latvia and Lithuania.

<sup>a</sup> World FDI inflows to the area in million of US \$.

<sup>b</sup> World FDI inflows to the area in percentage of developing countries inflows (in which the CEECs are not included).

<sup>c</sup> Total number of operating MNEs in a given year, as retrieved from the PECODB dataset.

<sup>d</sup> Internal trade of the CEECs as sum of c.i.f. bilateral import volumes in million of US \$.

<sup>e</sup> EU-CEECs trade as sum of c.i.f. imports of each CEEC from the EU. The percentage of the total imports of the CEECs from the EU over their total imports is also reported.

Source: Author's calculation based on Annex Table B.1 in UNCTAD, *World Investment Report*, various years for FDI (in particular *1996 ed.* for data concerning 1990; *1997 ed.* 1991-1994; *2002 ed.* for data 1995-2001). Data on trade flows are retrieved from IMF, *Direction of Trade Statistics Yearbook*, *1998 ed.* for data concerning 1991-1993, and *2001 ed.* for data concerning 1994-2000.

**Table 3.2. Correlation coefficients**

	Internal trade CEECs	FDI inflows	N. of MNEs	EU-CEECs trade
Internal trade CEECs	1.0000			
FDI inflows	0.9269***	1.0000		
N. of MNEs	0.9859***	0.9278***	1.0000	
EU-CEECs trade	0.9626***	0.9597***	0.9807***	1.0000

Source: Author's calculation based on data in Table 3.1.

**Table 3.3. The gravity equation**

Variable	(1)	(2)	(3)
$y_i$	1.28*** (.183)	.52*** (.20)	.53** (.28)
$y_j$	.90*** (.02)	.83*** (.02)	.90*** (.02)
$\delta_{ij}$	-1.31*** (.09)	-1.10*** (.09)	-1.23*** (.09)
$\delta_{ij-1990}$			-.098*** (.03)
$\delta_{ij-1991}$			-.078** (.03)
$\delta_{ij-1992}$			-.150** (.03)
$\delta_{ij-1993}$			-.118*** (.03)
$\delta_{ij-1994}$			-.086*** (.02)
$\delta_{ij-1995}$			-.087*** (.02)
$\delta_{ij-1996}$			-.077*** (.02)
$\delta_{ij-1997}$			-.060*** (.02)
$\delta_{ij-1998}$			-.047** (.02)
$\delta_{ij-1999}$			-.056*** (.02)
<i>border</i>	.32*** (.11)	.40*** (.10)	.33*** (.10)
<i>FTA</i>		.73*** (.09)	
const	-9.72*** (2.07)	-2.55 (2.19)	-1.67 (3.09)
n. obs.	693	693	693
R <sup>2</sup>	.81	.85	.83
F (country coeff.)	2.27**	2.16**	1.63*

\*\*\*, \*\* or \*: significant at the 1, 5 or 10 per cent level, respectively

Note: Panel data estimations with country fixed effects. Standard errors in parentheses.

**Table 4.1. Econometric results – benchmark models**

Variable	(1)	(2)	(3)	(4)	(5)
$\psi(\text{GDP})$	1.05*** (.34)				
$\psi(\text{H})$		1.06*** (.34)			
$\psi$			1.21*** (.35)		
$\psi(\text{H-NIA})$				1.41*** (.39)	
$\psi(\text{NIA})$					<b>2.34*** (.84)</b>
$\Theta$	-.12 (.10)	-.12 (.10)	-.13 (.10)	-.12 (.10)	-.14 (.10)
$\gamma$	-.88*** (.21)	-.89*** (.22)	-.75*** (.18)	-.97*** (.22)	-.55*** (.16)
<i>8 country dummies</i>	175.1***	174.81***	114.11***	154.27***	204.09***
<i>48 industry dummies</i>	126.06***	126.05***	126.83***	125.85***	127.17***
<i>8 time dummies</i>	153.38***	152.51***	158.52***	155.93***	167.82***
constant	-11.58*** (3.25)	-11.77*** (3.32)	-14.00*** (3.60)	-15.33*** (3.85)	-31.59*** (10.72)
n. obs.	2784	2784	2784	2784	2784
Log-L	-1155.53	-1155.56	-1154.34	-1153.84	-1156.36
Specification test	209.54***	209.48***	211.92***	212.92***	207.88***

\*\*\* significant at the 1 per cent level

\*\* significant at the 5 per cent level

Note: Standard errors in parentheses. The Chi-sq. test of  $H_0$ : joint coefficients = 0 is reported for dummy variables.

The specification test is a LR test of the restricted (dummies and constant only: Log-L = -1260.30) model vs. the unrestricted model. The test statistic is  $\chi^2$  distributed with three degrees of freedom.

**Table 4.2. Econometric results – robustness check**

Variable	(1)	(2)	(3)	(4)	(5)
$\psi(\text{GDP})$	.84** (.35)				
$\psi(\text{H})$		.85*** (.36)			
$\psi$			1.12*** (.35)		
$\psi(\text{H-NIA})$				1.15*** (.41)	
$\psi(\text{NIA})$					<b>2.79*** (.84)</b>
$\Theta$	-.12 (.10)	-.12 (.10)	-.12 (.10)	-.12 (.10)	-.12 (.10)
$\gamma$	-.87*** (.21)	-.87*** (.21)	-.81*** (.18)	-.93*** (.22)	-.67*** (.17)
ORI	.03** (.01)	.03** (.01)	.04*** (.01)	.03** (.01)	.05*** (.01)
<i>8 country dummies</i>	162.92***	162.74***	86.52***	140.50***	148.07***
<i>48 industry dummies</i>	125.97***	125.97***	126.58***	125.82***	126.95***
<i>8 time dummies</i>	159.50***	158.66***	159.72***	160.99***	166.54***
constant	-10.89*** (3.22)	-11.00*** (3.29)	-14.68*** (3.59)	-13.99*** (3.87)	-39.35*** (10.83)
n. obs.	2784	2784	2784	2784	2784
Log-L	-1153.20	-1153.25	-1150.88	-1152.14	-1150.47
Specification test	214.20***	214.10***	218.84***	215.78***	219.66***

\*\*\* significant at the 1 per cent level

\*\* significant at the 5 per cent level

Note: Standard errors in parentheses. The Chi-sq. test of  $H_0$ : joint coefficients = 0 is reported for dummy variables.

The specification test is a LR test of the restricted (dummies and constant only: Log-L = -1260.30) model vs. the unrestricted model. The test statistic is  $\chi^2$  distributed with four degrees of freedom.

## Methodological Annex - Calibration of the theoretical model

Equation (6) in the paper measures the degree of integration of country  $i$  at time  $t$  in the RIA (its ‘market access’  $MA$ ) as

$$MA_{it} = \sum_j \frac{m_{ijt}}{d_{ij}}$$

where  $m_{ij}$  denotes the value of country  $i$ ’s imports from country  $j$ , and  $d_{ij}$  is the (geodetic) distance between the two countries.

Transport costs  $\tau_{ij}$  can be considered as the reciprocal of this value: the higher is the degree of integration (i.e., the higher the distance-weighted bilateral trade flows of country  $i$  with other countries  $j$ ), the lower are the transport costs of serving country  $i$  from a production plant located in country  $j$ . In order to explore the dynamics of integration, it is convenient to normalize the market access at time  $t$  with respect to its initial value in  $t_0$ : as market access grows larger over time, the measure of transport costs tends to zero and therefore adding one retrieves the original iceberg formulation of transport costs<sup>26</sup>. As a result:

$$\tau_{ijt} = 1 + \left( \frac{MA_{it}}{MA_{it_0}} \right)^{-1} \quad (\text{A.1})$$

Summing over the entire set of  $N$  countries yields the following expression for total transport costs of a RIA at time  $t$ :

$$\tau_t = 1 + \left( \sum_i \frac{MA_{it}}{MA_{it_0}} \right)^{-1} \quad (\text{A.2})$$

Once endowed with the dynamic measure of bilateral transport costs reported in Equation (A.1), the term capturing the market potential of the area ( $\psi_{jt}$  in Equation 5), can be conveniently calculated in its dynamic form considering

$$\psi_{jt} = (1 + g_t) \sum_{i=1}^N M_{it-1} \sum_{i=1}^N \tau_{ijt}^{1-\sigma} \quad (\text{A.3})$$

with  $M_{it} = M_{it-1}(1 + g_t)$  and  $g_t$  set to be equal to the average growth rate of the area for the period considered<sup>27</sup>.

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<sup>26</sup>For simplicity, internal transport costs within countries have not been considered in the calibration, i.e.  $\tau_{jj} = 1$  for every  $t$ .

<sup>27</sup>Equation (A.3) implies that market potential  $\psi_{jt}$  of a country  $j$  at time  $t$  is given by the sum of the total expenditures of all  $i \in z$  countries at time  $t$  (calculated as the total expenditures at time  $t - 1$ ,  $M_{it-1}$ , increased by the average growth rate  $g_t$  of the area), times the total transport costs  $\tau_{ijt}^{1-\sigma}$  among all countries in the area, always at time  $t$ . The average growth rate  $g_t$  of the region is assumed exogenous, i.e. there are no medium term dynamic effects linking the establishment of a RIA and the presence of MNEs (see Blomstrom and Kokko, 1997).

In terms of calibration, transport costs  $\tau_{ijt}$  have been measured through Equation (A.1) calculated on the bilateral trade data retrieved from the IMF Direction of Trade Statistics and employed in Table 3.1, with  $t_0 = 1990$ ; the parameter  $g_t$  (the region's real GDP growth) has been proxied as the yearly average of the single CEECs growth rates (data retrieved from the World Development Indicators of the World Bank) while the elasticity of substitution has been set at the conventional value  $\sigma = 5$ .

Following Geroski (1995) and the results of a vast empirical I.O. literature, the entry of firms (the degree of competition measured by the parameter  $\vartheta_t$  in Equation 5) has been assumed proportional to expected post-entry profits, typically proxied by lagged profitability  $\pi_{t-1}$ , net of the costs of entry, summarised by the parameter  $\alpha_t$ . For the purposes of the calibration, profits  $\pi_{t-1}$  are retrieved from Equation (5)<sup>28</sup>. As a result, it is possible to assume an entry rule of the form:

$$\vartheta_t = \vartheta_{t-1} + \alpha_t \pi_{t-1} \quad \text{with } 0 < \alpha_t \leq 1 \quad (\text{A.4})$$

In this sense,  $\alpha_t$  can be thought as a measure of the barriers to entry faced by potential foreign investors in the region at time  $t$  and can be proxied through an index of transition (*ori*), directly related to the degree to which business operating conditions affect production and profits earned in a local country by a foreign firm<sup>29</sup>.

The calculated values of Equations (A.2), (A.3) and (A.4) are reported in Figure 3.1 (top), together with the results they yield in terms of profits according to Equation (5), ruling out changes in comparative advantages across countries (i.e. assuming  $\sum_{j=1}^N \gamma_{jt} = 0$ ). To highlight the theoretical evolution of profits due to the integration dynamics, initial values have been normalised so that in  $t_0$  a zero profit condition holds.

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<sup>28</sup>Note how in Equation (5) the term  $\psi_{jt}$  affects positively current profits  $\pi_t$ , while here lagged profits  $\pi_{t-1}$  enter negatively, through the term  $\vartheta_t$ , in the determination of  $\pi_t$ . This implicitly ensures the stability of the dynamic system calibrated in Figure 3.1 (top), which will converge to a zero profit condition. The key question is the time span it takes for profit opportunities to be wiped out by the entry of new firms, since as long as profits are positive they will induce a parallel evolution of FDI and trade in the RIA.

<sup>29</sup>The ORI index, elaborated by BERI s.a. through the yearly country ratings of a permanent panel of 105 experts around the world, takes the values 0-100, with the last figure indicating ideal business conditions. As a sensitivity check I have also proxied  $\alpha_t$  with the average percentage of Foreign Direct Investment in the region's gross-fixed capital formation (GFCF), obtaining similar results in terms of the evolution of profits.

## Statistical Annex

### The EU-CEECs multilateral RIA

In the early 90s the EU concluded bilateral “Europe Agreements” with the CEECs, removing the standing import quotas on a number of products and progressively establishing free trade in goods and services, with the exception of some agricultural products. At the same time, within the CEECs, two Regional Integration Agreements emerged: the Central European Free Trade Agreement (CEFTA) and the Baltic Free Trade Area (BAFTA).

<i>Country</i>	<i>Signature of Europe Agreement</i>	<i>Membership of CEFTA</i>	<i>Membership of BAFTA</i>
Bulgaria	1 March 1993	1 January 1999	-
Czech Rep.	6 October 1993	21 December 1992	-
Estonia	12 June 1995	-	1 April 1994
Hungary	16 December 1991	21 December 1992	-
Latvia	12 June 1995	-	1 April 1994
Lithuania	12 June 1995	<i>Negotiating</i>	1 April 1994
Poland	16 December 1991	21 December 1992	-
Romania	8 February 1993	1 July 1997	-
Slovakia	6 October 1993	21 December 1992	-
Slovenia	10 June 1996	1 January 1996	-

### Data sources and the classification of industries

CEECs include: Bulgaria, Czech Republic, Hungary, Estonia, Poland, Romania, Slovak Republic, Slovenia.

GDP data (in US\$ at market prices) are retrieved from the World Bank, *World Development Indicators*.

Labour costs (gross monthly wages in manufacturing) are retrieved from the WIIW database on Central and Eastern Europe, with the exclusion of Estonia, where the statistics of the Estonian Statistical Office have been used.

Distance is the quickest street link in km. between capital cities, computed through standard route software (MapQuest).

FDI data are retrieved from Annex Table B.1 in UNCTAD, *World Investment Report*, various years (in particular *1996 ed.* for data concerning 1990; *1997 ed.* 1991-1994; *2002 ed.* for data 1995-2001) or from the PECODB database developed at ISLA-Bocconi University, Milan, for firm-specific observations.

Trade data are c.i.f. bilateral imports retrieved from IMF, *Direction of Trade Statistics Yearbook*, *1998 ed.* for data concerning 1991-1993, and *2001 ed.* for data concerning 1994-2000.

The model includes a total of 48 industries, grouped according to the following NACE 2 and 3 digits classification.

10-11-12-13 and 14 (mining of coal, metals and stone; extraction of petroleum and natural gas); 151 and 152 (production and transformation of meat and fish); 153 and 155 (vegetables, milk and dairy products); 156 (grains); 157 (pet food); 158 (fabrication of bread, tea, coffee and other alimentary products); 159 (drink and beverages); 16 (tobacco); 17 (textiles); 18 (clothing); 19 (leather); 20 (wood); 21 (paper and pulp); 22 (publishing and press); 241 and 242 (basic chemicals and agro-chemicals); 243, 244 and 245 (paintings, pharmaceuticals and soaps and detergents); 246 and 247 (other chemical products and synthetic fibres); 251 (rubber products); 252 and 262 (plastics and ceramics); 26 (other non-metallic products); 27 (metallurgy); 28 (metals); 291 (mechanical machinery); 292 (general machinery); 293 (agricultural machines); 294 and 295 (machine tools); 297 (domestic appliances); 30 (office machines); 31 (electrical appliances, excluding domestic); 321 (electronics); 322 and 323 (communication equipment); 331 and 332 (medical and precision instruments); 334 and 335 (optics, photography, clocks); 341 (car production); 343 (car components); 351 (ship building); 352 and 354 (railways; motorcycles); 361 and 362 (furniture); 363 and 365 (musical instruments and toys); 366 (other general manufacturing); 401 and 402 (electricity and gas); 45 (construction); 55 (hotels and restaurants); 642 (telecommunications); 65 and 66 (financial intermediation and insurance); 72 (computer and related activities); 73 (research and development); 92 (cultural and sporting activities).