Master Thesis in Economics

European Regional Integration and Foreign Direct Investment Flows to Joining Countries

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Abstract:

This paper studies the determinants of foreign direct investment in the countries that joined the EU from 1985 to today, and the impact of EU membership on their bilateral FDI inflows from all OECD countries. The empirical method used is the gravity model, extended with additional explanatory variables, and the econometric models used are pooled OLS, a panel FE model and the FE Poisson model. We find that GDP’s of host and source countries, the distance between them, common language and common border all play important roles in determining bilateral FDI flows in our sample. We also find some support for labor costs of host and source countries, their openness to trade and inflation level in host country, although these results are mixed and depend on the econometric models used. Last but not least it is found that EU-membership has had a strong effect on intra-EU FDI flows, and has also affected the general level of FDI inflows from all OECD countries.
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1 Introduction

A regional integration arrangement (RIA) is economically speaking equivalent with a reduction in trade barriers between member countries. If the agreement is a Customs Union, like the EU for example, all member countries are also bound to set up a common external tariff against the rest of the world. Over the last couple of decades the world has experienced a proliferation of regional trade agreements, ranging from Free Trade Areas (FTAs) to Customs Unions (CUs). To name the largest, NAFTA and MERCOSUR have been created in the Americas, ASEAN and APEC in Asia and the European Community has evolved into a single market with a common currency for member countries. The number of regional FTAs in the world today is so large that Bhagwati has characterised the overlapping agreements between countries as the “spaghetti bowl phenomenon”.

Parallel to this development, global foreign direct investment (FDI) flows have increased immensely. During the last two decades, while world trade has increased by a factor of 2, flows of FDI have increased by a factor of 10!\(^1\) FDI flows have also grown at rates well above global economic growth during the 1990s.\(^2\) Hence, the linkage between RIA’s and FDI has become increasingly relevant for economists. However, due to the multi dimensional character of this relationship, the impact of RIA’s on FDI is not an obvious one. There are many channels through which RIA’s could potentially have an impact on the location of FDI.

According to theory, the formation of a regional trade agreement will increase inter-regional FDI but have a more ambiguous effect on intra-regional FDI. The outcome will be determined by the structure and motives of the investment made prior to the RIA. The larger market size resulting from a RIA is expected to have a positive effect on inter-regional FDI. Flows from non-members are also likely to increase if the level of external protection increases along with the RIA. With regard to intra-regional FDI Jaumonette (2004, p 4) writes: “... the lowering of internal tariffs tends to reduce the incentives for tariff-jumping FDI, but on the other hand it facilitates vertical FDI which delocalizes the production process to the countries with the best advantage by location”.

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\(^1\) C. Daude *et al* 2004, page 1
\(^2\) IMF, 2003
The European Union is an interesting laboratory case to study the link between integration and FDI because it is the region with the deepest integration between member countries, at the same time as it is the largest recipient of the global share of FDI.

Already in 1980 the European countries were, together, the largest recipient of inward FDI making up 32.74% of the global share of FDI stocks. Next came the developing economies of Asia with 31.19%, followed by North America with 19.47%.

During the past 30 years, as European integration has widened and deepened further, the global share of inward FDI stocks in Europe has increased more than anywhere else. From 1980, to 2008 this share has gone up by 13.74 percentage points, compared to only 3.51 in US or 0.9 in Japan during the same period. In Canada, Australia and Africa this share has even decreased, but the sharpest fall has been experienced by the developing economies of Asia (from 31.19% to 17.27%). From the table below we can see that the biggest increase in the share of FDI stocks in Europe is attributed to the integrated economies of the European Union.

**Table 1: Changing share of Foreign Direct Investment Inward stocks by host economy/region, 1980-2008 (%)**

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<td>Europe</td>
<td>32.74</td>
<td>30.30</td>
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<td>41.96</td>
<td>39.63</td>
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<td>Other European countries</td>
<td>0.93</td>
<td>1.84</td>
<td>2.43</td>
<td>2.62</td>
<td>2.05</td>
<td>2.51</td>
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<tr>
<td>Canada</td>
<td>7.68</td>
<td>6.71</td>
<td>5.81</td>
<td>4.23</td>
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<td>Asia</td>
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<td>Israel</td>
<td>0.45</td>
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<td>Japan</td>
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<td>0.51</td>
<td>1.15</td>
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<td>Oceania</td>
<td>3.85</td>
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<td>Australia</td>
<td>3.51</td>
<td>2.76</td>
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<td>2.12</td>
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<td>New Zealand</td>
<td>0.34</td>
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<td><strong>Developing economies</strong></td>
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<tr>
<td>Africa</td>
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<td>Asia</td>
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<td>18.31</td>
<td>19.70</td>
<td>18.67</td>
<td>16.18</td>
<td>17.27</td>
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The benefits from Foreign Direct Investment for receiving countries are many. Firstly, through provision of capital inputs, FDI permits the transfer of technologies to local industry that otherwise could not have been accomplished by way of trading of goods and services. Secondly, FDIs help in the creation of new jobs, increasing the salaries of workers and raising the host country’s international competitiveness by raising the productivity of capital. Thirdly, FDI’s assist in increasing the tax income that is generated through revenues realized through taxation. Moreover, they enhance the export sector by creating services that could be used as strategic inputs in the traditional export sector to expand the volume of trade.

The role of FDI in the development process of growing and transition economies and has recently gained great attention. During the 1990s foreign direct investment was one of the major external sources of financing for most countries that were undergoing economic growth. The positive externalities that foreign investors bring to the host countries include: general knowledge and specific technologies in production and distribution, work experience for the labour force, industrial upgrading, introduction of modern management, upgrading of telecommunication services and the like.

If it can be proven that integration generally has a positive effect on inward FDI, then the incentives for countries to join a RIA or FTA would surely increase, leading to a greater effort being put in by governments to reach such goals. This would especially be beneficial for developing and transition countries that lag behind in technology and modern business practices.

1.1 Purpose

In this paper we investigate the impact of European Union membership on inward FDI for joining countries, after 1985. We would like to find out the following:
• Has the volume of FDI inflows to the joining countries been affected by their deepening integration with the European Union? What is the magnitude of this relationship?

• Has European integration had a different effect on intra-FDI inflows compared to inter-FDI flows in the investigating countries?

• Has there been a difference between the first two and the last two enlargements in attracting FDI after their EU-joining?

• Which variables are important in determining the flow of FDI in our sample countries?

The paper is organized as follows: Section two discusses FDI theory and determinants. In this section we also present a template for studying the relationship between RIA’s and FDI where we discuss how regional integration can potentially affect investment decisions among countries. Lastly some earlier empirical studies on this relationship are reviewed. Section three presents some background information on EU integration as well as FDI trends to the investigating countries. Section four consists of the empirical part of the study, where the gravity model for FDI is described, as well as the data and methodology used for this study. The results and analysis are presented at the end of this section. Section five concludes.

1.2 Method

The method used is the gravity model, extended with additional variables such as common language and border between source and host countries, their openness to trade, labour costs and inflation level in host country. The dependent variable is bilateral FDI flows from all OECD countries to the joining countries of the EU, from 1985 to 2008. As usual for the gravity model, a logarithmic specification is used for all variables except for inflation. Since we have a large number of negative and zero FDI flows, we first set negative FDI flows to zero and then use Eichengreen and Irwin’s (1997) transformation: \( \ln (1+\text{FDI}) \) in order to not lose the important information those observations convey.

First a OLS regression is run with the basic gravity variables, and then additional explanatory variables are added. To control for country-pair heterogeneity we run
Fixed Effects regressions with only the time-variant variables. Lastly we employ a FE Poisson model to better deal with the large number of zero observations in the sample.

1.3 Limitations

This study uses total bilateral FDI flows, and no consideration is made with respect to sectoral patterns. No attention is paid to welfare or redistributive effects either. Taking these aspects into consideration would enable to study locational advantages among the EU countries and how integration alters investments in different sectors and across countries.

Moreover, the effects of source country membership in any RIA are not considered, which could alter FDI outflows from those countries to Europe. Besides including trade openness indexes of host and source countries into the model, there is no further analysis of bilateral trade data being done to establish the relationship between trade and FDI. Due to their close links it is preferred that FDI and trade be studied together.

The main reason for ignoring the above effects is the limited time frame within which this study had to be conducted. To acquire data on sectoral investments, trade or host country RIA membership would be very time consuming. Hence we have limited the study to only focus on total FDI flows to the joining countries of the EU.
2 FDI theory and Integration

2.1 The eclectic OLI paradigm

There are several theoretical models trying to explain the patterns of FDI. Dunning’s eclectic OLI approach is an attempt to bring together and cover some of the most important contributions of this area. The OLI approach links FDI to the theory of MNEs through analyzing the level and pattern of international production. This development will be the outcome of three interdependent forces; Ownership advantages, Location advantages and Internalization advantages. 3 Starting with the ownership advantages, these can be said to be related to the why question; why invest in a foreign country? Ownership advantages refer to “The (net) competitive advantages firms of one nationality possess over those of another nationality in supplying any particular market or set of markets.”4 These advantages should compensate for the costs often associated with undertaking FDI. The second force, location advantages, relates to the where question; where to locate? These advantages refer to a combination of the competitive advantages and the factor endowments in the foreign country or region. Factor endowments can consist of for example labor and land. Taken together, these form firm specific advantages with which the company can make profits. Finally, internalization advantages relate to the how question; in what way should companies undertake foreign investment? For example; how big part of a company’s activities should be located abroad? There are many choices related to the entrance of a foreign market (Dunning, 2000 and Princeton Encyclopedia of the World Economy, 2009). The OLI approach stipulates that the strength of the forces and how they interact will depend on the context, i.e. it will vary across industries, regions and among firms.

As was mentioned previously, a great deal of FDI in recent years has been undertaken between developed countries. According to Barrell and Pain (1997) there are two forces explaining this pattern; knowledge-based firm specific factors and the way barriers to trade change between and within large regional markets such as the EU. With knowledge-based assets is meant product innovations and intangible assets such as managerial and marketing skills. This thinking is though based on the assumption that trade and FDI are substitutes.

3 Dunning, 2001
4 Dunning, 2001, p 176
The OLI paradigm further distinguishes between four types of FDI. The first one is *market/demand oriented FDI* which is targeted at operating in a specific foreign market. The second one is *resource seeking/supply oriented FDI*. This type focuses on securing availability to natural resources such as unskilled labour and minerals. The third one, *rationalized/efficiency seeking FDI*, attempts to create a more efficient division of labour alternatively a specialization of an existing portfolio of foreign and domestic assets by MNEs. Last but not least, *strategic asset seeking FDI* seeks “..to protect or augment the existing O specific advantages of the investing firms and/or to reduce those of their competitors”\(^5\)

To sum up, The OLI approach suggest many variables as determinants of FDI. Which fundamentals that will be relevant for a specific study will depend on the context.

It may also be in place to elucidate the concepts of horizontal and vertical FDI. Horizontal FDI refers to firms’ establishment of similar units/activities as those at home in foreign countries. Vertical FDI refers to the outsourcing of different stages of production to different countries. Most FDI tend to be horizontal. This is backed up by the fact that developed countries are both the source and the host for the greater part of FDI. Hence, market access seems to be preferred over lowered production costs. The author also writes (p 1) “Standard models of horizontal FDI revolve around the trade-off between plant-level fixed costs and trade costs.” If trade costs are lower than the fixed costs for setting up a plant, then exports are chosen over FDI and vice versa (*Princeton Encyclopedia of the World Economy*, 2009).

### 2.1.1 FDI determinants

Empirical studies support the OLI paradigm, for example the view that ownership advantages are important factors explaining FDI. R&D and advertising expenditure, managerial resources, technology, capital intensity, labour skills, firm size, scale economies and experience have all proved to matter. Lots of studies have been carried out about FDI fundamentals the past couple of decades. Since the focus of this thesis will be on inward FDI flows to European Union countries, only studies related to this will be regarded. Unfortunately though, the

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\(^5\) Dunning, 2000, p 165
supply of such studies is relatively scarce, with most studies focusing only on the enlargement of the Central and Eastern European countries.

In a paper by Janicki and Wunnava (2004) bilateral FDI flows are studied between members of the EU and eight central and eastern European countries in transition. Using cross-sectional data for 1997, the authors find support for market size, host country risk, labour cost of host country as well as openness to trade. In another study of FDI flows to eleven Central- and Eastern European countries covering the 1994-2000 period, Bevan and Estrin (2004) found unit labour cost, market size and proximity to be relevant FDI fundamentals. In a similar study by Holland and Pain (1998) proximity, the method of privatization and the extent of trade linkages with advanced economies seemed to have an impact on FDI into the ten Central and Eastern European countries studied. Moreover, countries that have a common border to the core EU countries did relatively better in attracting FDI. Finally, the results indicate that FDI tends to be depending on relative factors such as production costs and perceptions of country risk. The study covered the years 1992-1996. In another study by Pain (1996) including Poland, Hungary, Slovakia and the Czech Republic over 1991-1993 the author again emphasized the form of the privatization programmes for FDI. He also found relative labour costs and research intensity to be significant determinants.

2.2 Effects of Regional Integration on Foreign Direct Investment

The relationship between economic integration and foreign direct investment is an intimate one, since both seek to overcome forms of market failure. While regional integration attempts to reduce allocative and efficiency costs of market distortions induced by national policies, multinational corporations (MNCs) seek to avoid the transaction costs of using markets to organize particular activities by internalizing intermediate product markets.\(^6\)

The main impact of RIA’s on FDI arises from their impact on location related factors\(^7\), and this effect is dependent on the type of FDI. There are two sources of FDI flows: 1.Intra-regional flows, that is, investment flows between members of the same

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\(^6\) P. Robson (1998), page 109

\(^7\) V.N. Balasubramanyam, page 461
RIA; and 2. Extra regional flows, that is, flows between individual member countries and non-member countries. Since we are using net bilateral FDI data we can make a distinction between these two cases. Hence for this study we find it more relevant to structure the discussion from the intra/inter regional nature of FDI, rather than the horizontal/vertical dimension.

Daude, Stein and Yeyati (2002) define three effects on FDI between member countries that result from a RIA formation: a) the tariff jumping effect – whereby reduction of trade barriers reduce incentives for FDI since horizontal FDI and trade are substitutes; b) the international vertical integration effect – where (vertical) FDI and trade are complements and thus a reduction in trade barriers increase FDI by reducing transaction costs; and c) the investment provision effect - where transaction costs are further reduced, for example by liberalizing capital flows, homogenizing legal norms etc., having a positive effect on FDI.

If on the other hand the source country is not a member of the RIA, the extended market effect seems to dominate the decisions to set up subsidiaries inside the RIA (all else equal). That is, the enlarged market offers new opportunities for economies of scale making a previously unprofitable FDI profitable (for example by bearing the fixed costs). This effect results in an increase of FDI for the RIA as a whole. However, concentration of investment may also serve to reduce the total volume of FDI in the region, though not its efficiency. It is important to note that the distribution of FDI will not be even for all member countries but rather concentrated to areas with the strongest locational advantages whereby the foreign producer supplies the rest of the region through trade. The issue of what determines whether a country is a looser or a winner in this game then goes back to the debate of FDI determinants. Moreover, extra-regional FDI is also expected to increase if the average protection increases following a RIA, or if fear of such is raised.

The outcome for FDI following a RIA also depends on the type of barriers removed. Sanna-Randaccio, F. (1996) categorizes the various NTB (Non Tariff Barriers) into two groups8: Type I barriers, which include custom classification procedures, custom clearance procedures and border controls have the same effect as tariffs – that is, they result in additional costs for foreign exporters but not for the foreign firms subsidiary.

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8 F.S. Randaccio (1996), page32
producing in the protected market. Hence, the removal of type I barriers primarily affects intra-regional *trade*. Type II barriers on the other hand, include state subsidies to locally owned firms, health and safety regulations and R&D financing and exert an impact on FDI. All else equal, a removal of type I barriers would increase intra-regional trade and may decrease FDI, while the removal of type II barriers may increase FDI and decrease trade. This approach implicitly assumes that trade and FDI are substitutes.

Although the earliest empirical literature on Integration and FDI does in fact regard trade and FDI as substitutes (eg. Mundell, R. (1957), it is now widely accepted that a complementary relationship often holds. This is not least proven by the increased FDI flows between rich countries despite systematic removal of trade barriers between them. Some studies that establish this complementarity are: Fontagné, L. (1999), F. Di Mauro (2000), Hejazi and Safarian (2001), Balasubramanyam and Sapsford (2000), and Greenaway and Milner (1986).

Blomström and Kokko define another motive for foreign investment that show that some FDI activity can exist even when there are no formal trade barriers between countries: Exploitation of intangible assets. In order to be competitive in a foreign market where local producers have superior knowledge about consumer preferences and business practices, the foreign firm must possess some firm specific intangible assets that give them a competitive edge. To effectively exploit these assets, firms sometimes have to “internalize” their international operations by setting up foreign affiliates to avoid the high transaction costs involved with other modes of business. In this case, a reduction in trade barriers would stimulate FDI activity between the negotiating partner countries by allowing MNE’s to operate more efficiently across borders. Thus, the net effect of RIA’s on individual countries depends on the pre-existing motives for foreign investments.

In conclusion, the dominant view is that trade liberalization is likely to lead to a net increase of inter-regional FDI inflow, whereas intra-regional FDI is subject to contradictory influences.

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9 V.N. Balasubramanyam (2002), page 464
10 Kokko, Blomström (1997), page 4
2.2.1 Static and dynamic effects

Besides the static effects mentioned above such as liberalization of capital flows and elimination of preferential treatment to local firms, there are further static effects to be gained by regional integration. Firstly, as reform decisions are raised from national to international level, the investment environment becomes more predictable, making the region a more attractive location for investments. Secondly, as market forces become more important determinants for investment decisions compared to political risk, FDI concentrates to the most attractive areas in the region. Inward FDI could also be stimulated by the elimination of trade related measures (TRM) such as requirements for foreign affiliates to satisfy specific export targets and by the presence of strong investor property rights which reduce the risk of direct and indirect expropriation.\(^\text{11}\)

As for the dynamic effects of integration, the enlarged market brings about many new firm characteristics that encourage FDI. Scale economies and specialization allow firms to grow larger and in turn invest more in R&D, creating more intangible firm-specific assets. Moreover, merger activities are stimulated to face tougher competition in the extended market. Consequently, more FDI is generated, and all this may not just have temporary but also permanent effects on incomes and growth rates of countries. These dynamic benefits further increase the attractiveness of the integrating region as a location for local and foreign investment. Although the exact link between integration and dynamic growth effects has not yet been established, there are numerous studies that find a positive relationship between the two. For example, Richard Baldwin and Elena Saghezza in “Growht and European Integration: towards an empirical assessment” (1996) survey empirical work on integration and growth and conclude: “there is strong evidence that trade liberalization promotes growth by boosting investment in physical capital. Because European integration has substantially liberalized European trade, we conclude that it has promoted European growth”. Similarly, Magnus Henrekson \textit{et al.} (1996) find from base regressions that EC and EFTA memberships do in fact have a positive and significant effect on economic growth. Their results also suggest that regional integration may not only affect resource allocation, but also long-run growth rates.

\(^{11}\) Kokko, Blomström (1997), page 6
The complexity of the relationship between a RIA formation and FDI is may be best captured by linking each if the static and dynamic effects of integration with the strategic responses by firms. Yannopoulos (1990) identifies four types of investment responses by MNC’s: a) defensive import substituting investment; b) reorganization investment; c) offensive import substituting investment and d) rationalized investment. Import substituting investment of the defensive type is a response to trade diversion effects of integration. The international firm shifts its strategy from trade based to investment based, as a way of maintaining its market share. To the contrary, reorganization investment results from pressure generated from trade creation effects of integration. Trade creation encourages reallocation in accordance with competitive advantage. Hence, the MNC’s already producing within the bloc have an incentive to regroup production in fewer locations offering the lowest costs. Rationalized investment is investment in response to international differences in production costs. Production costs are often reduced following a RIA, making it a more attractive place for international sourcing. Finally, the dynamic effects of integration agreements have macroeconomic implications in the sense that they enhance economic growth, efficiency and innovation. These effects give rise to offensive import substituting investments (export-oriented investment) to take advantage of new markets and growing demand.

2.3 Previous studies on integration and FDI

The formation of the European community and especially the establishment of the common market has been a laboratory for the earliest studies on integration and FDI. Most of empirical work on the impact of European integration on FDI focuses on US investment abroad, with only a marginal attention paid to non-US foreign direct investments. During the years following the first stage of the customs union in the EC, member countries of EC experienced a considerable inflow of FDI from the United States. In 1967, only three years before the completion of this stage, the value of US direct investment in the member states of the community more than trebled in comparison to the year of the establishment of the community (1957). EC members expanded their share of US exports in a much faster pace than the EFTA countries,

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12 Yannopoulos (1990), pp. 235-59
and Dunning (1960)\textsuperscript{13} suggests that there might have been diversion of American investment form non-EC countries in western Europe, especially UK, to the member states of EC. However, to attribute these increases in FDI solely to integration would imply ignoring the trends that were already under way since 1950. There is no agreed consensus on the exact contribution of integration in this trend, and the main reason for this is errors in model specification due to lack of interlinking between theory of economic integration with theory of international production.\textsuperscript{14} As we mentioned earlier, a correct inking of the two theories requires an understanding of the strategic responses of firms to static and dynamic trade effects induced by integration. But one thing is certain: economic integration makes the region a more attractive location for foreign investment, all else equal.

As for inter-regional FDI, studies of later stages of European integration also pay attention to the upsurge of Japanese investment in EU during the 1990s. V.N Balasubramanyam and D. Greenway (1992) present evidence suggesting that Japanese FDI to EC has increased in anticipation of the completion of the Internal Market sometime after 1992, but that it also is partly related to the continuing EC enlargement.

Anticipatory effects on FDI are also found in the case of intra-EU FDI. P. Egger and M. Pfaffermayr (2002) assess the impact of three different events in the EU integration process during the 90’s on bilateral European FDI relations: the Single Market Programme, the 1995 enlargement and the Europe Agreements between the EU and the CEEC. What they find is that all three events are characterized by a substantial positive anticipation effect in the period between the announcement and the formal establishment of each integration step. But only the last enlargement experienced a strong increase of FDI of the EU15 into seven CESS’s after its formal establishment.

The most similar study to ours is, to our knowledge, done by P. Brenton, F. Di Mauro and Matthias Lucke (1998). Using the gravity model, they assess the impact of deepening integration between EU and CEEC’s on FDI flows by first estimating expected long term levels of FDI in CEES’s and then comparing those to actual FDI levels. Next, they examine the relationship between trade and FDI, and finally they investigate whether an increase of the attractiveness of the CEEC’s to foreign

\textsuperscript{13}Dunning (1960), pp. 8-17
\textsuperscript{14}Yannopoulos (1990)
investors effect the magnitude of FDI going to other European countries. They find that host country membership in the EU does not significantly influence the stock of inward FDI and that stock of FDI in CEEC countries diverges little from the normal pattern expected after controlling for the main determinants of FDI stocks throughout the world. According to their predictions “The key determinants of the growth of FDI to the region will be the pace of income growth and the success with which CEEC governments orient their policies to be conducive to business”. In addition, they find no evidence of FDI diversion due to deepening integration.

2.3.1 Other empirical studies

MacDermott (2007) examines what impact regional trade agreements may have on FDI. He uses a fixed effects gravity model and OECD panel data for the 1982-1997 periods. By studying the NAFTA (that went into force 1994), he finds that integration spurred FDI for all NAFTA members; Mexico, Canada and the United States. Significant anticipatory effects were also found. These findings are not surprising. Along with the implementation of NAFTA several investment-friendly guidelines such as most-favoured-nation-treatment and dispute settlement were agreed upon. These were supposed to stimulate FDI flows to member countries. The author further showed that FDI rises with host and source country GDP and falls with distance.

Blomström and Kokko (1997) focus on three regional agreements; CUSFTA, NAFTA and MERCOSUR to investigate how regional integration affects FDI flows. Starting with the CUSFTA’s effect on inward FDI to Canada, it seems as if the agreement only had modest effects. This applies to both investment made by the US (members) as well as from non-member countries. This development may be explained by on the one hand the fact that the US already prior to the agreement had invested lots in its neighbour country and on the other, that Canada prior to CUSFTA already was very “developed” and liberalized. In other words, CUSFTA did not bring about any noteworthy changes.

Turning to the NAFTA, and more specifically, Mexico’s entrance to the customs union, we can observe increased FDI flows both from members as well as from the rest of the world. This development is not surprising; Mexico had, prior to the
agreement, undergone major changes that made the country more investment-friendly, and the agreement probably contributed further to this. Moreover, Mexico can be said to have important locational advantages such as cheap labour, which makes it attractive to investors.

Finally, it is still too early to really assess MERCOSUR’s effects on inward FDI. However, the authors speculate about the development. It makes sense to assume that macroeconomic stability has been a more important determinant of FDI inflows than regional integration. This can be seen in Argentina and Brazil. Also, FDI tend to have been concentrated in certain countries; Argentina and Brazil have received more than Uruguay and Paraguay, which may be explained by their location advantages.
3 A brief overview of EU integration and foreign direct investment flows to the new member countries

A first step of the EU cooperation took place in the aftermath of the Second World War, as an attempt to prevent further conflicts. This took form of the Coal and Steel community (1951) in which Belgium, France, Germany, Italy, Luxembourg and the Netherlands were members. A couple of years later, the treaty of Rome was signed creating the European Economic Community (EEC), also referred to as the common market. In the 1970s the first enlargement took place when Denmark, Ireland and the United Kingdom entered the Union in 1973. In the 1980s the cooperation grew further when Greece (1981) and Spain and Portugal (1986) decided to join. 1993 was the year of the Single market when movement of goods, services, people and money were in the running. Moreover, two treaties were signed; the Maastricht treaty (1993) and the treaty of Amsterdam (1999). The year of 1999 was also the time when the euro was introduced to financial world markets. In 1995 Austria, Finland and Sweden were accepted as new members. The past ten years, the union has experienced further enlargements as several central and Eastern European countries joined (2004); Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovenia and Slovakia, Malta and Cyprus. The last enlargement includes Bulgaria and Romania, who joined the union in 2007.  

This study will consider the last four enlargements.  

Below we present the development of FDI inflows into each investigating country from 1980 to 2008.

As we can see FDI inflows in Portugal and Spain take off the same year as they enter the EU. In Spain they increase by a factor of 44 between 1985 and 2008. In Portugal however FDI levels remain below 10,000 (million) USD per annum during the whole examination period.

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16 http://europa.eu/abc/history/index_en.htm, retrieved 2010-10-08
The second enlargement consists of Austria, Finland and Sweden who joined EU in 1995. All three countries experienced increased FDI inflows right after their joining, the sharpest increase being observed in Sweden where this trend had already begun in 1990. In 2000, the upward trend is reversed both in Sweden and Finland, while it continues to go up in Austria, but at a slower rate than before. In 2005 FDI inflows into Sweden swiftly take off again, while in Finland they continue to fall and become negative after 2005.

The figure below shows that in the four central European countries – Hungary, Poland, Czech Republic and Slovakia - the increase in FDI inflows sharply took off as soon as in 1990, while in the remaining countries this happened only after 2000.
and at a much slower rate. If we take 2005 as a braking point we can see that in most countries the upward trend continues at different pastes, except in Czech Republic, Hungary and Estonia where it starts to fall.

**Figure 3**: Enlargement 3, FDI Inflows, USD at current prices in millions

![Figure 3](image_url)

**Source**: Compiled by the authors based on UNCTAD (2010)

The picture for the last enlargement is more unified than in the other groups. The increase in FDI inflows begins in mid 90s in both countries but takes off sharply in 2000 and continues to increase throughout the whole examination period.

**Figure 4**: Enlargement 4, FDI Inflows, USD at current prices in millions

![Figure 4](image_url)

**Source**: Compiled by the authors based on UNCTAD (2010)
4 Empirical model

4.1 Methodology – a gravity approach

Our empirical strategy is based on the gravity model (GM) which is a standard model used in the empirical literature to analyze the determinants of bilateral trade. In its simplest form, it states that bilateral trade flows (in our case bilateral FDI flows) is a positive function of the product of the source and host countries’ GDP’s and a negative function of the distance between them.

Since the gravity equation was introduced in the 1960s by Tinbergen it has been extended with other explanatory variables. For example, Carrere modifies the GM by including variables such as: level of infrastructure, exchange rate, total population, dummies for whether the trading regions share a common border or not, and whether they are landlocked or not. In assessing effects of regional trade agreements (RTA’s), three additional dummies are then included: $D_I=1$ if both partners belong to the same RTA (to capture intra-bloc trade); $D_m=1$ if importing country i belongs to the RTA and exporting country j to the RoW (to capture block imports from the RoW) and $D_x=1$ if exporting country j belongs to the RTA and importing country to the RoW (to capture bloc exports to the RoW).\(^ {17} \)

Despite the model’s popularity in the field of international economics it has been much criticized; being accused of lacking a theoretical ground. Throughout the years, scholars have attempted to improve its theoretical underpinnings. Anderson (1979) for example brought the derivation of transport costs by using Armington preferences in a model of homogenous goods. It was presumed that distance and transport costs were closely linked. Bergstrand (1989 and 1990) and Anderson and van Wincoop (2001) extended this study. Anderson and Wincoop (2001) added the relative distance effect whilst Bergstrand contributed with assumptions about monopolistic competition. Eaton and Kortum (2001) derived the gravity model out of a Ricardo framework in which they put the gravity equation in a model of monopolistic competition with increasing returns to scale.\(^ {18} \) Hence, the GM has nowadays several theoretical foundations with the common denominator being models in homogenous and differentiated goods.

\(^{17}\) Carrere (2006), page 227-229

\(^{18}\) Greenway, Milner (2002)
As for the econometric specification, the first approaches in using the gravity equation for trade have been cross sectional. But since they often fail to account for country specific heterogeneity, panel data approaches have often been employed. Bussiere et al (2008) for example, use the within-estimator (treating country specific heterogeneity as fixed) to examine integration between the CSEEC’s with the EU area. Anderson and Wincoop (2006) on the other hand find the between-estimator to be a more suitable method in their search for RTA effects on trade flows. However, both studies regard panel-data as superior to cross-sectional models in using the gravity equation.

Given the similarity between trade and FDI, variations of the gravity models have become the most popular empirical approaches for examining FDI activity across countries. See for example Eaton and Tamara (1994), Frankel and Wei (1997), Stein and Daude (2000), Bloningen and Davis (2000), MacDermott (2006).

Regarding the econometric specification of the gravity model for FDI, the same arguments apply as for trade. There are numerous studies that estimate the gravity model for FDI with cross sectional ordinary least squares (OLS), adding time effects or/and host and source country effects (see for example Frenkel, Funke & Stadtman 2004). The most popular criticism against this method is that when heterogeneity among country pairs is not controlled for, OLS produces biased results. To mitigate this problem, researchers have turned towards panel data which has the advantage of allowing for general forms of heterogeneity. In studying FDI activity many authors use the fixed effects (FE) estimator, which controls for country-pair specific heterogeneity (for example Blonigen and Davies (2000), Yeyati et al (2002)).

Before continuing with our empirical model, we would like to discuss some important methodological points. Firstly, a double-log specification is used since we want to interpret the coefficients as elasticities. However, there is a problem with taking logs of the dependent variable, since our dataset includes a large number of observations where bilateral FDI flows are zero or negative\textsuperscript{19}. These observations would normally

\textsuperscript{19} Data on FDI flows are on a net basis (capital transactions’ credits less debits between direct investors and their foreign affiliates). Net decreases in assets (FDI outward) or net increases in liabilities (FDI inward) are recorded as credits (recorded with a positive sign in the balance of
be dropped by taking logs. That would imply a substantial loss of information since zero observations contain important information in this context. For example, it could be that bilateral FDI flows are zero between countries that are geographically far apart or between countries that do not belong to the EU. Although some authors do exclude zero observations (example Rose, 2000) this strategy could lead to estimation bias given their importance. Other authors solve the problem by replacing zero values with very small values (example Wang and Winters, 1991), but since the log of a small number is a large negative number, the observations in question are given too large weight.

We choose to work with the transformation proposed by Eichengreen and Irwin (1997) in dealing with zero values, taking logs of \((1+\text{FDI})\), which is approximately equal to taking logs of FDI alone, especially when FDI values are large. The problem of minus values we address by replacing all minus FDI flows with zero, using the logic that minus FDI flows is almost equivalent to no positive FDI flows. Again, we are interested in keeping the information conveyed in these observations. This transformation approximates quite well with a Tobit regression (see Greene, 1980).

Our approach is the following: first, we estimate the log-linear gravity model by Ordinary Least Squares (OLS) with only the basic gravity variables, adding common language as additional explanatory variables as they are considered important FDI determinants, as well as two integration dummies. The dummy for Integration takes the value of 1 if the source country is a member of EU that given year and zero otherwise; and the dummy for EUboth takes the value of 1 if both the source and host country is a member of EU that given year, and zero otherwise. In addition, dummy variables \(\lambda_t\) for each of the years are inserted, to capture a common time trend (if any). Our first specification is the following:

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payments), while net increases in assets or net decreases in liabilities are recorded as debits (recorded with a negative sign in the balance of payments). Hence, FDI flows with a negative sign indicate that at least one of the three components of FDI (equity capital, reinvested earnings or intra-company loans) is negative and not offset by positive amounts of the remaining components. These are instances of reverse investment or disinvestment. (definition taken from uctad.org)
\[ 
\ln(1 + FDI_{ijt}) = \\
\beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_3 \ln(\text{Pop}_{it}) + \beta_4 \ln(\text{Distance}_{ij}) + \\
\beta_5(\text{CommonL}_{ij}) + \beta_6(\text{CommonB}_{ij}) + \beta_{12}(\text{Integration}_{it}) + \beta_{13}(EUboth_{ijt}) + \\
\lambda_t + u_{ijt} 
\]  

(1)

where \( FDI_{ijt} \) measures the investment flows from source country \((j)\) to host country \((i)\) in period \(t\). \( GDP_{it} \) and \( GDP_{jt} \) are the gross domestic products of host and source countries at time \(t\); \( \text{Pop}_{it} \) is the population of the host country at time \(t\); \( \text{Distance}_{ij} \) measures the distance between the capital cities of host and source country; the variables \( \text{CommonL}_{ij} \) and \( \text{CommonB}_{ij} \) are dummy variables which take the value of 1 if the host and source countries share a common Language / Border and zero otherwise.

After some diagnostic checking, we find that some of the explanatory variables are highly correlated, making the OLS estimates unreliable. We find that: the variable GDP host is highly correlated with the Population variable; distance is correlated with the dummy for common border, which also makes sense intuitively, and the dummy for intra EU FDI-flows “EUboth”; and last but not least a high correlation is found between our integration dummies “Integration” and “EU both”. Therefore, in the next step we run two separate regressions including only uncorrelated variables in each regression. Specification 2a and 2b take on the following structure:

\[ 
\ln(1 + FDI_{ijt}) = \\
\beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_4 \ln(\text{Distance}_{ij}) + \beta_5(\text{CommonL}_{ij}) \\
+ \beta_{12}(\text{Integration}_{it}) + \lambda_t + u_{ijt} 
\]  

(2a)

\[ 
\ln(1 + FDI_{ijt}) = \\
\beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_5(\text{CommonL}_{ij}) + \beta_6(\text{CommonB}_{ij}) + \\
\beta_{13}(EUboth_{ijt}) + \lambda_t + u_{ijt} 
\]  

(2b)
In the next step, additional explanatory variables are added to the model, which we think are relevant determinants for FDI flows in the sample. These are: indexes for host and source country openness to trade, host and source country labor costs as well as inflation level in host country which we use a proxy for macroeconomic stability. All variables are logged, except inflation, since the absolute rather than the relative level of this variable is of interest in this context. We want to keep the correlated variables in separate regressions, hence keeping the structure of 2a and 2b but now adding the additional explanatory variables:

\[ \ln(1 + FDI_{jit}) = \]
\[ \beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_4 \ln(Distance_{ij}) + \beta_5 (CommonL_{ij}) + \]
\[ \beta_7 \ln(Laborcost_{it}) + \beta_8 \ln(Laborcost_{jt}) + \beta_9 \ln(Openness_{it}) + \]
\[ \beta_{10} \ln(Openness_{jt}) + \beta_{11} (Inflation_{it}) + \beta_{12} (Integration_{it}) + \lambda_t + u_{ijt} \]

(3a)

\[ \ln(1 + FDI_{jit}) = \]
\[ \beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_5 (CommonL_{ij}) + \beta_6 (CommonB_{ij}) + \]
\[ \beta_7 \ln(Laborcost_{it}) + \beta_8 \ln(Laborcost_{jt}) + \beta_9 \ln(Openness_{it}) + \]
\[ \beta_{10} \ln(Openness_{jt}) + \beta_{11} (Inflation_{it}) + \beta_{13} (EUboth_{ijt}) + \lambda_t + u_{ijt} \]

(3b)

In search for a more suitable model with respect to the nature of our data the next step will be to introduce the panel dimension of the data into the model. Being influenced by the many studies that argue for country-pair specific heterogeneity in bilateral FDI flows, we choose to use a country pair fixed effects model. Before continuing, a Hausman test is run to confirm our hypothesis that the data contains country pair specific effects. In absence of such effects, a random effects model would yield more parsimonious estimation, but if fixed effects are present than a random effects estimation would be inconsistent. The results of the Hausman test reject the null hypothesis of no significant difference between the fixed and random effects estimators. Although other sorts of misspecification can also lead to a rejection, the
most important reason why the estimators would be different is the existence of correlation between the individual effects $\beta_{ij}$ and the regressors $x_{ij}$.

To account for pair specific effects hidden in the standard gravity model, a dummy variable is inserted for each of the country pairs found in the sample. The time invariant variables disappear in a FE model, to be captured by the fixed effects. The time effects are kept, and so are the integration dummies. Our FE regressions are specified as follows:

\[
\ln (1 + FDI_{jlt}) = \\
\beta_{ij} + \beta_{1}\ln(GDP_{it}) + \beta_{2}\ln(GDP_{jt}) + \beta_{7}\ln(Laborcost_{it}) + \beta_{8}\ln(Laborcost_{jt}) \\
+ \beta_{9}\ln(Openness_{it}) + \beta_{10}\ln(Openness_{jt}) + \beta_{11}(Inflation_{it}) \\
+ \beta_{12}(Integration_{ijt}) + \lambda_{t} + u_{ijt}
\]

\[\text{(4a)}\]

\[
\ln(1 + FDI_{jlt}) = \\
\beta_{ij} + \beta_{1}\ln(GDP_{it}) + \beta_{2}\ln(GDP_{jt}) + \beta_{7}\ln(Laborcost_{it}) + \beta_{8}\ln(Laborcost_{jt}) \\
+ \beta_{9}\ln(Openness_{it}) + \beta_{10}\ln(Openness_{jt}) + \beta_{11}(Inflation_{it}) + \beta_{13}(EUboth_{ijt}) \\
+ \lambda_{t} + u_{ijt}
\]

\[\text{(4b)}\]

In specification 4a and 4b the intercept $\beta_{ij}$ captures all types of unobserved country-pair specific heterogeneity that is constant over time while the time effects $\lambda_{t}$ capture all forms of time-varying heterogeneity that is shared among the country pairs.

As a last step, a different approach is tried to handle the large fraction of zero values in the data set, by using a FE Poisson ML estimator (regressed on 4a and 4b). The advantages of this approach are that it includes all zero values and it gives practically unbiased estimates even with heteroscedastic data. The results from these regressions are presented in specification 5a and 5b.
4.2 Data
Our data is panel data spanning from 1985 to 2008, which includes 30 source countries (all OECD countries) and 16 European host countries, yielding a total of 12 024 country pairs. The number of observations is substantially reduced (to about 5070) due to missing observations. Data on inward FDI flows are extracted from the online statistical database of OECD and EUROSTAT. Our independent variables: host and source country GDP, host country GDP/cap, host country population and host country inflation level, are all from the World Data Bank; host and source countries’ labour cost indexes as well all host and source countries’ openness to trade (calculated from import, export and GDP data) are from the online statistical database of OECD; and distance, common language and common border between host and source country are extracted from the dataset of CEPII.

4.3 Results and analysis
As mentioned above, bilateral FDI is expected to be a positive function of the countries’ gross domestic products, and a negative function of the distance between them. The size of the host population is also expected affect FDI flows positively. If the host country shares a common language or/and border with the investing country, they are expected to receive more FDI inflows. Host and source country labor costs are expected to have opposing influences on FDI flows since investors aim to reduce operating costs: the higher host country labor costs, the lower their FDI inflows and the higher the source country labor costs the higher will the FDI flows be to host countries. Inflation is expected to have negative influence on FDI. The expected signs of the openness indexes are ambiguous. If they are significantly positive, then trade and FDI increase simultaneously, which means they are complements. On the other hand, negative signs indicate that trade and FDI are substitutes. Therefore, the coefficients for these variables depend on the bilateral trade relations between countries.

The expected sign for “EUboth” is also ambiguous. If the coefficient for this dummy variable is significantly positive, it can be concluded that partnership in the EU has increased intra regional FDI flows more than expected from standard gravity estimation.
Lastly, we expect EU Integration to have an overall positive effect on bilateral FDI flows, although this should not be taken for granted. The extended market effect is an important stimulus for non-EU investors to invest in the region. However, this incentive is not as strong for EU investors who can supply the newly integrated markets by trade instead. Hence, the overall outcome depends on the nature of FDI, more precisely if they are horizontal or vertical as well as on the origin of FDI prior integration.

Below is a summary of the expected signs of our variables:

**Table 2: Expected Signs of Variables used**

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Expected Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ln GDP Host</td>
<td>+</td>
</tr>
<tr>
<td>Ln GDP Source</td>
<td>+</td>
</tr>
<tr>
<td>Ln Distance</td>
<td>-</td>
</tr>
<tr>
<td>Ln Population Host</td>
<td>+</td>
</tr>
<tr>
<td>Common Language</td>
<td>+</td>
</tr>
<tr>
<td>Common Border</td>
<td>+</td>
</tr>
<tr>
<td>Ln Openness Host</td>
<td>?</td>
</tr>
<tr>
<td>Ln Openness Source</td>
<td>?</td>
</tr>
<tr>
<td>Ln Labor cost Host</td>
<td>-</td>
</tr>
<tr>
<td>Ln Labor cost Source</td>
<td>+</td>
</tr>
<tr>
<td>Ln Inflation Host</td>
<td>-</td>
</tr>
<tr>
<td>Integration</td>
<td>+</td>
</tr>
<tr>
<td>EU both</td>
<td>?</td>
</tr>
</tbody>
</table>

Table 3 presents the results from our baseline regressions and the extended regressions.

**Table 3: Results from pooled OLS regressions**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2a</th>
<th>2b</th>
<th>3a</th>
<th>3b</th>
</tr>
</thead>
<tbody>
<tr>
<td>β0</td>
<td>-19.54***</td>
<td>-21.05***</td>
<td>-31.36***</td>
<td>-23.47***</td>
<td>-24.34***</td>
</tr>
<tr>
<td></td>
<td>[0.89]</td>
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<td>0.51***</td>
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<td></td>
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<td>[0.03]</td>
<td>[0.03]</td>
</tr>
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<td>0.65***</td>
<td>0.49***</td>
<td>0.71***</td>
<td>0.56***</td>
</tr>
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<td>[0.02]</td>
<td>[0.03]</td>
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<td></td>
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<td>[0.03]</td>
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<td>----------</td>
<td>----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\beta_7$ Laborcost(H)</td>
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<td>-0.83***</td>
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</tr>
<tr>
<td></td>
<td>[0.20]</td>
<td>[0.13]</td>
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<tr>
<td>$\beta_8$ Laborcost (S)</td>
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<td>0.65***</td>
<td></td>
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<td></td>
</tr>
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<td></td>
<td>[0.06]</td>
<td>[0.06]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\beta_9$ Openness(H)</td>
<td>0.18**</td>
<td>0.26**</td>
<td></td>
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<td></td>
</tr>
<tr>
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<td>[0.08]</td>
<td>[0.13]</td>
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<td></td>
</tr>
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<td>$\beta_{10}$ Openness (S)</td>
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<td>0.40***</td>
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<td>[0.13]</td>
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<td>-0.0002</td>
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<td>[0.00]</td>
<td>[0.00]</td>
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<td>$\beta_{12}$ Integration</td>
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<td>[0.09]</td>
<td>[0.08]</td>
<td>[0.08]</td>
<td></td>
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</tr>
<tr>
<td>$\beta_{13}$ EU both</td>
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<td>1.11***</td>
<td>0.88***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[0.09]</td>
<td>[0.07]</td>
<td>[0.09]</td>
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</tr>
<tr>
<td>Time effects</td>
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<td>YES</td>
<td>YES</td>
<td>YES</td>
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</tr>
<tr>
<td>R squared</td>
<td>0.347</td>
<td>0.321</td>
<td>0.231</td>
<td>0.349</td>
<td>0.265</td>
</tr>
<tr>
<td>Adjusted Rsq</td>
<td>0.343</td>
<td>0.318</td>
<td>0.228</td>
<td>0.345</td>
<td>0.261</td>
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<td>F-test</td>
<td>110.25</td>
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<td>65.53</td>
<td>93.56</td>
<td>60.53</td>
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<tr>
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<td>0.000</td>
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<td>5705</td>
<td>5704</td>
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</tbody>
</table>

**Note1:** Robust standard errors in square brackets. *, **, *** stand for 10%, 5% and 1% significance level respectively. **Note2:** When time effects are excluded: in specification 1 Integration becomes significant at 1% level with a coefficient of 0.28; in specification 2a Integration becomes positive and significant at 1% level with a coefficient of 0.32. **Note3:** In specification 3a and 3b we replace country characteristics ($\beta_7$-$\beta_{11}$) with host and source country effect dummies. The important changes are: in 3a Integration becomes significant at 1% level with a coefficient of 0.42. adjusted R-sq. Becomes 0.477; in 3b adjusted R-sq. Becomes 0.445.

While all coefficients have the expected signs, the coefficients for GDP host, common border and integration are not statistically significant. As we mentioned before, we suspect multicollinearity in the data between similar variables, and with the help of a correlation matrix we identify the correlated variables. GDP host is highly correlated with population, hence the latter is dropped in coming regressions; integration is highly correlated with EUboth, hence we divide these into separate regressions; distance is correlated with common border and slightly correlated with EU both, hence we include distance in the regressions with the integration dummy (2a, 3a), while leaving common border in the regressions containing EUboth (2b and 3b). After this division we get statistically significant coefficients for all variables except the integration dummy.

A one percent increase in host GDP has an estimated effect of 0.40 to 0.65% increase in the bilateral inflow of FDI (see GDP host estimates in specification 2b and 2a).
The corresponding effect of the source country GDP is somewhat higher and lies between 0.49% and 0.71%. The coefficient for distance (-1) tells that a one percent increase in the distance between host and source country decreases FDI flows by 1%.

Interpretation of the dummies for common border (1.64) and common language (0.98 and 1.03) indicate that host countries that share a common border with the investing country will receive 416% more direct investments from that country than expected from the gravity equation results, and if they share a common language they will on average receive 160%-180% more FDI.

Integration with the EU seems not to have any effect on the overall attraction of FDI to joining countries. However, when both countries are members of the EU the estimated effect is an increase of 203% in bilateral FDI flows.

Regarding the goodness of fit of our regressions, it is only natural that the more variables are included, the more likely it is that the R-square value is higher. Hence the first regression has the highest adjusted R-sq. (0.343), followed by regression 2a (0.318). The explanatory power of regression 2b on the other hand is quite smaller – 22.8% of the variation in bilateral FDI flows in our data is explained by the variables: host and source GDP, common language, common border and the dummy EU both. Now moving on to the extended models in 3a and 3b:

The added variables labour costs, openness to trade and inflation all have, as suspected, the expected signs.

- Labour costs in both the host and source countries seem to be very important and highly significant in determining bilateral FDI flows. A 1% increase in the labour costs of the host country leads to a fall of 0.71-0.73% in FDI inflows, while a 1% increase in the labour costs of the source country leads to a 0.57% - 0.65% increase in bilateral FDI.
- The openness index of host countries is also positive and highly significant in both regressions: a 1% increase of this index leads to 0.18 % – 0.26 % more FDI. From this observation we can also conclude that trade and FDI are complements rather than substitutes in the FDI-receiving EU countries in our sample. This speaks for vertical direct investments. The openness index for source countries is only positive and

\[ e^{1.64} - 1 \times 100 = 416\% \]
\[ e^{0.98} - 1 \times 100 = 160\% \text{ and } e^{1.03} - 1 \times 100 = 180\% \]
\[ e^{1.11} - 1 \times 100 = 203\% \]
significant in regression 3b – open source countries are more likely to invest abroad. Also here trade and FDI seem to be complements.

- The variable of inflation, while having a negative sign as expected, is not statistically significant in either one of the models.

The dummy for integration is once again not statistically significant, and this time even has a surprising negative sign. There seems to be no support for the extended market effect on FDI following integration. On the other hand, the coefficient for the dummy indicating intra-EU FDI flows is once again positive (0.88) and significant at 1% level.

The explanatory powers in both regressions go up compared to the former two. Now, 26.1% and 34.5% of the variation in our data is explained by the including variables, compared to 22.8% and 31.8% in 2a and 2b.

Before proceeding with the fixed effects models, it is in place to discuss some important points regarding the integration dummy which is the only insignificant variable throughout our analysis so far (besides inflation). In attempt to find an explanation to this observation, we have slightly experimented with our regressions to see how this variable is affected. First, we have removed the time dummies from regression 1, 2a and 2b, since some of them were not significant (although only 29% of them in regression 1 and 17% of them in 2a and 2b). The important changes are that Integration becomes highly significant in both 1 and 2a with coefficients of 0.28 and 0.32 respectively. Hence, in absence of a common time trend (globalization) in the model, integration leads to an increase in bilateral FDI of 32.3% to 37.7%. This effect of integration has so far been picked up by the time effects.

Next, in regression 3a and 3b we replace the added variables (labour costs, openness and inflation) with host specific and source specific effects by including dummies for each host and source country. The results are:

a) once again the coefficient for integration becomes positive and highly significant.

b) a higher explanatory power in both models (0.477 and 0.445), which is intuitive since more effects are captured by generally grouping host and source specific effects than by our 5 added explanatory variables. On the other hand, the differences in adjusted r-sq are not that much higher, i.e. 0.132 higher in 3a and 0.184 higher in 3b,
which means that our 5 chosen variables are quite good proxies for host country and source country specific effects in the countries studied.

In table three we present the results from our FE and Poisson models. Here the time invariant variables disappear from the specification, but are captured by the country pair fixed effects.

### Table 4: Results from (country-pair)FE and FE Poisson (ML) model

<table>
<thead>
<tr>
<th></th>
<th>4a</th>
<th>4b</th>
<th>5a</th>
<th>5b</th>
</tr>
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<tbody>
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<td>β0</td>
<td>Constant</td>
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<td>-68.86***</td>
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<td></td>
<td></td>
<td>[14.81]</td>
<td>[14.42]</td>
<td></td>
</tr>
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<td>β1</td>
<td>GDP host</td>
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<td>0.680</td>
<td>0.230</td>
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<td></td>
<td></td>
<td>[0.53]</td>
<td>[0.51]</td>
<td>[0.20]</td>
</tr>
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<td>β2</td>
<td>GDP source</td>
<td>2.20***</td>
<td>2.17***</td>
<td>1.31***</td>
</tr>
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<td></td>
<td></td>
<td>[0.46]</td>
<td>[0.46]</td>
<td>[0.16]</td>
</tr>
<tr>
<td>β3</td>
<td>Pop.</td>
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<td></td>
<td></td>
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<tr>
<td>β4</td>
<td>DIST</td>
<td></td>
<td></td>
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<td>β5</td>
<td>Language</td>
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<td></td>
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<td>β6</td>
<td>Border</td>
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</tr>
<tr>
<td>β7</td>
<td>Labor cost (H)</td>
<td>-0.56**</td>
<td>-0.64***</td>
<td>-0.13</td>
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<td></td>
<td></td>
<td>[0.25]</td>
<td>[0.25]</td>
<td>[0.12]</td>
</tr>
<tr>
<td>β8</td>
<td>Labor cost (S)</td>
<td>-0.13***</td>
<td>-0.14***</td>
<td>0.19**</td>
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<tr>
<td>β9</td>
<td>Openness (H)</td>
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<td>0.01</td>
<td>-0.15</td>
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<td>[0.02]</td>
<td>[0.02]</td>
<td>[0.13]</td>
</tr>
<tr>
<td>β10</td>
<td>Openness (S)</td>
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<td>1.17***</td>
<td>0.00</td>
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<td></td>
<td>[0.39]</td>
<td>[0.32]</td>
<td>[0.00]</td>
</tr>
<tr>
<td>β11</td>
<td>Inflation (H)</td>
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<td>-0.001[***</td>
<td>-0.0005***</td>
</tr>
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<td></td>
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<td>[0.00]</td>
<td>[0.00]</td>
<td>[0.00]</td>
</tr>
<tr>
<td>β12</td>
<td>Integration</td>
<td>0.25**</td>
<td>0.16***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[0.11]</td>
<td>[0.04]</td>
<td></td>
</tr>
<tr>
<td>β13</td>
<td>EU both</td>
<td></td>
<td>0.24**</td>
<td>0.11***</td>
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<td></td>
<td></td>
<td>[0.10]</td>
<td>[0.03]</td>
<td></td>
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<tr>
<td>Time effects</td>
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<td>YES</td>
<td>YES</td>
<td>YES</td>
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<td>R-sq. Overall</td>
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<td>F-stat</td>
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<td>19.77</td>
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<td>525</td>
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<tr>
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</tr>
<tr>
<td>Observations</td>
<td>5078</td>
<td>5078</td>
<td>4852</td>
<td>4852</td>
</tr>
</tbody>
</table>

**Note:** In specification 5a and 5b values in square brackets represent bootstrapped standard errors, and F-stat corresponds to Wald chi2. *, **, *** stand for 10%, 5% and 1% significance level
After controlling for country pair heterogeneity, we can see that the importance of host country GDP diminishes and becomes insignificant in both FE models. The importance of source country GDP however increases sharply: a 1% increase in source GDP leads to a percentage increase in FDI of 2.17% to 2.20%! Larger and richer countries invest much more abroad than their counterparts, after taking into account country pair characteristics.

The coefficients of host labor costs also increase slightly but remain highly significant. Interestingly the coefficients for source labor cost turn negative (-0.13, -0.14) and significant, implying that higher unit labor costs in investing countries lead to less FDI outflows from those countries. This is economically counter intuitive.

The variable for host openness becomes insignificant after controlling for country pair heterogeneity, but now the coefficient for inflation turns significant. In the case of inflation the slope coefficient measures the proportional or relative change in $Y$, $\ln(FDI+1)$ in our case, for a given absolute change in the explanatory variable, inflation (this relative change multiplied by 100 gives the percentage change). So, for a unit increase in the inflation level, FDI decreases by 0.001 or 0.1%. In any case, this proves that macroeconomic instability does affect FDI flows negatively.

Finally, we get a positive and significant coefficient of 0.25 for the integration dummy.

Moreover, intra-regional FDI flows are also positive and statistically significant at 5% level. Countries that join the EU get 27.1% more investment from EU countries than expected by the gravity equation results.

The overall R-squared in these models are quite low, but cannot be straight forwardly compared to the R-squared values in the OLS regressions.

In sum the OLS and country-pair FE regressions suggest the following:

- All gravity variables, including common border and common language in the OLS regressions are highly significant
- Host and source country labor costs are also significant, and have the expected signs in the OLS regressions: FDI flows are higher to locations with relatively lower unit labor costs, and higher from locations where unit labor costs are
higher. Host country openness to trade is also an important and significant FDI determinant.

- The coefficient for common EU membership is highly significant and positive in the OLS regressions, meaning that if both countries are EU-members bilateral FDI increases.

- There is mixed and ambiguous evidence on source country openness and the integration variable, while no support is found for inflation in the OLS regressions.

- Contrary to the above results, the country pair FE model gives us strong support for the importance of source country openness, integration and inflation as FDI determinants.

- In the FE there is no support for host GDP and host country openness, which proved important in the OLS regressions.

- Integration becomes highly significant and positive in the FE model: after joining the EU, countries receive about 28% more FDI. The coefficient for intra-EU FDI remains significant and positive, but is now smaller.

While the OLS regressions allow us to study the time invariant variables considered important in the gravity model such as distance, common border and common language, it fails to account for country-pair heterogeneity. Since there often is country pair fixed effects present in bilateral FDI data, conventional cross sectional estimates of the gravity model are generally biased. The FE model is suitable since it controls for these effects. It does however not specifically determine the importance of the time invariant variables.

The standard linearization of the gravity model requires the dependent variable to be strictly positive, which is a big draw back since it is rather the rule than the exception that FDI (as well as trade) data contains many zero-observations. The problem at hand has been dealt with by using the transformation \( \ln(1+\text{FDI}) \) and reporting negative FDI as zero, however this method can possibly artificially distort the sample distribution, leading to biased estimates. The same consequence is observed in the case when small positive values of the dependent variable are reported as zeros.

Hence the Poisson model is an attempt to better handle the large number of zero observations in our dependent variable.
This estimator has further reduced the number of significant variables, but as discussed above there is reason to believe that these estimates are more reliable.

The Poisson regressions produce the following important changes:
Source country labor cost coefficients turn rightly positive (0.18, 0.19) and highly significant – meaning that countries with higher labor costs are more likely to invest abroad, or more correctly, the investigating countries receive more FDI inflows from countries where labor costs are high.
The coefficient for host labor costs turn insignificant in 5a, and in 5b it decreases to -0.17 but retains its significance.
The coefficients for integration and intra-EU FDI decrease from former 0.25 and 0.24 to 0.16 and 0.11 respectively, but are both highly significant. The effects of integration on FDI are much smaller when using this estimation method – EU-membership leads to an increase of overall FDI inflows of 11.6% and an increase of intra-EU FDI flows of 17.4%.
Moreover, source openness turns insignificant in these regressions, meaning that none of the openness indexes are longer significant. The coefficients for source country GDP are still significant but now much smaller (1.31 compared to 2.17 and 2.20). Host GDP remains insignificant in regression 5a but turns significant in 5b. The coefficients for inflation are still significant (although smaller).

In the next and final step we analyze the differences in FDI determinants and the effect of EU integration between the countries in the two first enlargements and the countries from the last two enlargements; hence the countries are divided into two groups. This division is made with respect to country characteristics, i.e. Spain and Portugal are more similar to Sweden, Finland and Austria in the economic structure, while the Bulgaria and Romania have more in common with the CEEC’s (generally speaking).
Table 4 shows the results from the two separate groups of regressions. We have chosen to use the Poisson model, which accounts for country-pair fixed effects as well as the large number of zero observations in the dependent variable:
Table 5: Results from Poisson regressions for countries in the first and second EU enlargements (group 1) and in the third and fourth enlargement (group 2)

<table>
<thead>
<tr>
<th></th>
<th>Ln of</th>
<th>Group 1a</th>
<th>Group 1b</th>
<th>Group 2a</th>
<th>Group 2b</th>
</tr>
</thead>
<tbody>
<tr>
<td>β1</td>
<td>GDP host</td>
<td>-0.95</td>
<td>-0.66</td>
<td>0.92***</td>
<td>1.02***</td>
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<td></td>
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</tr>
<tr>
<td>β2</td>
<td>GDP source</td>
<td>1.53***</td>
<td>1.56***</td>
<td>1.61***</td>
<td>1.65***</td>
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<td></td>
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<tr>
<td>β7</td>
<td>Labor cost (H)</td>
<td>-0.58**</td>
<td>-1.97***</td>
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<td>0.28*</td>
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<td></td>
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<td>[0.17]</td>
</tr>
<tr>
<td>β8</td>
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<td>0.47***</td>
<td>-0.08</td>
<td>-0.08</td>
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<tr>
<td>β9</td>
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<td>[0.0312]</td>
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<tr>
<td>β11</td>
<td>Inflation (H)</td>
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<td>-0.01</td>
<td>0.00</td>
<td>-0.003*</td>
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</tr>
<tr>
<td>β12</td>
<td>Integration</td>
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<td>-0.31***</td>
<td>-0.07</td>
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<td></td>
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<tr>
<td>β13</td>
<td>EU both</td>
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<td>-0.07</td>
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<td>279.80</td>
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<td>2393</td>
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</table>

Note: Values in square brackets represent bootstrapped standard errors, and *, **, *** stand for 10%, 5% and 1% significance level

As can be seen above, the coefficients for host country GDP in the first group are ambiguously negative but statistically insignificant. In the second group however, a 1 percent increase of host GDP leads to a statistically significant increase of 0.92% to 1.02% in FDI flows.

Source country GDP seems to be the most important FDI determinant according to this estimation method. The coefficients for this variable are highly significant in all cases, but slightly smaller for group 1 (0.53 and 0.56 compared to 1.61 and 1.65 in group 2).

What come as a surprise are the coefficients of host country labour costs. They are negative, quite high and significant in the first group, but positive and insignificant in the second group. We would expect the labour abundant countries of central and Eastern Europe to attract FDI inflows to labour intensive sectors, making the labour cost index an important (and negatively related) determinant for FDI flows into these
countries. Similarly, we would expect a smaller importance of this index in the capital-abundant countries in group one. Hence these results remain ambiguous. No support is found for the importance of source country labor costs or the openness indexes in bilateral FDI flows.

Inflation does not gain much support as a determinant of FDI either. It is only significant (and correctly negative) in specification 4b for group 1.

The impact of EU integration on total bilateral FDI inflows seems to have opposing effects in the two groups. While for the countries in the first group EU membership leads to an increase in FDI inflows of 26%, for the second group of countries it leads to a decrease of 27%!

An explanation for this could be that FDI in the second group came initially mainly from EU countries and were of horizontal kind, hence tariff-jumping FDI decreased with integration. In this case, the source countries are members of the EU facing lower (or no) trade barriers after the host countries’ joining to the union, and are able to serve their markets through trade instead of FDI.

A complete analysis would require more information about the origin of FDI prior and after EU membership.

There is no statistical significance for the coefficients measuring intra-EU FDI flows.

4.4 Discussion

This study shows that intra EU investment flows are affected positively by the integration process. The impact of European integration, more specifically of the internal market program on the level and pattern of intra-EU FDI flows has been subjected to considerable debate. Although the removal of trade barriers stimulates firms to exploit scale economies by allowing them to produce in the lowest cost locations and serve the whole market through trade, it isn’t always the case that trade and FDI are substitutes. The internal market program eases a number of non-tariff barriers by harmonizing technical standards, and removing customs barriers and constraints on capital markets. It is expected that such measures might raise direct investments in non-tradable sectors within the union. For example, the single license principle facilitates market entry in financial services and the principle of mutual
recognition of national standards helps improve the market access in other sectors where common standards have not been agreed upon. Vertical FDI is also stimulated by the easing of non-tariff barriers.

Another reason why intra EU FDI flows may increase with integration are (despite the common internal market) persistent differences in national policies in worker representation, health, security or environmental requirements of industry.

Until now we have implicitly assumed that FDI is mainly driven by the desire to seek out low-cost locations. But FDI can also be motivated by strategic considerations, for example to achieve market power required to fully exploit intangible assets.

The results obtained from the cross sectional OLS regressions demonstrate that in absence of special ties between the investing country and the receiving country, factors which are considered important FDI determinants are supported empirically. Countries that share the same language enjoy better knowledge of one another’s local cultures and hence face lower transaction costs for investments, thus relating positively to FDI flows. But incentives for vertical FDI are lower between countries with similar cultures, which common language could be a proxy for, but not necessarily so.

Factors such as distance and common border are subjected to contradictory forces: on the one hand, the shorter the distance between countries, the cheaper it is to set up a foreign affiliate, ceteris paribus. However, for a firm contemplating to undertake FDI of horizontal kind, it may be cheaper to export to countries located nearby, especially in the presence of regional trade agreements. Overall, the standard gravity relationship between FDI and distance seems to hold – the further away the investing country, the lower will the FDI inflows from that country be.

Hence, the gravity model framework suggests that economic activities should be concentrated regionally. There are many economic incentives such as tax benefits or preferential tariffs to locating within a region.

Also the size of host country as measured by its GDP, as well as its openness to trade prove important for determining its volume of FDI inflows in the absence of country pair specific effects. A larger and richer country implies a broader market and higher consumption levels which are crucial incentives for multinational activity. A more open market is easier to penetrate and serves well especially for vertical FDI. While a
RIA increases the incentives for multinational activity of vertical nature, it reduces those of horizontal kind which are a substitute for trade. Thus, openness to trade will not only increase the impact of integration agreements on FDI but it can also change the composition of FDI (from horizontal to vertical).

These last two variables are no longer significant once controlling for country-pair heterogeneity, which probably means that they have been captured by the constant term.

The fixed effects estimator has reduced the number of statistically significant variables in our model, which is only natural considering that the country-pair fixed effects now capture a part of the variation in the dependent variable. This estimator has however produced a significant coefficient for the integration dummy which previously proved insignificant. This means that once the special ties between countries have been controlled for, the process of integration becomes important in determining FDI flows.

The impact of integration on FDI flows comes mainly from the creation of a larger market which is especially attractive for investors outside the union. Another important reason why the volume of FDI may increase from the world outside the EU is that integration has been associated with a higher average tax-level in the joining countries, leading to tariff-jumping FDI. Moreover, the prospects for EU membership may be perceived by potential investors as a reduced country risk because to enter the union the countries have to meet the requirements for admission which involves an external quality validation of institutional development and management. This is especially beneficial for the transition countries of central and Eastern Europe. Additionally, EU membership in the Euro area could be perceived as a guarantee for macroeconomic stability in the future.

It is interesting to note that both the results from the cross sectional and the FE regressions show that host country labor costs are highly significant and negatively related to FDI flows. Production is especially sensitive to factor costs when trade barriers are minimal. Although we cannot distinguish between horizontal and vertical FDI in our data, we can interpret this result as support for vertical FDI. Previous studies have shown that labor costs play a significant role in the case of vertical FDI (see H. Branconier et al 2005, K. Fukaou and Y. Wei 2008).
5 Conclusion

This paper has investigated the FDI determinants in the European countries that joined the EU after 1985, and the importance of this integration for bilateral FDI flows from OECD countries.

The results have shown to depend largely on the econometric models used. Those from the standard OLS regressions show that the basic gravity variables host/source country GDP, distance, common border and common language all have the expected signs and are all highly significant determinants of FDI flows in the sample countries. Moreover, labor cost also proves significant and so does host country openness to trade.

However, once country-pair heterogeneity is controlled for some of the above results are contradicted: host country GDP and openness become insignificant, while the insignificant and ambiguous variables of the OLS regression: inflation, source country openness and integration become important FDI determinants.

A unified result from the pooled regressions is that common membership in the EU has a significant and positive effect on bilateral intra-regional FDI flows to the joining countries. However the magnitude of this effect depends again on the estimator. According to the cross sectional OLS regressions common membership in the EU more than doubles intra-regional FDI flows, while according to the FE and the Poisson estimators this increase is significantly lower and lies around 30% and 20% respectively. It seems like the cross sectional OLS model overestimates the effect of integration on intra-regional FDI flows, and this is most probably due to the presence of country-pair fixed effects in the data (which is controlled for in the FE and Poisson models).

The FE model also shows that overall FDI inflows from all OECD countries rise with nearly 30% after integration. This increase is likely to come from the extended market associated with the formation of the RIA – a larger market is more attractive for outside investors.

After dividing the sample into two groups according to country characteristics and time of membership, we find that the effect of integration while positive for FDI inflows to Sweden, Austria, Finland, Spain and Portugal, is negative for the countries of CEE. A full assessment of this observation would require more information about
the origin of FDI into the CEEC’s prior and after EU membership. It could be that overall FDI into these countries came mainly from other European countries to start with and were of horizontal kind, in which case the lowered trade barriers following the integration led to a substitution of those investments with trade.

The inflow of FDI is not likely to be distributed evenly among countries. The countries enjoying larger streams of FDI will be the ones with the strongest locational advantages. This brings us to the limitations of the presented paper and suggestions for further studies. Future research could consider welfare effects within the EU and outside the union, which European countries enjoy best locational advantages and which factors determine such advantages. Moreover, this study has focused on the impact of EU integration on total bilateral FDI flows. An analysis of how this integration has affected sectoral patterns of FDI streams within Europe would be of interest.
References


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Greenaway, D and C Milner (1986), “The Economics of Intra-industry Trade”.


**Internet sources**


CEPII database: [http://www.cepii.fr/anglaisgraph/bdd/distances.htm](http://www.cepii.fr/anglaisgraph/bdd/distances.htm)
## Appendix:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDI</td>
<td>Inward FDI flows from source country to host country, expressed in Million USD</td>
</tr>
<tr>
<td></td>
<td>Gross Domestic Product of Host country, expressed in Billion USD, constant</td>
</tr>
<tr>
<td>GDP H</td>
<td>Gross Domestic Product of Host country, expressed in Billion USD, constant</td>
</tr>
<tr>
<td></td>
<td>2000prices</td>
</tr>
<tr>
<td>GDP S</td>
<td>Gross Domestic Product of Source country, expressed in Billion USD, constant</td>
</tr>
<tr>
<td></td>
<td>2000prices</td>
</tr>
<tr>
<td>GDP/cap H</td>
<td>Per capita GDP in host country</td>
</tr>
<tr>
<td>Distance</td>
<td>The geographical distance between the capital cities of host and source countries</td>
</tr>
<tr>
<td>Pop.</td>
<td>Population in host country</td>
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<tr>
<td>Open. H</td>
<td>Host country openness to trade, calculated as (Imports+exports)/GDP</td>
</tr>
<tr>
<td>Open. S</td>
<td>Source country openness to trade, calculated as (Imports+exports)/GDP</td>
</tr>
<tr>
<td>Laborcost H</td>
<td>Host country laborcost index, where 2005=100</td>
</tr>
<tr>
<td>Laborcost S</td>
<td>Source country laborcost index, where 2005=100</td>
</tr>
<tr>
<td>Inflation</td>
<td>Price level in host country</td>
</tr>
<tr>
<td>Integration</td>
<td>Dummy variable that takes the value 1 if host country is a member of the EU that given year, and 0 otherwise</td>
</tr>
<tr>
<td>EU both</td>
<td>Dummy variable that takes the value 1 if both host and source country are members of the EU that given year</td>
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### Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Std.Dev.</th>
<th>Observations</th>
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<td>10.6</td>
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<td>LN GDP/cap H</td>
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<td>LN Pop. H</td>
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<td>LN Open. H</td>
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<td>76.1</td>
<td>10362</td>
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