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ECONOMIC INTEGRATION BETWEEN THE EU AND THE CEECS:

A SECTORAL STUDY

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ABSTRACT

Economic integration between the EU and the CEECs has proceeded at high speed over the 90's, with the main channels of such integration being trade and FDI. Some authors believe that the 'commercial transition' is now complete and that a new, deeper phase of integration has started, with growing flows of FDI in the region. Following a gravity-type approach, in this paper I tackle two difficult issues surrounding the EU-CEECs integration: has FDI in the CEECs region substituted EU exports, therefore harming employment at home? Has FDI in the CEECs region been redirected away from similarly attractive countries, such as Spain and Portugal? By using a unique database on FDI broken down by country and by sector, which allows more detailed qualifications than possible in previous work, the answers to these two questions appear to be negative.

Keywords: Foreign Direct Investment, Economic integration, Gravity Model

JEL classification codes: F15, F21, F23.

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FRANCESCA DI MAURO

1. Introduction

The economic integration between the European Union (EU) and the Central and Eastern European Countries (CEECs) has proceeded at high speed in the past eight to nine years. The main channels of such integration have been trade and FDI flows. The EU share in CEECs exports has in fact nowadays reached levels close to 60-70% for nearly all the ten candidate countries (CCs)[1], showing that quickly after the collapse of Comecon a massive re-direction of trade towards Western Europe has occurred in the CEECs. Similar figures have been subsequently observed for FDI, whereby the main investors in these countries come from EU member states, Germany in particular.

Economic integration especially between developed and emerging countries could therefore be described as a sequence of events. In the first stages of integration trade appears as the main channel, while subsequently FDI becomes more important. In fact, investing abroad implies a certain long-term commitment for the investor, who is not willing to place his money in an uncertain environment. Deeper integration between countries often means that the emerging country exerts major efforts in reforming its economy, which in turn benefits from foreign investment. At the same time though, deeper integration between countries may create some fears at home; in the context of the EU-CCs relationship, the most frequent complaints are twofold, and derive from the fear that either (i) increasing FDI becomes a substitute for EU exports to the CCs, harming therefore the (employment of the) exporting sector at home, or (ii) FDI to the CEECs may displace FDI going to previous partners, e.g. Spain or Portugal.

The objective of this paper is precisely to look at these two issues in detail, given their importance for the accession debate. Previous work (Brenton and Di Mauro (1999) and Brenton, Di Mauro and Lücke (1999)) on these issues has focused on aggregate data (for both exports and FDI), by using estimations of gravity-type equations. The contribution of this paper is to use a unique sectoral database, available for Germany on a relatively long term

[1] These are the 10 CEECs that requested EU membership: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

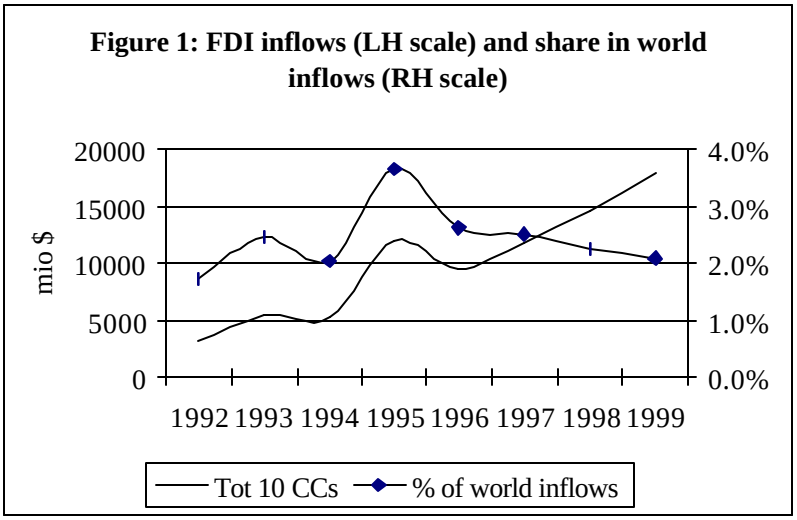
basis, that will allow us to detect differences between sectors and to identify which sectors are particularly attractive in the CCs. The methodological tool used throughout the paper is the gravity model, largely and successfully used for trade flows in the past. However, following the work of Brainard (1993), the gravity approach has also expanded to FDI analysis, giving satisfactory results.

The paper is organised as follows: Section 2 illustrates some stylised facts on FDI in the CCs and introduces the issues at stake. Section 3 sets out the theoretical framework for the gravity model, while Section 4 presents the empirical results. Section 5 concludes.

2. Stylised facts

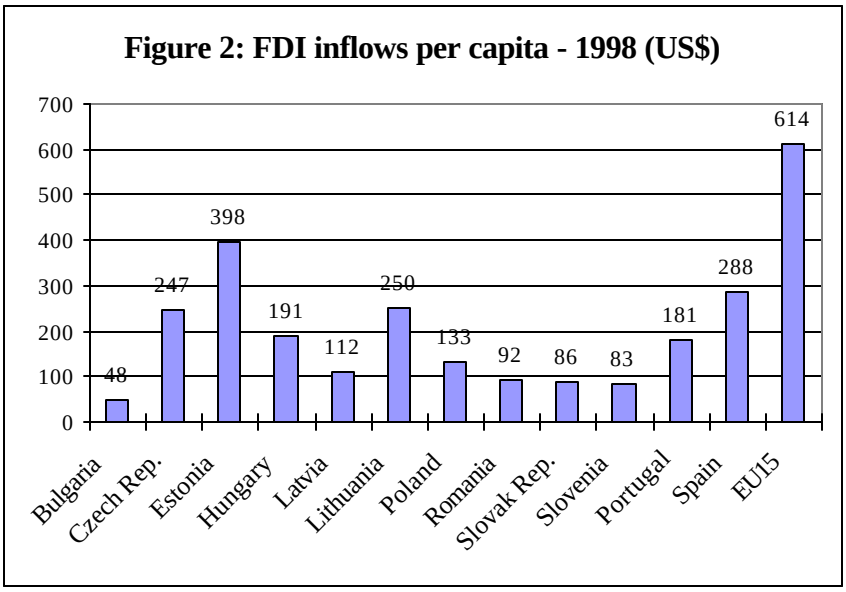
Since the opening-up of their economies, the CCs have increasingly redirected their exports towards the EU, away from their previous Comecon partners. Several authors now believe that the 'commercial transition' is now complete (Brenton and Gros (1997)) and that a new, deeper phase of integration has started, with growing flows of FDI in the CCs. As can be seen from Figure 1, these countries have witnessed an increase in both their absolute value of inward FDI flows and in their world share.

Figure 1: FDI inflows (LH scale) and share in world inflows (RH scale)



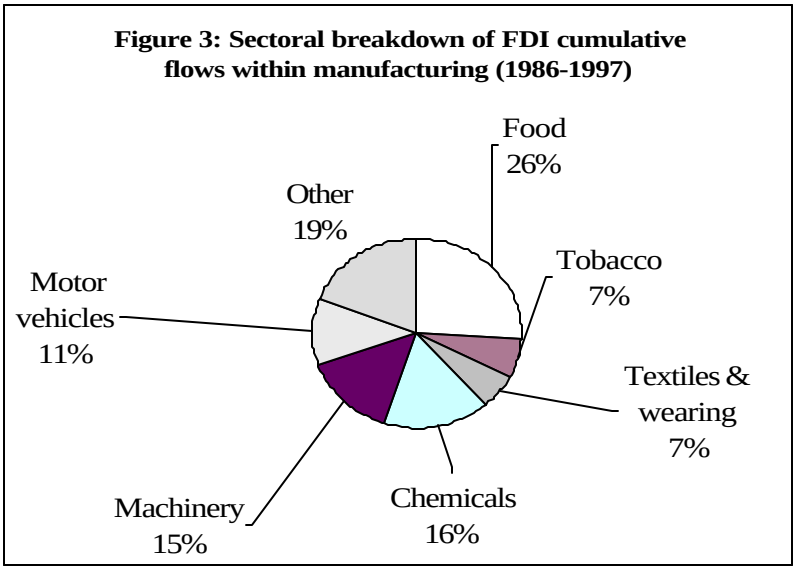
Source: World Investment Report (2000), UNCTAD.

In terms of FDI per capita (see Figure 2), a measure of the growing importance of FDI in these economies, we observe for example that the figures for the Czech Republic, Estonia, Hungary and Lithuania are already greater than those for Portugal, and even higher than those for Spain, in the case of Estonia.



Source: IMF IFS (1999).

At the sectoral level, data are available for the period 1987-1996 for the ten EU candidates for accession. On average, FDI in manufacturing accounts for 63% of total inflows, while 36% is in services; Figure 3 shows the breakdown within manufacturing. These averages hide large differences across countries. For example, FDI in the food sector represents 80% in Bulgaria and 59% in Latvia, while motor-vehicles gets 45% of total in Czech Republic; Slovakia and Slovenia are particularly attractive for the chemical sector, with 46% and 53% of total FDI respectively. Recent figures display a shift towards more investment in services, probably because of efficiency gains in manufacturing.



Source: Bocconi University (1997).

In terms of the home countries concerned, the EU accounts for nearly 80% of total FDI in the

CCs region; within the EU, Germany's role is predominant, with 43% of total. This predominance of EU countries further explains the potential fears about FDI substituting EU exports or FDI being redirected away from Southern European countries, often heard in Europe. In the 'substitution' issue, similarly to the case of American workers perceiving a jobs threat from Mexican 'maquiladoras', upon creation of NAFTA, EU workers started to fear it from CCs' workers, upon greater economic integration between the two regions. In terms of employment, the channel through which the labour market can be affected is two-fold and it is linked to the nature of FDI. On the one hand, when a firm establishes a plant abroad and produces directly in the host market rather than exporting (market-seeking FDI), the export sector at home may contract, with some domestic plants closing down and unemployment rising, if the labour market suffers from rigidities and wages do not adjust consequently. This would be the case with horizontal FDI. On the other hand, when a firm produces abroad in order to take advantage of cheaper labour and export back home (efficiency-seeking FDI), as in the case of vertical FDI, domestic workers may again be left worse-off, especially the unskilled ones, since they are the direct competitors of cheaper unskilled labour abroad. Nevertheless, in both cases we have at least to take into account the effect of intra-firm trade, e.g. in capital or intermediate goods, from the parent firm to the affiliate, since this can fuel demand for labour in the home economy, and therefore offset the negative impact on the final good sector. The net effect is uncertain though, and the issue then becomes an empirical matter.

The second concern about deeper integration between the EU and the CCs is related to the issue of 'redirection'. Has FDI to CCs been redirected away from Member States similarly attractive, e.g. Spain and Portugal? The evolution of shares of German FDI tells us that while for Czech Republic and Hungary they went from 0.5% to around 1.3% between 1992 and 1997, they decreased from 4.9% to 3.2% for Spain, while they stayed constant for Portugal. However, one cannot conclude from that that a redirection has taken place. Maybe their initial high shares of FDI just had to close the gap with respect to other EU member States at a higher level of development. In any case, and for both issues, what is needed is a theoretical model that can take into account the determinants of FDI, and from which one can derive sensible estimates for various countries, given their level of development. Only then, one can attempt to find causalities and relationships in what is observable with simple data. The next section therefore introduces the gravity model, the tool that I will use to carry out such investigations.

3. From theory to practice: the gravity model

The traditional theory of FDI tries to explain why firms produce abroad instead of simply servicing the markets via exports. After all, multinational companies (MNCs) experience additional costs in producing abroad: higher costs in placing personnel abroad, communication costs, language and cultural differences, informational costs on local tax laws and regulations, costs of being outside domestic networks; they also incur higher risks, such as the risks of exchange rate changes or even of expropriation by the host country. One theoretical approach, introduced by Dunning (1977, 1981), the "OLI framework", considers FDI as determined by Ownership, Location and Internalisation advantages which the MNC holds over the foreign producer; when these advantages outweigh the above costs, FDI arises. The so-called "New Theory of FDI" takes inspiration from the OLI approach and refers mainly to the Ownership and Location advantage to introduce MNCs in general equilibrium models, where they arise endogenously. The early literature (Helpman 1984, Helpman and Krugman 1985) was mainly able to explain 'vertical FDI', i.e. investment that takes place in order to take advantage of differences in relative factor endowments (hence in factor prices) across countries. Instead, what is observed among developed countries is mainly 'horizontal' FDI, because similar types of production activities, owned by MNCs, take place in different countries. This phenomenon is better clarified if multinational activity is not driven by factor endowments differences, but rather by the trade-off between proximity and concentration (Brainard 1993), which constitutes the starting point of the more recent literature. The proximity advantage stems from 'firm-level' economies of scale, whereby R&D activity (or any other type of 'knowledge capital') is transferable to affiliates and allows MNCs to be closer to the foreign market. The concentration advantage derives from traditional 'plant-level' economies of scale, which make it more profitable to concentrate production in one location and then export. Whenever the former outweigh the latter, foreign investment will take place, and this will be more likely the higher are intangible assets relative to fixed costs of opening up an affiliate and the higher are transport costs, which are assumed to be positive and an increasing function of geographical distance in this model. This allows for horizontal FDI, where two-way investment between similar countries occurs, both in terms of absolute and relative factor endowment.

When we get to the empirical analysis, and we want to be able to compare 'attractiveness' across countries and explain the geographic distribution of FDI we need a model that can pick up its common determinants. In order to synthesise the two approaches discussed above, i.e.

Helpman and Krugman's treatment of vertical FDI and Brainard's horizontal one, I will include in the model the following variables[2]: relative factor endowments, an index of countries' similarity in size, geographic distance between the partner countries and a measure of the 'economic space' between the two countries, given by the sum of the two GDPs. The last variable is included to catch the 'market-seeking' aspect of FDI, i.e. when investors produce abroad to sell in the host market and increase their market shares there. Additional variables, such as a common language, a common border, or preferential trade agreements, that may reduce the costs of locating abroad, can be introduced via dummy variables. This specification can easily be recognised as the 'gravity model'. In contrast to the common view among economists, the gravity model rests on a sound theoretical basis. Maurel (1998) carries out a thorough investigation of its origins, and shows its evolution across the trade theories of Linnemann (1966), Helpman and Krugman (1985) and the empirical studies by Helpman (1987) and Brainard (1993). She also shows how the gravity model applied to trade can be compatible with both the traditional Heckscher-Ohlin and the Helpman and Krugman framework, without becoming a meaningless black box. Given the similarity between trade and FDI in terms of trends, it has also been employed to estimate bilateral FDI flows (see Brenton (1996), Eaton and Tamura (1996), and Brenton and Di Mauro (1999)). The variables specified above are therefore also valid for a gravity equation applied to exports, something, which will be done later in the paper, in Section 4.2. The general form of the gravity equation that I estimate is the following:

$$\ln Y_{ij} = a + b_1 SUMGDP_{ij} + b_2 SIMILSIZE_{ij} + b_3 RELENDOW_{ij} + b_4 \ln Dist_{ij} + \sum g_k D_{kij} + e_{ij} \qquad (1)$$

with the following variable definitions: Y_{ij} is the value of FDI or exports from country i (home country) to country j (host country);

$$SUMGDP_{ij} = \ln\left(GDP_i + GDP_j\right) \qquad (2)$$

$$SIMILSIZE_{ij} = \ln\left[1 - \left(\frac{GDP_i}{GDP_i + GDP_j}\right)^2 - \left(\frac{GDP_j}{GDP_i + GDP_j}\right)^2\right] \qquad (3)$$

$$RELENDOW_{ij} = \left|\ln\frac{GDP_i}{Pop_i} - \ln\frac{GDP_j}{Pop_j}\right| \qquad (4)$$

[2] A similar version of this model specification was first introduced by Helpman (1987) for a trade equation; more recently, Egger (2000) has applied a refined version of it to both exports and FDI data.

$Dist_{ij}$ is the distance between countries i and j, D_{kij} are dummy variables (mostly country dummies) used when appropriate.

The 'economic space' variable (SUMGDP) is expected to have a positive impact in both the FDI and exports equation. The index of size similarity (SIMILSIZE) takes values between $-\infty$ (i.e. the log of a number near zero) in case of perfect dissimilarity and -0.69 (the log of 0.5) for perfect similarity. Similarity in size should have a positive effect on exports: countries similar in size will trade more, as the Helpman and Krugman theory of increasing returns predicts, trade is of intra-industry nature. I also expect a positive coefficient in the FDI equation, if the New FDI Theory holds true, as those models were motivated by the observation that FDI arises more among similar countries.

Differences in relative endowments (RELENDOW) are measured here by the absolute difference in GDP per capita[3]; one could question the validity of this proxy, since, as noted in Helpman (1987), this method is accurate when there are only two factors of production (capital and labour) and all goods are freely traded. Better measures would be: GDP per worker, the ratio of capital (gross fixed capital formation) over working population, or that of skilled workers in total employment, as advocated by Wood (1994) for assessing the factor content of trade. I foresee undertaking such refinements in the construction of this variable in the future[4]. As far as the impact is concerned, a negative coefficient in the exports equation is a sign that Helpman and Krugman's theory of intra-industry trade (IIT) prevails: trade is not determined by differences in factor composition, as foreseen by traditional Heckscher-Ohlin inter-industry type trade models. For FDI, the story is similar: vertical FDI (equivalent to inter-industry trade) emerges as countries greatly differ in their factor composition – hence showing a positive coefficient, while horizontal FDI (comparable to IIT) is determined by similarity in factor composition, therefore displaying a negative coefficient. One cannot know a-priori, which type prevails and the answer is an empirical one.

As for distance, the effect on exports is clearly negative, being it a proxy for transport costs. On the other hand, FDI theory suggests that firms will invest abroad rather than export provided that trade costs are high. However, this variable may also have a negative coefficient in the FDI equation since the costs of operating overseas affiliates are still likely to rise the

[3] Measuring in terms of the simple difference does not change the results.

[4] Preliminary results (available on request) using the GDP per worker definition of factor endowments do not differ substantially from those with the GDP per capita one.

further they are from the MNCs headquarters. Overall though, I expect the coefficient in the exports equation to be higher than that in the FDI equation.

Empirical studies of trade using the gravity model have been widely undertaken and they usually explain a high proportion of the variance. However, the standard error of the estimated equation being always high, it suggests some caution in interpreting the results. Moreover, misspecifications in the gravity equation are not excluded either, as pointed out by Polak (1996) and Matyas (1997), but if a proper specification of the model is ensured, it seems that the gravity equation represents a good way to proceed empirically when trying to explain the geographical distribution of FDI.

4. Empirical analysis

Before addressing the two main issues of the paper (i.e. 'substitution/complementarity' between exports and FDI and FDI 'redirection'), the empirical analysis will begin by delivering a detailed picture of the most attractive sectors in the CCs for German investors. The database that I use (published by the Deutsche Bundesbank) gives a unique breakdown of German FDI stock both by destination country and by sector, in approximately 30 countries per year and in nine 'macro-sectors'. Data are available from 1985, but I decided to start my analysis in 1992, given that FDI was practically non-existent in the CCs before that date, and end it in 1997. The host countries for German FDI (see the Annex for a detailed list) include EU member states, US, Canada and Japan, various developing countries and three of the CCs (Czech Republic, Hungary and Poland); unfortunately no data are available for the other seven. Nevertheless, these three countries represent on average about 80% of total FDI received by the CCs over the period 1992-1999.

The sectors available in the database include both manufacturing and services (according to the NACE Rev. 1 classification); in particular, for the former I have: chemicals, machinery, electrical machinery, motor vehicles; for the latter: distributive trade, monetary intermediation, other financial institutions, insurance and holdings. Even though the sectoral breakdown is not very disaggregated, these nine sectors account on average for 89% of total FDI, over the period 1992-1997. One can therefore be confident that the overall picture of German FDI is relatively close to reality. The database therefore includes three dimensions: time (six years from 1992 to 1997), sectoral (nine sectors) and geographical (at most 32 destination countries); this richness is best exploited by panel data analysis, the estimation

technique used here[5]. Were the panel balanced, the database should contain 6 x 9 x 32= 1728 observations, but due to missing countries in some years, the available number of observations is 1411.

My main interest lies in the sectoral dimension of the data, i.e. I first want to detect which are the most attractive sectors for German investors in general, and then assess (via country dummies) the specificity of the CC3 considered (Czech Republic, Hungary and Poland), as well as other country groups[6]. For the general equation I therefore choose to introduce sectoral dummy variables and estimate it as a Fixed Effect Model (FEM). Subsequent equations also include country dummies interacted with sectoral dummies, in a way that will become clear in the next sections of the paper.

The gravity equation that I specify in each following sub-section can in general be described as follows:

$$\ln Y_{ijkt} = a + b_1 SUMGDP_{ijt} + b_2 SIMILSIZE_{ijt} + b_3 RELENDOW_{ijt} + b_4 \ln Dist_{ij} + b_5 time + d_k + \sum g_h D_{hij} + e_{ijkt} \quad (5)$$

where Y_{ijkt} is the value of FDI or export from country i (home country) to country j (host country) in sector k in year t, and where I have added a time trend (time), sectoral fixed effects (δ_k) and the usual error term; the other variables are those described in Section 3.

4.1 Sectoral distribution of German FDI in the CC3

This sub-section is designed to give a detailed idea of which sectors are most attractive in the three CCs considered (named CC3), once the common determinants of FDI are taken into account. As mentioned before, the methodology here is the following: I estimate a gravity equation for German FDI stocks over the period 1992-1997, with sectoral dummies and with specific CC3-sectoral dummies. I also include in my equation an EU sectoral dummy, in order to take into account the deeper integration already in place between Germany and the other EU countries.

A first specification of equation (5) is to look at the simple breakdown between manufacturing and services, by aggregating data on the four manufacturing and the five services sectors. This will already qualify the type of FDI in the CC3. Table 1 shows the estimation results, where 'services' serves as the baseline sector.

[5] Heteroscedasticity problems in the data are tackled directly throughout the analysis, either by calculating robust standard errors or by using the feasible GLS estimator.

[6] An F-test on the hypothesis that these three countries can be considered jointly cannot be rejected at the 4.7% confidence level.

The gravity variables all have the expected sign: increased 'economic space' (SUMGDP) has a noticeable impact on FDI and a positive coefficient is also found for the size similarity variable. Overall, differences in relative factor endowments have a negative impact on FDI; from the theoretical discussion above one can infer that on average, German investors are in general more prone to horizontal than vertical FDI. Finally, distance appears to harm FDI too, something, which is more intuitive in the case of exports.

Looking at the coefficients of the dummy variables, the first observation is that FDI in manufacturing appears to be nearly twice as large as in services (exponent of 0.6391). However, the opposite is true for EU countries, where investment in services becomes the prevalent one, while FDI in manufacturing within EU countries is not greater than that observed at a world level. This observation is somehow reversed for the CC3, where, when Germans invest in the CC3, they will tend to do in the manufacturing sector, on average twice as much (exponent of 0.6279) than in any other country of those included. In contrast, FDI in services in the CC3 does not appear to show any specificity.

Table 1: Two-sector breakdown
(White Heteroskedasticity-Consistent Standard Errors & Covariance)

Dep. Var.: LFDI	Coefficient	Robust Std. Error	t-Statistic
SUMGDP	1.8470	0.1943	9.5080
SIMILSIZE	0.4040	0.0974	4.1480
RELENDOW	-0.3731	0.0873	-4.2740
DIST	-0.2842	0.0699	-4.0670
EUMANUF	-0.1391	0.1912	-0.7280
EUSERVICES	1.0856	0.2396	4.5310
CC3MANUF	0.6279	0.2770	2.2670
CC3SERVICES	0.0096	0.3579	0.0270
MANUFACT	0.6391	0.1591	4.0180
TIME	0.0593	0.0328	1.8090
_cons	-135.6831	64.9391	-2.0890
N. of observations	371		
Adjusted R-squared	0.5622		
S.E. of regression	1.0440		
F-statistic	63.15		
Prob > F	0.0000		

In further analysis (not shown here) I also interacted the CC3 dummy with the three 'core'

gravity variables SUMGDP, SIMILSIZE and RELENDOW. These interaction terms are never significant, hence revealing that the core determinants of German investors in the CC3 do not deviate from those of other potential host countries.

I can now investigate in more detail the relative attractiveness of the various sectors, by including sectoral, as well as crossed country/sectors dummies. The results of the regressions are reported in Table 2, where the chosen baseline sector is 'machinery' (again, coefficients on the dummies should be read as deviations from this sector). The first comment concerns the general sectoral dummies: here again I find a similar picture as in Table 1. Manufacturing sectors all show a significant and positive coefficient (except for motor vehicles), while services have a negative one, the only exception being distributive trade, with a positive and significant coefficient. Secondly, the EU sectoral dummies confirm what was found before, namely that FDI in the EU is predominantly in services, ranging from 3 times (in the case of 'insurance') to nearly 15 times (for 'other financial institutions') more than in any other country on average. Thirdly, in the CC3, I see that the leading sector in manufacturing is 'motor vehicles', where FDI is 7 times higher than in the other manufacturing sectors (exponent of 1.9985). More surprisingly, I find that monetary intermediation plays an important role in the CC3 (nearly 8 times higher), while FDI in holdings is clearly below the other countries' average.

An explanation of the monetary intermediation performance could come from forward and backward linkages phenomena: German firms establishing in the CC3, e.g. in the motor-vehicle sector, also provide an incentive to their bankers, with whom they have a backward linkage in terms of credit supply, to follow them abroad and open up a branch in the same destination countries. This explanation is even more realistic as financial markets in transition countries are not perceived as the most complete.

Over the period 1992-1997, I can therefore conclude that German FDI in the CC3 has been driven mainly by the manufacturing sector, and by the production of motor vehicles in particular. This occurred in contrast to the EU trend, where German FDI was much more concentrated in services.

Table 2: Sectorial analysis (Cross-sectional time-series FGLS regression)

Dep. Var.: LFDI	Coefficient	Std. Err.	z
SUMGDP	1.5460	0.1435	10.7750

SIMILSIZ	0.6610	0.0597	11.0620
RELENDOW	-0.3756	0.0483	-7.7760
DIST	-0.2361	0.0442	-5.3420
CC3CHEM	-0.2653	0.4297	-0.6170
CC3MACHI	0.2987	0.3583	0.8340
CC3MOTOR	1.9985	0.6204	3.2210
CC3ELECT	0.4080	0.3776	1.0810
CC3DISTR	0.7747	0.2734	2.8340
CC3MONET	2.0494	0.7010	2.9230
CC3OTHER	-0.5564	0.9655	-0.5760
CC3INSUR	0.2700	0.6951	0.3880
CC3HOLDI	-1.7551	0.9568	-1.8340
CHEMICAL	1.3493	0.1889	7.1430
MOTORVEH	0.2137	0.2662	0.8030
ELECTRMA	0.7726	0.1748	4.4210
DISTRIBT	1.4226	0.1462	9.7280
MONETINT	-0.4114	0.3184	-1.2920
OTHERFIN	-1.5880	0.3181	-4.9920
INSURANC	-0.5984	0.2916	-2.0520
HOLDINGS	-1.7461	0.3004	-5.8130
EUCHEM	-0.3167	0.2449	-1.2930
EUMACHIN	0.1755	0.2122	0.8270
EUMOTOR	0.1014	0.4052	0.2500
EUELECTR	0.0884	0.2257	0.3920
EUDISTRI	0.4257	0.1593	2.6730
EUMONET	1.8268	0.4479	4.0790
EUOTHERF	2.6914	0.4605	5.8450
EUINSURA	1.0938	0.3842	2.8470
EUHOLDIN	1.7122	0.4362	3.9250
TIME	0.0706	0.0228	3.0930
_cons	-155.7856	45.1092	-3.4540
N. of observations	1411		
Wald $chi^2(31)$	1453.34		
Pr > chi^2	0.0000		

4.2 FDI and exports: complements or substitutes?

As already mentioned at the beginning of the paper, closer economic integration between countries – especially through FDI – may cause fears in terms of 'job loss' in the home (investor) country. It is therefore the relationship between FDI and employment at home that ought to be analysed, if one wants to draw conclusions on the impact of 'globalisation'. Two approaches have been followed in the literature until now to tackle this issue: a direct approach and an indirect one. The former usually consists in estimating simple regressions equations of the demand for labour of home-country parent firms, as a function of affiliates net sales (which proxy their production). This implies the necessity to use data on activities of foreign affiliates, which can be done in a consistent way only for the U.S. and Sweden, two countries with such data (see for example Blomström et al. (1997) and Brainard and Riker (1997)). The results usually show a very low substitution between employment at home and in the affiliates.

The indirect way to empirically test the impact of FDI on employment is to look at the relationship between exports and FDI. Here the objective is to see whether FDI substitutes for exports, and therefore indirectly harms the exporting sector's employment at home. The methodology that I adopt takes inspiration from the work of Graham (1996). Two gravity equations are estimated, one for exports and one for FDI at a sectoral level, and then the residuals of the estimation are regressed against each other. The presumption of this method is to remove the influence of the common factors on FDI and on exports, by using gravity equations. A positive correlation between the two residuals is therefore interpreted as a sign of complementarity, since high residuals in exports are associated with high residuals in FDI, and vice-versa. This method is intended only to give a first indication about the relationship between exports and FDI, and should be viewed as a starting point for further analysis.

In my sectoral case, I faced some problems in finding comparable trade data on services; therefore I decided to conduct the analysis only for the four manufacturing sectors, i.e. to estimate exports and FDI equations for 'chemicals', 'machinery', 'motor vehicles' and 'electrical machinery' (which explains the reduced sample size – 669 observations). In order to pick up the differentiated sectoral effect for the CC3, I included in the residuals regression the CC3 sectoral dummies. The results in Table 3 show a positive and significant coefficient for the general export residual (RESEXP), hence a sign of complementarity between exports and FDI. At the same time, the specific sectoral impact for the CC3 does not significantly

deviate from this general result. Moreover, a significant complementarity relationship is detected for 'electrical machinery' in the CC3.

One other method has also been tried, and it gives the same results (available upon request): I run a SURE regression with the FDI and the exports equations, and then look at the correlation matrix of the residuals. The positive coefficient found fails to pass a Breusch-Pagan test of independence, hence suggesting a sign of complementarity.

Table 3: Complementarity vs. substitutability (OLS)

Dep. Var.: resfdi	Coefficient	Std. Error	t-Statistic
Resexp	0.6090	0.0950	6.4110
rxcc3chemicals	-0.3546	0.3453	-1.0270
rxcc3machinery	-0.0774	0.2501	-0.3090
rxcc3motorvehicles	-0.1453	0.1447	-1.0040
rxcc3electrical	0.3363	0.1700	1.9790
_cons	0.0003	0.0534	0.0050
N. of observations	669	R-squared	0.0678
Adjusted R-squared	0.0608	F(5, 663)	9.64
Root MSE	1.3823	Prob > F	0.0000

Previous conclusions on this issue at an aggregate level (Brenton, Di Mauro and Lücke (1998)) are therefore confirmed at this, albeit limited, sectoral dimension. Exports and FDI seem in general to go hand in hand for German investors, and this is also true for the CC3.

4.3 FDI redirection: a myth?

Does economic integration between two countries or regions affect the amount of FDI being invested in third countries? The experiences of Spain and Portugal, upon joining the EU, and Mexico, following the decision to negotiate NAFTA, suggest that joining a regional economic integration scheme can provide an impetus to inward FDI. This raises the question of whether these increases in incoming FDI affected the flows of direct investment going to other potential host countries that did not offer the advantage of belonging to the regional integration scheme concerned. Baldwin et al. (1995) suggest that the creation of the Single Market in the EU "probably led to investment diversion in the economies of the European Free Trade Association (EFTA) and investment creation in the EU economies", the latter being particularly prevalent in Spain and Portugal. This may, in turn, have encouraged these

countries to seek access to the Single Market via the European Economic Area, and subsequently to request membership of the EU itself.

This issue of a potential redirection of FDI from Southern European countries will be treated by comparing the amount of FDI received by the two groups of countries, still within the gravity approach, and by including the sectoral dimension. This will enable us to check in which sectors there has been (or not) a redirection of FDI from Spain and Portugal towards the CC3. In particular, I use the gravity model to look at the evolution over time of the bilateral distribution of German FDI and assess whether the increased FDI from Germany to the CC3, in the aftermath of their liberalisation in the 1990s, had any noticeable impact upon foreign investments by Germany in Portugal and Spain.

My methodological approach is based upon that of Sapir (1997) who sought to identify whether a domino effect had characterised the impact of European integration upon bilateral trade flows. A gravity equation is estimated for FDI, by including country and sectoral dummies for three groups of partners of German investors: the CC3, Spain and Portugal (EP) and the remaining EU countries. The results are presented in Table 4. One can observe some common features of EP and the CC3: both groups of countries seem to have their strength point in 'motor-vehicles' and in 'distribution', while the least attractive sector is the same too: 'holdings'. These results could be interpreted as a first sign of 'competition' between the two groups of countries, since they appear to have the same structure of 'attractiveness' across sectors.

Nevertheless, these tentative results are based on the whole period considered (1992 to 1997). In order to detect potential breaks in the series, I therefore decided to conduct the regressions by splitting the period in two equal sub-periods: 1992-1994 and 1995-1997. These also represent two phases of the CC3 integration: a mere economic integration, with the signature of the Europe Agreements in the first period, while the second one benefited from a speeding-up process for accession, launched during the European Summits of Essen in December 1994 (creation of the Phare programme) and Madrid in December 1995 (opening-up of the negotiations). This allows us to better identify the temporal pattern of any change in German investors' taste in terms of host countries. In order to facilitate the interpretation of the regression results (not fully reported here, but available on request) I give a graphical representation sector by sector (see Figures 1 to 9). As in the case of Table 4, I include in the regression dummy variables for the CC3, EP (Spain and Portugal) and the remaining EU

Table 4. FDI redirection

Variable	Coefficient	Std. Error	t-Statistic
SUMGDP	1.5324	0.1413	10.8450
SIMILSIZ	0.6829	0.0589	11.5840
RENDOW1	-0.3703	0.0476	-7.7840
DIST	-0.2422	0.0448	-5.4050
CC3CHEM	-0.2574	0.4197	-0.6130
CC3MACHI	0.3059	0.3546	0.8630
CC3MOTOR	2.0094	0.5966	3.3680
CC3ELECT	0.4157	0.3679	1.1300
CC3DISTR	0.7815	0.2734	2.8590
CC3MONET	2.0531	0.7027	2.9220
CC3OTHER	-0.5494	0.9035	-0.6080
CC3INSUR	0.2777	0.6899	0.4020
CC3HOLDI	-1.7444	0.8861	-1.9690
EPCHEM	0.3377	0.4255	0.7940
EPMACHIN	0.4749	0.3615	1.3140
EPMOTOR	1.9980	0.6855	2.9150
EPELECT	1.0019	0.3765	2.6610
EPDISTR	0.5366	0.2717	1.9750
EPMONET	1.0290	0.9962	1.0330
EPOTHERF	-0.3619	0.7748	-0.4670
EPINSURE	-0.0153	0.6763	-0.0230
EPHOLDIN	-1.8266	0.7574	-2.4120
CHEMICAL	1.3488	0.1850	7.2910
MOTORVEH	0.2101	0.2570	0.8170
ELECTRMA	0.7722	0.1709	4.5170
DISTRIBT	1.4231	0.1450	9.8120
MONETINT	-0.4085	0.3186	-1.2820
OTHERFIN	-1.5870	0.2997	-5.2950
INSURANC	-0.5986	0.2891	-2.0710
HOLDINGS	-1.7450	0.2807	-6.2160
EU10CHEM	-0.4742	0.2565	-1.8490
EU10MACH	0.0894	0.2274	0.3930
EU10MOTO	-0.4613	0.4251	-1.0850
EU10ELEC	-0.1686	0.2393	-0.7040
EU10DIST	0.3963	0.1708	2.3200
EU10MONE	1.9192	0.4658	4.1200
EU10OFIN	3.4272	0.4619	7.4200
EU10INSU	1.3206	0.4024	3.2820
EU10HOLD	2.4641	0.4307	5.7210
TIME	0.0708	0.0225	3.1540
_cons	-155.9214	44.3771	-3.5140
N. of observations	1411	Wald $chi^2(40)$	1606.18
		Pr > chi^2	0.0000

countries, for each of the two sub-periods (labelled P1 and P2 in the figures). The graphs only show the value of these country dummies. The way to read the graphs is the following: the height of the histogram bar in each case shows the magnitude of the coefficient on the dummy, whilst the small circles above and below show the relevant (5 per cent) confidence interval. Thus, if the bar lies outside of the relevant upper or lower circle, then the estimated coefficient is statistically significant.

A general comment on the results is that all the standard gravity variables have the expected sign. By looking at the relative magnitudes of the dummy variables coefficients, one can notice three phenomena: some dummies stay the same over the two periods (e.g. EPmotor, EU10holdings), some others increase from one period to the next (as in CC3monet, CC3holdings – from clearly negative to zero – EPholdings and EU10otherfin) and finally in four sectors one can observe a reduction in the value of the coefficient over the two periods (CC3motor, EU10monet, EU10insure and EU10holdings). The last phenomenon tells us something about the integration process within the EU: the FDI surge in services has mainly occurred in the period 1992-95, i.e. following the completion of the Single Market Programme. Moreover, the emergence of FDI in the motorvehicle sector in the CC3 mainly took place in the initial phases of integration between the two areas; this can be tentatively explained by the presence of ‘first-mover advantages’ in an oligopolistic sector such as the motorvehicle one and the fact that German firms were (geographically) well placed to take full advantage of it. This ‘move’, however, does not seem to have happened at the expense of Spain and Portugal, given the results on the EPmotor dummy. Finally, some of the dummies on the services sectors in EP and CC3 have picked up in the second period, hence showing a trend towards a catching up process with the European trend.

Fig.1: chemicals

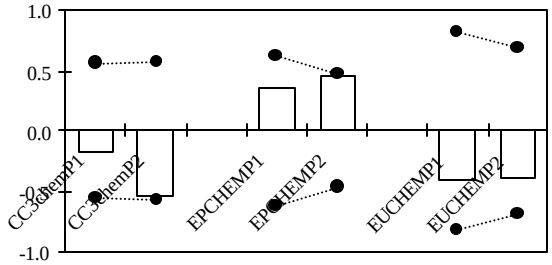


Fig.2: machinery

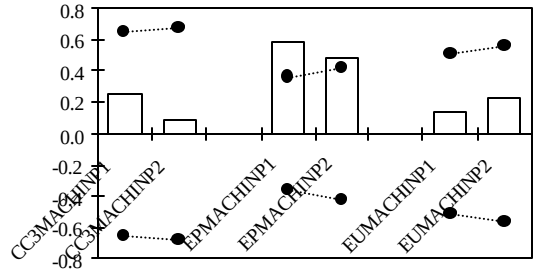


Fig.3: motorvehicles

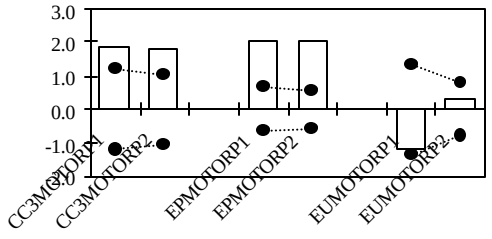


Fig.4: electrical machinery

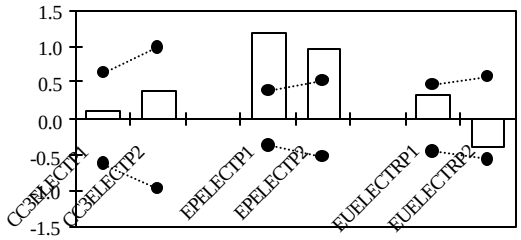


Fig. 5: distributive trade

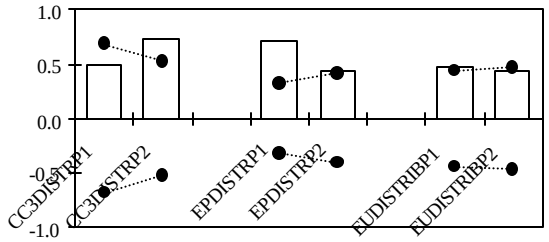


Fig. 6: monetary intermediation

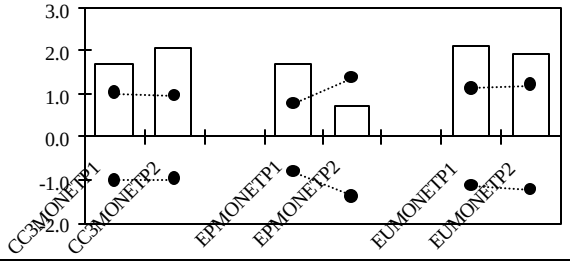


Fig. 7: other financial intermediation

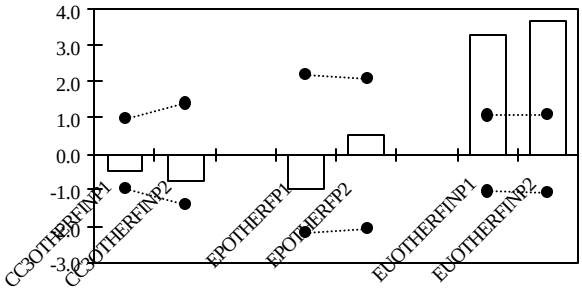


Fig. 8: insurance

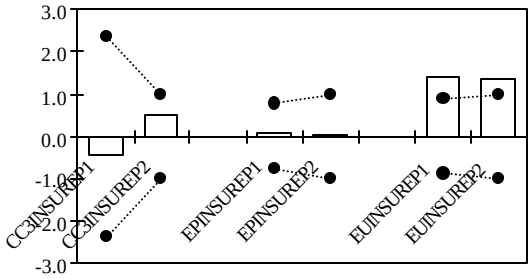
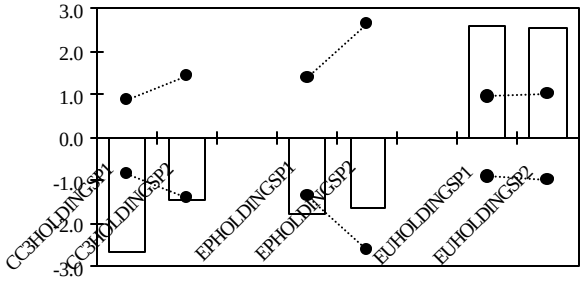


Fig. 9: holdings



5. Concluding remarks

Following a gravity-type approach, in this paper I have tried to tackle two difficult issues surrounding the EU-CEECs integration: has FDI in the CEECs region substituted EU exports, therefore harming employment at home? Has FDI in the CEECs region been redirected away from similarly attractive countries, such as Spain and Portugal? The answer to the first question appears to be negative: exports and FDI seem to go hand in hand as far as German investment is concerned; furthermore, a complementarity relationship is detected for the 'electrical machinery' sector between exports and FDI in the CC3.

Concerning the second question, and taking into account the level of available sectoral disaggregation, no redirection appears between FDI going to Spain and Portugal and that going to the CC3. In particular, a reinsuring result is that no redirection appears in the motor-vehicle sector, in contrast to what is often heard. German investors seem to have quickly taken the advantage of moving motor-vehicle plants into the CC3, but without reducing the amount of investment that was already going to Spain and Portugal in the same sector.

A more general result is that FDI in the CC3 is mainly concentrated in the manufacturing sector, while German investors in the EU are more attracted by services. This preference for manufacturing is also visible in Spain and Portugal though, which may confirm the impression that the two groups of countries share a similar structure of 'attractiveness' across sectors. However, from an analytical point of view, the existence of this similarity does not seem to cause great competition between the two groups of countries. From a 'political' point of view, this similarity should not be the basis for all those who try to prevent the integration process of the CEECs in the EU; on the contrary, economic integration is inevitable the more the CCs develop and close the gap between them and the EU countries, as Spain and Portugal did, following their own accession.

Future improvements of the paper include, from the data viewpoint, the extension of the time-series, up to 1998; exploration of other definitions of 'relative factor endowments', for example by taking the actual capital/labour ratio, or skilled labour over total employment, as far as economic concepts are concerned; and finally – from the econometric viewpoint – by adopting a dummy variable transformation advocated by Suits (1984), whereby the interpretation of the dummy coefficients on the sectors becomes much more direct than having to choose a baseline.

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Annex

Data source: 'International Capital Links', Special Publication No.10 Deutsche Bundesbank, various issues (also on http://www.bundesbank.de).

Data definition: German outward FDI stock (Classification: NACE Rev. 1).

Treatment of zero values: According to the methodological notes of the Bundesbank publication, zero values mean less than 0.5 but more than nil, hence I replaced them by 0.25, the average value between 0 and 0.5, and kept the observation.

List of host countries included in the database: Argentina, Australia and New Zealand, Austria, Belgium, Brazil, Canada, China, Czech Republic, Denmark, France, Hong Kong, Hungary, India, Ireland, Italy, Japan, Luxembourg, Malaysia, Mexico, Netherlands, Norway, Poland, Portugal, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Turkey, UK, US.

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