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Structural Funds, EU Enlargement, and the Redistribution of FDI in Europe

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Abstract

The envisaged EU enlargements will lead to a redirection of Structural and Cohesion Funds expenditures from current to new EU-members. This redistribution of funds makes the accession countries even more attractive as a location of FDI. Using a logistic regressions approach, this paper shows that a hypothetical reallocation of Structural Funds as envisaged by Agenda 2000 leads to a redistribution of FDI by approximately $5-7$ percentage points from the current EU members to the accession countries (2004 scenario) and by about $7-9$ percentage points (2007 scenario), respectively.

Key words: FDI; Structural Funds; European integration; Panel econometrics

JEL classification: C33; F14; F15

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1 Introduction

The fifth and largest enlargement of the EU by ten countries will take place on May 1, 2004. According to the Agenda 2000 and the decisions by the European Council at the Copenhagen meeting on December 2002, this EU enlargement will be financed mainly by a redirection of Structural and Cohesion Funds (SCF) expenditures from the current to the new EU member states. By preserving current overall expenditure levels in the enlarged EU, the redistribution of SCF aims at promoting the catching up process of the ten new members - eight of which are Central and Eastern European countries (CEEC) - and to close the still considerable gaps in infrastructure and capital endowments as a legacy of these formerly planned economies. This redistribution of funds is expected to increase foreign direct investment (FDI) into the accession countries in relative terms at the expense of FDI into the current EU member states. The aim of this paper is to quantify the degree of possible FDI shifts from the old to the new EU member states.

The reallocation of SCF should not only affect the inward FDI position of incumbent EU countries in absolute terms, but also its distribution between the incumbent and the entrant countries. The theory of horizontal MNEs suggests that SCF expenditures may reduce the plant set-up costs and, in this way, change the proximity-concentration trade-off in favor of MNE activity (Breuss et al., 2001). On the other hand, they may also improve the infrastructure of a country part of which form its transportation networks. The latter effect reduces transportation costs and favours trade rather than FDI. Hence, the overall impact of the Structural Funds on the allocation of FDI remains an empirical question, which is best analyzed in a logistic re-

gressions framework, which accounts for spatial dependence. This approach allows to analyze the determinants of a country's share in FDI, originating from a 'typical' direct investing country as the dependent variable. Further, one is able to explicitly account for external effects of changes in SCF on FDI across borders. Specifically, with such a model one can simulate the impact of a hypothetical reallocation of SCF as formulated in Agenda 2000 and the updated cost calculations of EU enlargement on the distribution of FDI across current and new member countries.

We study two enlargement scenarios: the 2004 scenario with eight CEECs plus Cyprus and Malta, and the 2007 scenario with the accession of Bulgaria and Romania. Whereas the 2004 scenario already takes into account the financial agreements of the decisions made by the European Council on December 2002, the 2007 scenario is based on own projections. Although our estimates of the distribution of SCF expenditures are only preliminary, our main results do not depend on these projections. Rather, we obtain a consistent and robust estimate of the corresponding share-multiplier on which any other projection could be based.

The paper is organized as follows. The next section reports the main features of the Structural Policy Reform in the EU. Section 3 draws on the proximity-concentration trade-off and formulates the most important theoretical hypotheses concerning the impact of SCF expenditures on the distribution of inward FDI, while Section 4 introduces the logistic bilateral FDI regression framework, which accounts for spatial dependence. Section 5 reports the estimation results and Section 6 presents the simulation exercise. The last section summarizes the main findings.

2 Agenda 2000 and the Structural Policy Reform in the enlarged EU

The heads of governments or states of the EU at their historic European Council meeting in Copenhagen on December 12-13, 2002, decided to enlarge the EU by ten new countries (eight CEECs[1] plus Cyprus and Malta). Ten years ago at the European Council summit in Copenhagen (June 1993), the Union invited the Central and Eastern European countries (CEEC) to enter the EU and formulated the famous three accession criteria: democracy, market economy and the acquis communautaire. In July 1997, the European Commission issued a communication "Agenda 2000: For a Stronger and Wider Union" (COM(97) 2000 final), which dealt with the reform of the common agricultural policy, the future of economic and social cohesion policy, the establishment of a pre-accession strategy, the consequences of future enlargement and the financing of the Community. The necessary reform of the EU institutions (Council, Commission, European Parliament) in an enlarged Union was laid down in the Nice Treaty, which entered into force on February 1, 2003.

Agenda 2000 tried to strengthen Community policies and to provide a new financial framework for the period 2000-06 in view of the enlargement. It was launched in 1999 and focused inter alia on the increase in the effectiveness of SCF expenditures by a better thematic and geographic concentration of projects on specific objectives and geographical areas; to the reduction of

[1] Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, and Slovenia.

the number of objectives from seven to three (Objective 1 - regions with a per capita GDP below 75 percent of EU15 average; Objective 2 - regions undergoing restructuring; Objective 3 - human resources) and to the adoption of a new financial framework for the period 2000-06 in order to enable the European Union to cope with an enlargement by a maximum of six countries within this period, while ensuring budgetary discipline. Due to the changed date of both enlargement (now 2004, whereas the Agenda 2000 assumed the accession by 2002) and the number of entrants (not six but ten countries), the European Commission issued a revised cost calculation for the period 2004-06 on January 2002, which was accepted with a few adjustments by the Copenhagen Council meeting on December 2002. Accordingly, EU enlargement by ten new members will lead to additional financial burdens for the EU budget over the period 2004-06 by around 37 bn. Euro (at 1999 prices) plus a special cash-flow facility by over 3 bn. Euro. The major part of the cost of enlargement is due to structural actions (i.e., SCF expenditures). Two additional applicants (Bulgaria and Romania) are planned to accede the EU in 2007. Since the budgetary plans for the new financial period 2007-13 are not yet decided, we have to rely on own projections for the 2007 scenario.

The basic principles of financing the EU enlargement was already fixed at the Berlin European Council on March 1999. There, the heads of governments or states decided that financing EU enlargement must be realized without changing the own resources ceiling of 1.27 percent of GNP between 2000 and 2006. The additional costs of enlargement envisaged in the financial perspective for 2000-06 must be brought up by reducing transfers to the present EU members - mainly in the area of Structural Funds Operations.

To maintain economic and social cohesion as one of the Union's main objectives, the Interinstitutional Agreement between the European Parliament, the Council and the Commission of May 6, 1999 (OJ. No. C172/1, of June 18, 1999) on budgetary discipline and improvement of the budget procedure for the 2000-06 financial perspective maintains the funding for economic and social cohesion at 0.46 percent of the enlarged Union's GNP over the period 2000-06 (as was already the case in the period 1993-99). Since the 0.46 percent ceiling will then cover 25 EU countries, the current EU15 economies will be confronted with a (relative) reduction as compared to the former program period.

In the 2004 enlargement scenario (ten new member states) the redistribution of SCF transfers will lead to the largest reduction in the so-called cohesion countries. Compared with 1995/96, Ireland and Portugal will lose transfers by 1.5 percentage points of GDP in 2004, whereas Greece and Spain will only lose 0.3 percentage points. In contrast, the new member states will gain $1-2$ percentage points of SCF transfers in terms of their GDP (Slovenia 0.5 percentage points). In the 2007 enlargement scenario (Bulgaria and Romania) the redistribution will continue (see Table 4 for details). From the other current EU member states, only Belgium-Luxembourg, Finland, the UK, Italy and Denmark will face minor reductions in transfers out of the SCF program of the EU.

3 Theoretical Background

The effect of structural expenditures on bilateral FDI is best modelled in a general equilibrium framework of trade and multinationals (MNEs). In the model of trade and horizontal multinational firms (Markusen, 1995, 2002; Markusen and Venables, 1998, 2000; Egger and Pfaffermayr, 2003a), the formation of MNEs and FDI is favored by low plant set-up costs and high transportation costs. Concentration of production facilities at a single location and exporting is favored by plant economies of scale (e.g., by high foreign plant set-up costs) and by low transportation costs. Structural expenditures change the proximity-concentration trade-off and, thereby, the international allocation of FDI, if they are used to reduce plant set-up costs (see Breuss et al., 2001). To the extent that these expenditures are used to improve transport infrastructure and to reduce transportation costs, they may also lower FDI in favor of trade.

Horizontal MNE models suggest two important size-related determinants of FDI (see Markusen et. al., 1996; Markusen and Maskus 1999, 2002): an increase in both bilateral market size and in similarity in size fosters bilateral multinational activity. Finally, relative factor endowments are relevant as additional controls. The sending to receiving country's physical capital to low-skilled labor ratio as well as the high-skilled to low-skilled labor ratio should exert a positive impact on bilateral outward FDI. A relative better endowment with (internationally mobile) physical capital implies a comparative advantage in capital intensive activities (like setting up plants abroad), and a better endowment with high-skilled labor (human capital) represents a comparative advantage in inventing new varieties and setting up firms ir-

respective of whether they are multinationals or domestic ones (see Breuss et al., 2001; and Egger and Pfaffermayr, 2003a, for more details).

In the robustness section, we also apply a specification motivated by the knowledge-capital model of trade and multinational firms, which accounts for the emergence of both horizontal and vertical MNEs (see Egger and Pfaffermayr 2003b; Markusen, 2002; Markusen and Maskus, 2002). We follow Markusen and Maskus (2002) and introduce an interaction term between the high-skilled to low skilled ratio with the size variables. In this way, it is possible to account for the different influence of size and endowment differences for horizontal and vertical MNE activity. Similar to the horizontal model, a reduction of foreign plant set-up costs, e.g., due to SCF expenditures, enables a country to attract more FDI.

4 A Logistic Bilateral FDI Regression Model

According to the theoretical arguments, we set up a logistic regression model, which accounts for the impact of SCF expenditures on the distribution of each home country's bilateral stocks of outward FDI.[2] We also allow for distance related neighborhood effects, by introducing spatial lags in the endogenous FDI variable, in the exogenous SCF variable, and in the error term (Kelejian and Prucha, 1998, 1999). In this way, we can test, whether SCF expenditures exert external effects on neighboring countries, and whether the decision to undertake FDI in one country simultaneously influences the decision to directly invest in other (surrounding) host economies. There are arguments

[2] Compare Belderbos (1992) for a similar approach in another context.

for both negative and positive neighborhood effects. Negative effects would occur, if SCF expenditures in one country lead to a loss of FDI in other countries, and even more so, the smaller the distance to these countries. Forward and backward linkages across neighboring countries, on the other hand, would imply a positive effect of spatially lagged FDI. If domestic SCF expenditures spill over to regions in neighboring countries, so that they also become more attractive for FDI as well, we would expect a positive parameter of spatially lagged SCF expenditures.

We envisage a FDI sending country $i = 1, ..., N$, which allocates its foreign direct investment stocks to current and future EU host countries $j = 1, ..., J$ at time $t = 1, ..., T$. Hence, we look at a 'typical' OECD country and the allocation of its outward FDI stocks among the EU15 and the CEEC, disregarding other alternative investment possibilities. For reasons of data availability, we take Spain as the base host country and define the right hand side variable $O_{itj} = \log\left(\frac{FDI_{itj}}{FDI_{i,t,Spain}}\right)$. For each exporter i at time t, the model reads

$$\begin{aligned}\mathbf{O}_{it} = {} & \beta_0 + \rho_1 \mathbf{W}\mathbf{O}_{it} + \rho_2 \mathbf{W}\left(\mathbf{s}_t - \mathbf{s}_{Spain,t}\right) + \beta_1\left(\mathbf{s}_t - \mathbf{s}_{Spain,t}\right) \\ & + \beta_2\left(\mathbf{G}_{it} - \mathbf{G}_{i,Spain,t}\right) + \beta_3\left(\mathbf{S}_{it} - \mathbf{S}_{i,Spain,t}\right) + \beta_4\left(\mathbf{k}_{ijt} - \mathbf{k}_{i,Spain,t}\right) \\ & + \beta_5\left(\mathbf{h}_{ijt} - \mathbf{h}_{i,Spain,t}\right) + \beta_6\left(\mathbf{t}_{ijt} - \mathbf{t}_{i,Spain,t}\right) + \mathbf{Z}_{\mu_i}\boldsymbol{\mu}_i + \mathbf{Z}_\lambda \lambda_t + \boldsymbol{\varepsilon}_{it}\end{aligned} \tag{1}$$

$\boldsymbol{\varepsilon}_{it} = \left(\mathbf{I} - \rho_2 \mathbf{W}\right)\mathbf{u}_{it}$ with $\mathbf{u}_{it} \sim N\left(0, \sigma^2 \mathbf{I}\right)$. For each it, all variables are J-vectors, and $\mathbf{W}$ is a $J \times J$ spatial, row-normalized weighting matrix. We choose distance as the spatial weight, so that the typical off-diagonal element of $\mathbf{W}$ reads $w_{jk} = \frac{1}{d_{jk}} / \sum_{k=1}^{K} \frac{1}{d_{jk}}$, $k \neq j$ and $w_{jj} = 0$. $\mathbf{Z}_{\mu_i}$ is a $J \times J$ design matrix for fixed bilateral specific effects $\boldsymbol{\mu}_i$, and $\mathbf{Z}_\lambda$ is a $J \times 1$ of ones to

capture the fixed time effects λ_t.

FDI_{itj} denotes the log of country i's real stock of outward FDI held in country j in year t. s_{tj} is the host country's SCF expenditure to GDP ratio, G_{itj} is the log of the bilateral sum of real GDP, S_{itj} denotes the log of the bilateral similarity index in terms of real GDP with $\log(0) \leq S_{ijt} \leq \log(0.5)$ (see Helpman, 1987). k_{itj} represents the bilateral difference in the logs of the physical capital to low-skilled labor ratio and h_{itj} is the bilateral difference in the logs of the high-skilled to low-skilled labor ratio. Transportation costs are approximated by the log of the $c.i.f./f.o.b.$ ratio derived from trade statistics (see Baier and Bergstrand, 2001). μ_{ij} capture all unobserved influences, which are constant over time (distance, language, border, etc.), and λ_t those common to all country pairs (e.g., common cycle effects). Like the other explanatory variables, these dummies are defined relative to the base (Spain).[3]

5 Data Sources and Estimation Results

Table 1 summarizes the data sources. We include all available bilateral outward FDI stocks of the OECD countries in the European economies. Real figures are approximated in the following way. Similar to previous studies, we assume that the available book values of foreign assets approximate the depreciated nominal figures of outward stocks of FDI. We use investment deflators and exchange rate indices for all countries to convert them to real

[3]Specifically, time effects capture the yearly variation in the propensity of all home countries to directly invest in Spain as compared to all other European host economies.

figures with 1995 as the base year. The same deflation method is applied to the GDP figures using GDP-deflators.

> Table 1 <

Real capital endowments are estimated by the perpetual inventory method (see Keller, 2000). We start the calculation in 1978, i.e., eight years earlier as the first year in the estimation period, to give lower weight to possibly mismeasured initial stock values:

$$K_{1978} = 2 \cdot (I_{1976} + I_{1977} + I_{1978} + I_{1979} + I_{1980}), \tag{2}$$

where K_t denotes the real capital stock and I_t is gross fixed capital formation. In line with the bulk of the literature, we assume a constant and identical depreciation rate of 7 percent, so that the real capital stocks in the other years are given by

$$K_t = 0.93 \cdot K_{t-1} + I_t. \tag{3}$$

The difference in the real stock of capital to low-skilled labor ratio (k) uses employment times the share of people with less than secondary school enrolment as a proxy of the low-skilled labor force. We measure h by the secondary to primary school enrolment figures' ratio.

The panel covers outward FDI from a large set of OECD countries into the EU15 and the Central and Eastern European countries over the period 1986 to 1997, and it is unbalanced. Altogether, we can exploit information from 1022 observations in the regression analysis, covering 168 bilateral relations.

We estimate (1) using the GMM-estimator proposed by Kelejian and Prucha (1998, 1999), which is computationally much less demanding than

maximum likelihood estimation (Anselin, 1988). Since we have a panel of N home countries and T periods, there are NT cross-sections of host countries, which are spatially correlated. Table 2 presents the estimation results of the preferred specification. Equation (3) refers to the full spatial model, accounting for all three types of spatial correlations, Equation (2) restricts the spatial autocorrelation of the error term to zero, while Equation (1) only considers spatial dependence of SCF expenditures.

> Table 2 <

All three versions of the preferred model in Table 2 fit well, and the parameter estimates are relatively similar. Since the Moran I test (Kelejian and Prucha, 2001) rejects the hypothesis of zero spatial correlation of the error term, we base our inference on Equation (3). We find a significant positive impact of both own and spatially weighted foreign SCF expenditures on inward stocks of FDI. The latter implies that external effects of SCF expenditures are at work. Also, the positive coefficient of spatially lagged FDI indicates that direct investment in a particular European country is not at the expense of inward FDI in the neighboring economies. In contrast, external effects magnify a country's inward FDI attracting policies. For example, forward and backward linkages across countries, and the exploitation of specialization gains due to cross-border fragmentation of production could generate such an effect. By and large, the parameter point estimates of the remaining variables do not square with theory. Noteworthy, all variables are measured relative to Spain and within transformed (country pair *and* time effects), rendering the parameter estimates of several controls insignificant

at conventional levels. There is not enough variation left to estimate these parameters precisely. Especially, this holds true for the size related controls (G, S),[4] the bilateral difference in the high-skilled to low-skilled labor ratio (h) as well as transportation costs (t). There is, however, enough time variation in both capital stock and SCF expenditures data. The latter is partly due to variation in the degree of exploitation of the available SCF.

> Table 3 <

Table 3 reports the results from an extensive sensitivity analysis, concerning the parameters of interest. First, we estimate a parsimonious model, skipping all variables with absolute t-values below 1.44 (i.e. a p-value below 15%) in Equation (3) of Table 2 (#1). Second, to assess the outlier sensitivity, we skip the observations in the first and last percentile of residuals (#2). Third, we estimate the knowledge-capital model specification as motivated in Markusen and Maskus (2002) and Markusen (2002), introducing interaction effects between the size and endowment variables (#3). Finally, we run four Jackknife exercises (see Efron and Tibshirani, 1998), to identify the most influential country pair relations for the relevant SCF expenditure coefficients (#4-#7).

In the first two experiments, the SCF expenditure coefficients turn out robust. They are considerably lower in the Markusen and Maskus (2002) specification. However, in the latter the two additional interaction terms are insignificant, so that it is inferior to the preferred Equation (3) of Table 2

[4]Obviously, Spain's GDP developed relatively similar as compared to the other European host economies.

in our application. Also in the Jackknife exercises, the parameters are quite robust. Hence, we conclude that the parameters of interest are sufficiently robust to proceed with the simulation exercise.

6 Simulating the FDI Redistribution in Europe after EU Enlargement

With the results of Equation (3) at hand, we are able to assess the impact of a change in the SCF expenditures to GDP ratio as planned to support the Eastern Enlargement on the distribution of inward FDI stocks among the current and future EU members. To get a quantification of the SCF expenditures' impact on the FDI shares, we use a simple approximation, as given in the Appendix (see Hosmer and Lemeshow, 2000, for a model without spatial correlation). As a result, the impact depends positively on the FDI share a country initially holds, as long as the FDI share is smaller than 50 percent and on the spatial magnification effect as captured by the parameter ρ_1. As shown in Table 4, an increase in the SCF expenditures to GDP ratio by one percentage point[5] on average raises the FDI share by 1.64 percentage points. However, the impact varies between 5.8 percentage points for the UK, which holds the largest FDI share, and (approximately) 0.2 percentage points for Bulgaria with a initial FDI share of 0.02 percent. The overall impact of the redistribution can only be inferred, when looking at the predicted shares before and after the change in SCF expenditures. The reason is that we have

[5] In many cases, this would imply that the Structural Funds to GDP ratio more than doubles.

to include the external effects of such a change, which are not fully covered by the reported estimates of the marginal effect.

Below, we use the estimated SCF parameters (ρ_2, β_1) and the spatially lagged FDI parameter (ρ_1) of Equation (3), to undertake two thought experiments. The first one looks at the hypothetical effect of the entry of the first five countries of the available CEECs in our sample[6] as planned in 2004, assuming a SCF expenditure distribution as projected (see Section 2). The second thought experiment assumes that all seven covered CEECs enter the EU[7], and the SCF expenditure allocation corresponds to our 2007 projection. In both experiments, we set all other explanatory variables to their 1995/1996 averages and do not include their forecasts.

These thought experiments are subject to several important qualifications. First, we use the EU Commission's forecasts on each country's GDP and the (partly vague) information on the volume of SCF (ceiling of 1.27 percent of EU GNP) to calculate the expected distribution of SCF across the current and new member countries. Second, to obtain SCF *expenditure* figures (i.e., the exploitation of funds, which inter alia depends on domestic cofinancing), we have to assume that on average each present member country exploits the available funds as in the 1990's and the CEEC will exhaust them as the EU15 average did in the past. Since we are interested in a simulation experiment rather than a forecast per se, we use the obtained figures to redistribute the 1995/96 SCF expenditure to GDP ratios according

[6] Czech Republik, Hungary, Poland, Slovak Republic, and Slovenia. We omit Estonia due to missing FDI data

[7] Bulgaria, Czech Republik, Hungary, Poland, Romania, Slovak Republic and Slovenia, omitting the Baltic countries due to missing FDI data.

to the two scenarios and derive the implied counterfactual distributions of the real stocks of outward FDI in this base period. Consequently, the results are widely independent of the overall *volume* (rather than the *distribution*) of SCF expenditures and also of the remaining variables. The significance levels of the projections are based on Monte Carlo simulations (see the Appendix). The results of the simulation analysis are presented in Table 4. Note, almost all estimates are significant in the sense that zero is not included in the $1\% - 99\%$ interval (***) or in the $5\% - 95\%$ interval (**), respectively.

> Table 4 <

First, in the 2004 scenario the average projected SCF expenditure to GDP ratio in the present EU changes marginally as compared to 1995/96 (it declines by 0.09 percentage points), but it increases from zero to roughly 1.4 percentage points in the average applicant CEEC. This results in a redistribution of the 1995/96 stocks of outward FDI by about 7 percentage points from the current EU to all seven CEEC. Compared to the EU as whole, the CEEC in 1995/96 only hold 3 percent of the inward FDI of all reported countries and from their point of view, this redistribution is quantitatively very important. Though the redistribution of SCF expenditures is mainly at the expense of Portugal and Ireland in relative terms, it is the United Kingdom and the Netherlands, which lose most in terms of FDI. There are even countries with rising inward FDI shares, whose SCF to GDP ratio declines (e.g., Austria). There are two reasons for this outcome: (i) the complex reaction of FDI due to distance-weighted cross-border spillover effects of SCF expenditures, and (ii) the property of the logistic model that larger countries

react (see Anderson and van Wincoop, 2001, for a theoretical illustration of the size-related impact of changing trade frictions in a pure trade model).

Accordingly, a country like the United Kingdom loses FDI shares for three reasons. First, their own SCF expenditures to GDP ratio gets lower. Second, the SCF expenditures in its neighboring countries (Belgium-Luxembourg, Denmark, Ireland, the Netherlands) decline. Third, it is a large economy, and such economies react stronger than small ones.

In contrast, a country like Austria gains FDI shares despite its loss in the SCF expenditures to GDP ratio, since in four out of its five neighbors in the sample (Germany and three CEEC: Czech Republic, Hungary, Slovak Republic) the SCF to GDP ratio rises. In this case, the external effect of SCF expenditures outweighs the negative own effect.[8]

In the five applicant economies of 2004, the positive impact of SCF is relatively large. They gain a lot because of the rise in their domestic and their (CEEC) neighboring economies' SCF expenditures. However, since their FDI share is relatively small in 1995/96, the marginal impact of structural policy is also small as compared to the average EU country.

In the 2007 scenario, the distribution effects are somewhat stronger, since SCF expenditures are now shared by all seven applicant countries in our sample. Again, the impact on the average current EU economy's SCF expenditure to GDP ratio is about -0.1. However, the average CEEC's ratio rises from zero (in 1995/96) to about 2.4 percentage points in this counterfactual scenario. The result is a redistribution of the 1995/96 FDI stocks from the

[8] Disregarding spatial spillover effects, a reduction in SCF expenditures relative to Spain would always lead to a decline in FDI relative to Spain.

current EU to the CEEC by about 9.5 percentage points. For the same reasons as above, this is again mostly at the expense of the United Kingdom's and the Netherlands' inward FDI stocks and mostly in favor of Austria's, Hungary's and the Czech Republic's inward FDI, although one also observes considerable gains of the remaining accession countries. According to the simulation results, only 6 out of the 14 EU economies (Belgium-Luxembourg is treated as a single country) lose FDI shares due to the planned structural policy reform. However, with the exception of the United Kingdom and the Netherlands the reduction will not be higher than 3 percentage points.

> Table 5 <

From Table 3, we are aware of lower bound estimates of the two SCF expenditure parameters (sensitivity analyses #4 and #6). Therefore, we additionally give the inward FDI stock share changes associated with these parameter estimates in Table 5. From a very cautious point of view as represented in the figures of this table, the redistribution between the current EU15 and the applicant economies would be about $1.5-2.5$ percentage points lower in both the 2004 and the 2007 scenarios. Of course, the results remain unchanged in general terms.

7 Conclusions

According to Agenda 2000, the EU-enlargement leads to a reallocation of Structural and Cohesion Funds. This follows from the consensus to preserve the current overall expenditure levels and to finance the New Structural Operations in the Central and Eastern European economies by a redistribution

from the incumbent to the entrant countries. Hence, it can be expected that the direct investments into Europe and the CEEC are reallocated from the former to the latter, independent of whether the overall volume rises or not.

Based on the proximity-concentration trade-off as formulated in the theory of trade and horizontal multinationals, this paper formulates a bilateral FDI distribution model to estimate the impact of the Structural and Cohesions Funds reallocation on the distribution of FDI from the OECD into the current EU and the CEEC. Further, we allow neighborhood effects of Structural and Cohesion Funds expenditures and for spatial autocorrelation in general. Our estimates imply that an increase in the Structural and Cohesion Funds expenditures to GDP ratio by one percentage point raises the average country share in real stocks of FDI by 1.6 percentage points in the average European economy.

More important, we conduct two experiments of thought, which look at the hypothetical impact of the envisaged Structural and Cohesion Funds reallocation as planned in Agenda 2000 on the FDI allocation in 1995/1996. The first one looks at the accession of the Czech Republic, Hungary, Poland, the Slovak Republic, and Slovenia and estimates an increase in FDI shares in Central and Eastern Europe altogether by $5-7$ percentage points. This is mostly at the expense of FDI to the United Kingdom and the Netherlands and in favor of FDI in Austria, Hungary and the Czech Republic. In the second scenario, which includes seven accession countries, the effects are somewhat larger, raising the average CEEC's Structural Funds to GDP ratio from zero (in 1995/96) to about 2.4 percent and their share in FDI stocks by about $7-9$ percentage points.

The simulations suggest the following general results. First, there are pronounced cross-border spillover effects of Structural and Cohesion Funds expenditures so that neighbors of Structural and Cohesion Funds losers (such as the United Kingdom) tend to lose FDI shares while neighbors of winners (such as Austria) gain as well. Second, large economies in terms of FDI shares (such as the United Kingdom or the Netherlands) react more sensitive to changes in Structural and Cohesion Funds expenditures than small ones (such as the CEEC).

8 Appendix

The approximated impact of a ceteris paribus change in the structural funds to GDP ratio of country j, $\Delta \mathbf{S}_t$, on its own FDI-share in all OECD economies' outward FDI into Europe in year t, F_{tj}, is given by the $j-th$ row of $\Delta \mathbf{F}_t \approx \beta_1 \left(\mathbf{I} - \rho_1 \mathbf{W}\right)^{-1} \Phi_t$, where Φ_{tj} is given by $F_{itj}(1 - F_{itj})\Delta S_{tj}$. The external effect on neighbor country $k \neq j$ is given by the $k-th$ row of $\Delta \mathbf{F}_t \approx \rho_2 \left(\mathbf{I} - \rho_1 \mathbf{W}\right)^{-1} \Phi_t \mathbf{W}$. Here, we only consider the case, where $\Delta S_{tk} = 0$, if $k \neq j$.

We calculate the predicted values of the basic and the counterfactual model as follows. For convenience, we denote the $J \times 1$ vector of changes in the predictions of $\mathbf{O}_{it}$ due to a redistribution of structural funds at time t as $\Delta \mathbf{Z}_t = \left(\beta_1 \mathbf{I} + \rho_2 \mathbf{W}\right)\left(\Delta \mathbf{S}_t - \Delta \mathbf{S}_{t,Spain}\right)$, where the exporter i index is skipped for simplicity. Defining the right hand side variable $O_{tj} = \log\left(\frac{F_{tj}}{F_{t,Spain}}\right)$,

$j = 1, ..., J$, we have in matrix form

$$\begin{aligned} \mathbf{O}_t &= \rho_1 \mathbf{W}\mathbf{O}_t + \mathbf{Z}_t \\ &= (\mathbf{I} - \rho_1 \mathbf{W})^{-1} \mathbf{Z} = \widetilde{\mathbf{Z}}. \end{aligned} \tag{4}$$

Now, take the difference of $\mathbf{Z}$ before and after the redistribution of structural funds to obtain the $J \times 1$ vector

$$\mathbf{O}'_t - \mathbf{O}_t = (\mathbf{I} - \rho_1 \mathbf{W})^{-1} \Delta \mathbf{Z}_t = \Delta \widetilde{\mathbf{Z}}_t. \tag{5}$$

Using $F_{tj} = \frac{e^{\tilde{Z}_{tj}}}{\sum_{j=1}^{J} e^{\tilde{Z}_{tj}}}$,

$$\frac{F'_{tj}}{F'_{t,Spain}} = \frac{F_{tj}}{F_{t,Spain}} e^{\Delta \tilde{Z}_{tj}} \tag{6}$$

$$\sum_{j \neq Spain} F'_{tj} = \frac{F'_{t,Spain}}{F_{t,Spain}} \sum_{j \neq Spain} F_{tj} e^{\Delta \tilde{Z}_{tj}} = 1 - F'_{t,Spain} \Rightarrow \tag{7}$$

$$F'_{t,Spain} = \frac{F_{t,Spain}}{F_{t,Spain} + \sum_{j \neq Spain} F_{tj} e^{\Delta \tilde{Z}_{tj}}} \tag{8}$$

$$F'_{tj} = \frac{F'_{t,Spain}}{F_{t,Spain}} F_{tj} e^{\Delta \tilde{Z}_{tj}}. \tag{9}$$

(8) and (9) are used to derive the counterfactual estimates in Tables 4 and 5. Since the standard errors of this non-linear effect cannot be derived analytically, we take the estimated preferred model as the true one and use Monte Carlo simulations to assess the significance of the effects. That means, we randomly draw 10000 coefficients from the multivariate normal with means $\widehat{\rho}_1$, $\widehat{\rho}_2$, and $\widehat{\beta}_1$ and the variance-covariance matrix as estimated in Equation (3) to produce the significance levels in Table 4.

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Table 1 - Data Sources

Variable:	Source:
Outward Stocks of FDI	OECD, International Direct Investment Statistics Yearbook
Investment Deflators	OECD National Accounts, Volume 1
Structural Funds	European Commission
Exports and Imports (for trade costs)	OECD, Monthly Statistics of International Trade; IMF, Direction of Foreign Trade; and the Vienna Institute of International Economic Studies
GDP	OECD, Economic Outlook and National Accounts Volume 1; IMF, International Financial Statistics; and the Vienna Institute of Internat. Econ. Studies
School Enrolment	OECD Education Statistics 1985-1992, Education at a Glance, several years, and the UNESCO Statistical Yearbook
Gross Fixed Capital Formation	OECD, Economic Outlook and National Accounts Volume 1; IMF, International Financial Statistics; and the Vienna Institute of Internat. Econ. Studies

Table 2 - Regression Results

Explanatory variables	Equation (1)		Equation (2)		Equation (3)	
	Coeff.	t	Coeff.	t	Coeff.	t
Spatially lagged FDI	-	-	0.18	1.92 *	0.19	1.97 *
Spatially lagged structural funds expenditures in % of GDP (s)	58.19	2.10 **	70.70	2.30 **	72.44	2.28 **
Structural funds expenditures in % of GDP (s)	31.32	3.03 ***	31.87	3.43 ***	31.60	3.46 ***
Sum of bilateral real GDP (G)	-0.37	-0.17	0.58	0.38	0.99	0.67
Similarity in real bilateral GDP (S)	0.90	1.41	0.90	1.49 #	0.83	1.40
Bilateral difference in capital to low-skilled labor ratio (k)	0.81	1.93 *	0.70	1.63 #	0.72	1.69 *
Bilateral difference in high-skilled to low-skilled labor ratio (h)	-0.48	-1.56 #	-0.40	-1.29	-0.40	-1.32
Bilateral transportation costs (t)	-0.29	-1.80 *	-0.23	-1.56	-0.20	-1.32
Observations	1022		1022		1022	
Cross-sections	168		168		168	
R^2	0.94		0.95		0.95	
ρ_3	-		-		0.10	
σ_e	0.54		0.52		0.51	
Joint impact of domestic and spatially lagged structural funds expenditures		5.99 ***		7.50 ***		7.40 ***
		(2,848)		(2,847)		(2,847)
Time effects: F-test		4.28 ***		3.17 ***		2.83 **
		(11,848)		(11,847)		(11,847)
Bilateral effects: F-test		181.45 ***		38.60 ***		39.65 ***
		(155,848)		(155,847)		(155,847)
Moran I test: N(0,1)		-		-		9.48 ***

Notes:
Degrees of freedom in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%; # significant at 15%.

Table 3 - Robustness of Equation (3) Results

Label	Model	Spatially lagged FDI		Spatially lagged structural expenditures		Structural expenditures	
		Coeff.	t	Coeff.	t	Coeff.	t
#1	Parsimonious model (with |t|<1.44)	0.47	1.19	75.55	2.88 ***	38.07	3.13 ***
#2	Excluding outliers of the first and last percentile	0.24	2.23 **	85.70	2.82 **	33.42	3.79 ***
#3	Markusen and Maskus (2002) specification	0.24	2.51 **	42.98	1.65 *	28.14	3.17 ***
	Excluding one bilateral relationship at each run:						
#4	Minimum structural expenditures coeff.	0.18	1.89 *	50.27	1.60 #	21.10	2.24 **
#5	Maximum structural expenditures coeff.	0.08	0.84	60.54	2.13 **	36.60	3.29 ***
#6	Minimum spatially lagged structural expenditures coeff.	0.14	1.46 #	34.81	1.12	31.87	3.54 ***
#7	Maximum spatially lagged structural expenditures coeff.	0.25	2.75 ***	92.30	3.06 ***	32.95	3.61 ***

Notes:
Degrees of freedom in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%; # significant at 15%.

Table 4 - Simulating the Impact of the Reallocation of Structural Funds on Stocks of FDI into the EU

	Reference period 1995/96			2004 scenario versus 1995/1996		2007 scenario versus 1995/1996	
	Structural funds to GDP ratio	FDI share in all reported countries	Marginal impact of structural expenditures on the FDI share	Structural funds to GDP ratio	FDI share in all reported countries	Structural funds to GDP ratio	FDI share in all reported countries
	Percentage points			Percentage point change[a)]			
Belgium-Luxembourg	0.16	14.06	4.34	-0.10	-1.81 ***	-0.11	-2.57 ***
Denmark	0.08	1.76	0.90	-0.06	0.85 ***	-0.05	0.90 ***
Germany	0.15	10.07	3.20	0.01	0.08	-0.03	0.28
Finland	0.17	0.65	0.50	-0.11	0.77 **	-0.05	0.81 **
France	0.13	10.40	3.44	-0.04	-1.06 ***	-0.04	-1.58 ***
Greece	2.23	0.43	0.39	-0.28	0.69 **	-0.61	0.73 **
UK	0.17	21.61	5.81	-0.10	-5.01 ***	-0.07	-6.12 ***
Ireland	2.08	4.46	1.83	-1.56	-0.85 **	-1.78	-1.13 ***
Italy	0.27	5.13	1.83	-0.07	0.25	-0.05	0.58 **
Netherlands	0.08	18.66	5.27	-0.03	-2.82 **	-0.02	-3.66 ***
Austria	0.12	2.22	0.89	-0.03	1.69 ***	-0.06	2.92 ***
Portugal	3.17	0.91	0.66	-1.62	0.56	-1.41	0.53
Sweden	0.07	2.23	0.98	-0.02	0.56 ***	0.00	0.62 ***
Spain	1.34	4.39	1.68	-0.30	-1.01 ***	-0.55	-1.88 ***
Hungary	0.00	1.00	0.54	1.39	1.40 ***	2.23	2.38 ***
Poland	0.00	0.53	0.44	1.73	1.14 ***	2.75	1.59 ***
Czech Republic	0.00	0.83	0.55	1.14	1.23 ***	1.88	1.67 ***
Bulgaria	0.00	0.02	0.24	0.00	0.70 **	1.11	0.75 **
Romania	0.00	0.08	0.26	0.00	0.70 **	1.53	0.79 **
Slovak Republic	0.00	0.24	0.30	2.12	0.97 ***	3.47	1.31 ***
Slovenia	0.00	0.31	0.38	0.50	0.95 **	0.81	1.07 ***
West	0.32	96.99	2.27	-0.09	-7.09	-0.11	-9.56
East	0.00	3.01	0.36	1.40	7.09	2.40	9.56
Total	0.32	100.00	1.64		0.00		0.00

Notes:

a) Impact of a one percenatge point change of structural expenditures. - b) p-values are estimated by Monte Carlo Simulations with 10000 repetitions using the respective parameters and variance-covariance matrix of Equation (3) in Table 2. *** significant at 1%; ** significant at 5%.

Table 5 - Robustness of the Simulated Impact on European FDI (Percentage Point Changes)

	2004 scenario versus 1995/1996			2007 scenario versus 1995/1996		
	Reference (Table 4)	Minimum structural expenditure coeff. (#4 in Table 3)	Minimum spat. lagged struct. expenditure coeff. (#6 in Table 3)	Reference (Table 4)	Minimum structural expenditure coeff. (#4 in Table 3)	Minimum spat. lagged struct. expenditure coeff. (#6 in Table 3)
Belgium-Luxembourg	-1.81 ***	-1.51 **	-1.20 **	-2.57 ***	-1.94 ***	-1.62 **
Denmark	0.85 ***	0.77 **	0.60	0.90 ***	0.82 **	0.63
Germany	0.08	-0.17	-0.05	0.28	0.07	-0.01
Finland	0.77 **	0.72 **	0.55	0.81 **	0.75 **	0.58
France	-1.06 ***	-0.84 **	-0.59	-1.58 ***	-1.13 **	-0.87
Greece	0.69 **	0.64 **	0.48	0.73 **	0.67 **	0.48
UK	-5.01 ***	-4.18 **	-3.29 **	-6.12 ***	-4.84 **	-3.83 **
Ireland	-0.85 **	-0.47	-1.02 **	-1.13 ***	-0.67	-1.25 ***
Italy	0.25	0.15	0.10	0.58 **	0.42	0.26 **
Netherlands	-2.82 **	-2.47 **	-1.79	-3.66 ***	-2.92 **	-2.22
Austria	1.69 ***	1.12 **	0.79	2.92 ***	1.85 **	1.21
Portugal	0.56	0.61	0.34	0.53	0.59	0.34
Sweden	0.56 ***	0.50 ***	0.40 **	0.62 ***	0.56 **	0.43 **
Spain	-1.01 ***	-0.70	-0.65	-1.88 ***	-1.41 **	-1.34 **
Hungary	1.40 ***	1.00 ***	1.06 ***	2.38 ***	1.51 ***	1.73 ***
Poland	1.14 ***	0.92 ***	0.92 ***	1.59 ***	1.16 ***	1.30 ***
Czech Republic	1.23 ***	0.99 ***	0.95 ***	1.67 ***	1.24 ***	1.31 ***
Bulgaria	0.70 **	0.65 **	0.50	0.75 **	0.68 **	0.53
Romania	0.70 **	0.64 **	0.50	0.79 **	0.70 **	0.57
Slovak Republic	0.97 ***	0.78 ***	0.72 **	1.31 ***	0.96 ***	0.99 ***
Slovenia	0.95 **	0.84 **	0.68	1.07 ***	0.92 **	0.76 **
West	-7.09	-5.83	-5.32	-9.56	-7.17	-7.18
East	7.09	5.83	5.32	9.56	7.17	7.18

Notes:
p-values are estimated by Monte Carlo Simulations with 10000 repetitions using the respective parameters and variance-covariance matrices. *** significant at 1%; ** significant at 5%.

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