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Structural Policy Reform and the Distribution of FDI in Europe

Fritz Breuss, Peter Egger and Michael Pfaffermayr*

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Abstract

The envisaged EU enlargement 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 0.8 percentage points from the current EU members to the accession countries (first round) and 2.6 percentage points (second round), respectively.

Key words: FDI; Structural Funds, Gravity equation; European integration; Panel econometrics

JEL classification: C33; F14; F15

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1 Introduction

The EU Enlargement will lead to a redirection of Structural and Cohesion Funds expenditures from current to future EU member states. According to Agenda 2000, there is a consensus to preserve current overall expenditure levels and to finance the New Structural Operations in the Central and Eastern Economies (CEEC) by a redistribution from current to the new members. The aim is to promote the catching up process of the new members and to close the - in some of the accession countries considerable - gaps in infrastructure, capital endowments, etc. 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 members.

The impact of the reallocation of Structural and Cohesion Funds on the inward FDI position of incumbent EU countries does not only depend on the *absolute* change in the amount of structural funds, but also on whether they gain or loose *relative* to the other countries competing for FDI. So, the reallocation of funds will not only affect the absolute level of a countries' inward FDI position, but also its distribution between the incumbent and the entrant countries.

The theory of horizontal MNEs suggests that Structural and Cohesions Funds expenditures 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 also improve the infrastructure of a country part of which form its transportation networks. This component reduces transportation costs and favors trade rather than FDI. Hence, the overall impact of the Structural Funds on the allocation of FDI remains an em-

pirical question, which is best analyzed in a logistic regressions framework. This approach explicitly refers to the country's share in FDI originating from a 'typical' direct investing country as the dependent variable. Specifically, with such a model one can simulate the impact of a hypothetical reallocation of Structural and Cohesion Funds as formulated in Agenda 2000 on the distribution of FDI across current and new member countries.

We base our projections on own estimates of the distribution of Structural Funds in the 2005/06 enlargement scenario with 5 CEEC and Cyprus as formulated in Agenda 2000 and a further 2007/08 enlargement scenario with 5 additional CEEC and Malta. Although our estimates of the distribution of the Structural Funds 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 Structural and Cohesion Funds expenditures on the distribution of inward FDI, while Sections 4 reports both the estimation and the simulation results. The last section summarizes the main findings.

2 Agenda 2000 and the Structural Policy Reform in the EU

The European Council in Nice in December 2000 has paved the way for the enlargement of the European Union (EU). With the institutional reform implemented in the Nice Treaty as the last one of a series of steps towards enlargement, the EU is now formally ready for the membership of 27 countries, although the Irish "No" to the Nice treaty could delay the ratification. 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.

Agenda 2000 tries 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 focuses inter alia on the increase in the effectiveness of the Structural and Cohesion Funds expenditures by a better thematic and geographic concentration of projects on specific objectives and geographical areas; to the reduction of the number of objectives from seven to three 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.

At the Berlin European Council, the heads of governments or states decided that financing EU enlargement must be realized without changing the own resources ceiling of 1.27% of GNP between 2000 and 2006. The additional costs of enlargement envisaged in the financial perspective for 2000-06 amount to about 80 bn. Euro (at 1999 prices) or 0.25% of the EU GNP in 2006 for six new members and 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% of the Union's GNP over the period 2000-06 (as was already the case in the period 1993-99). Since the 0.46% ceiling will then cover 21 EU countries, the current EU15 economies will be confronted with a (relative) reduction as compared to the former program period. In particular, the structural transfers to the so-called cohesion countries (mainly those to Ireland and Portugal) will be reduced by around a quarter to one percent of GDP until 2006, when the first six accession countries are expected to join the EU. Here, we assume that in 2007/2008 the accession of the remaining candidates will take place, which should lead to a further reduction for the cohesion countries[1]. Our tentative estimates suggest a reduction by 0.5

[1] After the Laeken summit of December 2001, the EU plans to take in up to 10 CEEC already by 2004. Hence, our assumed enlargement schedule (first round 2005/06; second round 2007/08) gives a lower bound estimated of the first round redestribution effect based

and 1.5 percentage points for Portugal and Ireland, respectively. The UK, Belgium-Luxemburg and Denmark will also face (minor) reductions, while all other current EU-members will get slight increases in their Structural and Cohesion Funds to GDP-ratio.

3 Theoretical Background

The effect of the EU's structural expenditures on (bilateral) FDI or trade is best modelled in a general equilibrium framework of trade and multinationals. Using a simple model of horizontal multinationals, a single differentiated product and three factors of production, Breuss et al. (2001) demonstrate how structural expenditures determine the proximity-concentration trade-off. The formation of multinational firms and FDI is favored by low plant set-up costs, high transportation costs and high structural expenditures, if the latter are used to reduce plant set-up costs (compare Markusen, 1995; Markusen and Venables, 2000; Breuss et al., 2001). 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.

Traditional horizontal MNE models (see Markusen et. al., 1996; Markusen and Maskus 1999A and 1999B; Breuss et.al., 2001) suggest two important size-related determinants: an increase in both the bilateral market size and the similarity in size fosters bilateral multinational activity. Finally, relative factor endowments are relevant. The sending to receiving country's physical capital to low-skilled labor ratio as well as the high-skilled to low-skilled

on the now official enlargement plans.

labor ratio should exert a positive impact on bilateral outward FDI, since 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 i.e., setting up firms irrespectively of whether they are multinationals or domestic ones (compare Breuss et al., 2001 and Egger and Pfaffermayr, 2000, for more details).

4 A Logistic FDI Gravity Model, the Data Sources and the Estimation Results

According to these theoretical arguments, we can set up a gravity FDI distribution model, which accounts for the impact of structural expenditures on bilateral stocks of outward FDI.[2] We envisage a FDI-sending country i, which allocates its foreign direct investments to $j = 1, ..., J$ current and future European host countries. Hence, we look at a 'typical' OECD country and the allocation of its outward FDI 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 formulate the following logistic

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

equation:

$$\log\left(\frac{F_{ijt}}{F_{i,Spain,t}}\right) = \beta_0 + \beta_1\left(s_{jt} - s_{Spain,t}\right) + \beta_2\left(G_{ijt} - G_{i,Spain,t}\right) \quad (1)$$
$$+ \beta_3\left(S_{ijt} - S_{i,Spain,t}\right) + \beta_4\left(k_{ijt} - k_{i,Spain,t}\right)$$
$$+ \beta_5\left(h_{ijt} - h_{i,Spain,t}\right) + \beta_6\left(t_{ijt} - t_{i,Spain,t}\right) + \mu_{ij} + \lambda_t + \varepsilon_{ijt}$$

where F_{ijt} denotes the log of country i's real stock of outward FDI held in country j in year t. s is the host country's structural expenditure to GDP ratio, G is the log of the bilateral sum of real GDP, S denotes the log of the bilateral similarity index in terms of real GDP with $\log(0) \leq S \leq \log(0.5)$ (compare Helpman, 1987). k represents the bilateral difference in the logs of the physical capital to low-skilled labor ratio and h 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 (compare Baier and Bergstrand, 2001). μ_{ij} and λ_t capture all unobserved influences, which are either constant in all years (distance, language, border, etc.) or common to all cross-sections (e.g. common cycle effects). As the other explaining variables, these dummies are also defined relative to the base (Spain). Finally, the remainder error ε is assumed to be $i.i.d.$ normally distributed $N(0, \sigma^2)$.

> Table 1 <

Table 1 summarizes the data sources. Real bilateral stocks of outward FDI are approximated in the following way. Similar to previous studies, we assume that the available book values of foreign assets (OECD, Foreign Direct Investment Statistical Yearbook) 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 figures with 1995 as the base year. The same deflation method is applied to the GDP figures using GDP-deflators from OECD (National Accounts). Real capital endowments are estimated by the perpetual inventory method (compare 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 (OECD, National Accounts). In line with the bulk of the literature, we assume a constant and identical depreciation rate of 7%, 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 primary school enrolment (OECD, Education at a Glance) as a proxy of the low-skilled labor force. We measure h by the secondary to primary school enrolment figures' ratio (OECD, Education at a Glance).

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 960 observations in the regression analysis.

We estimate (1) using the fixed effects AR(1) estimator, since the autocorrelation of the residuals turned out to be substantial (compare the modified Bhargava et al., 1982, Durbin-Watson statistics in Table 2) and AR(1) estimation seems a must. Table 2 presents the results from four estimated models. Models (1) and (3) include both the EU15 members and the CEEC as destinations of OECD outward FDI. Models (2) and (4) exclude the CEECs. Models (3) and (4) skip excessive outliers by excluding all observations with residuals in the first and last percentile.

> Table 2 <

All four estimated models fit well and the results are fairly robust with respect to both the sample coverage and the correction for outliers. In any model, the estimated coefficient of the structural funds variable is highly significant. To get a quantification of its impact on the FDI shares, we use the simple approximation $\Delta F_{ijt} \approx F_{ijt}\left(1 - F_{ijt}\right)\beta_1 \Delta s_{jt}$ (see Hosmer and Lemeshow, 2000). 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%. As shown in Table 2, an increase in the Structural expenditures to GDP ratio by one percentage point[3] on average raises the FDI share by 0.97 percentage points. However, the impact varies between 3.6 percentage points for the UK, which holds the largest FDI share, and (approximately) zero percentage points for Bulgaria with a FDI share of 0.02%. The estimated parameters of the remaining variables do not square with theory and need no further discussion here.

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

Model (4) seems preferable, since it excludes both possible outliers and the CEEC with zero Structural Operations during the estimation period. Using the estimated Structural Funds parameter, we can simulate the impact of the Structural Policy Reform on the redistribution of real stocks of outward FDI within Europe. We undertake two thought experiments: The first looks at the hypothetical effect of the entry of the first four countries of the available CEEC in our sample[4] in 1995/96, assuming a Structural expenditure distribution as projected for 2005/06 (compare Section 2). We set all other explaining variables to their 1995/1996 averages and do not include their forecasts. The second thought experiment assumes that seven CEEC enter the EU[5], and the Structural expenditure allocation corresponds to our 2007/08 projection. These thought experiments are subject to several important qualifications. First, we use the EU Commission's forecasts on each country's GDP to account for e.g. country specific business cycles and the (partly vague) information on the volume of Structural Funds (ceiling of 1.27 % of EU GNP) to calculate the expected distribution of the Structural Funds across the current and new member countries. Second, to come up with Structural *expenditure* figures (i.e., the exploitation of Funds, which inter alia depends on domestic co-financing), we assume that on average each present member country exploits the available funds as in the 1990's and the CEEC exhaust them as the EU average does. Since we are interested in a simulation experiment rather than a forecast per se, we use the obtained figures

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

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

to redistribute the 1995/96 Structural expenditure to GDP ratios according 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 of Structural expenditures and also of the remaining variables. The significance levels of the projections are based on Monte Carlo simulations with 10000 repetitions under the assumption that the parameter of the structural expenditures variable is distributed normally with the mean and variance according to Model (4) in Table 2.

The results of the simulation analysis are presented in Table 3. Note, almost all estimates are significant in the sense that zero is not included in the 1%-99% interval (***), and in the 5%-95% interval (**), respectively.

> Table 3 <

First, in the 2005/06 scenario the average projected Structural expenditure to GDP ratio in the present EU only marginally deviates from its observed value (it rises by 0.06 percentage points), but it increases from zero to roughly one percentage point in the average applicant CEEC. This results in a redistribution of the 1995/96 stocks of outward FDI by 0.8 percentage points from the current EU to the CEEC (implying an increase in their shares by approximately 30%). Compared to the EU as whole, the CEEC only hold 3% of the inward FDI of all reported countries and from their point of view, this redistribution is quantitatively important. It is mostly at the expense of FDI to Ireland and Portugal and in favor of FDI in the Czech Republic and Hungary. In the 2007/08 scenario, the effects are considerably more pronounced. Again, the impact on the average current EU economy's

Structural expenditure to GDP ratio is more or less zero. However, the average CEEC's ratio rises from zero (in 1995/96) to about 2.7 percentage points in this counterfactual scenario. The result is a redistribution of the 1995/96 FDI stocks from the current EU to the CEEC by about 2.6 percentage points (an increase by 43%-100% for the CEEC). In absolute terms, this is again mostly at the expense of Ireland's and Portugal's inward FDI and in favor of Czech Republic's and Hungary's inward FDI, although one also observes considerable gains of the remaining accession countries. According to the simulation results, every current EU economy but Greece loses FDI-shares in the 2007/08 scenario. However, with the exception of Ireland and Portugal the reduction will not be higher than 2%.

5 Conclusions

According to Agenda 2000, the EU-enlargement leads to a reallocation of Structural 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, without changing the overall volume too much.

Based on the proximity-concentration trade-off as formulated in the theory of trade and horizontal multinationals, this paper formulates a gravity FDI distribution model to estimate the impact of the Structural and Cohesions Funds reallocation on the distribution of OECD FDI into the current

EU and the CEEC. Our estimates imply that an increase in the Structural and Cohesion expenditures to GDP ratio by one percentage point raises the average country share in real stocks of FDI by 0.97 percentage points. 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 Hungary, Poland, the Czech Republik and Slovenia and estimates an increase in FDI shares of these countries by 0.8 percentage points (implying an increase in their shares by about 30%). This is mostly at the expense of FDI to Ireland and Portugal and in favor of FDI in the Czech Republic and Hungary. In the second scenario, which includes 7 accession countries, the effects are considerably more pronounced, raising the average CEEC's Structural Funds to GDP ratio from zero (in 1995/96) to about 2.7% and its share in FDI stocks by about 2.6 percentage points. In the simulations, every current EU economy but Greece loses FDI-shares, but, except for Ireland and Portugal, the decrease will not exceed 2%.

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Table 1 - Regression Results

Explaining variables	Equation (1)		Equation (2)		Equation (3)		Equation (4)	
	β	t	β	t	β	t	β	t
Structural funds expenditures in % of GDP (s)	23.32	2.39 **	18.90	1.91 *	24.91	2.81 ***	21.44	2.51 **
Sum of bilateral real GDP (G)	2.02	3.23 ***	2.13	2.97 ***	1.92	2.87 ***	1.95	2.59 **
Similarity in real bilateral GDP (S)	0.99	2.19 **	0.66	1.41	1.05	2.3 **	0.57	1.19
Bilateral difference in capital to low-skilled labor ratio (k)	0.66	1.53	0.66	1.14	0.87	2.11 **	0.69	1.2
Bilateral difference in high-skilled to low-skilled labor ratio (h)	-0.29	-0.67	-0.50	-0.95	-0.45	-1.07	-0.57	-1.15
Bilateral transportation costs (t)	-0.19	-1.37	-0.14	-0.82	-0.15	-1.23	-0.07	-0.45
Observations	878		615		870		610	
Cross-sections	168		127		168		127	
R^2	0.98		0.98		0.98		0.98	
ρ	0.54		0.50		0.63		0.63	
σ_e	0.46		0.44		0.41		0.37	
Time effects: F-test		2.55 ***		1.70 *		1.97 **		1.44
		(11,693)		(11,471)		(11,685)		(11,466)
Bilateral effects: F-test		12.99 ***		12.13 ***		10.66 ***		9.07 ***
		(167,693)		(126,471)		(167,685)		(126,466)
Autocorrelation: modified Durbin Watson (Bhargava et al., 1982)		0.99		1.12		0.84		0.88

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

Table 2 - Simulating the Impact of the Reallocation of Structural Funds on Stocks of FDI into the EU

	Reference period 1995/96			2005/06 scenario versus 1995/1996			2007/08 scenario versus 1995/1996		
	Structural funds to GDP ratio	FDI share in all reported countries	Marginal impact of a on percenatge point change of Structural Funds 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 poins	Percentage point change	Percentage point change	Percentage point change	in % [a)]	Percentage point change	Percentage point change	in % [a)]
Belgium-Luxembourg	0.10	14.06	2.59	-0.01	-0.01	-0.07 ***	-0.02	-0.25	-1.78 ***
Denmark	0.07	1.76	0.37	-0.01	0.00	-0.23	-0.02	-0.03	-1.66 ***
Germany	0.13	10.07	1.94	0.06	0.13	1.31 **	0.05	-0.03	-0.30 **
Finland	0.18	0.65	0.14	0.02	0.00	0.59 ***	0.02	-0.01	-0.94 ***
France	0.13	10.40	2.00	0.01	0.02	0.23 **	0.00	-0.14	-1.30 ***
Greece	1.87	0.43	0.09	0.38	0.04	8.47 ***	0.17	0.01	2.28 ***
UK	0.16	21.61	3.63	-0.02	-0.09	-0.39 ***	-0.04	-0.46	-2.11 ***
Ireland	1.66	4.46	0.91	-1.34	-1.11	-24.93 ***	-1.47	-1.25	-28.00 ***
Italy	0.27	5.13	1.04	0.06	0.07	1.34 ***	0.04	-0.02	-0.41
Netherlands	0.08	18.66	3.25	0.01	0.07	0.36 ***	0.01	-0.22	-1.16 ***
Austria	0.11	2.22	0.47	0.00	0.00	0.08	0.00	-0.03	-1.41 ***
Portugal	2.55	0.91	0.19	-0.23	-0.04	-4.81 ***	-0.54	-0.11	-12.00 ***
Sweden	0.06	2.23	0.47	0.05	0.02	1.10 ***	0.03	-0.01	-0.63
Spain	1.05	4.39	0.90	0.10	0.10	2.20 ***	0.02	-0.04	-0.83 **
Hungary	0.00	1.00	0.21	1.21	0.30	29.72 ***	3.13	0.93	93.25 ***
Poland	0.00	0.53	0.11	1.21	0.16	29.64 ***	3.11	0.49	92.26 ***
Czech Republic	0.00	0.83	0.18	1.25	0.26	30.91 ***	3.28	0.82	99.53 ***
Bulgaria	0.00	0.02	0.00	0.00	0.00	0.08	1.94	0.01	49.55 ***
Romania	0.00	0.08	0.02	0.00	0.00	0.08	1.74	0.04	43.20 ***
Slovak Republic	0.00	0.24	0.05	0.00	0.00	0.08	1.95	0.12	49.87 ***
Slovenia	0.00	0.31	0.07	1.18	0.09	29.01 ***	2.09	0.17	54.37 ***
West	0.25	96.99	1.38	0.06	-0.80		0.04	-2.58	
East	0.00	3.01	0.09	0.88	0.80		2.69	2.58	
Total	0.25	100.00	0.97		0.00			0.00	

a) p-values are estimated by Monte Carlo Simulations with 10000 repetitions using the parameters of Model (4).

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