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**The Determinants of FDI in the Central and Eastern Europe:
The Impact of the European Integration**

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Abstract: The amount of FDI inflows to the Central and Eastern Europe increased dramatically during the last two decades. This article is aimed at identifying the ability of the Central Eastern European countries to attract FDI in the context of European integration, and at estimating the most important factors that influence the decision of foreign investors to invest in the region. Despite the broad research has been devoted to define the FDI determinants, the literature dealing in particular with the role of the European Union in the mobilization of FDI is rather scarce, and these findings are very discrepant. In order to understand factors that influence the location of FDI, we employ an empirical model for the period of 1992-2013 for twenty CEE countries. This study reveals that the most important determinants of FDI in CEECs are the market size, cost of labor and the European integration. The results of the research can be used to estimate the effect on FDI inflows from a prospective additional Eastern expansion of the EU by the countries currently not within the EU.

Keywords: FDI; transition economies; EU accession; panel econometrics

JEL Classification: F15; F21; C33

1 Introduction

After the fall of communism in 1991, the transition economies in Central Europe, Southeast Europe, and Eastern Europe have experienced a unique type of political and economic change in modern time. Following liberalization policies initiated by most of the CEE countries in 1990s, the post-soviet countries started dynamically integrating into the world economy and in particular in the EU. The time of the integration coincided with the increase of the importance of the FDI.

These countries have been great attention of developed and emerging economies associated with moving FDI into this region, and the integration with the EU can be viewed as a determining element of the operating business environment. However, after more than two decades from the beginning of transition of former centrally planned economies in Europe it is still difficult to assess the most important factors that influence the decision to invest in a particular country, because each country started its own transition course with a different economic potential, policies, and resource endowments.

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However, while there has been broad research devoted to study the determinants of FDI in developed and developing countries, very little has been done on this issue for transition economies, especially for those integrating into the EU.

2 Related Work

The problem of the effective mobilization of FDI in the leading countries of the region has not been fully investigated yet, and the obtained results contradict each other in many findings.

In general, many results confirmed that market access is considered to be the most important factor in investment decisions, with factor costs playing a lesser, although in many cases, still significant role (Klaus, 1995; Lankes and Venables 1996; etc). The influence of labor costs on FDI is found to be inconclusive: some studies find it relevant while others find it insignificant. However, Merlevede and Schoors showed that the impact of the relative unit labor cost becomes more important during a transition period, (Merlevede and Schoors, 2004) .

Literature dealing in particular with the role of the European Union in the mobilization of FDI is rather scarce. This scarcity is primarily due to the short period of the involvement into integration with the EU, which began only two decades ago.

Thus, Holland and Pain suggested that the effect of a prospective EU membership reduces the investor's perceived level of country risk within the CEE (Holland und Pain 1998), . Bevan and Estrin investigated the effect of the European Union's enlargement process on foreign direct investment in the CEE countries and showed that announcements impacted directly upon FDI receipts (Bevan and Estrin, 2000). Clausing and Dorobantu and Hakan, Oğus, Ayla indicated that the EU announcements had statistically significant and quantitatively important effects on foreign direct investment in the CEE states (Güngör and Oğus, 2010; Clausing and Dorobantu, 2005).

However, P. Brenton, F. DiMauro, M. Lücke, B. Kaminski showed that EU membership did not appear to influence FDI flows in a statistically significant way (Brenton et al., 1998; Kamiński, 2001). J.W.B. Bos, and M. Van de Laar studied an announcement effect on FDI from the Netherlands for the ten EU accession countries in CEE. There was also no evidence that the announcement effect exists (Bos und Laar, M. van de, 2004). Some considerable part of studies are devoted to the other type of integration such as concluding of bilateral and multilateral trade agreements. D. Medvedev found that PTA membership was associated with a positive change in net FDI inflows (Medvedev, 2006). A. Seric presented an attempt at determining how the Central European Free Trade Agreement (CEFTA) and the Baltic Free Trade Area (BAFTA) influence the location of FDI (Seric, 2011). E. Hengel illustrated how trade integration and institution building are conducive to higher FDI in South East Europe (Hengel, 2011). It was to be viewed as a complement to the work of A. Seric by extending the analysis to SEE countries.

The existing literature does not clearly indicate whether the integration with the European Union changes the amount of FDI received by the CEE countries.

3 Problem Statement

The overview of the existing literature showed that the most of the studies that are aimed at the estimation of the effects of the EU accession on FDI inflows consider almost the same group of countries - the ten EU-accession countries from CEE (Bulgaria, Czech Republic, Hungary, Latvia,

Lithuania, Poland, Romania, Slovak Republic, Slovenia, Estonia). These findings nowadays can be used with a great concern, because current integration of the CEE countries with the EU includes additional ten countries that differ a lot from first-wave and second-wave accession countries in many macroeconomic characteristics and liberalization progress. Moreover, the research foundation almost does not include the studies devoted to estimating the FDI determinants in the Southeastern Europe and completely do not examine former Soviet states. In our paper, we include Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Moldova, Montenegro, Poland, Romania, Russian Federation, Serbia, Slovak Republic, Slovenia, TFYR of Macedonia, Ukraine. Belarus, Moldova, the Russian Federation and Ukraine are included as “control countries” to find the net effect of the integration with the EU. The most important limitation of the previous researches is the absence of a complex study that includes all the steps and types of integration with the EU. Previous studies investigated either the FTA or accession to the EU. We indicate 3 types of collaboration according to the tightness of relations: the free trade agreements (trade liberalization), Association Agreements (regulate economic, political, social and cultural aspects), and the EU-accession.

4 Variables

In order to understand factors that influence the location of FDI in the CEE we employ an empirical model. The data used comprise a panel of 22 transition CIS countries between 1992 and 2013. Year 2014 is not included in this study, because sources used to pool the data for independent and dependent variables are not sufficient. For the summary of data see Table 2.

Table 1. Descriptive Statistics

	Correlation with LNFDI	Mean	Standard Error	Median	Minimum	Maximum	Count
LNFDI	1,00	6,49	0,10	6,65	-6,91	11,28	423
LNGDP	0,74	10,21	0,07	10,10	7,07	14,58	423
GDPPC	0,41	5,89	0,26	4,03	0,28	26,84	423
GDPGR	0,12	2,36	0,37	3,80	-34,63	54,20	423
OPEN	0,17	101,36	1,72	101,44	0,00	191,65	423
WTO	0,39	0,56	0,02	1,00	0,00	1,00	423
LNRER	0,18	2,20	0,11	2,05	-7,35	9,09	423
SER	0,51	44,90	1,04	43,07	0,47	101,29	423
RES	0,28	3,48	0,28	1,79	0,09	44,53	423
LNWAGE	0,54	5,73	0,05	5,95	2,32	7,84	423
FTA	0,12	0,35	0,02	0,00	0,00	1,00	423
Aasig	0,10	0,38	0,02	0,00	0,00	1,00	423
Aafor	0,15	0,26	0,02	0,00	0,00	1,00	423
Poten	0,04	0,10	0,01	0,00	0,00	1,00	423
Candid	0,01	0,09	0,01	0,00	0,00	1,00	423
Acces	0,14	0,10	0,01	0,00	0,00	1,00	423
Acced	0,11	0,05	0,01	0,00	0,00	1,00	423
EU	0,32	0,21	0,02	0,00	0,00	1,00	423
Euro	0,01	0,04	0,01	0,00	0,00	1,00	423

The independent variables include GDP and GDP per capita, and GDP growth rate to identify the market-seeking investment. The figures are drawn from UNCTAD databases. Since GDP, GDP per capita and GDP growth rate are used as an indicator of the economic conditions and market potential for the output of foreign companies, the expected sign is positive.

We include in our model trade openness and membership in the WTO, which can be interpreted as a measure of the absence of trade restrictions. These proxies are important for foreign investors who are motivated by the export markets. It is widely believed that international trade openness promotes FDI, however, we suppose that FDI can substitute international trade, that is why the sign of the proxies is ambiguous. The trade openness made available from UNCTAD database and WTO membership from the WTO official website.

The average wages estimate the cost of the labor force. The sign of the wages is also ambiguous. On the one side, the investors could be driven by a cheap labor cost; on the other side, high wages also stand for high purchasing power. Our data for average wages come from UNECE databases and from ILO and ILOSTAT Databases. The general tertiary school enrollment rate indicates the quality of the labor force. We expect a positive impact of this factor. The data for tertiary school enrollment rate come from World Bank's World Development Indicators.

Total natural resource rents estimate the endowments of natural resources. The resource rent of a natural resource is the total revenue that can be generated from the extraction of the natural resource, less the cost of extracting the resource, it is the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents. As posited by the eclectic theory countries that are rich in natural resources would receive more resource-seeking FDI. The data are gathered from World Bank's World Development Indicators.

To assess the efficiency of the economies, we include in our model exchange rates. We suppose, that high exchange rate means the weak competitiveness. The exchange rates are taken from UNCTAD.

The last group of explanatory variables is used to show the effects of the integration with the European Union. To proxy the effects of the integration with the EU we include in our regression model 9 dummy variables: the membership in CEFTA or BAFTA, the signing of the Association Agreement, entry into force of the Association Agreement, application for membership, granting the candidate status, the start of negotiations, the signing of the Accession Treaty with the EU, membership in the EU, and Euro area membership. The value 1 indicates that a country was approved for a particular stage of the integration, and 0 displays that the stage has not been reached yet. We expect to observe the same effect of membership in a FTA as for trade openness. Other EU integration proxies are supported to have a positive influence on FDI inflows, because integration into EU results in improvement of institutions and investment climate.

Often the distribution of values has econometric asymmetry. The use of the logarithm allows to reduce it. Moreover, in some cases the logged values bring closer the distribution of the residuals to the normal one. That is why we use logs for all natural values. Interior missing data are replaced by linear interpolation. Table 1 provides basic information about all variables.

5 Model

On the first step of our analysis, we employ four basic techniques to analyze panel data: the pooling model, the fixed effects model, the between and the random effects model.

The basic linear panel models used in econometrics can be represented in the following form:

Equation 1 The basic linear panel model

$$y_{it} = \beta_0 + \beta x_{it} + v_{it}, i = 1, \dots, N, t = 1, \dots, T$$

Where i is a country, t is a year, β_0 is an absolute term, β is a vector of the factor coefficients, x_{it} ($x_{1,it}, x_{2,it}, \dots, x_{n,it}$) is a vector of explanatory variables.

Equation 2 The error term structure

$$v_{it} = u_i + \varepsilon_{it}$$

The error term has two separate components, one of which is specific to a country and does not change over time. The individual component may be either independent from the factors or correlated with them. The residual ε_{it} is assumed to be independent from both the factors x_{it} and the individual error component u_i (Yves Croissant und Giovanni Millo 2008).

Our empirical equation has the next form:

Equation 3 Empirical Model

$$\begin{aligned} \text{LNFDI}_{it} = & \beta_0 + \beta_1 \text{LNGDP}_{it} + \beta_2 \text{GDPGR}_{it} + \beta_3 \text{GDPPC}_{it} + \beta_4 \text{OPEN}_{it} + \beta_5 \text{WTO}_{it} + \beta_6 \text{LNRER}_{it} \\ & + \beta_7 \text{SER}_{it} + \beta_8 \text{RES}_{it} + \beta_9 \text{LNWAGE}_{it} + \beta_{10} \text{FTA}_{it} + \beta_{11} \text{Aasig}_{it} + \beta_{12} \text{Aafor}_{it} \\ & + \beta_{13} \text{Poten}_{it} + \beta_{14} \text{Candid}_{it} + \beta_{15} \text{Acces}_{it} + \beta_{16} \text{Acced}_{it} + \beta_{17} \text{EU}_{it} + \beta_{18} \text{EURO}_{it} \\ & + v_{it} \end{aligned}$$

When the **pooling model (Pool)** is used, the panel structure of the data is ignored and it does not take this special error structure into account. The estimations of the pooling model would give inconsistent results because of the correlation between y_{it} and v_{it} . Therefore, the estimations of β_0 and β are biased (Yves Croissant, Giovanni Millo, 2008).

The **between model (BE)**, which is computed on time averages of the data, allows to estimate the individual effects in the variability of the predictor. This regression consists of averaged in time variables which are estimated by OLS (Yves Croissant, Giovanni Millo, 2008).

In the **fixed effect model (FE)** the residual ε_{it} is independent and equally distributed random variable and u_i is fixed, and it does not change over time. Fixed effect model removes the inconsistency because it includes the individual effect of the countries (Yves Croissant, Giovanni Millo, 2008).

The **least square dummy variable model (LSDV)** helps to understand fixed effects model. This model includes a set of dummy variables, which identify the countries and hence additional parameters. The estimations of the LSDV are numerically identical with the FE model therefore consistent under the same assumptions (Yves Croissant, Giovanni Millo, 2008).

The least square dummy variable model has too many factors. The loss of the degrees of freedom can be avoided if we assume that individual effects u_i are random. This type of model is called the **random effect model**. The random effects model assumes that u_{it} is between-entity error and ε_{it} within-entity error. The major disadvantage of this model is driven by the assumption that, the unobserved effect u_i is uncorrelated with each independent variable (x_{it}) (Yves Croissant, Giovanni Millo, 2008).

In our model, the relation between FDI and GDP attracts special attention in the empirical studies. As a matter of fact, high market potential attracts more FDI. Foreign investors add capital stock in the host country, what in the issue stimulates the economic growth. That is why there is a problem of the

endogeneity between FDI and GDP. To eliminate the endogeneity we use **the two-stage least square regression** on the second stage of our analysis.

The two-stage least squares model includes problematic an endogenous variable correlated with the error term, additional factors that are not correlated with the error term, and instrumental variables correlated with the endogenous variables, but uncorrelated with the error term.

Our choice of instruments includes the following variables: the lagged value of the LNFDI, year, consumer price index, the logarithm of the population and the average of the EBRD transition indicators. They are pure instrumental variables and were not included in the model. GDP growth rate, membership in the WTO, abundance of natural resources, school enrollment rate, exchange rate, wages and all European integration dummies are not correlated with the error term and also can be used as instrumental variables.

6 Analysis of Results

In columns 1 to 4 of the table 2 we represented the results from one-stage least square analysis. First, consider column 1, the pooling model. In whole, almost all variables enter the regression with expected signs in addition to their statistical significance. The adjusted R-squared for the pooling model indicates that the variables included explain approximately 70 percent of the variation in FDI inflows in a country. However, the pooling method is unsuitable since it fails to control the country specific effects. Comparing pooling and fixed effects model we should admit that the quality of the model has improved with the adding of dummy variables as adjusted R-squared has increased.

In the between model almost all coefficients are insignificant, moreover the adjusted R-squared is 13,6 per cent. In general, the between effects model is mostly used as an auxiliary analysis.

Equation 4 estimates the random country-effects estimation. The results are consistent with those in column 1 and 2. However, the interpretation of the coefficients is tricky since they include both the entity and between-entity effects.

We used F-test and Wald test to show, that the fixed effect model is more preferable than the pooling model. The Breusch-Pagan Lagrange multiplier (LM) test helps to decide between the random effects regression and the pooling model. Here we reject the null hypothesis and conclude that random effects are more appropriate, since there are differences across countries. The Hausman test allows us to choose between the fixed or random effects model. It is safe to say that the individual effects in our model are strong. This proves the necessity to explore the fixed effect model.

Table 2 Econometric Analysis

	Pooled		LSD and FE		BE		RE		2SLS FE	
Constant	-7,347	***	-9,706	***	-3,0745		-7,541	***	-24,139	**
LNGDP	0,9185	***	10905	***	0,4708	.	0,9158	***	28784	*
GDPPC	-0,121	***	-0,075	*	0,0838		-0,121	***	-0,6812	**
GDPGR	-0,005		-0,004		-0,18	*	-0,004		-0,0146	
OPEN	0,0084	***	0,0078	*	0,0194	*	0,0084	***	0,0149	
WTO	0,4646	*	-0,331		-0,9862		0,3165	.	-0,5144	.
LNRRER	0,0921	**	0,3452	***	-0,3508	*	0,1082	***	0,2335	*
SER	0,0025		-0,023	*	-0,0027		0,0025		0,0042	
RES	0,0397	**	0,0257		0,0683	.	0,0382	**	0,022	

LNWAGE	0,5717 ***	0,8399 ***	0,7283	0,6172 ***	0,8697 **
FTA	0,3228	-0,098	-1,6723	0,258	-0,8496
Aasig	0,0497	0,4294 .	-2,8623	0,0743	0,3571
Aafor	-0,216	0,2998	11,7 *	-0,161	0,2547
Poten	0,442 *	0,2213	5,4443 *	0,4235 .	0,717 *
Candid	0,3287	0,3319	-9,8048 *	0,3909	0,8974 *
Acces	0,409	0,5128 *	-2,6988	0,4414 .	1,1557 **
Acced	0,329	0,5966 .	-2,6988 .	0,3632	1,2186 *
EU	0,6231 *	1,1925 ***	0,6614	0,6615 *	2,7606 ***
Euro	-0,186	1,4802 **	-2,731	-0,048	4,6564 **
df	404	383	18	404	
R-squared	0,7057	0,9803	0,9945	0,6824	0,635
Adjusted R-squared	0,674	0,9782	0,1356	0,6518	0,5979
Hausman test (p-value)		0	***		
Breush-Pagan LM (p-value)				0	***
F-test (p-value)		0	***		
Wald test		0	***		
Wu-Hausman (p-value)					0,0018 ***
Sagran (p-value)					0,0006 ***

Signif. codes: 0 ‘***’ 0,001 ‘**’ 0,01 ‘*’ 0,05 ‘.’ 0,1 ‘.’ 1

In column 5, we reported results from **the two-stage least squares fixed effect model**. The results are mostly consistent with one-stage fixed effect model, but a few changes are noteworthy.

The coefficient of GDP reflects theoretical expectations. Also of high statistical significance are the average wages, the positive sign indicates the high consumption power. Thereby, flows are expected to be greater in larger economies with high consuming capacity.

The WTO and FTA have negative sign – this supports the assumption, that foreign trade is replaced by FDI after integration in the EU. The Student-t confirms that the variables are significant.

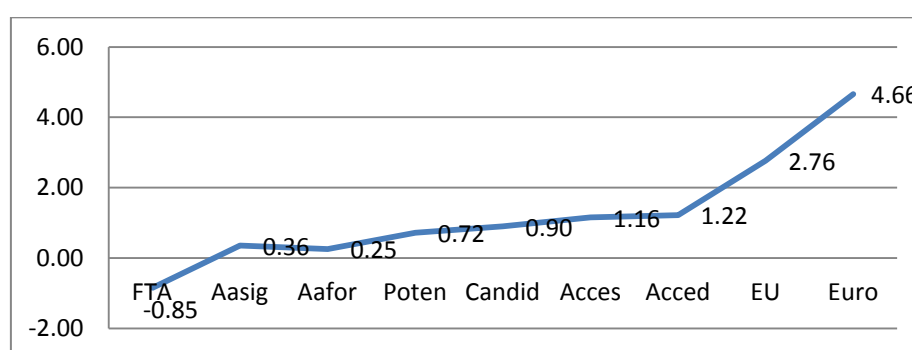


Figure 1. The Coefficients of the Integration Stages

Finally, we found the effects of EU accession starting from the application for a membership are positive and statistically significant. The significant result of the variables supports the hypothesis that even deeper EU integration of the CEE countries contributes the greater increase of FDI inflows (see Figure 1). The results also enforce our expectation that the efficiency-seeking FDI dominate the region during the time-horizon. From this point of view, it can be inferred that economic integration has a direct and positive effect on FDI flows.

7 Future Work

A suggestion for future studies would be to investigate the significance of the factors not analyzed in this study such as corporate taxes, structural reforms and their relevance as FDI determinants. As well it would be interesting to make special calculations for groups of countries to identify the factors of FDI in sub-regions.

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