

An Empirical Investigation of the Determinants of Foreign Direct Investment in the Central and Eastern European Countries Using Multi-level Data

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Simona Rasciute

Department of Economics, Loughborough University, Loughborough, Leicestershire,
LE11 3TU, UK

Tel. +44 79 5837 3535; E-mail: S.Rasciute@lboro.ac.uk

Supervised by: Dr. Helena Marques
Prof. Eric Pentecost

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ABSTRACT

In order to incorporate FDI factors for different MNEs, industries and countries, a unique dataset that includes country-, industry- and firm- level data is constructed. This approach avoids the aggregation or disaggregation problem by considering several levels of data simultaneously in to the analysis. The constructed database contains information on 1,223 foreign investment made by EU15 countries and other major investors in CEE (Japan, Norway, Russia, Switzerland and US) in 12 CEECs, namely 10 new EU member states (except for Malta and Cyprus) and Bulgaria, Croatia, Romania and Ukraine. This paper analyses two main questions. First of all, to what extent do different level determinants explain the size of investment at firm level? For this purpose OLS regression is used and it can be concluded that all firm- and industry-level and some country-level factors can explain the size of investment at firm level. Hence, the insignificance of some country-level variables is not a sufficient argument to dismiss them from the analysis: those variables may not influence the size of the investment at the firm level, but they can affect the choice to invest or not in a particular country. As a result, the second question is raised, where do MNEs choose to locate in CEE? The results confirm that the responsiveness of FDI in CEECs to country-level variables differs across sectors and across firms of different sizes and profitability.

1. Introduction

There has been a significant increase in the flows of foreign direct investment (FDI) to Central and Eastern European countries (CEECs) since 1990s when many of the countries started their transition period from planned to market economies. This growth in foreign investment is also thought to be driven by the process of integration of CEECs into the European Union (EU) and the corresponding elimination of barriers to trade and foreign investment.

The CEECs are, however, not homogeneous and accordingly the stock of FDI differs across countries. Although the Central European countries with favourable initial conditions, such as Czech Republic, Slovenia, Poland and Hungary, have attracted a substantial amount of foreign capital, more risky and poorer performing CEECs are still behind. This discrepancy cannot be explained by traditional FDI determinants, such as market size, trade costs, input costs and relative factor endowments, because transition-specific factors, such as the level and method of privatization, share of private business, risk associated with each host country play an important role in the investment decision of multinational companies. Carstensen and Toubal (2004) note that investment in one of the better performing countries guarantees access to all of their markets and to the nearby European Union. Furthermore, they are characterized by a low country risk, high share of private businesses and high level of reform. On the other hand, in such countries as Bulgaria and Romania, the slow progress towards the market economy has impeded FDI flows, despite them having the lowest labour costs in Central and East Europe.

The complexity of the international business environment does not allow a single model to fully incorporate all FDI factors through time, for all MNEs, industries and countries. "FDI is a firm level decision, one that evolves from the firm's idiosyncratic strategic objectives in the prevailing international business environment" (Sethi, 2002). Aggregating across firms of different sizes and firms operating in different sectors assumes an average firm which does not exist (Buch et al., 2005). On the other hand, FDI trends indicate that the investments by MNEs are usually concentrated in a particular

region and industry despite variations in individual investment decisions, indicating that country level factors, as well as industry specific determinants also effect FDI decisions.

Most of the empirical FDI literature however, is based on aggregate data, due to the lack of detailed data at the industry and firm-level. In order to incorporate FDI factors for different MNEs, industries and countries, a unique dataset that includes country-, industry- and firm- level data is constructed. This approach avoids the aggregation or disaggregation problem by considering several levels of data simultaneously in to the analysis. The constructed database contains information on 1, 223 foreign investment made by EU15 countries and other major investors in CEE (Japan, Norway, Russia, Switzerland and US) in 12 CEECs, namely 10 new EU member states (except for Malta and Cyprus) and Bulgaria, Croatia, Romania and Ukraine. In order test how different level variables affect the size of investment at the firm level and the choice of MNEs to invest in a CEEC, both OLS regression and CLogit model are used.

The remainder of the paper is organised as follows. Section 2 provides an overview on the related literature. Section 3 reviews the econometrical model. Section 4 presents the data. Section 4 analysis main results. Finally, the key findings are summarized and policy implications are presented in the last section.

2. Related Literature

An extensive empirical literature exists why firms become multinational, however there is still lack of detailed analysis where firms choose to locate their investment. Most of empirical studies on industry location choice rely on discrete choice methodology. The growing popularity of discrete choice methodology is based on the fact that the econometric specification is obtained directly from the random utility maximization framework (Pusterla and Resmini, 2005). The conditional model used in spatial probability choice modelling is based on Carlton, (1983) where firms simultaneously make decisions as to where to locate and how many employees to hire, taking into

account a close link between location and firm size. McFadden, (1974) developed conditional logit analysis of population choice behavior from the distribution of individual decision rules. It was assumed that all the utility maximizing economic consumers in a population have a common behavior rule, except for purely random ‘optimization’ error. McFadden assumed that these “random errors” have a specific statistical distribution in the population. Various studies since then have researched location choices of foreign investors, mostly in manufacturing, using discrete choice methodology (Barrios et al., 2004; Basile, 2003; Becker et al., 2004; Békés, 2004; Disdier and Mayer, 2004; Guimaraes et al., 2000; Head et al., 1999).

Location choice determinants can be classified into four larger groups: demand of the host country, factor costs, the number of domestic and foreign firms operating in the same location (agglomeration effect) and public policies designed to attract firms (Crozet et al., 2004). Local market together with political, economic and legal environment are the main factors why MNEs locate in CEECs, while productions costs advantages do not appear as a dominant motivation for investing (Bevan et al., 2004; Disdier and Mayer, 2004). (Disdier and Mayer, 2004) find that in the early days of transition the distinction between Eastern and Western European countries is important for the location choice of the investors, but, as a transition process goes on, investors consider the countries more and more similar.

3. Theoretical Model

The Conditional Logit model allows the estimation of how nominal outcomes are affected by the characteristics of the outcomes that vary across individuals. The dependent variable is a CEEC in which a firm decides to locate its investments. The effect of a country’s characteristics on an investment choice are estimated, however country characteristics vary for each investing firm and industry. The level of profit of firm i (where $i \in \{1, \dots, I\}$) located in sector s (where $s \in \{1, \dots, S\}$) in country c

(where $c \in \{1, \dots, C\}$ depends on the investing firm, host country and industry characteristics:

$$\Pi_{csi}(i, s, c) = \alpha + \beta a_{csi} + \gamma c_{cs} + \lambda d_c + \varepsilon_{isc}$$

Where d_c denotes a vector of location-specific variables; b_{cs} stands for a vector of industry characteristics interacted with country characteristics, and a_{csi} denotes a vector of investing firm characteristics interacted with host industry and country indicators. The error term ε_{isc} has a I type extreme value (Gumbel) distribution, which gives slightly fatter tails compared to a Normal.

The investor will choose country c provided the following condition holds for $\forall l \neq c$:

$$\text{Prob}[\pi_{ijs}(c) < \pi_{ijs}(l)] = \text{prob} [\varepsilon_{isl} < (\varepsilon_{isc} + \alpha_c + \beta a_{csi} + \gamma c_{cs} + \lambda d_c - \alpha_l - \beta a_{lsi} - \gamma c_{ls} - \lambda d_l)] \quad (1)$$

The investor's probability of firm i selecting host industry s and country c is

$$P_{cis} = \frac{\exp(\beta a_{csi} + \gamma c_{cs} + \lambda d_c)}{\sum_{l=1}^C \exp(\beta a_{lsi} + \gamma c_{ls} + \lambda d_l)} \quad (2)$$

The probability $P_{c(i,s)}$ is the logit model itself. Estimation is carried out by maximising the log-likelihood:

$$\log L = \sum_{i=1}^I \sum_{s=1}^S \sum_{c=1}^C n_{isc} \log P_{c(i,s)} \quad (3)$$

where n_{isc} denotes the number of investments carried out by firm i in sector s and in country c .

4. Data

Country-specific determinants of FDI are divided into traditional determinants, namely market size, distance between investing and investment receiving country and unemployment rate, and transition-specific determinants, such as risk associated with each host country. Industry-specific explanatory variables include industry dummy variables for scale-intensive industries and industry-specific wages. Characteristics of individual investing firms can also have an influence on FDI distribution across countries and sectors. Large firms are expected to dominate scale-intensive sectors and to be more sensitive to market size and efficiency considerations, while small and medium enterprises prefer to invest in countries with strong historical ties and similar culture and language. The degree of internationalisation is largely determined by the size of the firm, since larger firms tend to be more profitable and productive and higher productivity increases the probability of setting up a foreign affiliate (Buch et al., 2005).

Denoting an investing firm by m and investment receiving firm by n , the source country by i and the host country by j , and finally an industry by k , the following specification is estimated:

$$Deal_{mn} = \beta_0 + \beta_1 Dist_{ij} + \beta_2 Pop_j + \beta_3 GDP_j + \beta_4 Corrupt_j + \beta_5 EU_{ij} + \beta_6 Export_j + \beta_7 Industry_{kj} + \beta_8 Wage_{kj} + \beta_9 Turnover_n + \beta_{10} EBIT_n + u_{mnik}$$

where

Deal_{mn} - financial deal (acquisitions, joint ventures, institutional buy-outs, etc.) value in Euros between firm n and m .

Distance_{ij} – distance between the capital cities of the source country i and the host country j in kilometres.

Pop_j – population of the host country j averaged over the period of time from 1997 to 2003.

GDP_j – Gross Domestic Product of the host country j averaged over the period of time from 1997 to 2003.

Corrupt_j – Corruption perception index of the host country j averaged over the period of time from 1997 to 2003.

EU_{ij} - dummy variable that takes a value 1 if the investing and investment receiving countries belong to EU, and 0 otherwise.

Export_j – exports of country j as a percentage of GDP averaged over the period of time from 1997 to 2003.

Unemploy_j - unemployment rate of country j (percentage per annum) averaged over the period of time from 1997 to 2003.

Industry_k – dummy variable that takes a value 1 if the industry k is an intensive scale industry, and 0 otherwise.

Wage_{kj} – hourly wage rates in the industry k in the country j averaged over the period from 1997 to 2003.

Turnover_j – turnover of the investment receiving firm n in Euros in most recent years.

EBIT_n – earning before interest and taxes of the investment receiving firm n in Euros in most recent years.

u_{mnijk} - is a log-normally distributed error term with $E(u_{mnijk})=0$.

A cross section estimation technique is applied using Stata 9 software. In order to check for the location choices of the firms in the CEECs, a Conditional Logit (CLogit) model has also to be applied. The specific aspects of the dataset restrict the analysis to the cross-sectional one, as some of the variables are stationary. Choice of entry is a one-shot event rather than an ongoing process as often described in the business literature (Sinani and Jensen, 2005).

Firm-level data on FDI flows is used from the firms of 19 market economies and other major investors in CEECs (EU15 countries, USA, Japan, Russia, Norway and Switzerland) to the firms in 12 transition economies (ten new EU member states (except for Malta and Cyprus) plus Belarus, Bulgaria, Croatia, Romania and Ukraine) from 1997 to 2003. In case of OLS regression, the dependent variable is the value of the deal measured in current Euros. The dependent variable, a financial deal value (acquisitions, joint ventures, institutional buy-outs, etc.), comes from Bureau van Dijk Zephyr database.

In Clogit model the dependent variable is a CEEC, in which MNEs choose to locate their investment.

In order to capture market size of a host country the GDP variable is used. The parameter of the variable is expected to be positive. The data for the host countries' gross domestic product come from the International Financial Statistics (IFS) database compiled by the International Monetary Fund (IMF).

Bevan and Estrin (2004) note that distance can be considered as a measure of the transaction costs of undertaking foreign activities, such as the costs of transport and communications, the costs of dealing with cultural and language differences, the costs of sending personnel abroad, and the informational costs of institutional and legal factors, e.g., local property rights, regulations and tax systems. These kinds of costs are assumed to increase with distance. Distance is measured by calculating a distance between source and host country capitals and expressed in kilometres¹.

Both theoretical and recent empirical investigations have shown the institutional, legal, political and macroeconomic environment, i.e. inflation, transparency and effectiveness of legal system, to be of importance for the decision of foreign investors to locate their capital abroad. A measure of the extent of corrupt practices in the country is used. It is a Transparency International Corruption Perception Index which pools information from ten different surveys of business executives, risk analysis and the general public. Transparency International corruption perception index, ranks countries in terms of the degree to which corruption is perceived to exist among public officials and politicians. It varies from 1 (high corruption) to 10 (no corruption). The parameter of the variable is expected to be negative.

In order to control for EU membership, an EU dummy variable is included in the analysis. It takes a value 1 if both investing and investment receiving countries belong to EU and 0 otherwise. The parameter of the variable is expected to be positive.

¹ The data is available from <http://www.indo.com/distance>

Much of the theoretical and empirical literature recognises the importance of the 'openness' of the economy to foreign investment, as foreign investors prefer countries with liberal trade regimes. In order to take this effect into account, investment receiving country's exports as a percentage of its GDP is also included in the econometric model. The data comes from World Development Indicators compiled by the World Bank. The sign of the parameter of this variable is expected to be positive.

High unemployment rates can have an ambiguous effect on MNEs' decisions to invest abroad. On the one hand, a high unemployment rate may mean that it is easy to recruit labour, though on the other hand, it could reflect a low local demand for the product and/or labour market rigidity (Carlton, 1983). Unemployment rate as a percentage per annum come from the International Financial Statistics (IFS) database compiled by the International Monetary Fund (IMF).

A sector dummy variable is included in order to control for the scale-intensive industrial sectors. It is expected that firms in scale intensive industries will attract relatively more investment. Scale-intensive sectors include typical oligopolistic large firm industries, with high capital intensity, wide economies of scale and learning, high technical and managerial complexity, such as automobiles, aircrafts, chemicals, petrol and coal products, shipbuilding, industrial chemicals, drugs and medicines, petrol refineries, non-ferrous metals and railroad equipment (Guerrieri, 1998; Midelfart-Knarvik et al., 2000).

Furthermore, industry level wages are included in the above mentioned specification as a proxy for costs for firms. The profitability of the firm investing abroad is expected to be higher if the capital and labour costs are lower in the source country than in the host country which is why the coefficient of labour costs are expected to have negative signs. Capital and labour costs are expected to be of importance especially for efficiency seeking investments. Industry-specific average hourly labour costs data and short term government bonds interest rates data are from Eurostat New Cronos Database.

The firm-level variables include the turnover of the firm as a proxy for its size and Earnings before interest and tax (EBIT), as a proxy of profitability. Both variables come from Bureau van Dijk Zephyr database. The parameters are expected to be positive, as the size of investment should be higher the bigger and the more profitable the firm is.

5. Results

The econometric analysis is carried out by starting with OLS regression with one layer of data (firm-level data), gradually combining all the three levels of data (Table 1). All the parameters of firm- and industry-level variables appear to be significant and of the expected signs. In the case of country-level variables, it is true only for distance, GDP and the Corruption Perception index of the host countries. As a result, specification 3 is chosen.

Larger and more profitable firms are expected to invest more. For example, an increase in investing firm's turnover by 1 Euro, would increase its foreign investment by 0.2 cents, other things being equal. An increase in investing firm's earnings before interest and tax by 1 Euro, would increase its investment by 1.4 cents, other things being equal. Positive and statistically significant dummy variable for scale intensive industries indicate that firms in scale intensive industries will attract relatively more investment. Industry level wages are negatively related to the size of foreign firms' investment, which proves that investments in CEECs are also efficiency seeking investment. Positive parameter of GDP variable and negative parameter of distance variable indicate that the size of investment is larger the larger is the host country's GDP and the closer the source and the host countries are.

Specifications of OLS regressions

Table 1

	1	2	3	4	5	6
Dist			-9111.4**	-7804.325	-8950.65**	-8950.6**
			{-2.10}	{-1.49}	{-2.06}	{-2.06}
GDP			0.000210***	0.001831		0.0004005
			{1.80}	{1.40}		{1.39}
Pop					-395275.9	-395275.9
					{-0.35}	{-0.35}
EU				1.04e+07		
				{0.45}		
Export					669600.5	669600.5
					{0.86}	{0.86}
Corrupt			2.07e+07**	1.83e+07	1.08e+07	1.08e+07
			{1.97}	{1.55}	{0.65}	{0.65}
Industry		3.4e+07**	5.07e+07*	5.11e+07*	5.06e+07*	5.06e+07*
		{2.30}	{3.03}	{3.04}	{3.02}	{3.02}
Wage		-554163.3	-1.59e+07***	-1.7+07***	-1.59e+07***	-1.59e+07***
		{-0.07}	{-1.61}	{-1.67}	{-1.6}	{-1.60}
Turnover	0.0027077*	0.0026462*	0.0025097*	0.0024863*	0.00024667*	0.0024667*
	{4.16}	{4.08}	{3.87}	{3.81}	{3.78}	{3.78}
EBIT	0.0151534*	0.0133132*	0.0143319*	0.0145498*	0.0145977*	0.0145977*
	{3.46}	{3.01}	{3.24}	{3.27}	{3.29}	3.27
R-squared	0.0908	0.1007	0.1157	0.1161	0.1171	0.1169
Adjusted R-squared	0.0873	0.0936	0.1035	0.1020	0.1013	0.1028

* Significant at 1 percent level

** Significant at 5 percent level

*** Significant at 10 percent level

Hence, the insignificance of some country-level variables is not a sufficient argument to dismiss them from the analysis: those variables may not influence the size of the investment at the firm level, but they can affect the choice to invest or not in a particular country. In order to check for the location choices of the firms in the CEECs, a Conditional Logit (CLogit) model is applied.

However, the CLogit does not allow for individual firm heterogeneity, for example, each decision maker faces 13 choices to locate his/her investment and chooses a particular firm in a particular industry and country. The problem arises, when firm-level explanatory variables have to be arranged. The value of the firm-level explanatory variables is observed only for the location that was chosen. However, firm specific characteristics on their own cannot explain the location choices and they have to be combined with other factors. As a result, the characteristics of investing firms are used and they are interacted with location characteristics.

The CLogit methodology is first used for one layer of data (country-level), gradually combining all the three levels of data (Table 2). All the parameters of country- and industry-level variables and some of the interaction terms appear to be significant and of the expected signs.

Furthermore, the signs of the parameters coincide with the ones estimated with OLS regression, however now more country-level variables are significant. Although such country-level variables as unemployment rate and EU membership do not explain the size of the firm-level investment, they still explain the location choice of MNEs in CEE. The preferred model in Table 2 is specification 2.

Specifications of Conditional Logit Model

Table 2

	1	2
GDP	1.40e-11* {22.57}	1.40e-11* {22.37}
Unemployment	-.047* {-4.25}	-.04408* {-4.06}
EU membership	.1905*** {1.62}	.2584* {2.15}
Distance	-.00095* {-11.85}	-.00098* {-12.07}
Corruption	.1531* {2.85}	.1732* {3.19}
Wages	-.1959* {-4.84}	-.2184* {-5.03}
Prof*Lend		1.49e-12*

Size*Wage		{3.73}
		-1.94e-12****
		{-1.44}
Scale*Dist		.000056***
		{1.77}
Tradit*EU		-.1691
		{-1.57}
Pseudo R-squared	0.1240	0.1252

* Significant at 1 percent level

** Significant at 5 percent level

*** Significant at 10 percent level

****Significant at 15 percent level

In the results presented in Table 2 (specification 2), the coefficients for the GDP of the investment receiving country, the distance between investing and investment receiving countries, industry-level wages of the host country and the Corruption Perception index of the host country are of expected signs and significance. This indicates that the higher the income of the host country and the closer it is to the source country, the lower the wages and the lesser the extent of corrupt practices in the host country, the more likely it to be chosen by MNEs to locate investment.

In contrast to the OLS regression result, in the results provided by Clogit such country-level variables as unemployment rate and the dummy variable for EU membership are statistically significant and of the expected signs. Negative and statistically significant parameter of unemployment rate in the host country indicates a higher unemployment could reflect a low local demand for the product and/or labour market rigidity. As a result, CEECs with higher unemployment rate are less likely to be chosen to locate investment. Furthermore, country's membership in the EU increases the possibility of being chosen by MNEs as an investment location.

The following interaction terms appear to be statistically significant: the interaction term between investing firm's profitability and annual lending rate in a host country² (Prof*Lend), the interaction term between investing firm's size and industry-level wages in the host country (Size*Wage), the interaction term between the dummy variable for scale-intensive industries and distance between the capital cities of the source and host country (Scale*Dist) and the interaction term between the dummy variable for traditional sectors³ and the dummy variable for EU membership of both source and host countries (Tradit*EU). The statistically significant interaction terms show, that even though FDI to CEE can be explained by a number of country-level variables, the responsiveness of FDI to those variables differ across sectors and firms of different sizes and profitability. For example, positive and statistically significant interaction term Prof*Lend indicate that more profitable firms are able to pay higher interest rates for loans abroad and are more likely to choose CEECs with higher lending rate. Negative and statistically significant interaction term Size*Wage goes in line with the fact that large firms are expected to be more sensitive to efficiency considerations, therefore countries in CEE with higher wage rates are less likely to be chosen by large MNEs to locate their investment.

Typically, scale-intensive sectors include oligopolistic large firm industries, with high capital intensity and wide economies of scale. In contrast to large efficiency-seeking MNEs, small firms have a preference for locations close to their home base and they prefer to invest in countries with strong historical relationships and low cultural and linguistic barriers, in order to minimize the costs of entering a foreign market. Positive parameter of Scale*Dist indicate that large companies operating in scale-intensive industries are not discouraged to invest in more remote CEECs. Finally, negative coefficient of Tradit*EU supports the statement that most investment located in non-EU countries have taken place in traditional sectors such as manufacturing of food products and beverages, manufacture of tobacco products, textiles, clothing apparel, leather and

² Host country lending rate as a percentage per annum comes from the International Financial Statistics (IFS) database compiled by the International Monetary Fund (IMF).

³ The *supplier-dominated (traditional)* sectors encompass the more traditional consumer and non-consumer goods industries such as textiles, clothing, furniture, leather and shoes, ceramics, and the simplest metal products (Guerrieri, 1998).

leather products, wood and wood products, manufactures of fabricated metal products and furniture.

6. Conclusions

This paper provides an original contribution to the analysis of the location choices of MNEs in CEECs by incorporating three levels of data: country-, industry- and firm-level. This approach avoids aggregation and disaggregation problems by fully incorporating FDI factors through different MNEs, industries and countries.

Two main questions are raised. First of all, to what extent do different level determinants explain the size of investment at firm level? For this purpose OLS regression is used and it can be concluded that all firm- and industry-level and some country-level factors can explain the size of investment at firm level. Hence, the insignificance of some country-level variables is not a sufficient argument to dismiss them from the analysis: those variables may not influence the size of the investment at the firm level, but they can affect the choice to invest or not in a particular country. As a result, the second question is raised, where do MNEs choose to locate in CEE? In order to check for the location choices of the firms in the CEECs, a Conditional Logit (CLogit) model is applied.

Local market, political, economic and legal environment together with production costs advantages appear to be the main factors where and how much MNEs locate in CEE. However, the responsiveness of FDI in CEECs to country-level variables differs across sectors and across firms of different sizes and profitability. More profitable MNEs are more willing to pay higher lending rates for loans abroad, while larger firms are more sensitive to efficiency considerations and are expected to choose countries with lower wages. MNEs operating in scale-intensive industries are more likely to invest in remote CEEC than smaller MNEs, while firms operating in traditional sectors are less concerned if a CEEC is a EU member or not.

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