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European Integration and Outward FDI from Central and Eastern Europe – Is There Any Evidence of Knowledge-seeking?

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Abstract: The EU member states in Central and Eastern Europe (CEECs) witnessed a surge in outward foreign direct investment (OFDI) between 2000 until the start of the global financial crisis. This article investigates whether the European integration process altered the relative importance of host country location factors. In particular we investigate to which extent knowledge-seeking is a relevant investment motive, which has been documented as a key determinant for OFDI from other emerging economies. We apply a discrete choice approach to model foreign location choice of firms from CEECs within the EU 27 (1996- 2010). We find that the EU integration process is related with increasing importance of market access and less emphasis on labour cost advantages. We find heterogeneity in the valuation of foreign knowledge related assets. The location probability within the EU15 is positively associated with knowledge-seeking. It also plays a role for technology intensive industries and larger firms.

Keywords: European integration, outward FDI, central and east Europe, location choice

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Introduction

Emerging market economies have progressively increased their foreign presence. The global share of outward foreign direct investment (OFDI) stocks from emerging markets rose from 4 % in 1980 to around 16 % in 2010 (UNCTAD 2011). Today emerging economies such as China, Russia, the Republic of Korea, Singapore, Mexico, and Chile are among the top 20 investor economies (UNCTAD 2013). Among world regions, the European Union (EU) is a prime investment destination for OFDI from emerging markets.

The growth of OFDI from Central and East European Countries[1] (CEECs) has been somehow slower compared to other mainly East Asian emerging economies. It only gathered momentum after 2000 but increased steadily until the start of the global economic crisis. In 2011, the share of CEECs in total world OFDI stocks was about a third of the Chinese OFDI stock. In absolute terms primarily Poland, Hungary, and the Czech Republic contributed to rising volumes of OFDI stocks[2]. However, also smaller CEECs such as Estonia and Slovenia show increasing levels of foreign engagement when measures in OFDI stocks per capita.

A number of authors argued that the internationalization process of firms from emerging markets is fundamentally different from their counterparts in developed countries (Wells 1983, Lall 1983, Mathews 2002, Child and Rodrigues 2005, Dunning 2006, Goldstein 2007, Ramamurti 2012), and their location strategies are peculiar to their countries of origin (Dunning 1998, Rugman, 2009). In addition to the traditional investment motives such as market access or production cost advantages, scholars have argued that knowledge-seeking OFDI motives are of

[1] CEECs refer to the ten transition economies that entered the European Union in 2004/2007 i.e. Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

[2] Source: UNCTADstat (1995-2011).

importance to emerging market firms mainly from East Asian economies (Makino et al. 2002, Mathews 2002, 2006, Luo and Tung 2007, Lessard and Lucea 2009, Luo and Rui 2009, Rugman 2009, Li 2010, Kedia et al. 2012).

Specifically, it is argued that emerging market firms lack the strength of ownership advantages such as international experience and technological, managerial and marketing competences (Mathews 2002, Ramamurti and Singh 2009). This may prompt emerging markets firms to improve their technological and commercial capabilities by following a knowledge-seeking OFDI strategy to leverage knowledge resources not available at home locations (Mathews 2006, Rugman 2009, Li 2010, Narula, 2012).

So far we lack evidence to which extent this process applies to the internationalization process of firms from CEECs. Existing evidence shows the prevalence of market seeking investment motives (e.g. Svetličič and Jaklič 2003, Svetličič and Jaklič 2006, Sass and Kalotay 2010). However, it has been expected that EU accession would prompt an increase of OFDI from CEECs in EU15 countries, since firms would attempt to strengthen their competitive position with local presence around the single economic area (Kalotay 2004)

Our paper contributes to existing research by investigating whether EU integration also led to an increasing importance of foreign knowledge as location determinant for OFDI from CEECs as observed in the case of East Asian emerging economies. We analyse the location choice of a sample of firms from CEECs with foreign entries within the EU between 1995 and 2010. The research generates evidence to which extent OFDI has started to complement inward FDI and foreign trade, which have already been identified as important channels for technological catching-up in the CEECs' model of growth through economic integration into the

EU (see Crespo and Fontoura 2007, Hunya 2000, Landesmann and Stehrer 2002, Medve-Bálint 2014).

Literature review and conventional framework

Existing research on OFDI from CEECs (Andreff 2002, Boudier-Bensebaa 2008, Radlo and Sass 2012, Zemplinerova 2012) refers to the model of investment development path (IDP) (Dunning, 1981, Dunning and Narula 1996, Narula 1996), which holds that economic and social transformations have a systematic relationship with the behaviour of inward and outward FDI. Drawing on Dunning's eclectic paradigm (Dunning, 1980), the IDP analyses how patterns in FDI respond to changes in the ownership advantages of domestic firms; the advantages of foreign firms; and the location advantages of countries. In the IDP model OFDI increases as domestic firms become more competitive in comparison to foreign firms. The motivations of inward and outward FDI evolve in tandem with the development of location and ownership advantages.

Considering the dynamics of inward and outward FDI for CEECs the first observation is that inward FDI per capita has been growing dramatically since the 1990s, significantly faster than in Western European countries or than the average for developed or developing countries (Narula and Bellak 2009, Narula and Guimón 2010). At the same time the growth of OFDI was much slower given the stock of inward FDI and the level of economic development. The typical approach to model the IDP is to relate a country's net outward investment position with its level of economic development, usually measured by per capita gross national product.

Andreff (2002) tested this relationship for a larger sample of transition economies in East and South East Europe in the late 1990s. He confirms that the level and structure of GDP of home countries strongly determines the extent of OFDI. Boudier-Bensebaa (2008) also confirms this relationship for a similarly large set of transition economies and longer period of observation

(1991- 2005). However, she also highlights the idiosyncratic nature of the IDP, and thus the difficulty of econometrically testing its applicability on a large group of economies. The idiosyncratic nature has been linked to different socio-political and economic path dependencies as well as differences in fundamental structural economic factors (Narula and Guimón 2010).

The focus of our analysis is not so much on explaining the determinants of the net outward position of CEECs but rather on the qualitative aspects of OFDI. On this issue the existing literature agrees that market seeking constitutes the dominant investment motive (e.g. Svetličič and Jaklič 2003, Svetličič and Jaklič 2006, Sass and Kalotay 2010). During the 1990s OFDI aimed primarily at markets of other CEECs often neighbouring countries at similar levels of development (Antalóczy 2001, Varblane et al. 2001, Antalóczy and Éltetö 2002, Radlo 2012). At this stage, also efficiency seeking did not play a considerable role for OFDI from CEECs (Varblane et al. 2001, Andreff 2002, Sass and Kalotay 2010).

During this early phase of internationalization the ownership advantages of CEECs' firms have been related mainly to '*knowing how to do businesses*' in familiar markets. Thus geographical, cultural, and historical proximity enhanced their internationalization process (Jaklič and Svetličič 2003, Svetličič and Jaklič 2003). This could be explained by a staged internationalization process as observed for firms in Scandinavian economies in the 1970s (Johanson and Wiedersheim-Paul 1975, Johanson and Vahlne 1977, 1990). Existing evidence also suggest that neither technological development of the home country is a statistically significant factor explaining OFDI (Andreff 2002), nor is innovation judged to be the dominant source of firm-specific advantage underlying the internationalization process (Antalóczy and Sass 2008).

However, the general assumption of ownership advantages as a precondition for internationalization (as present in the IDP) has been challenged. The technological accumulation approach (Cantwell 1989, 1995) suggests that ownership advantages can also be endogenously created by firms' strategies to invest in multiple locations. It emphasizes that firms may benefit from externalities such as knowledge spillover in foreign host country locations. Thus, firms may not only exploit but also augment technological capabilities at foreign host locations (Kuemmerle 1999, Cantwell and Piscitello 2005, 2014).

Recent research on the foreign expansion of emerging market firms - mainly from East Asia - associated OFDI with capability building through learning, acquiring or leveraging knowledge resources not available at home locations (Mathews, 2002; Child and Rodrigues, 2005; Luo and Tung, 2007; Lessard and Lucea, 2009; Luo and Rui, 2009; Li, 2010; Kedia et al., 2012). Thus, it seems possible to upgrade ownership specific assets without the traditional ownership-location advantages in the home country by asset augmentation through internationalization (Narula, 2012). This could be facilitated through internalization of the assets of other firms through mergers and acquisitions or internalizing the location assets of foreign locations associated with their knowledge infrastructure and clusters as suggested by the technological accumulation approach.

We need to acknowledge that the socio-political and economic transformation of East Asian economies differs considerably from the growth model adopted in CEECs. Yet, some authors argued that OFDI from CEECs is pulled by external factors rather than pushed by investors' home country or firm-specific advantages (Jaklič and Svetličič 2003, Svetličič and Jaklič 2003). This argument points to the explanatory power of macro-organisational factors linked the EU integration process. In turn, we would expect that with EU accession CEECs' firms

not only locate more often in the EU15, but also that they try to leverage knowledge resources not available at home locations. This would be in line with Cantwell's (1989, 1995) argument of the importance of technological accumulation in the internationalization process of firms. It would also signal that the European integration of CEECs reached a stage, when technological capability at the firm level does not only rely upon inward FDI and foreign trade but is complemented by investment activities originating from the region.

Our Model

We follow the literature that models the location choice for of foreign investors as a discrete choice problem (e.g. Devereux and Griffith 1998, Guimarães et al. 2004, Basile et al. 2008). In our analysis, location choice is a discrete choice problem where profit maximizing firms choose from a set of 25 EU countries (excluding the respective home country). Given that our set of alternatives is relatively small McFadden (1984) proposes the conditional logit model (CLM) as appropriate estimation approach. It relies on the assumption that each location decision is a discrete choice made among different alternatives. Coefficients in CLM are estimated by maximum likelihood procedures.

Following Guimarães et al.(2004), we assume the existence of *j* choices among EU countries with *j=1,….,j* and *N* investors with *i=1,…..,N,* then the profit derived by investor *i* by locating in country *j* is given by

$$\pi_{ij} = \beta' z_{ij} + \epsilon_{ij} ,$$

Where β is a vector of unknown parameters,z_{ij} is a vector of observed explanatory variables, and ϵ_{ij} is a random term. Thus, the profit for the investor i of locating in country j is

composed of a deterministic and a stochastic component. The investor will choose the country that will yield him the highest expected profit.

Building our model we include a number of standard explanatory variables related to local market dynamics, labour market conditions, infrastructure and institutional aspects as well as prior foreign involvement and geographic distance as used in the existing empirical research on foreign firms' location choice (see for example Devereux and Griffith 1998, Guimarães et al. 2004, Basile et al. 2008). However, we place particular emphasis on measuring technology related location determinants. In our model, the expected profit derived by investor i if he locates at country j is given by the following base line specification:

$$(I)\ \pi_{ij} = \beta_1 GDP_{jt_{i_{-1}}} + \beta_2 GDPGROWTH_{jt_{i_{-1}}} + \beta_3 RnD_{jt_{i_{-1}}} + \beta_4 HRSTO_{jt_{i_{-1}}} + \beta_5 PAT_{jt_{i_{-1}}} + \beta_6 FDIstocks_{jt_{i_{-1}}} + \beta_7 INFRA_{jt_{i_{-1}}} + \beta_8 DIST_j + \beta_9 INST_{jt_{i_{-1}}} + \beta_{10} UNEMP_{jt_{i_{-1}}} + \beta_{11} WAGE_{jt_{i_{-1}}} + \beta_{10} TAX + \epsilon_{ij}\ ,$$

,where $\beta_1 \mathrm{GDP}_{\mathrm{jt}_{\mathrm{i}_{-1}}}$ is the log gross domestic product of the host country j at t_{-1} as time entry of investor i; $\beta_2 \mathrm{GDPGROWTH}_{\mathrm{jt}_{\mathrm{i}_{-1}}}$ is the annual GDP growth; $\beta_3 \mathrm{RnD}_{\mathrm{jt}_{\mathrm{i}_{-1}}}$ is the log total expenditure for R&D per inhabitant; $\beta_4 \mathrm{HRSTO}_{\mathrm{jt}_{\mathrm{i}_{-1}}}$ is the log share of human resources in science and technology occupations in total labour force; $\beta_5 \mathrm{PAT}_{\mathrm{jt}_{\mathrm{i}_{-1}}}$ is the number of total priority patent applications per 1.000 inhabitants; $\beta_6 \mathrm{FDIstock}_{\mathrm{jt}_{\mathrm{i}_{-1}}}$ is the log bilateral stock of FDI in host country j and the respective home country; $\beta_7 INFRA_{\mathrm{jt}_{\mathrm{i}_{-1}}}$ is the log share of paved roads in total roads; $\beta_9 \mathrm{DIST}_{\mathrm{j}}$ is the log geographical distance between capital city of host country j and the capital city of the home country of investor *i;* $\beta_9 \mathrm{INST}_{\mathrm{j}}$ is the relative quality of legal institutions; $\beta_{10} \mathrm{UNEMP}_{\mathrm{jt}_{\mathrm{i}_{-1}}}$ is the annual average unemployment rate; $\beta_{11} \mathrm{WAGE}_{\mathrm{jt}_{\mathrm{i}_{-1}}}$ is the

average hourly labour compensation; and $\beta_{12}\mathrm{TAX}_{\mathrm{jt_{i-1}}}$ is the adjusted top statutory taxation rate of corporate income. Explanatory variables are measured with reference to host country *j* at one year preceding the entry of investor *i* (for a full description of variable measurement and data sources please see Annex Table A1).

R&D, HRSTO, and patent intensities approximate location factors relevant to knowledge-seeking. Due to high correlations of these three variables as well as with other explanatory variables we introduce each separately into the base line model. Then we create a standardised composite index based on all three knowledge-related variables, which we introduce as $\beta know_{jt_{i-1}}$ und use instead in all subsequent estimations.

Our base line model (I) assumed that the host country specific location factors apply uniformly across location and firms. In order to account for unobserved heterogeneity we control for selected country specific (EU15 *versus* EU10 locations), time specific (pre *versus* post EU accession), sector specific (services *versus* manufacturing) and firm specific effects (direct *versus* indirect OFDI, large *versus* small firms). In a conditional logit approach such effects are estimated by introducing corresponding interaction terms. Therefore, we specify:

$$(III)\ \pi_{ij} = \beta' z_{ij} + \gamma' dummy_i + u_{ij}\ ,$$

where β is a vector of unknown parameters, z_{ij} the vector of the observed explanatory variables specified in estimation (II), γ a vector of unknown parameters from the interaction between the corresponding specific effect dummy_i and v_{ij} a vector that contains a linear combination of all exogenous variables as defined in specification (II) and u_{ij} is a random term. In contrast to estimations using different sub-sample, this approach allows to test for statistically significant differences of country, industry and firm-specific effects.

Data and descriptive statistics

Existing econometric studies on OFDI from CEECs relied upon aggregate balance of payment statistics, which suffers from incomplete industry data and does not offer any firm-specific information (Andreff, 2002; Kalotay 2003, 2004). We exploit a firm level data set drawn from the AMADEUS database that offers data on location, industry, and ownership structure of foreign affiliates. Parent companies are located in Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. We define foreign ownership in case a parent firm holds directly a minimum of 10 % equity or if it holds indirectly a minimum of 25 % in a foreign affiliate.

Following this definition we identify a total of 2,518 foreign affiliates in the year 2012 that were established by a CEECs' parent firms worldwide. By far the majority, i.e. about 76 % (1,906) of them are located within the EU27. As many as 65 % of the parent firms with foreign affiliates in the EU27 are domestic companies. The other 35 % of parent firms have one or more foreign shareholder, which in turn mainly come from countries in the EU15 (65 %). This group of firms located in CEECs undertakes so called "indirect OFDI".[3]

From the 1,906 foreign affiliates located in the EU27, we could identify a sample of 990 foreign affiliates that entered the EU during the observation period of this paper (1996 to 2010). No foreign affiliates were found in Cyprus or Malta.[4] In this sample the Czech Republic (33 %) and Poland (30 %) account by far for the highest shares of foreign affiliates. All other CEECs

[3] Indirect OFDI includes regional headquarters based in CEECs that belong to foreign multinationals but also so called "virtual indirect OFDI", i.e. firms based in CEECs with foreign shareholders but no single (or identifiable group of) foreign investors holding a clear majority (Sass et al. 2012).

[4] We stick to the notation EU27 in this paper.

account for less than 10 % of foreign affiliates (Bulgaria 1,4 %; Estonia 7,8 %; Hungary 5,1 %, Lithuania 7,4 %, Latvia 4,9 %, Romania 1,5 %; Slovenia 3,1 %; Slovakia 6,1 %). About 27 % of all foreign affiliates of the sample can be classified as indirect OFDI.

During the observation period (1996-2010) the number of annual total foreign entries by firms from CEECs increased continuously until the start of the financial crisis in 2008 (see Table 1). About 58 % of foreign affiliates located in the EU10. This implies that the majority of foreign affiliates during the observation period were located in other CEECs. Slovakia (17 %), Poland (10 %), Latvia (9 %), the Czech Republic (6 %), Estonia (6%), Lithuania (5 %) account for the largest shares in total stock of foreign affiliates.

Table 1 about here

We observe high entry rates of firms into other EU10 countries in the period between 1996 and 2003. With EU accession the entry rates into EU15 countries start to exceed entry rates into EU10, which led to an increased presence in EU15 countries such as Great Britain (20 %), Germany (11 %), the Netherlands (3 %), and Austria (3 %). Within the sample 54 % of parent firms are in services and 46 % in manufacturing. In turn, we find 87 % of foreign affiliates are in the service sector and only 13 % in manufacturing. This implies that the overwhelming majority of OFDI from CEECs is into foreign services, which applies also to parent firms in manufacturing. About 30 % of parent firms have more than 250 employees.

Estimation results

First we estimate the base line model (I) for the full sample (see Table 2). Thereby, we introduce our three explanatory variables related to host countries' technological capability separately (see estimation 1 to 3) and subsequently estimate specification (II) using the composite index (see estimation 4). We find higher R&D intensity of host countries reduces the location probability of foreign affiliates (see estimation 1). The same applies to the coefficient for the intensity of human resources in science and technology and patent applications as well as the composite knowledge index (see estimation 2, 3 and 4). Thus, in contrast to our key hypothesis, the results would indicate that firms from CEECs tend to locate in EU27 countries that are not characterized by relatively high technological endowment.

Table 2 about here

Taking a look at the other explanatory variables (see Table 1), we find in line with our expectation that CLM results would suggest GDP, GDP growth, prior bilateral FDI stocks, the quality of infrastructure and legal institutions have a significant positive effect on the location probability. Similarly, higher unemployment rates as well as labour cost advantages increase the location probability. In turn, geographic distance decreases the location probability and in contrast to our expectation, high statutory tax rates of corporate income do not lower the location probability.

Effects of the EU integration process

In the next step we introduce location and time specific interaction terms to test for the effect of the EU integration process on the relative importance of locational determinants of OFDI from CEECs. Our interpretation focuses on any changes to the sign and significance of the composite knowledge index as key explanatory variable. First we differentiate location choice for foreign affiliates based in EU15 versus EU10 countries (see Table 3 estimation 1). We find a positive and significant coefficient of the interaction term between the knowledge index and the EU15 dummy. Yet, the overall effect is not positive[5]. We also find no statistically different effect from the base category for entries in the post EU accession period of the respective home country (see Table 3 estimation 2). Even when looking only at entries into EU15 countries after EU accession, we find a positive coefficient of the interaction term but the overall effect remains negative. From these estimation results we can identify heterogeneity in firms' valuation of knowledge related resources depending upon locations in EU10 versus EU15 locations. However, so far we cannot conclude that firms' location choice in EU15 countries or in the post EU accession period is driven by knowledge-seeking.

Table 3 about here

Yet we find for the other explanatory variables that the EU integration process altered the relative valuation of location factors. For example, the importance of market size is higher for locations in EU15 and entries in the post EU accession period (see Table 3 estimation 1-3), whereas the importance of market growth potential is reduced (see Table 3 estimation 1 and 3).

[5] Please note that the coefficients of interaction terms need to be interpreted in relation to the respective coefficient of the control group. Both constitute the overall effect of the respective parameter.

We also find for entries in the EU15 and post EU accession entries that countries with higher average unemployment rates are less attractive and that the effect of the level of corporate income taxations has a negative effect on the location probability (see Table 3 estimation 3).

Industry-specific effects

We also investigate industry specific differences in the relevance of knowledge related variables in location choice by firms from CEECs. The effect of knowledge related endowments is not statistically different between for parent firms in the service sector compared to manufacturing parents (see Table 4 estimation 1). We find negative effects of knowledge related endowments to be larger in case of for foreign affiliates in services compared to manufacturing affiliates (see Table 4 estimation 2).

Table 4 about here

We find the negative effects of knowledge related endowments reduced in case of technology intensive investment projects; although the overall effect is still negative (see Table 4 estimation 3). Repeating these estimations using only the sub-sample of entries into the EU15, we find the overall effect for the knowledge index turns significantly positive, which indicates that firms from CEECs are attracted by knowledge endowments when the investment takes place in technological intensive manufacturing and services sectors within the EU15.

Firm-specific effects

Finally, we consider the effect of firm heterogeneity. The negative effect of the knowledge index is more pronounced; when the parent firm is fully domestically owned ('direct OFDI') (see Table 5 estimation 1). Its size is reduced but still negative for foreign affiliates in which parents hold the majority equity stake (see Table 5 estimation 2). The latter applies also entries by larger parent firms (see Table 5 estimation 3).

Table 5 about here

When we repeat these three estimations using only the sub-sample of entries into the EU15, we find the statistical difference in the coefficients of the knowledge index between direct vs. indirect OFDI as well as majority vs. minority owned foreign affiliate not anymore significant. Yet, we find a positive overall effect of the knowledge index when the investment is undertaken by larger parents firms. This indicates that larger investors from CEECs are attracted by knowledge related endowments when locating in EU15 countries. However, we find no evidence that host country technology plays a positive role for direct OFDI, which would limit the effect on domestic technological accumulation through OFDI.

Robustness checks

The results obtained from the conditional logit estimation (CLM) hold under the IIA assumption that the error terms are independently and identically distributed across alternatives. This implies that for any two alternatives in the choice set, the ratio of probabilities is independent of the attributes or existence of all other alternatives. In our case it is likely that there is a correlation for unobserved reasons (such as institutional factors) between alternative host

countries in the EU10 group and the EU15 group of host countries respectively. In this case a nested logit model is an appropriate estimation approach (Train 2003).

Therefore, we estimate a nested logit model for our base line specification. We use nests that correspond to all foreign affiliates located in EU10 vs. EU15 countries, since these countries could share unobserved factors (such as institutions) within but not across the groups. The corresponding estimation results show that the sign of all coefficients do not differ from the results obtained using the CLM (see Annex Table A2). The LR test indicate that we reject the null hypothesis that all of the log-sum coefficients are 1 ($p = 0.0004$) and hence should use a nested rather than a standard logit. However, our model is not random utility maximum likelihood consistent, since the dissimilarity parameters are not bounded by 0 and 1, which may lead to misspecification (Heiss 2002).

Therefore, we turn to a mixed logit model (MLM) that allows random taste variation, unrestricted substitution patterns, and correlation in unobserved factors over time. The MLM is highly flexible and can approximate any random utility model (McFadden and Train 2000). It also adds in terms of explanatory power, since we can estimate two sets of parameters: First, the parameters that also enter the logit formula; these parameters have a density; and second the set of parameters that describes this density.

We run three mixed logit estimations: The first on the full sample, the second on the sub-sample of EU15 locations and the third on the sub-sample of all entries in the post EU accession period (see Annex Table A3). The results for the full sample indicate that the estimated mean of the parameter associated with the specified location factors do not differ in terms of the sign nor much in terms of magnitude compared to the results obtained for the corresponding CLM apart from the taxation variable (see column 1 Table A3). The results show also large and significant

standard deviation of the knowledge index, which signals considerable heterogeneity within the full sample. If we repeat this estimation in the sub-sample of EU15 locations, we find a positive and significant coefficient for the knowledge index (see column 3 Table A3). The fact that the corresponding standard deviation is not significant indicates that this applies fairly homogenously across foreign affiliates that locate in EU15 countries. As in case of the CLM we find a negative mean of the effect of the knowledge index of foreign entries in the post accession period (see column 3 Table A3). Thus, we can conclude from the MLM results that the relevance of knowledge related location factors for OFDI by firms from CEECs is subject to considerable heterogeneity. In general it has been not a decisive for location choice across EU27 countries for firms from CEECs so far. Knowledge seeking did also not gain importance for entries in the post EU accession period. Yet, knowledge related factors positively affect entries within the EU15.

Discussion, implications and limitations

Our descriptive evidence indicated that firms from CEECs redirected their OFDI from other CEECs that dominated as investment destinations in the period from 1996 to 2003, to EU15 countries after EU accession. This trend supports the assumption by Kalotay (2004) that EU accession would prompt an increase of OFDI from CEECs, since firms would attempt to strengthen their competitive position with local presence around the single economic area.

In line with prior evidence we find that market seeking constitutes the dominant investment motive of OFDI from CEECs. However, with EU accession the focus changed from other - often neighbouring - CEECs countries (Svetličič and Jaklič 2003, Svetličič and Jaklič 2006, Sass and Kalotay 2010) to EU15 markets. We can show that with EU accession and for locations in the EU15 the importance of market size increased significantly. At the same time the

growth potential of foreign markets became less important, since EU15 economies grow on average at a slower pace compared to EU10 economies. The results demonstrate that a larger market size attracts in particular 'direct' OFDI and smaller investors from CEECs.

Earlier research found that efficiency seeking did not play a considerable role for OFDI from CEECs (Varblane et al. 2001, Andreff 2002, Sass and Kalotay 2010). Yet our results suggest that labour cost advantages between home and host country affected the location probability across EU27 countries positively, despite a degree of heterogeneity of this effect. In general investors from CEECs are sensitive to labour costs. However, our investigation indicates that investors attribute less importance to labour cost advantages and labour supply in the post-EU accession period.

In the context of efficiency-seeking, prior research pointed at the relevance of tax optimisation strategies as a motivation for OFDI from CEECs (Antaloczy and Eltetö 2002, Radlo and Sass 2012). Our results indicate that locations in EU15 countries as well as entries in the post accession period are negatively related to the level of top statutory taxation of corporate income; although mixed logit results seem to indicate considerably heterogeneity of this effect. Having in mind the limitation of using statutory corporate taxation rates as a measure for taxation, the evidence obtained in our analysis seems to support earlier findings i.e. a portion of investors from CEECs uses OFDI to optimise corporate taxation.

However, the main contribution of our analysis lies in the investigation of the question whether EU integration led to an increasing importance of knowledge-seeking as a motivation for OFDI by investors from CEECs. Our results indicate that location choice is not associated with knowledge-related endowment factors when considering the choice set of EU27 countries during the full observation period. However, we can show that there exists considerably heterogeneity in

the valuation of foreign knowledge related assets amongst the group of investors from CEECs. The evidence robustly demonstrates that the location probability within the EU15 countries is positively associated with knowledge related assets. We can show that knowledge related assets affect the location choice of investment projects in technology intensive industries and services. Furthermore, the evidence indicates that in particular large firms from CEECs attribute a larger importance to foreign knowledge resources within EU15 countries.

This result could be interpreted as evidence that EU integration now reached a stage in which firms from CEECs use OFDI for capability building through leveraging knowledge resources not available at home locations. This would parallel a process observed in research on the foreign expansion of East Asian firms locations (Mathews, 2002; Child and Rodrigues 2005, Luo and Tung 2007, Lessard and Lucea 2009, Luo and Rui 2009. Li 2010, Kedia et al. 2012) and would support the argument that it is possible to upgrade owner specific assets without the traditional ownership-location advantages in the home country by technological asset augmentation through internationalization (Cantwell 1989, 1995, Narula 2012).

However, our evidence does not show that technology seeking applies uniformly across locations within the EU27, industries or firms. In particular there is no evidence that is especially relevant for 'direct' OFDI i.e. domestic owned parent firms from CEECs. This would be the case, when we expect that OFDI forms a complementary strategy for technological upgrading as observed in other emerging economies. We need to place our findings in the context of prior research arguing that OFDI from transition countries is unrelated to the stage of technological development of the home country (Andreff 2002) and that innovation does not constitute a dominant source of firm-specific advantage underlying the internationalization process of firms from CEECs (Antalóczy and Sass 2008). Thus knowledge-seeking OFDI is still a new and rare

phenomenon for firms from CEECs, which has been supported by EU integration but grows at much slower pace in comparison to other (particular larger) emerging economies. Two interrelated factors might constrain this path to technological upgrading in CEECs: The first is their peripheral position in a European production and innovation network; the second is the lagging performance of domestic innovation systems in the majority of CEECs.

Finally, it should be noted that our analysis overcomes some of the limitations of prior empirical research by exploiting a data set that covers a large set of CEECs over a long period of time and allows for the consideration of industry and firm specific effects. However our approach suffers from at least two limitations: First the investigation of knowledge seeking motives could be enhanced by shifting the level of analysis from host countries to sub-national regions to capture spatially bounded externalities that form an important part of foreign location strategies (Cantwell 1998, 1995). Second the adopted estimation approaches cannot elegantly accommodate home-country specific effects, given that there is significant heterogeneity amongst CEECs in terms of technological capabilities (Radosevič 1999, 2004), this might be a crucial factor that explains heterogeneity in terms of knowledge-seeking OFDI from the region.

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Tables

Table 1: Annual entries of OFDI from CEECs (number of foreign affiliates and %) 1996-2010

	EU27		EU15**		EU10***	
Year of Entry*	Freq.	%	Freq.	%	Freq.	%
1996	57	5,76	9	2,14	48	8,42
1997	60	6,06	15	3,57	45	7,89
1998	66	6,67	31	7,38	35	6,14
1999	64	6,46	19	4,52	45	7,89
2000	85	8,59	25	5,95	60	10,53
2001	64	6,46	20	4,76	44	7,72
2002	72	7,27	35	8,33	37	6,49
2003	70	7,07	18	4,29	52	9,12
2004	81	8,18	45	10,71	36	6,32
2005	88	8,89	33	7,86	55	9,65
2006	95	9,60	52	12,38	43	7,54
2007	108	10,91	66	15,71	42	7,37
2008	42	4,24	25	5,95	17	2,98
2009	25	2,53	15	3,57	10	1,75
2010	13	1,31	12	2,86	1	0,18
Total	990	100	420	100	570	100

*Note: *Year of entry is based on the year of incorporation of the foreign affiliate. **EU15 are the 15 EU member countries before Eastern enlargement (Belgium, Denmark, Germany, Finland, France, Greece, GB, Italy, Ireland, Luxemburg, Netherlands, Austria, Portugal, Sweden and Spain). ***EU10 are the ten CEECs (see footnote 2)*
Source: AMADEUS Database. Own calculations.

Table 2: Estimations results for the base line model (conditional logit)

	(1)	(2)	(3)	(4)
GDP	0.535***	0.233***	0.322***	0.392***
	(0.0510)	(0.0447)	(0.0442)	(0.0461)
GDP growth	0.0761***	0.0647***	0.0703***	0.0775***
	(0.0170)	(0.0171)	(0.0179)	(0.0178)
R&D	-1.354***	-	-	-
	(0.0834)			
HRSTO	-	-1.885***	-	-
		(0.262)		
Patents	-	-	-3.424***	-
			(0.647)	
Knowledge (Index)	-	-	-	-7.781***
				(0.674)
Bi-lateral FDI	0.600***	0.534***	0.498***	0.542***
	(0.0280)	(0.0267)	(0.0254)	(0.0264)
Infrastructure	0.581***	0.609***	0.407***	0.311***
	(0.0679)	(0.0633)	(0.0665)	(0.0658)
Distance	-0.469***	-0.586***	-0.605***	-0.736***
	(0.0633)	(0.0617)	(0.0655)	(0.0637)
Institutions	1.174***	-0.181	-0.0455	0.575***
	(0.148)	(0.112)	(0.125)	(0.137)
Unemployment	0.0497***	0.127***	0.118***	0.110***
	(0.0112)	(0.0110)	(0.0109)	(0.0108)
Wages	0.0689***	0.0816***	0.0841***	0.0637***
	(0.0101)	(0.00981)	(0.00983)	(0.00988)
Tax	0.00819	0.000797	0.00310	0.0199**
	(0.00673)	(0.00657)	(0.00685)	(0.00696)
Observations	23,760	23,760	23,760	23,760
Number of affiliates	990	990	990	990
Loglikelihood	-2239	-2351	-2362	-2307
Chi-square	1143	1150	1177	1170
P-value Chi	0.0000	0.0000	0.0000	0.0000

Standard errors in parentheses, *** p<0.001, ** p<0.05, * p<0.1

Table 3: Estimation results for effects of EU integration (conditional logit)

	(1) **EU15 locations vs. EU10 locations**		(2) **Post vs. Pre-EU-accession entries**		(3) **EU15 post accession locations vs. others**	
GDP	-0.355***	(0.0883)	0.427***	(0.0539)	0.360***	(0.0510)
GDP growth	0.0766**	(0.0236)	0.0771***	(0.0209)	0.103***	(0.0194)
Knowledge	-15.56***	(1.577)	-7.182***	(0.803)	-7.241***	(0.770)
Bi-lateral FDI	0.423***	(0.0392)	0.572***	(0.0299)	0.550***	(0.0281)
Infrastructure	0.543***	(0.129)	0.418***	(0.0804)	0.347***	(0.0748)
Distance	-1.277***	(0.113)	-0.707***	(0.0734)	-0.749***	(0.0699)
Institutions	-0.674**	(0.243)	0.229	(0.170)	-0.0995	(0.154)
Unemployment	0.00649	(0.0168)	0.0962***	(0.0122)	0.0753***	(0.0115)
Wages	-0.0494**	(0.0161)	0.0899***	(0.0130)	0.0547***	(0.0112)
Tax	0.0623***	(0.0125)	0.0190**	(0.00766)	0.0140*	(0.00744)
Interactions						
*GDP	2.121***	(0.121)	0.668***	(0.134)	1.237***	(0.175)
*GDP growth	-0.118*	(0.0632)	0.159**	(0.0535)	-0.477***	(0.115)
*Knowledge	15.08***	(2.082)	-0.308	(1.661)	3.905*	(2.358)
*Bi-lateral FDI	-0.454***	(0.0885)	-0.227**	(0.0732)	-0.0839	(0.148)
*Infrastructure	-0.504**	(0.213)	-0.402**	(0.169)	-0.740**	(0.281)
*Distance	0.866***	(0.194)	-0.357**	(0.171)	0.254	(0.281)
*Institutions	2.491***	(0.378)	0.653**	(0.321)	1.861***	(0.428)
*Unemployment	-0.288***	(0.0461)	-0.142***	(0.0398)	-0.384***	(0.0981)
*Wages	0.161***	(0.0347)	-0.0727**	(0.0221)	0.0701	(0.0522)
*Tax	-0.0843***	(0.0191)	-0.0808***	(0.0231)	-0.0902**	(0.0436)
Observations	23,760		23,760		23,760	
Number of	990		990		990	
Loglikelihood	-1491		-2227		-2127	
Chi-square	1568		1250		1341	
P-value Chi	0.0000		0.0000		0.0000	

Standard errors in parentheses, *** p<0.001, ** p<0.05, * p<0.1

*Note: *In the EU 15 vs. EU10 estimations in interaction term the dummy equals 1, if the foreign affiliate is located in EU15 countries and 0 otherwise. In the Post vs. Pre EU accession estimations in the interaction terms the dummy equals 1, if the foreign affiliate was created after EU accession of the home country and 0 otherwise.*

Table 4: Estimation results for industry specifics effects (conditional logit)

	(1) **Services vs. Manufacturing** (Parent level)		(2) **Services vs. Manufacturing** (Affiliate level)		(3) **High-Tech vs. Low-Tech** (Parent & affiliate level)	
GDP	0.568***	(0.0680)	0.263**	(0.128)	0.416***	(0.0512)
GDP growth	0.107***	(0.0280)	0.0755	(0.0493)	0.0918***	(0.0198)
Knowledge	-6.799***	(0.936)	-3.963**	(1.751)	-8.868***	(0.759)
Bi-lateral FDI	0.437***	(0.0388)	0.396***	(0.0702)	0.583***	(0.0296)
Infrastructure	0.304**	(0.0950)	0.110	(0.178)	0.250***	(0.0727)
Distance	-0.737***	(0.0905)	-0.760***	(0.166)	-0.771***	(0.0711)
Institutions	0.654***	(0.195)	0.385	(0.374)	0.646***	(0.150)
Unemployment	0.0984***	(0.0154)	0.161***	(0.0279)	0.111***	(0.0118)
Wages	0.0763***	(0.0153)	0.0538**	(0.0268)	0.0624***	(0.0108)
Tax	0.0236**	(0.0101)	0.0330*	(0.0199)	0.0187**	(0.00757)
Interactions						
*GDP	-0.352***	(0.0946)	0.135	(0.137)	-0.199	(0.127)
*GDP growth	-0.0486	(0.0370)	0.00207	(0.0530)	-0.0961*	(0.0492)
*Knowledge	-1.467	(1.377)	-4.230**	(1.901)	6.353***	(1.795)
*Bi-lateral FDI	0.165**	(0.0542)	0.168**	(0.0759)	-0.283***	(0.0722)
*Infrastructure	-0.0150	(0.135)	0.218	(0.192)	0.202	(0.185)
*Distance	-0.0712	(0.131)	0.00473	(0.180)	0.0133	(0.176)
*Institutions	-0.289	(0.279)	0.152	(0.402)	-0.689*	(0.398)
*Unemployment	0.00809	(0.0222)	-0.0618**	(0.0303)	-0.0376	(0.0325)
*Wages	-0.0331	(0.0204)	0.00973	(0.0288)	-0.0165	(0.0286)
*Tax	-0.00621	(0.0142)	-0.0143	(0.0212)	0.0160	(0.0214)
Observations	23,424		23,424		23,208	
No. affiliates	976		976		976	
Loglikelihood	-2234		-2254		-2230	
Chi-square	1160		1177		1156	
P-value Chi	0.0000		0.0000		0.0000	

Standard errors in parentheses, *** p<0.001, ** p<0.05, * p<0.1

Table 5: Estimation results for firm specific effects (conditional logit)

	(1) **Direct vs. Indirect Investor** (Parent level)		(2) **Majority vs. minority ownership** (Affiliate level)		(3) **Large vs. small size** (Parent level)	
GDP	0.0969	(0.0845)	1.373***	(0.108)	0.571***	(0.0601)
GDP growth	0.0496	(0.0312)	0.116**	(0.0554)	0.103***	(0.0228)
Knowledge	-3.410**	(1.286)	-14.03***	(1.584)	-11.73***	(0.902)
Bi-lateral FDI	0.477***	(0.0463)	0.548***	(0.0822)	0.696***	(0.0358)
Infrastructure	0.411***	(0.125)	0.681***	(0.174)	0.440***	(0.0882)
Distance	-0.604***	(0.125)	-1.170***	(0.164)	-0.917***	(0.0820)
Institutions	0.391	(0.284)	2.621***	(0.380)	1.205***	(0.183)
Unemployment	0.0954***	(0.0211)	0.151***	(0.0335)	0.155***	(0.0147)
Wages	0.0919***	(0.0208)	0.133***	(0.0286)	0.0852***	(0.0127)
Tax	0.0351**	(0.0133)	-0.0430**	(0.0186)	0.0153*	(0.00862)
Interactions						
*GDP	0.422***	(0.101)	-1.240***	(0.120)	-0.355***	(0.0952)
*GDP growth	0.0415	(0.0381)	-0.0370	(0.0588)	-0.0496	(0.0379)
*Knowledge	-5.998***	(1.516)	8.436***	(1.769)	9.203***	(1.387)
*Bi-lateral FDI	0.0993*	(0.0566)	-0.0473	(0.0872)	-0.407***	(0.0550)
*Infrastructure	-0.122	(0.147)	-0.460**	(0.190)	-0.303**	(0.137)
*Distance	-0.195	(0.145)	0.404**	(0.180)	0.270**	(0.136)
*Institutions	0.247	(0.325)	-2.561***	(0.412)	-1.445***	(0.284)
*Unemployment	0.0193	(0.0247)	-0.0496	(0.0357)	-0.106***	(0.0231)
*Wages	-0.0348	(0.0237)	-0.0912**	(0.0307)	-0.0529**	(0.0210)
*Tax	-0.0204	(0.0156)	0.0829***	(0.0204)	0.0148	(0.0150)
Observations	23,760		23,160		23,760	
No. of affiliates	990		965		990	
Loglikelihood	-2285		-2092		-2230	
Chi-square	1183		1397		1092	
P-value Chi	0.0000		0.0000		0.0000	

Standard errors in parentheses, *** p<0.001, ** p<0.05, * p<0.1

Annex

Table A1: Overview of variables

Variables	Measurement
Dependent	
Choice	Binary variable for choice from a given set of alternatives (host countries): 0: no entry in given host country 1: entry in given host country
Independent	*(alternative/host country specific variables)*
GDP	Log gross domestic product (GDP) (in Million Euro)[1]
GDP Growth	Annual GDP growth rates (in %) [1]
R&D	Log of total research & development (R&D) expenditure per inhabitant[2]
HRSTO	Log of share of the human resources in science and technology occupations (HRSTO) of in total labor force[2]
Patents	Log of total priority patent applications per 1.000 inhabitants[3]
Knowledge	Standardized composite index based on R&D, HRSTO and patents (see above)
Bi-lateral FDI	Log of bilateral stock of FDI in host country and the respective home country[4]
Infrastructure	Log of the total length of roads (in km) per km² [2]
Distance	Log of the Distance (in km) between capital of the given home and host country[4]
Institutions	Relative measure of the quality of legal institutions based on a factor analysis on nine different items incl. property rights, judicial independence and civil liberty[5]
Unemployment	Average annual total unemployment rates[2]
Wages	Difference between average hourly labor compensation in home and host country[7]
Tax	Adjusted top statutory top tax rates on corporate income[8]
Industry -specific characteristics	(*used for interaction terms with alternative specific variables*)
Sector (parent)	Dummy =0 if parent firm is in manufacturing (NACE Rev. 2 10-33) [9] Dummy =1 if parent firm is in services (NACE Rev. 2 35-98)
Sector (affiliate)	Dummy =0 if affiliate is in manufacturing (NACE Rev. 2 10-33) [9] Dummy =1 if affiliate is in services (NACE Rev. 2 35-98)
Technological Intensity	Dummy =0 if affiliate is in high-tech /medium-high manufacturing or knowledge intensive services (based on NACE Rev. 2 classification) [9] Dummy =1 if affiliate and parent are in high-tech /medium-high manufacturing or knowledge intensive services (based on NACE Rev. 2 classification)
Firm –specific characteristics	(*used for interaction terms with alternative specific variables*)
Direct investor (parent)	Dummy =0 if parent firm has foreign shareholders [9] Dummy =1 if parent firm is fully domestic owned
Majority ownership (affiliate)	Dummy =0 if parent minority equity stake in foreign affiliate [9] Dummy =1 if parent majority equity stake in foreign affiliate
Size (parent)	Dummy =0 if parent firm has below 250 employees [9] Dummy =1 if parent firm has above 250 employees

Notes: [1] World Bank, [2] Eurostat Database, [3] PATSTAT Database, [4] WIIW FDI Database, [5] Kuncic, A. (2014) Institutional Quality dataset, Journal of Institutional Economics, 10(1): pp. 135-161. [7] EU-KLEMS Database, [8] Eurostat Statistical Books (2013) Taxation trends in the EU – Data for EU member states, Iceland and Norway, [9] AMADEUS database (2012) Bureau van Dijk.

Table A2: Estimation results baseline model (nested logit)

(1) Nested Logit Full sample	
GDP	0.670***
	(0.0854)
GDP growth	0.0866***
	(0.0241)
Knowledge	-11.31***
	(1.349)
Bi-lateral FDI	0.914***
	(0.0739)
Infrastructure	0.0841
	(0.0959)
Distance	-0.488***
	(0.115)
Institutions	2.279***
	(0.340)
Unemployment	0.134***
	(0.0188)
Wages	0.0513***
	(0.0141)
Tax	0.0628***
	(0.0126)

Country group (cd) equation[1]			*Dissimilarity parameters*		
EU10 _cons	3.634***	(0.445)	EU10_tau	1.498	(0.164)
EU15 _cons	0	(base)	EU15_tau	1.438	(0.162)
			LR test for IIA (tau=1)		
			Chi2(2)	15.57	
			Prob>chi2	0.0004	

Observations	23,760
No. of cases	990
Log-likelihood	-2202
Wald ch2(10)	196
P-value chi2	0.0000

Standard errors in parentheses *** p<0.001, ** p<0.05, * p<0.1

Table A3: Estimation results base model (mixed logit)

	(1) Full sample		(2) EU15 locations		(3) Post accession	
VARIABLES	Mean	Sd.	Mean	Sd.	Mean	Sd.
GDP	0.821***	1.259***	2.171***	0.375	1.610***	1.933***
	(0.0924)	(0.117)	(0.272)	(0.430)	(0.259)	(0.357)
GDP growth	0.140***	-0.155***	-0.0406	0.315**	0.122	0.341**
	(0.0269)	(0.0409)	(0.0776)	(0.101)	(0.0811)	(0.144)
Knowledge	-17.02***	11.63***	3.662*	0.460	-15.79***	9.978***
	(1.236)	(1.125)	(2.217)	(2.638)	(3.222)	(2.968)
Bi-lateral FDI	0.662***	-0.268***	-0.177*	0.0334	0.449**	-0.310
	(0.0509)	(0.0550)	(0.105)	(0.113)	(0.139)	(0.199)
Infrastructure	0.643***	-0.00936	0.164	0.472	-0.191	0.0917
	(0.102)	(0.144)	(0.248)	(0.433)	(0.254)	(0.309)
Distance	-1.254***	0.0662	0.289	2.250***	-1.913***	-0.309
	(0.0934)	(0.136)	(0.303)	(0.428)	(0.310)	(0.383)
Institutions	0.847***	-0.237	1.084**	0.0839	0.804**	-0.189
	(0.181)	(0.342)	(0.366)	(0.568)	(0.362)	(0.427)
Unemployment	0.0665***	0.0246	-0.492***	-0.303***	-0.161**	-0.0203
	(0.0153)	(0.0309)	(0.0803)	(0.0754)	(0.0649)	(0.132)
Wages	0.0606***	-0.103***	0.0420	0.0247	-0.112***	0.0335
	(0.0178)	(0.0270)	(0.0448)	(0.0446)	(0.0309)	(0.0415)
Tax	0.00671	0.000750	-0.0211	0.0344	-0.0796**	0.136**
	(0.00924)	(0.0258)	(0.0184)	(0.0471)	(0.0376)	(0.0440)
Observations	23,760		10,080		4,848	
No. affiliates	990		420		202	
Loglikelihood	-2198		-677.5		-451	
Chi-square	218.4		37.67		81.44	
P-value Chi	0.0000		0.0000		0.0000	

Standard errors in parentheses, *** p<0.001, ** p<0.05, * p<0.1