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Regional Determinants of MNE's Location Choice in Transition Economies

Andrea Gauselmann
Philipp Marek

Authors: *Andrea Gauselmann*
IWH, Department of Structural Change
E-mail: Andrea.Gauselmann@iwh-halle.de
Phone: +49 (0) 345 7753-806

Philipp Marek
IWH, Department of Structural Change
E-mail: Philipp.Marek@iwh-halle.de
Phone: +49 (0) 345 7753-862

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Abstract

This article at hand analyses the impact of agglomeration effects, labour market conditions and other determinants on the location choice of MNEs in transition economies. We compare data from 33 regions in East Germany, the Czech Republic and Poland using a conditional logit model on a sample of 4,343 subsidiaries for the time period between 2000 to 2010. The results show that agglomeration advantages, such as sectoral specialization, a certain economic diversity as well as a region's economic and technological performance prove to be some of the most important pull factors for FDI in transition regions. In addition, the labour market factors prove to play an important role in the location of FDI.

Keywords: multinational enterprises; agglomeration effects; international business; regional economic activity: growth, development, and changes; discrete choice

JEL Classification: F23; R11; C25

1. Introduction

The transition process from a socialist planned economy to a market economy was very challenging for the affected countries since this process involved the establishment of a new economic and institutional framework, market liberalisation as well as industrial privatisation and restructuring (Detscher 2006). Transition paths and economic development differed and still differ across Central East European Countries (CEEC). East Germany (EG), however, is a case on its own. As a result of the German reunification, EG received massive financial transfers from the western part of the country. These transfers and the institutional adoption of a well-functioning market economy and democracy supported EG's relatively strong and quick modernization process. Since the capital stock in all CEECs vanished dramatically in the course of the economic crisis of the late 1980s, the transition process had to be accompanied by a vast amount of Foreign Direct Investment (FDI). The discussion about FDI in East European regions and East Germany was dominated in the past by market access, quality of the local institutions and the degree of political and economic stability in these countries (Resmini 2000). Only in recent years have regional location determinants been taken into account when looking at the location choice of multinational enterprises (MNEs).

In order to analyse MNEs location decisions reliably, a range of regional characteristics has to be taken into consideration. Agglomeration effects and labour market factors are among the most important determinants in international FDI research (see e.g. Bellak, Leibrecht, and Riedl (2008) and Barrios, Görg, and Strobl 2008). The study at hand follows this line of research and empirically identifies the influence of different agglomeration, labour market and other region-specific characteristics on the location choice of MNEs in transition economies.

Among the existing studies, which take the impact of *regional characteristics* on FDI into consideration, the majority focus on the regional level in a single-country study (see e.g. Chung and Alcácer (2002) for the United States, Guimarães, Figueiredo, and Woodward (2000) for Portugal, Barrios, Görg, and Strobl (2006) for Ireland, or Crozet, Mayer, and Mucchielli (2004) for France). Concerning FDI in *transition economies*, most of the studies analyse the driving forces behind FDI on a regional level in single-country studies (see e.g. Chidlow, Salciuviene, and Young (2009) and Cieslik (2005) for Poland or Hilber and Voicu (2010) for Romania) or on a national

level in multi-country studies as do Bevan and Estrin (2004) or Bellak, Leibrecht, and Riedl (2008). In existing literature there are only a few studies which focus on a regional level in a multi-country framework (see e.g. Basile, Castellani, and Zanfei 2008; or Pusterla and Resmini 2007).

Most recent studies (see e.g. Chidlow, Salciuviene, and Young 2009; or Basile, Castellani, and Zanfei 2008) have shown that agglomeration economies have a significantly positive impact on the regional attractiveness for FDI while the evidence of labour market conditions is mixed. On the one hand, most studies for developed countries find wage levels have a positive effect on FDI location choice (see e.g. Crozet, Mayer, and Mucchielli 2004). On the other hand, studies on transition countries find income rates have a negative impact. In terms of the effects that labour availability and educational levels of the workforce have, most studies on transition countries find no significant evidence (see e.g. Hilber and Voicu 2010). However, due to limited data availability in the past, the majority of existing studies focus on developed economies such as the EU-15 countries or the United States. Taking the economic differences in the economic performance between transition and western industries into account, the results of the numerous FDI location studies on western countries might not apply for transition economies.

With respect to the regional level of analysis, the *new economic geography* basing on Krugman (1991) emphasises the importance of industrial linkages at the regional level in the decision-making process of firms. Hence, it is straightforward to analyse the importance of agglomeration economies on a regional rather than on a national level. This is why in this study, firms are assumed to make their location decisions based on the level of the European Union's regional statistical units (NUTS-2 regions).

Taking these aspects into consideration, this paper contributes - to the best of our knowledge - to the existing empirical literature on location choice of MNEs through a combination of three research characteristics. Firstly, it focuses on the influence of regional determinants - the effects of agglomeration and labour market in particular - on foreign investors' location choice in transition countries. Secondly, it provides a multi-country study on a regional (NUTS 2) level, whereas the majority of these studies analyse on a nationwide level. And thirdly, it exploits firm level data from 33 regions belonging to three transition economies from a unique and very large firm-level dataset, the population of the *IWH FDI Micro database*.

This paper is organized as follows: In Section 2 we provide the derivation of the economic model behind the location choice of MNEs. This is followed by the econometric theory, which underlies the empirical analysis. In Section 3 we derive hypotheses from the descriptive analysis, economic theory and previous literature FDI location. The data used in the regressions are described in Section 4, followed by discussion of the empirical results in Section 5. Finally, the main empirical findings and their policy implications are summarised in the concluding Section 6.

2. Theoretical Background

An enterprise bases its decision to invest abroad on at least three things (see e.g. Basile, Castellani, and Zanfei 2008). Firstly, the enterprise decides whether to serve a foreign market. Secondly, the enterprise takes the decision on how to serve this market. This investment can be implemented through exports, joint ventures, licensing, or foreign direct investment. Thirdly, the investing company chooses a region for its foreign investment. In this paper, we analyze the location choice of an investor who has already decided to invest either in EG, the Czech Republic or Poland. It faces the decision of choosing one of the $j \in J$ regions as the location for its foreign investment by focusing on the impact of agglomeration economies and labour market conditions.

2.1. Economic Theory

The model used for the analysis of investment decisions is based on the model of monopolistic competition developed by Dixit and Stiglitz (1977). One of the major advantages of the Dixit-Stiglitz model is that it links the production cost function with a demand function of a representative utility-maximizing individual. The Dixit-Stiglitz model was extended upon e.g. by Venables (1996) and Krugman (1991). The latter work is considered to form the basis of the *new economic geography* emphasizing the importance of agglomeration economies on regional development and attraction of investment from abroad. On the base of these contributions, Head and Mayer (2004) developed a theoretical framework for location choice analysis of foreign direct investments which has been frequently used in recent studies (see e.g. Mayer, Méjean, and Nefussi 2010; Spies 2010; and Amiti and Javorcik 2008).

Dixit and Stiglitz (1977) assume a homothetic and concave utility function with two consumption goods, x_0 and X. The market of good X is monopolistically competitive and consists of n product varieties, while x_0 describes the rest of the economy. Since the indirect utility of X equals the aggregate quantity of X and is driven by a constant elasticity of substitution (CES) function, the following utility function underlies the Dixit-Stiglitz model:

$$U = U(x_0, X(x_1, x_2, ..., x_n)) = \left(x_0, \left(\sum_{i=1}^{n} {x_i}^{\rho}\right)^{\frac{1}{\rho}}\right) = \left(x_0, \left(\sum_{i=1}^{n} {x_i}^{\frac{\sigma-1}{\sigma}}\right)^{\frac{\sigma}{\sigma-1}}\right) [1]. \quad (1)$$

With respect to the concavity assumption, we require $0 < \rho < 1$. Hence, the elasticity of substitution, denoted by $\sigma = \frac{1}{1-\rho} > 1$, exceeds unity. Assuming that x_0 is a numéraire good and that a share $a(P)$ of the total income Y is spent on good X, we obtain the following budget constraint serving as the side condition for the utility maximization:

$$Y = x_0 + a(P)Y \Rightarrow a(P)Y = \sum_{i=1}^{n} p_i x_i = \underbrace{\left(\sum_{i=1}^{n} {p_i}^{1-\sigma}\right)^{\frac{1}{1-\sigma}}}_{P} \cdot \underbrace{\left(\sum_{i=1}^{n} {x_i}^{\frac{\sigma-1}{\sigma}}\right)^{\frac{\sigma}{\sigma-1}}}_{X}, \quad (2)$$

where P is a price index.[2] Dixit and Stiglitz (1977) apply a two-step maximization to derive the optimal demand for good x_i. First, the optimal combination between x_0 and the aggregate good X is derived subject to the aggregate budget constraint on the right hand side of (2). Afterwards, the optimal quantity of variety i, x_i, is calculated subject to the more detailed budget constraint, $Y = x_0 + \sum_{i=1}^{n} p_i x_i$. By inserting the optimal choice of X, we obtain the optimal demand for x_i. According to (2), we can substitute $\frac{a(P)Y}{P}$ for X, which leads to the following optimal demand for x_i:

$$x_i = \left(\frac{P}{p_i}\right)^{\sigma} X = \frac{a(P)Y \cdot P^{\sigma-1}}{{p_i}^{\sigma}}. \quad (3)$$

After having derived the optimal demand based on the CES-function, we turn to the profit maximization of the producer of variety i. The producer's optimal monopoly price, p_{mp}, can be denoted by $p_{mp} = c/(1 - 1/|\epsilon_{x,p}|)$. By assuming that a single monopolist does not influence the price index, P, eq. (4) shows that the price elasticity of a single producer is equal to the negative substitution elasticity, σ. Hence, we

[1] The notation of the derivation follows Wied-Nebbeling and Schott (2001).
[2] The derivation of the price index P can be found in e.g. Wied-Nebbeling and Schott (2001: 320pp.).

obtain an optimal price depending only on the marginal costs and the elasticity of substitution.

$$\epsilon_{x_i,p_i} = \frac{\partial \ln x_i}{\partial \ln p_i} = -\sigma \Rightarrow p_i^* = \frac{\sigma}{\sigma - 1} c \tag{4}$$

Since we assumed above that $\sigma > 1$, the equilibrium price exceeds the marginal costs. Furthermore, (4) shows that the equilibrium price negatively depends on the substitution elasticity. This result is the basis for the profit maximization of an enterprise choosing a region j as a location for a plant in sector k to serve $m \in M$ markets. Furthermore, the distance between the production plant in region j and the market m produces transaction costs (such as transportation and communication costs). Hence, we assume iceberg-type transaction costs, ϕ_{jm},[3] and a corresponding cost function, $c_{jkm} = c_{jk}\phi_{jm}$. It is assumed that the firm tries to maximize its profits over a finite time horizon.

$$\pi_{jk} = (1 - t_j) \sum_{m=1}^{M} [(p_{jkm} - c_{jkm}) x_{jkm}] = (1 - t_j) \sum_{m=1}^{M} \left[\frac{1}{\sigma - 1} c_{jk} \phi_{jm} \frac{a_m(P_m) Y_m {P_m}^{\sigma-1}}{(\frac{\sigma}{\sigma-1} c_{jk} \phi_{jm})^{\sigma}} \right] \tag{5}$$

For the ongoing transformation, the factor of demand $a_m(P_m)Y_m$ and the price index ${P_m}^{\sigma-1}$ is defined as a region's market access MA_m, while it is assumed that the marginal costs c_{jk} depend on the sectoral wage rate, w_{jk}, including a tax wegde on labour, τ_j, capital costs (such as land prices), r_j, and a productivity factor, A_{jk}, accounting for the educational background of the workforce, E_j, agglomeration economies measured by existing inter-industry linkages, S_{jk}, the technological performance of the regional economy expressed by patent data, T_{jk}, and the regional economic structure, H_j. The distance between the investor's home country and the region of investment, d_j, is included in order to reflect transaction costs of production. By modifying the approach taken by Brülhart, Jametti, and Schmidheiny (2012), we assume that marginal costs are derived through the product of the independent variables which influencing the production costs by means of variable-specific elasticities. Hence, we obtain the following cost function:

$$c_{jk} = ((1 + \tau_j) w_{jk})^{\gamma_1} {r_j}^{\gamma_2} d_j^{\gamma_3} A(S_{jk}, T_j, H_j, E_j) = ((1 + \tau_j) w_{jk})^{\gamma_1} {r_j}^{\gamma_2} d_j^{\gamma_3} {S_{jk}}^{\delta_1} {T_j}^{\delta_2} {H_j}^{\delta_3} {E_j}^{\delta_4}. \tag{6}$$

[3] This implies that for the delivery of x goods from the location of production j to market m requires the shipment of $\phi_{jm}x$ goods. By definition, ϕ_{jm} exceeds unity if m does not correspond to j. If the goods do not cross region j, ϕ_{jm} equals one.

After inserting (6) and MA_m into (5), the profit function can be transformed into the following log-linear empirical function with the coefficient vector β and the error term, e_{jk},[4]

$$\pi_{jk} = \beta_0 + \beta_1 \ln t_j + \beta_2 \ln \tau_j + \beta_3 \ln w_{jk} + \beta_4 \ln r_j + \beta_5 \ln d_j + \beta_6 \ln S_{jk} + \beta_7 \ln T_j +$$

$$\beta_8 \ln H_j + \beta_9 \ln E_j + \beta_{10} \ln \left(\sum_{m=1}^{M} \frac{MA_m}{\phi_{jm}} \right) + e_{jk}. \tag{7}$$

2.2. Econometric Approach

The analysis of the location choice of FDI in the 33 NUTS 2 regions in EG, the Czech Republic and Poland is based on a conditional logit approach. In this framework, the location choice is based on a stochastic utility maximization process for an enterprise which results from the choice of region j as a plant location selecte from J possible regions of the sample. Following Greene (2003) and Train (2009), we assume that the investor chooses the region where he expects to make the largest profit, π_j.[5] In this analysis, the deterministic part of the profit function is made up by alternative specific regressors, z_j (e.g. GDP or the industrial structure in a specific region).[6] The stochastic and unobservable part of the equation is represented by an error term, e_j.

$$\pi_j = z_j' \beta + e_j \tag{8}$$

By definition, the investor chooses the region j, which exceeds the expected profits of all the other regions $l \in J$, with $l \neq j$. Thus, the location choice is the dependent variable of this analysis and equals one for the region chosen by the investor, and otherwise is zero. This assumption leads to the following estimation of the logit choice probabilities, P_j (see Train (2009)):

$$P_j = \text{Prob}(\pi_j > \pi_l, \forall\ l \neq j) = \text{Prob}(e_j > z_l' \beta - z_j' \beta + e_l, \forall\ l \neq j). \tag{9}$$

[4] See section A.1 of the appendix for a detailed specification of the coefficient vector β.

[5] For reasons of simplicity, the sectoral subscript k of the theoretical model will be omitted in the following notation.

[6] Individual specific regressors, in this case the characteristics of the investing firm, are omitted since the IWH FDI Micro Database only partly contains key figures of the investing companies. If this information were used in the regression, the sample size would be significantly reduce including a loss in the explanatory power of the analysis.

For the unobserved part of the error term we assume a Gumbel type I extreme value distribution, $F(e_j) = \exp(-\exp(-e_j))$, with independently distributed error terms among the alternatives.[7] Following McFadden (1973), a transformation of the distribution leads to the following probability equation

$$P_j = \frac{\exp(z_j'\beta)}{\sum_{l=1}^{J} \exp(z_l'\beta)}, \tag{10}$$

which is defined as the conditional logit equation.

3. Hypotheses

Following Marshall (1920), agglomeration effects are made up of three main factors: labour market specialisation, knowledge spillovers and supplier linkages. In the context of the regional attractiveness for FDI, agglomeration economies describe a positive correlation between a region's ability to attract further investors and the number of firms already existing in a specific sector.[8] In contrast, Crozet, Mayer, and Mucchielli (2004) theoretically show that the agglomeration effect depends on a trade-off between the positive externalities and the negative impact of competition.[9] Empirically, the former effect seems to dominate since recent studies [10] have shown a significantly positive impact of agglomeration economies on the regional attractiveness for FDI. These results confirm Marshall, implying that an enterprise's location choice is influenced by existing regional activities in the sector of investment. As one important pulling factor, he specifies positive agglomeration effects of a skilled labour force, meaning the share of employment in the investor's industry (see also Alcácer, Chung, and School 2010). Hence, a larger pool of specialized workers will *ceteris paribus* reduce production costs for an investment. This leads to the first hypothesis:

Hypothesis 1: A specialization of the regional workforce in the sector of investment increases the location probability of FDI.

Intuitively, a cost-seeking investment is deterred by a high sectoral wage rate. However, the results from recent studies on the impact of the wage rate on the location choice

[7] This distribution is the foundation of all logit approaches. See Train (2009:p.34).
[8] See Dunning and Lundan (2008:p.596).
[9] See Crozet, Mayer, and Mucchielli (2004:p.30).
[10] See e.g. Barrios, Görg, and Strobl (2006) or Basile, Castellani, and Zanfei (2008).

are ambiguous.[11] Guimarães, Figueiredo, and Woodward (2000) stress that the impact of the wages should be checked for other variables such as labour productivity, the skill level and the educational background of the workforce. Looking at the wage rates of the countries in our sample in Table 7 of the Appendix, we observe that, on average, the wage rate in EG is three times higher than the corresponding wages in the Czech Republic or Poland. This difference can hardly be explained by differences in the qualification of the regional labour force, represented by the share of employees with a scientific-technical occupation, since the proportions in East German and the Czech Republic are nearly identical. A possible explanation may be found by looking at differences in productivity and the endowment of capital; however, obtaining reliable information on this topic proves to be rather difficult. Paqué (2010) points out that labour productivity in Poland and the Czech Republic has so far only reached 35% and 38 % of the German level respectively, while the productivity of the East German economy is between 75% and 84% of the average German labour productivity.[12] This leads to hypothesis 2a and 2b:

Hypothesis 2a: A high sectoral wage rate does not necessarily decrease the location probability of FDI .

Hypothesis 2b: The educational qualification of the regional workforce raises the location probability of FDI.

Following the assumption above that an investor chooses the region which promises to maximize the investor's profits, the location decision of an investor is influenced by the regional demand measured by the regional GDP. Further, as noted above, the demand at a location is also driven by the access to other markets and the distance from location j to these markets. With respect to the regional purchasing power and the market potential to European markets, a region's attractiveness is presumed to depend positively on a high sales potential which compensates for the fixed set-up costs.[13]

Hypothesis 3: Regioanl market access and the market potential to European markets increase the location probability of FDI.

[11] On the one hand, Basile, Castellani, and Zanfei (2008) found the wage rate hhad a negative impact, which was not significant among all models, while on the other hand Barrios, Görg, and Strobl (2006) actually observed a positive influence of wage.
[12] See Paqué (2010:9pp.).
[13] See Basile, Castellani, and Zanfei (2008:p.332)

As discussed above, the distance between the investor's and the subsidiary's location produces transaction costs. The assumption that the probability to switch from trade and export relations to direct investments increases with higher trade costs and a large geographical distance cannot be empirically supported. Bartlett, Ghoshal, and Beamish (2006) summarise the results from recent studies and observe that distance has a negative impact on FDI as well as on trade activity. Furthermore, Bunyaratavej, Hahn, and Doh (2008) stress that the importance of geographical distance is lower for service off-shoring, since the progress in telecommunications technology has lowered the cost impact of the geographic distance on intangible goods such as services. Therefore hypotheses 4a and 4b are as follows:

Hypothesis 4a: The physical distance between the country of origin and the region of investment has a negative impact on the regional attractiveness for FDI.

Hypothesis 4b: The distance's negative impact is more pronounced among industrial FDI than among service FDI.

4. Data

The dataset consists of information on 33 NUTS-2 regions listed in table 6 of the appendix. It is constructed by merging the basic population of the *IWH FDI Micro Database* on FDI in EG and CEE (enterprise data) with regional data from Eurostat, the European Patent Office (EPO) and the OECD databases. The structure of this section is driven by the division of the dataset, as enterprise data are discussed in subsection 4.1 followed by a description of the regional data in Subsection 4.2.

4.1. Enterprise Data

To gain insight into the importance of local factors in determining real decisions to invest in transition regions, we use micro data on foreign direct investment in EG, the Czech Republic and Poland from the *IWH FDI Micro Database*. The East German subsample of foreign investors is supplemented by information on West German investors, since West German investment played a crucial role in the transition

process in EG.[14] Table 1 lists the available information obtained from the *IWH FDI Micro Database*.

Table 1: Enterprise Variables and their Sources

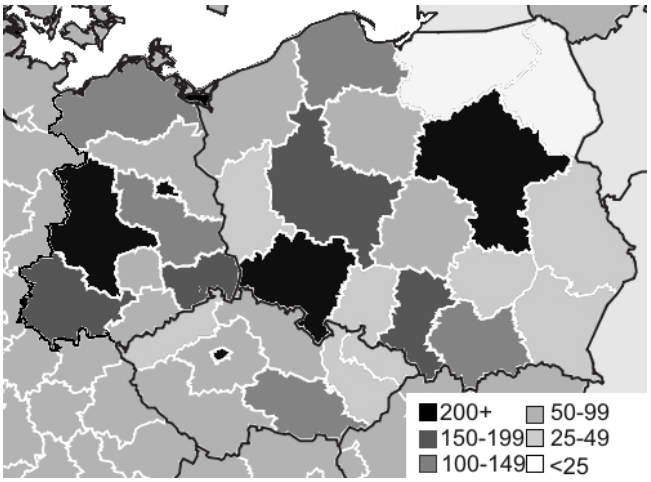
Variable Name	Description	Source
Date of investment	Date of registration of the affiliate in the register of commerce	IWH
Location of investment	Site where the affiliate is registered	IWH
Branch of industry	Branch of industry according to NACE-1.1 classification	IWH
Investor's origin	Home country of the investor	IWH

- Date of investment t: The date of investment is proxied by the date of registration of the affiliate company in the local register of commerce. Following Jindra (2011) and Spies (2010), it is assumed throughout the empirical analysis of this paper that the investment decision was made the year before the enterprise was entered in the register.
- Location of investment j: Each affiliate of an MNE is allocated to a NUTS-2 region using the postal code of the affiliate's registered address.
- Branch of industry k: This describes the industrial sector of the affiliate according to the European Union's NACE 1.1. classification. In this analysis we focus on the industrial production (NACE 1.1. Code 14-41)[15], wholesale, retail trade, transport (NACE 1.1. Code 51-64), financial intermediation and real estate (NACE 1.1. Code 65-74), as well as sewage and waste disposal, media, utilities and other services (NACE 1.1. Code 90-93).
- Investor's origin: The country where the parent company of the affiliate is registered.

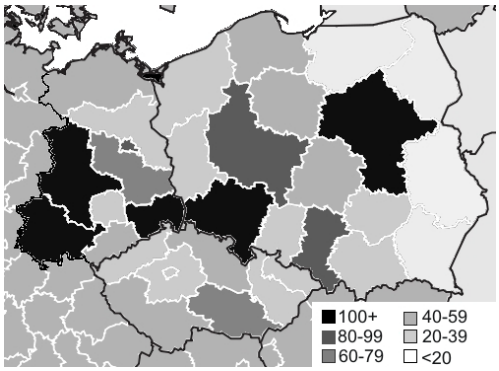
Due to data availability reasons, which will be described in more detail in the following subsection, the analysis of investment decisions is restricted to a time period between 2000 and 2010. Hence, the sample contains 4,343 affiliates of MNEs, thereof 1,710 in EG, 710 in the Czech Republic and 1,923 in Poland. The agglomeration tendencies towards each capital region shown in Figure 1 and Table 6 are mostly driven by a strong concentration of service FDI in the capital regions, which account for around half of the national service FDI streams in each country.

[14] See Günther, Gauselmann, et al. (2011:p.535) for more detailed information.
[15] Excluding construction

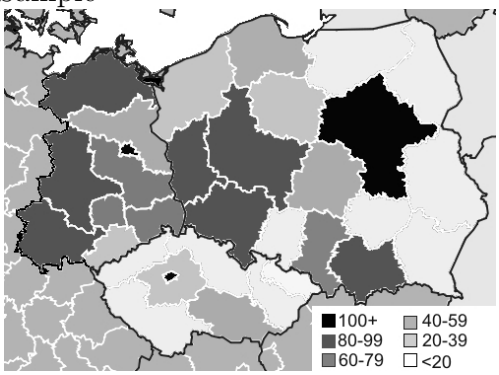
Figure 1: Spatial distribution of FDI per NUTS-2 region



Whole Sample



Industry



Services

As shown in Table 2, around 40% of FDI goes to the industrial sector in each country. In terms of regional distribution of industrial FDI, Figure 1 and Table 6 show a more distributed pattern, indicating agglomeration in traditional industrial and developing high-tech regions, such as the regions around the cities of Dresden and Wroclaw as well as in the federal states of Thuringia and Saxony-Anhalt. Furthermore, Figure 1 show that FDI streams to Poland and the Czech Republic are characterized by bias towards the West. FDI streams going to each eastern border region are relatively sparse, whereas the regions sharing borders with EU-15 countries attract more investment.

Table 2: Distribution of Enterprises per country, branch and origin of investor

Investment location	Total	Industry NACE (14-41)	Service NACE (51-74 & 90-93)
East Germany	1,710	647	1,063
Czech Republic	710	316	394
Poland	1,923	774	1,149
Total	**4,343**	**1,737**	**2,606**

4.2. Regional Data

For the econometric analysis we combined the enterprise data with regional information. As mentioned above, the sample was slightly reduced due to limited data availability. This reduction is mostly due to a limited availability of Central East European regional statistics until the end of the 1990s. In order to maintain the quality of the regression results, all registrations before the year 2000 are omitted for this analysis. Furthermore, due to a restructuring of the NUTS-2 regions in EG in 2003, parts of the data for the regions Brandenburg-Nordost and Brandenburg-Südwest are not available for the period before 2003. As a workaround, we calculated the missing data on the base of the relation between these two regions and the referring data of Brandenburg (NUTS-1).

Table 3: Summary of the Regional Variables and their sources

Variable	Description	Source
spec	Relative specialization of region j in industry k	OECD/own calculation
herf	Herfindahl Index	OECD/own calculations
patent	Number of applied patents in region j	European Patent Office
capital	Dummy for capital region	
wage	Compensation of Employees in industry k in 1,000 €	Eurostat
hrsto	Share of employees with a technical-scientific occupation	Eurostat
unemp	Unemployment rate in %	Eurostat
gdp	Market access (regional GDP in Mio. €)	Eurostat
mp	Market Potential (distance-weighted GDP of European markets)	Eurostat/own calculation
popdens	Population density in inhabitants/km^2	Eurostat
inf	Infrastructure-Index	Eurostat/own calculations
corp	Effective corporate tax rate in %	OECD
tax	Effective tax wedge in %	OECD
dist	Euclidean distance (km between capital of country of origin and major city in region j)	own calculation

Focusing on the importance of regional characteristics on MNEs location choice in transition regions, we include three groups of variables in the estimation model. The first group contains agglomeration variables, namely the relative specialization in the sector of investment, the economic diversity, the technological performance and a

dummy for capital regions. The second group - containing labour market variables - includes the sectoral wage rate, a human capital measurement and the unemployment rate. The third group includes several other regional variables like regional GDP, market potential, population density, infrastructure, corporate tax, taxes on labour and the geographical distance between the investor's country of origin and the region of investment. These latter variables are standard determinants to be included in location choice analyses and mainly serve as control variables in the estimation.

Agglomeration Variables: In order to analyse the impact of regional agglomeration on an enterprise's location choice, four agglomeration measures are included in the regression. Firstly, the *relative specialization*, $spec_{jk}$, measured by the share of employees in sector k of the total regional employment figure, accounts for the existence of intra-industry linkages prior to investment. This measurement goes beyond the specialization of the regional labour market, since the size of the sectoral employment figures also incorporates the importance of sector k in region j.

Secondly, supplier linkages depend on a variety of inputs from suppliers. The regional economic diversity the region j is calculated by means of the Herfindahl Index, $herf_j$,

$$herf_j = \sum_{k=1}^{K} \left(\frac{\text{emp}_{jk}}{\sum_{l=1}^{K} \text{emp}_{jl}} \right)^2 . \tag{11}$$

using the OECD's employment figures, emp_{jk}, from, $K = 31$, sectors specified by the NACE 1.1 Code.[16] As can be seen from equation (11), a diversified economy in region j coincides with a low value in the Herfindahl Index.

Thirdly, the regional patent activity captures the *technological performance* and potential knowledge spillovers in region j. The patent applications collected by the European Patent Office are the basis for the calculation of the patent measurement depending on the origin of the inventors of the registered patents. In order to avoid double counts of multi-investor patents, the patent measurement refers to a fractional counting[17] . This implies that regional patent activity also depends on the amount of inventors per patent. Since the data of the European Patent Office provide patent data for the industrial sector, the patent measurement refers to the general patent activity in a region.

[16] See Mukim and Nunnenkamp (2010:p.11) among others.
[17] See Frietsch, Schmoch, et al. (2011).

Finally, a dummy for capital regions, *capital*, controls for capital specific characteristics, capturing the influence of omitted agglomeration factors on the location choice decision (e.g. institutions of bilateral relations, like chamber of foreign trade, embassies etc.).

Labour Market Variables: Labour costs in industry k in region j, $wage_{jk}$, are measured by *compensation per employee*. Data from Eurostat's Labour Cost Survey, which are only collected every four years, are not appropriate for the purposes of this analysis especially as the survey did not include regional wage data from the EU's new member states until 2004. As outlined by López Rodríguez and Faíña (2007), this problem can be solved by calculating the regional wage level in different industries, w_{jk}, by using national account data and industrial employment figures to get a proxy for the *compensation per employee*. This variable allows for a differentiation of the wage level across eight industrial sectors driven by the NACE 1.1 code.[18]

In order to control for potential differences in labour productivity, the skill level and the educational background of the workforce is considered in the regression. This is done by means of the share of employees with a scientific-technical occupation, $hrsto_j$, as a proxy for the qualitative *human resource* potential in region j.[19] Furthermore, the unemployment rate of a region, $unemp_j$, is used as an additional labour market factor for explaining location choice.

Other Regional Variables: In order to capture a region's direct *market access* as a pull factor for investors, we consider the local GDP of the respective NUTS-2 region. Despite a varying population size among the NUTS-2 regions,[20] the regional GDP delivers a robust value for the purchasing power of a region. In order to account for potential export opportunities from the affiliate's location, we include an index

[18] The Polish sectoral wage rates could not be calculated for the year 1999 since the Polish sectoral employment figures have only been available since 2000. Hence, for the Polish investment decisions in 2000, we use an all-sectoral wage rate in order to extend sample size.

[19] See OECD (1995:p.16). This measurement seems to be more appropriate for this analysis than other human resource variables like secondary school enrolment, since it reflects the actual workforce potential. Furthermore, the secondary school enrolment varies among the countries and over time due to differing school systems or reforms. For example, in 1999 the secondary enrolment percentage (ISCED3) for Poland (68.9%) was more than twice that of East Germany's 26.1%. In 2008, the relation changed as the East German percentage (43.1%) became larger than the Polish one (38%). It is very unlikely that these differences reflect an actual shift in the enrolment figures.

[20] The average population of the NUTS-2 regions in the member states is presumed to be between 800,000 and 3 million inhabitants. See EU-Parliament and Council (2003:p.3).

for *market potential* measuring access to 26 European markets.[21] This index is calculated for each region j, mp_j, according to the formula proposed by Harris (1954),[22]

$$mp_j = \sum_{m=1}^{M} \frac{GDP_m}{D_{jm}}, \tag{12}$$

where the index m incorporates the 26 European countries. In order to calculate the potential for region j, the national GDP of each country m is divided by, D_{jm}, measuring the road distance in kilometres between the capital/major city of region j and the capital of the foreign market m.[23] The road distance approach seems to be more appropriate than simply using the direct geographical distance between the region in question and the foreign markets, as the majority of the intra-continental transport is carried out overland.

The effective combined *corporate tax rate*, $corp_c$, and the effective *tax wedge* on labour, tax_c, are country-level variables describing the fiscal policy of a country c. This data is drawn from the OECD tax database.[24] As the *tax wedge*, which describes the tax burden of a childless single person with average earnings, was not drawn before the year 2000, we assume the same values for the year 1999 as observed in 2000.

Following Bartik (1985), the regional *population density*, $popdens_j$, can be partly used as a proxy for land prices in order to capture capital costs of the location decision. This approach was chosen in several location choice studies (e.g. Guimarães, Figueiredo, and Woodward (2000) or Barrios, Görg, and Strobl (2006)).

The infrastructure of a region j as an FDI-attracting factor is included by means of an index, inf_j, which is based on the density of the region's highway, road, and railway networks. For each category, the region with the highest ratio in each category is taken as the benchmark and is assigned a value of 1 for the category. All other regions' scores lie between 0 and 1. Finally, a region's infrastructure index is calculated using a weighted average with the road's value assigned half the weight of the other indices.

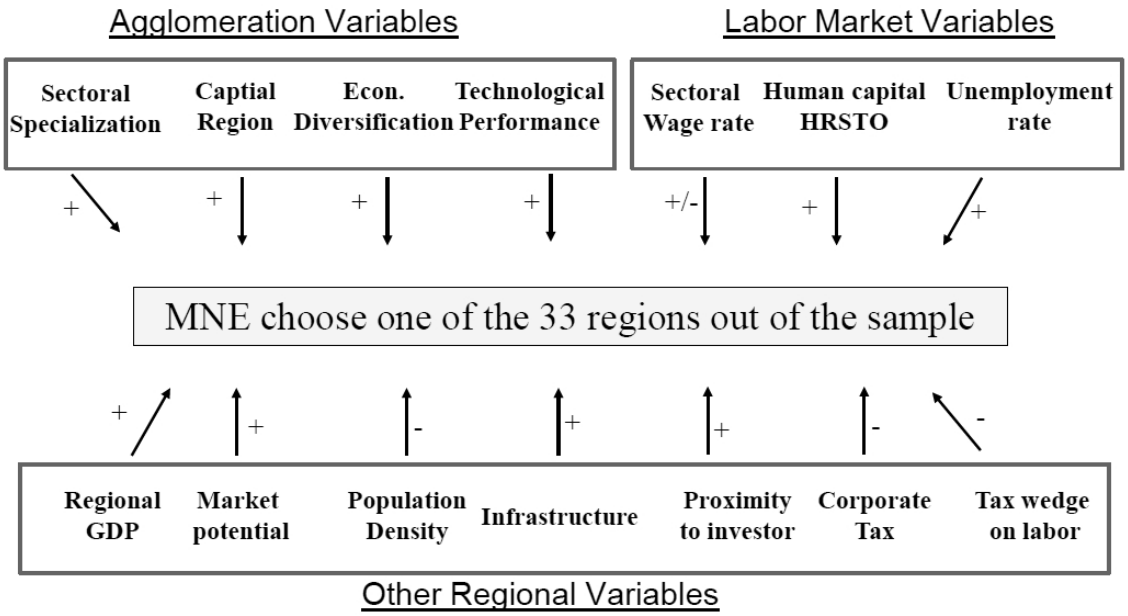
[21] All 27 EU countries except the islands of Cyprus and Malta, but including Switzerland.

[22] Though Harris' market potential is a very simple proxy, it has performed better than theoretically more sophisticated measures in other studies. See e.g. Head and Mayer (2004) for a comparison of the performance of Krugman's and Harris' market potential measures.

[23] For Germany, Frankfurt/Main was used as the city representing the economic centre of Germany because of its central location.

[24] See OECD (2009).

Figure 2: Explanatory Variables and expected impact



The distance to the investor's home country and the region of investment is included in order to capture transaction cost of production. Due to the fact that the origin of investors is not restricted in this analysis, it is impossible to apply the road distance approach as a distance measure. Hence, the distance is calculated as the Euclidean distance between the capital of the investor's home country and the major city of the region.

5. Empirical Results

The section presents the results of the regressions described above. Firstly, the conditional logit estimates for the whole sample are shown in Table 4. The first three columns of Table 4 contain the regression results for each group of explanatory variables, whereas column 4 shows the regression results for the complete set of variables. Secondly, Table 5 contains the regression estimates for the national and sectoral subsamples. The first three columns of Table 5 list the estimates for each country. The last two columns refer to the sample's division into two sectors: the industrial sector (Nace 1.1 Code 14-41) and the service sector (Nace 1.1 Code 51-74 and 90-93).

Table 4: Conditional Logit for the whole sample and country combinations.

Explanatory Variables	(1)	(2)	(3)	(4)
lnspec	0.369***			0.341***
	(0.0238)			(0.0238)
lnherf	-1.183***			-0.550***
	(0.113)			(0.133)
lnpatent	0.264***			0.0203
	(0.0228)			(0.0286)
capital	1.838***			0.968***
	(0.0692)			(0.0959)
lnwage		1.355***		0.413***
		(0.0672)		(0.0729)
lnhrsto		2.268***		0.762***
		(0.138)		(0.233)
lnunemp		0.292***		0.275***
		(0.0760)		(0.0807)
lngdp			1.489***	0.778***
			(0.0334)	(0.0627)
lnmp			-0.0955	0.577***
			(0.147)	(0.179)
lnpopdens			0.177***	-0.204***
			(0.0344)	(0.0505)
lninf			0.155	0.348***
			(0.114)	(0.127)
lncorp			1.216***	1.171***
			(0.208)	(0.213)
lntax			0.329	-0.156
			(1.434)	(1.473)
lndist			-0.0385	-0.0482
			(0.0510)	(0.0499)
Investments	4,343	4,343	4,343	4,343
Log-Likelihood	-13375	-13777	-13419	-13186

Conditional Logit Estimation. Dependent Variable: Location choice for Region j.
Standard errors in parentheses. Significance level: ***p<0.01,**p<0.05,*p<0.1.
Country-Dummies in regression are not shown in the table.

In the complete sample, the significantly positive specialisation coefficient indicating intra-industry linkages is in-line with Krugman's *new economic geography*, implying that a region becomes more attractive with increasing economic activities in the target sector of investment. In all national and sectoral subsamples (see Table 5) the sectoral employment share of the total workforce is also significantly positive. These results suggest that indeed a specialization of the regional workforce in the sector of investment increases the location probability of FDI (H1). The coefficients for the inter-industry linkages represented by the Herfindahl Index are significantly negative for the whole sample and the sectoral subsamples, implying that an economic diversification seems to be beneficial for a region's competitiveness to attract FDI. The third agglomeration variable – the number of patents applied for – is also positively significant in the first estimation (column 1), but proves to be insignificant on the whole as well as in all national and sectoral subsamples. This shift in significance

can be explained by the fact that this agglomeration variable reflects the region‘s economic potential and is therefore in correlation with the regional GDP (see table 4), so that it turns insignificant as soon as the GDP is added to the analysis. The last variable concerning agglomeration effects, the dummy for capital regions, is mostly significantly positive. This implies that additional, unobserved characteristics for capital regions seem to drive the investor's decision. As mentioned above, this could include institutions of bilateral relations.

All three labour market variables prove to be significantly positive in estimation (2) and remain significantly positive in the complete sample estimation. The wage rate, however, turns out to be significantly negative for the East German sample. This indicates somewhat that FDI in East Germany is more cost-sensitive, which can partly be explained by the comparatively high wage level in East Germany. Furthermore, FDI in the manufacturing sector proves to be more cost-sensitive than in the service sector. A deeper consideration is necessary when discussing the significantly positive influence of the wage rate level. The results of this analysis correspond to the phenomenon described above that labour productivity is incorporated into the wage rate. This can explain the result that a higher wage rate does not necessarily deter FDI (H2a). Despite its predominantly positive impact, the control for labor skills by means of the aggregate share of employees with a scientific-technical occupation appears to be insufficient to capture differences in productivity. Nevertheless, the results indicate that the educational qualifications of the regional workforce raises the location probability of FDI (H2b). The effect of the unemployment ratio is ambiguous across subsamples. The significantly positive coefficient in the complete sample might be explained by the fact that a higher unemployment ratio can go along with a better supply of potential employees compared to the other countries of the sample. In combination with the finding that human resources seem to be more important for service-sector FDI than for investments in the manufacturing sector, one could conclude that labour market requirements for FDI in the service sector are higher than the ones in industrial production. Nevertheless, this result has to be interpreted carefully, since the analytical division into two sectors, services and manufacturing, is quite crude and does not account for the heterogeneous structure within the sectors themselves.

In the entire sample, market access and market potential have a significantly positive impact and increase the location probability of FDI (H3). The GDP's impact is also

significantly positive for all subsamples, while market potential only has a positive impact on a location's attractiveness for FDI from the manufacturing sector. In the East German sample the latter even shows a significantly negative impact which might be explained by its closeness to the economically powerful West European markets and the geographic distribution of FDI in East Germany. This result leads to the conclusion that access to the immediate region seems to be more important for the location decision than the exporting possibilities from the chosen location to the major European markets.

Table 5: Conditional Logit for each country and branch

Explanatory	National Sub-samples			Sectoral Sub-Samples	
Variables	DE	CZ	PL	Industry	Service
lnspec	0.511***	0.610***	0.162***	0.225***	0.170***
	(0.0531)	(0.0903)	(0.0380)	(0.0375)	(0.0358)
lnherf	-0.0510	-0.174	-0.254	-0.650***	-0.612***
	(0.401)	(1.051)	(0.343)	(0.208)	(0.186)
lnpatent	0.151	-0.119	0.0416	0.0432	-0.0198
	(0.0989)	(0.103)	(0.0377)	(0.0408)	(0.0408)
capital	0.399	1.350	0.655***	0.481***	1.187***
	(0.638)	(2.366)	(0.186)	(0.149)	(0.136)
lnwage	-0.431**	1.591***	1.121***	-0.387*	0.156
	(0.186)	(0.283)	(0.156)	(0.203)	(0.104)
lnhrsto	1.442**	-0.984	-0.189	0.560*	1.376***
	(0.658)	(0.889)	(0.331)	(0.324)	(0.339)
lnunemp	0.896**	0.440	-0.405*	0.448***	0.0564
	(0.386)	(0.488)	(0.228)	(0.122)	(0.116)
lngdp	1.144***	3.016***	1.000***	0.961***	0.887***
	(0.219)	(0.798)	(0.111)	(0.0916)	(0.0921)
lnmp	-0.855*	-0.393	0.453	0.527**	0.262
	(0.488)	(1.640)	(0.527)	(0.257)	(0.263)
lnpopdens	-0.234	-0.684	-0.568***	-0.342***	-0.0932
	(0.190)	(0.580)	(0.221)	(0.0766)	(0.0743)
lninfra	0.352	-0.422	0.743*	0.399**	0.142
	(0.510)	(0.945)	(0.384)	(0.192)	(0.191)
lncorp				1.381***	1.370***
				(0.344)	(0.276)
lntax				1.634	1.553
				(2.363)	(1.927)
lndist	-1.110***	-0.766***	-2.169***	-0.253***	0.0833
	(0.181)	(0.260)	(0.207)	(0.0785)	(0.0672)
N	1710	710	1923	1737	2606
ll	-3267	-1200	-4022	-5733	-7218

Conditional Logit Estimation. Dependent Variable: Location choice for Region j. Standard errors in parentheses: ***p<0.01,**p<0.05,*p<0.1. Country-Dummies used in columns ALL are not displayed.

The infrastructure coefficient for the whole sample is significantly positive, whereas the infrastructure's impact within each country is insignificant except in the Polish case. This result indicates that regional infrastructure investments can increase the attractiveness of the region itself and that of its direct neighbouring regions at the same time. Hence, the impact of infrastructure investments on the attraction of FDI appears to be rather on a national level rather than on a regional level. In contrast

to the majority of location choice studies,[25] the impact of the population density is predominantly negative; there is a significantly negative impact on the entire sample and for the industrial subsample. Nevertheless, the choice of the population density as a proxy for land prices has to be interpreted carefully.

The regional proximity to the investor does not seem to matter in the complete sample. Previous studies on single countries suggest that most investments occur in countries close to the investor's country of origin and that the geographical proximity to the investor has a positive impact on the location choice (see e.g. Crozet, Mayer, and Mucchielli 2004). The results of the national subsamples in table 5 confirm these results. Nevertheless, in the complete sample, the distance measure has an insignificant impact. Hence, the impact of the geographic distance seems to depend from the choice of the sample as well as from the sectoral distinction (H4a). The significant negative sign in the industry sample can be explained by the transaction costs, which are higher in the manufacturing than in the service sector (H4b).

The results for the fiscal policy variables in Tables 4 and 5 draw an ambiguous picture, since the impact of the corporate tax rate is significantly positive, while the impact of the tax wedge on labour is insignificant. These results are in-line with several other studies (see e.g. Basile, Castellani, and Zanfei 2008), which stress the importance of the provision of public goods for location decisions by foreign investors. This explanation serves only in part for this sample since the corporate tax rate accounts only for a small share of the federal tax revenue in the sample's countries. If business promotion and/or business related public services were directly financed by corporate taxes, the significantly positive effect of this taxation could be partly explained.

6. Conclusion

The article at hand analyses the impact of regional determinants - agglomeration and labour market effects in particular - on the location choice of MNEs into transition economies. By means of a conditional logit model on a sample of 4,343 subsidiaries over the 2000-2010 time period we compare data from 33 regions in East Germany,

[25] See e.g. Basile, Castellani, and Zanfei (2008) or Spies (2010) who have found an insignificant or even positive impact of population density on the location choice.

the Czech Republic and Poland. The results show that agglomeration advantages, such as sectoral specialization, a certain economic diversity as well as a region's economic performance prove to be some of the most important pull factors for FDI in transition regions. Furthermore, the predominantly significant positive impact of the capital dummy shows that there are additional, unobserved - most probably institutional - agglomeration factors which drive FDI to the capital regions. These results support the outcomings of former studies which include agglomeration effects in post-communist economies into the investigation like Cieslik (2005).

In addition, the labour market factors prove to play an important role in the location of FDI. In contrast to most existing studies on location choice into CEE countries (see e.g. Cieslik 2005) - but in-line with Hilber and Voicu (2010) - the estimates in this analysis show that higher wages do not distract investors *per se*. They can even have a positive impact as long as higher wages go along with offsetting factors such as high endowment of capital and higher productivity of the workforce, as found in this study on Poland and the Czech Republic. This underlines the importance of education for attracting FDI, especially regarding the economically more sustainable FDI in more advanced sectors of the economy. The positive result for East Germany in this category suggests that East Germany's present and future could lie in the exploitation of competitive advantages and a highly educated and specialized workforce rather than in acting as the extended workbench for other, more industrialized countries. In terms of transaction costs, the estimates show that, especially for FDI in the manufacturing sector, the proximity between the region of investment and the headquarters of the investors is a crucial aspect when coming to a location decision.

The regional endowment effects also take the local economic performance into account and this shows that market access and market potential both strongly increase the location probability of FDI in general. When differentiating the analysis into sub-samples, the GDP's impact remains significantly positive while market potential becomes less important for FDI location on a national level. The coefficient for market potential even becomes negatively significant in the East German case. This might be explained by East Germany's geographical proximity to and its direct competition with the economically powerful West European markets. This result is partly in-line with the results from Spies (2010), who observed a significantly positive influence

of the direct market access to the German federal states throughout, whereas the regional's market potential was a less important driving factor.

Finally, it seems that a country's position in the transition to industrialization is important not only for the quantity but also for the structure of incoming FDI streams. Keeping factors reflecting the allocation of public goods, the educational background and productivity of the workforce in mind, it seems that countries finding themselves in different stages of the transition process attract FDI based on significantly different pull factors.

Since this analysis is based on a three-country sample, there is a large potential for extending research into FDI pull factors to further regions, such as additional transition countries. Since the enterprise data contains information about the investor and the subsidiary, there is research potential in controlling the location decision of an investor for bilateral trade and business relations. Empirically, the estimation could be enhanced by bilateral data as well as by investor-specific variables to gain insight into the interaction between investor-specific and regional characteristics.

A. Appendix

A.1. Specification of the Coefficients of the Empirical Function

The profit function

$$\pi_{jk} = (1-t_j)\left[\frac{(\sigma-1)^{\sigma-1}}{\sigma^{\sigma}}\left(((1+\tau_j)w_{jk})^{\gamma_1}\, {r_j}^{\gamma_2} {d_j}^{\gamma_3} {S_{jk}}^{\delta_1} {T_j}^{\delta_2} {H_j}^{\delta_3} {E_j}^{\delta_4}\right)^{1-\sigma} \sum_{m=1}^{M} \frac{{MA_m}^{\sigma-1}}{{\phi_{jm}}^{\sigma-1}}\right],$$

can be transformed by taking logs into the following log-linear empirical function with an error term, e_{jk}:

$$\ln \pi_{jk} = \underbrace{(\sigma-1)\ln(\sigma-1) - \sigma\ln\sigma}_{\beta_0} + \underbrace{\ln(1-t_j)}_{\approx\beta_1 \ln t_j} + \underbrace{\gamma_1(1-\sigma)\ln(1+\tau_j)}_{\approx\beta_2 \ln \tau_j} + \underbrace{\gamma_1(1-\sigma)}_{\beta_3}\ln w_{jk} +$$

$$\underbrace{\gamma_2(1-\sigma)}_{\beta_4}\ln r_j + \underbrace{\gamma_3(1-\sigma)}_{\beta_5}\ln d_j + \underbrace{\delta_1(1-\sigma)}_{\beta_6}\ln S_{jk} + \underbrace{\delta_2(1-\sigma)}_{\beta_7}\ln T_j + \underbrace{\delta_3(1-\sigma)}_{\beta_8}\ln H_j +$$

$$\underbrace{\delta_4(1-\sigma)}_{\beta_8}\ln E_j + \underbrace{(\sigma-1)}_{\beta_9}\ln\left(\sum_{m=1}^{M}\frac{MA_m}{\phi_{jm}}\right) + e_{jk}.$$

The definitions of the coefficients above lead to the profit function serving as the foundation for the empirical analysis.

$$\pi_{jk} = \beta_0 + \beta_1 \ln t_j + \beta_2 \ln \tau_j + \beta_3 \ln w_{jk} + \beta_4 \ln r_j + \beta_5 \ln S_{jk} + \beta_6 \ln L_{jk} +$$

$$\beta_7 \ln H_j + \beta_8 \ln E_j + \beta_9 \ln\left(\sum_{m=1}^{M}\frac{MA_m}{\phi_{jm}}\right) + e_{jk}.$$

A.2. Tables

Table 6: The 33 NUTS-2-regions included in the dataset

ID	Country	NUTS-2	Region	Industry	Service
1	**East Germany**	**DE30**	**Berlin**	**81**	**523**
2	East Germany	DE41	Brandenburg - Nordost	39	40
3	East Germany	DE42	Brandenburg - Südwest	60	73
4	East Germany	DE80	Mecklenburg-Vorpommern	59	85
5	East Germany	DED1	Chemnitz	56	35
6	East Germany	DED2	Dresden	100	67
7	East Germany	DED3	Leipzig	28	60
8	East Germany	DEE0	Sachsen-Anhalt	115	91
9	East Germany	DEG0	Thüringen	109	89
10	**Czech Republic**	**CZ01**	**Praha**	**39**	**244**
11	Czech Republic	CZ02	Stredni Cechy	32	21
12	Czech Republic	CZ03	Jihozapad	50	17
13	Czech Republic	CZ04	Severozapad	35	13
14	Czech Republic	CZ05	Severovychod	44	19
15	Czech Republic	CZ06	Jihovychod	60	53
16	Czech Republic	CZ07	Stredni Morava	35	13
17	Czech Republic	CZ08	Moravskoslezsko	21	14
18	Poland	PL11	Lodzkie	41	45
19	**Poland**	**PL12**	**Mazowieckie**	**170**	**585**
20	Poland	PL21	Malopolskie	30	82
21	Poland	PL22	Slaskie	83	79
22	Poland	PL31	Lubelskie	16	9
23	Poland	PL32	Podkarpackie	12	12
24	Poland	PL33	Swietokrzyskie	22	10
25	Poland	PL34	Podlaskie	4	3
26	Poland	PL41	Wielkopolskie	92	97
27	Poland	PL42	Zachodniopomorskie	34	30
28	Poland	PL43	Lubuskie	21	10
29	Poland	PL51	Dolnoslaskie	111	93
30	Poland	PL52	Opolskie	25	13
31	Poland	PL61	Kujawsko-Pomorskie	53	20
32	Poland	PL62	Warminsko-Mazurskie	11	4
33	Poland	PL63	Pomorskie	49	57
Capital regions highlighted in blackface letters.				**1,737**	**2,606**

Table 7: Descriptives of the secondary variables

Variable	EG	CZ	PL	Total
Relative Agglomeration	0.098*	0.070#	0.058#	0.0995
spec	(0.124)	(0.071)	(0.047)	(0.0962)
Diversification	0.148*	0.095#	0.122#	0.122
herf	(0.033)	(0.029)	(0.016)	(0.031)
Sectoral Wage	34.87*	15.44#	14.44#	22.65
wage	(15.82)	(12.76)	(9.754)	(16.26)
Human Resources	28.21*	28.80#	20.44#	24.59
hrsto	(4.143)	(7.540)	(3.357)	(6.367)
Unemployment Rate	16.53*	7.680#	15.02	13.70
unemp	(2.683)	(3.391)	(5.205)	(5.447)
Regional GDP	37794.4*	12194.4#	15425.0#	20742.6
gdp	(17903.3)	(6331.1)	(13185.8)	(17073.0)
Market Potential	14043.5*	13296.9#	10197.4#	11997.7
mp	(2400.1)	(2103.0)	(1660.4)	(2661.9)
Population Density	560.6*	420.5	129.1#	317.4
popdens	(1156.3)	(770.1)	(75.53)	(735.5)
Infrastructure-Index	0.889*	0.654#	0.740#	0.760
inf	(0.446)	(0.162)	(0.208)	(0.298)
Corporation Tax	39.81*	27.55#	23.73#	30.36
corp	(6.984)	(4.655)	(5.711)	(8.988)
Tax Wedge	52.99*	43.13#	42.17#	46.10
tax	(0.762)	(0.404)	(1.590)	(5.069)
Patents	183.85*	14.10#	4.683#	55.83
patents	(163.90)	(9.909)	(5.493)	(116.14)

Note: Mean of the referring variable aboves and the corresponding standard error in parenthesis below. * *=Significant mean difference compared to the Polish and Czech observations;* # *=Significant mean difference compared to the German observations. All tests refer to a 5% significance level. The mean and the standard error of the regional values are equally weighted over time, except for the relative agglomeration and wages, which are calculated on the base of the observation of the chosen investments.*

Table 8: Correlation table of explanatory variables

	spec	herf	patent	wage	hrsto	unemp	gdp	mp	corp	taxw	popd	infra
spec	1											
herf	.388	1										
patent	.375	.751	1									
wage	.208	.663	.673	1								
hrsto	.340	.625	.592	.583	1							
unemp	-.030	.197	.221	.139	-.340	1						
gdp	.362	.790	.844	.689	.545	.226	1					
mp	.040	.035	.352	.316	.395	.076	.202	1				
corptax	.202	.432	.527	.425	.296	.055	.363	.320	1			
taxwed	.211	.561	.699	.614	.371	.383	.585	.570	.781	1		
popdens	.415	.776	.831	.593	.798	-.082	.695	.158	.342	.385	1	
infra	.386	.726	.867	.566	.566	.101	.767	.090	.327	.420	.903	1

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