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Regional determinants of inward FDI distribution in Poland

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ABSTRACT

In this paper we examine the location determinants of the inflow of foreign direct investment (FDI) into Poland, at a regional level. Using survey data from an on-line questionnaire in February 2005 and a multinomial logit model incorporating the investor's specific characteristics, we show that knowledge-seeking factors alongside market and agglomeration factors, act as the main drivers for the inflow of FDI to the Mazowieckie region (including Warsaw), while efficiency and geographical factors encourage FDI to the other areas of Poland. Some implications are drawn for FDI attraction policy in Poland.

1. Introduction

Following the collapse of communism, the countries of Central and Eastern Europe (CEE), have been forging strategies to attract foreign capital as a way of achieving sustained economic growth (Martin & Velăzquez, 2000). Foreign direct investment by multinational corporations (MNCs) plays an important role in the transformation of former centrally planned economies into vibrant market systems, since it provides an inflow of capital, management skills, and jobs, alongside increasing exports and transfer of technology. It is also perceived as one of the conditions paving the way for improving the competitiveness of the economy and enhancing the provision of goods and services for the domestic market.

With the implementation of global and regional strategies by MNCs, the choice of location is becoming increasingly important, hence requiring a better understanding of the internationalization process and of the factors influencing the spatial distribution of FDI.

There have been numerous empirical studies that have focused on the location choices of MNCs and FDI flows in developed countries (Culem, 1988; Friedman, Gerlowski, & Silberman, 1992; Head, Ries, & Swenson, 1995; Nachum & Wymbs, 2005; Shaver, 1998; Shaver & Flyer, 2000). Since early-2000s these studies have also started to concentrate on the transition economies within the CEE region (Boudier-Bensebaa, 2005; Campos & Kinoshita, 2003; Cieślik & Ryan, 2005; Deichmann, 2001; Resmini, 2003, 2007).

Despite the growing interest in the subject, to our knowledge there is still no satisfactory empirical work which examines and explains the factors influencing by MNCs' decisions to invest in Polish regions for the first time through FDI. This research attempts to fill this gap by using primary data from an on-line questionnaire that covers the entire transition period.

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Fig. 1. The new territorial system of Poland in comparison with the old one.

Following the administrative decentralization introduced by the government in January 1999, a new territorial organization of Poland was introduced. The system replaced 49 voivodships with just 16 (Fig. 1). The new structure of sizeable regions with their statutory combination of central government and self-government functions was created in order to achieve more effective regional policies. This was based on the assumption that by decreasing the number of voivodships, the disparities at the level of territorial division among them can be reduced (Czyż, 2002). As claimed by Górzelak (2002), in the old system a steady and comparatively high growth rate was only recorded in big metropolitan regions such as Warsaw and Poznań, while the remaining regions registered a decline in their economic situation to a greater or lesser degree. The establishment of bigger voivodships with new territorial shapes has been a crucial step in Poland's adjustment to EU regulations (Churski, 2005).

Despite the new decentralized territorial system of Polish regions, the quality and allocation of FDI into those regions are still uneven. For example, the areas in the west, north, south and centre of Poland are the most prosperous and have been the most successful in attracting foreign capital, while the districts further to the east continue to suffer from lower investment, lower income and higher unemployment (The Economist Intelligence Unit, 2004).

Based on a regional-level dataset obtained from an on-line questionnaire conducted in February 2005, this paper provides an empirical contribution in two ways. First, it addresses the motives for the initial inflow of foreign capital into a particular Polish region. Second, it presents an investor's individual dataset at a regional level for Poland – both the largest recipient of FDI in CEECs and the largest country of the new EU members.

The remainder of the paper is structured as follows. Section 2 presents the underlying streams of literature and hypothesis formulation. Section 3 explains the method of data collection, the specification of the model and the variables used. Section 4 presents the econometric results that are then discussed. The conclusions and policy implications are finally presented in Section 5.

2. Underlying literature and hypothesis formulation

It has been recognized by scholars that different motives lie behind the investment decisions of firms in foreign countries. It is argued that "...there are substantial differences in economic performance across regions in virtually every nation. This suggests that many of the essential determinants of economic performance are to be found at the regional level" (Porter, 2003, pp. 550). In order to examine the rationale in one of the transitional economies, the theoretical framework of this paper addresses three branches of the literature.

The first branch emphasizes the new economic geography (NEG) initiated by Krugman (1991, 1993, 1996) and later synthesized by Fujita, Krugman and Venables (1999) (see also Brakman & Garretsen, 2003). Drawing upon Marshall (1920), Krugman proposes a model where the trade-off between increasing returns in production and transportation costs is fundamental to the understanding of agglomeration economies and the emergence of the centre-periphery pattern. Krugman (1996, 1998) demonstrates that the location of economic activity is determined by two groups of factors. First, those that include traditional natural advantages of particular locations such as central location and market size and external economies relating to supply linkages and knowledge spillovers. Second, factors relating to market forces including all kinds of input costs and non-market factors such as pollution.

While all the above forces play some role in the choice of location, empirical studies suggest that their importance may vary depending on region, country or industry characteristics. For example, Levinson (1996) and Coughlin and Segev (2000), analyzing the establishment of new plants in the US, show that agglomeration is the principal motive explaining the attractiveness of the South–East region for new plants. Assessing the location decisions of MNCs in Ireland, Barrios, Strobl and Gorg (2002) find that agglomeration factors as well as proximity to major ports and airports contribute substantially to location. Disdier and Mayer (2004) find that agglomerations effects are key location determinants of French investment in Western and Eastern Europe. In respect of transition economies, Campos and Kinoshita (2003) and Pusterla and Resmini (2005) find that agglomerations are one of the principal determinants of the spatial distribution of FDI. Martin and Velăzquez (2000) find a significantly negative effect of distance on FDI in the OECD countries, and a positive significant effect if the host and source countries share a common border. Drawing on the above empirical literature which states that geographical proximity and agglomeration positively encourage the inflow of FDI, we establish our first two hypotheses as follows:

Hypothesis 1. *Agglomeration* factors are a significant motive for inward FDI by MNCs into Poland: hence the stronger agglomeration factors are represented in a given region, the more likely an MNC will engage in FDI in that region.

Hypothesis 2. *Geographical* factors are an important motive for inward FDI by MNCs into Poland: hence the stronger geographical factors are represented in a given region, the more likely an MNC will engage in FDI in that region.

The second branch of the literature derives from the knowledge-based view of the firm (Cantwell, 1989; Cantwell & Janne, 1999; Cantwell & Piscitello, 2002, 2005). Cantwell (1989) states that knowledge-seeking investments vary across locations because they depend on location-specific factors, such as the number of scientists and educated people in the area, previously established innovations, R&D intensity, the education system, and linkages between educational institutions and firms. As a result, firms may supplement their existing technologies by expanding internationally to access new knowledge. This expansion may suggest two types of knowledge-seeking behaviour between firms originating from leading compared with lagging technical locations (Cantwell & Janne, 1999). Firms from lagging technical locations need to catch up, and hence, locate their research centres abroad in order to improve their existing technology. Firms from leading locations, by contrast, may also locate their research centres abroad to source more diverse knowledge. Due to the fact that knowledge is partially tacit and its transfer needs frequent interactions, knowledge-seeking investment requires physical proximity (Kogut & Zandler, 1992). Moreover, efforts to search for knowledge-seeking investment are not undertaken in isolation, but are strongly supported by various external organizations, such as public research centres, universities or industry associations (Cantwell & Piscitello, 2005). The latter, alongside the educational level of a country's citizens have increasingly important for the internationalization process, at both national and regional levels (Cantwell & Iammarino, 2001, 2003; Chung & Alcácer, 2002). Kuemmerle (1999) shows empirically that by establishing R&D facilities abroad firms in technology-intensive industries can expand their technological capabilities. Florida (1997) finds that accessing new indigenous technology is more important than customizing existing technology for new markets. Bartlett and Ghoshal (1990) show that as firms establish their facilities abroad and allocate heterogenous products to them, R&D sites in close proximity to factories are needed, in turn supporting knowledge transfer to the host country. In addition, specific regions within nations might be particularly attractive locations for knowledge-seeking investment (Jensen, 2004). Acknowledging the fact that there is insufficient empirical evidence relating to the importance of knowledge-seeking motives in the spatial distribution of FDI at a regional level (Cantwell & Piscitello, 2005; Cantwell & Iammarino, 2003) we present our next hypothesis:

Hypothesis 3. *Knowledge-seeking* factors are a central motive for inward FDI by MNCs into Poland: hence the stronger knowledge factors are represented in a given region, the more likely an MNC will engage in FDI in that region.

The last branch of the literature addresses the determinants of FDI in transition economies (Cieślik & Ryan, 2005; Estrin, Bevan, & Meyer, 2001; Garibaldi, Mora, Sahay, & Zettelmeyer, 2001; Holland & Pain, 1998; Lankes & Venables, 1996; Lansbury, Pain, & Smidkowa, 1996; Mayer, 2001; Rasmini, 2000). For instance, Garibaldi et al. (2001) find that the pattern of

FDI in transition economies can be well explained in terms of a standard set of economic fundamentals, such as those reflecting macroeconomic stability, the level of economic reforms, trade liberalization, natural resource endowments and the privatization method. Lansbury et al. (1996) demonstrate that labour costs and research intensity have a significant influence on the pattern of inward FDI. The evidence is consistent with the notion that some investors have been attracted to CEECs by a combination of relatively low labour costs and the availability of skilled workers in particular sectors and countries. Holland and Pain (1998) support and extend the findings of Lansbury et al. (1996) by showing that the extent of trade linkages with the advanced economies and proximity to the EU have significant effects on the level of investment. The availability of low cost production inputs is traditionally one of the most obvious reasons for establishing production facilities in foreign countries (Dunning, 1983, 1993). Estrin et al. (2001) find that the search for resources (labour and raw materials especially) is an important determinant of FDI inflows in Eastern European countries, and Galego, Vieira and Vieira (2004) confirmed these results for the CEECs. In addition, Przybylska and Malina (2000) and Ghemawat and Kennedy (1999) find that market-seeking factors positively influence FDI flows to Poland. For these reasons, it is possible to hypothesize a positive relationship between both market-and efficiency-seeking investment and the regional location of FDI, as follows:

Hypothesis 4. *Market-seeking* factors are a significant motive for inward FDI by MNCs into Poland: hence the stronger market factors are represented in a given region, the more likely an MNC will engage in FDI in that region.

Hypothesis 5. *Efficiency-seeking factors* are a valuable motive for inward FDI by MNCs into Poland: hence the stronger efficiency-seeking factors are represented in a given region, the more likely an MNC will engage in FDI in that region.

3. The dataset description and methodology

3.1. Data collection

The data for the present study derives from an on-line questionnaire, which was designed to examine the locational determinants of FDI in the Polish regions. The data collection was undertaken in February 2005. The list of 1243 MNCs was obtained from the Polish Information and Foreign Investment Agency (PAIiIZ), and included names and addresses of foreign companies that had established an enterprise in the Polish market, in the form of FDI, before 2003.

Due to the fact that the given data set was two years old, we examined its validity by checking the contact details of each investor using the internet and phone. We found that 147 companies were no longer reachable and 96 were double-counted. In addition, 148 companies were used for the pilot study. Hence, this left us with 852 companies in the dataset for the final analysis.

A pilot study was conducted in November 2004 comprising a sample of 148 randomly selected respondents. This was designed to fully test the questionnaire and the electronic survey methodology. 65% of participants in the pilot study were of European origin and 35% non-European; the response rate was 8.5%. Judging by the response rate, it was clear that a self-administered electronic survey would be an appropriate technique for this study (Kanuk & Berenson, 1975).

The structure of the final questionnaire covered topics ranging from general information about the MNC (e.g. year of establishment, origins, employment, sales and turnover) to specific information about the Polish location (e.g. entry mode, region, motive for investing) and characteristics relating to the post-entry development of the Polish subsidiary (e.g. competition, future plans).

In order to encourage participation in the survey, a multi-stage process was employed following Dillman (2000) and Heberlein and Baumgartner (1978). First, a brief prenotice e-mail was sent out to the senior management of all the companies for which the contact details had been verified, prior to sending the questionnaire. The aim of the letter was to explain the objectives and importance of the study, and to request their participation in it. Second, a link to the on-line questionnaire was sent out to the respondents who had expressed interest in participating in the study. It is worth noting that 237 contact e-mails were deleted by the respondents before they were even read; and so 615 contacts read the initial e-mail. 195 e-mail responses were received with the note "will not participate in the study". 329 contacts did not respond at all. As a result, the number of respondents totalled 91, representing approximately 15% of those initially contacted (see Appendix A for sample characteristics). Third, a reminder letter was sent out one week after the link to the questionnaire was delivered. The purpose of this letter was to express appreciation for willingness to fill out the questionnaire and at the same time to encourage response if the respondent had not yet completed the questionnaire. Finally, a thank you letter was sent to all respondents after the collection of the results.

The regional data, for this investigation, is in line with the Nomenclature of Territorial Unites for Statistics (NUTS)[1] level 2. However, after its examination foreign firms were grouped in five regions (Fig. 2 in Appendix A): North–West (28% of the firms in the sample) including the Zachodnio-pomorskie, Pomorskie, Lubuskie and Wielkopolskie voivodships; North–East (11%) containing the Warmińsko-mazurskie, Podlaskie and Kujawsko-pomorskie voivodships; the Mazowieckie voivodship (25%) containing Warsaw, the capital; South–East (11%) including the Lubelskie, Podkarpackie, Świętokrzyskie and Małopolskie voivodships; and South–West (25%) containing the Łódzkie, Dolnośląskie, Śląskie and Opolskie voivodships. This classification represents NUTS-1 level.

[1] The NUTS classification was adopted on May 2003 by the European Parliament and the Council of the European Union in order to manage changes on the availability and comparability of regional statistics of Member States.

The regional breakdown was based on a small village, Piątek (i.e. friday) in the Łódzkie voivodship, which represents the geographical middle point of Poland and Europe as well (Kondracki, 1994). This breakdown was undertaken for two reasons. First, "...from a methodological point of view categories (such as regions) should include a minimum number of cases in order to conduct a meaningful statistical analysis..." (Oerlemans & Meeus, 2005, pp. 96). This is important in our case, because the spatial level among 16 Polish regions was uneven in the sample; although it can also be regarded as a limitation of the study. Second, several notable structural economic differences can be observed between those five regions (see Table 1).

3.2. A model of a choice of region

Following Levinson (1996), Louri, Papanastassiou and Lantouris (2000) and Crozet, Mayer and Mucchielli (2002) we assume that foreign investors have a latent (i.e. unobserved) profit function once they have decided to establish their physical presence, for the first time, in one of the Polish regions. The profit function is dependent on the characteristics of the individual investor, and the random component that is arising from other unobserved characteristics of choices. Thus, the utility function of locating in region j for the nth investor faced with J choices of regions can be written in the following form:

$$U_{nj} = x'_n\beta_j + \varepsilon_{nj}. \tag{1}$$

where there are J error terms ε_{nj} for any investor n. The exogenous variables x'_n describe only the investor and are identical across alternatives. However, the parameter β_j differs across alternatives.

If the investor chooses region j in particular, then we assume that U_{nj} is the maximum among the J utilities. Hence, the statistical model is driven by the probability that region j is chosen, which is

$$Pr(U_{nj} > U_{nk}) \text{ for all other } k \neq j \tag{2}$$

Assuming that the error terms in Eq. (1) follow independently and identically an extreme value distribution[2] (Maddala, 1977; Manski & Lerman, 1977; McFadden, 1984) of the following form:

$$F(\varepsilon_{nj}) = \exp(-e^{-\varepsilon_{nj}}). \tag{3}$$

the probability that an investor n chooses region j is a simple expression of

$$Pr_{nj} = Pr(Y_n = j|x_n) = \frac{e^{x'_n\beta_j}}{\sum_{i=1}^{J} e^{x'_n\beta_j}}, \tag{4}$$

Eq. (4) forms the basis for the multinomial logit model (MNLM) (Greene, 2003). An interesting feature of this model is that the odds ratio (Pr_{nj}/Pr_{ni}) depends log-linearly on x_n. Hence J log-odds ratios can be computed based on:

$$\ln\Omega_{j|i}(x'_n) = \ln\left[\frac{Pr(y = j/x'_n)}{Pr(y = i/x'_n)}\right] = x'_n\beta_{j|i} \quad \text{for } j = 1,\ldots,J \tag{5}$$

where i is the base category. As $\ln\Omega_{m|i}(x'_n) = \ln 1 = 0$ it must be hold that $\beta_{i|i} = 0$. That is, the log odds of an outcome compared with itself are always 0, and thus the effects of an independent variable must also be 0. Hence we will only estimate $J - 1$ outcomes, due to the redundant information (Long & Freese, 2003).

The independence of the error term across alternatives in Eq. (1) is a strong assumption, and it implies that an investor's unobserved preference for a certain alternative is independent of its stochastic preference for other alternatives. This imposes the independence of irrelevant alternatives (IIA) restriction on the predicted probabilities, which means that the choice of the regions must be equally substitutable to investors (Hausman & McFadden, 1984).

The results are discussed in Section 4.

3.3. Dependent variable

Our dependent variable represents the probability of either investing or not in any given region mentioned above, with the Mazowieckie region being the comparison group. There are three reasons for selecting this particular region as the base category. First, the region includes Warsaw, the capital and at the same time the largest city in the country with its population of 1.6 million people (The General Statistical Office, 2004). Second, this is the leading area for finance, real estate and business services. Finally, it has benefited most from the transition to a market economy, consistently reporting the highest average income, lowest unemployment and largest share of inward investment of any Polish voivodship (The Economist Intelligence Unit, 2003).

3.4. Independent variables

In line with our theoretical discussion, 13 motives measuring the importance of investing in a given Polish region were extracted from the literature for the study. They formed a separate question in the questionnaire with the heading: *What*

[2] Also known as a Weibull distribution.

Table 1
Characteristics of Polish regions.

	North–West				North–East			Mazowieckie
	Zachodnio-pomorskie	Pomorskie	Lubuskie	Wielkopolskie	Kujawsko-pomorskie	Warmińsko-mazurskie	Podlaskie	Warsaw
Total area (in km^2)[a]	22.9	18.3	13.9	29.8	17.9	24.2	20.2	35.6
- of which towns	61	42	42	109	52	49	36	84
- of which villages	3172	2994	1508	5504	3581	3865	3945	9084
Population (in million)[a]	1.7	21.8	1.0	3.4	2.1	1.4	1.2	5.1
Employment (in thousands)[a,b]	513.4	698.8	304.2	1296.1	713.9	429.8	478.7	2275.8
Unemployment rate (in %)[a]	26.4	21.2	26.0	16.1	22.5	28.8	15.2	13.9
GDP[c]	33423.9	42498.7	17675.8	69397.1	36884.7	20659.8	17976.2	153702.2
Gross domestic expenditure on R&D[c]	90.6	227.2	138.5	324.7	110.4	56.4	38.0	1994.3
Researchers employed in R&D[d]	2.1	5.5	2.2	2.7	2.2	1.5	1.4	7.3
Graduates of higher education (in thousands)[a]	19.4	16.0	6.4	28.2	16.6	10.4	10.8	72.7
Hard surface public roads[a,e]	56.8	62.3	55.9	88.6	77.9	53.5	53.5	72.5
Average monthly wage and salaries[f]	126	132	127	128	126	130	129	128
Railway lines[a,e]	5.6	7.6	6.5	6.8	7.1	5.5	3.9	4.8
Telephone line (per 1000 population)[a]	325,5	302	322.2	259.7	298.5	310.4	356.6	359.1
Budget of voivodship – expenditure (in million zlotys) [1]	200.7	249.8	172.1	389.4	237.5	168.3	146.8	494.3
	South–West				South–East			
	Łódźkie	Dolnośląskie	Opolskie	Śląskie	Lubelskie	Podkarpackie	Świętokrzyskie	Młopolskie
Total area (in km^2)[a]	18.2	19.9	9.4	12.3	25.1	17.9	11.7	15.1
- of which towns	42	90	34	71	41	45	30	55
- of which villages	5167	2903	1555	1511	4173	2163	2831	2631
Population (in million)[a]	2.6	2.9	1.1	4.7	2.2	2.1	1.3	3.2
Employment (in thousands)[a,b]	1017.5	950.1	342.3	1647.3	947.7	916.7	570.4	1278.8
Unemployment rate (in %)[a]	18.4	22.4	19.3	16.5	15.7	16.9	18.5	13.9
GDP[c]	33423.9	42498.7	17675.8	69397.1	36884.7	20659.8	17976.2	153702.2
Gross domestic expenditure on R&D[c]	298.6	276.5	30.2	342.5	25.2	119.0	14.1	496.5
Researchers employed in R&D[d]	2.2	3.7	3.0	4.1	2.6	1.1	1.1	5.5
Graduates of higher education (in thousands)[a]	20.8	26.9	7.9	37.9	18.2	15.4	14.3	25.6
Average monthly wage and salaries[f]	127	130	128	125	128	129	126	128
Hard surface public roads[a,e]	88.3	92.2	87.7	163	71.2	78.6	95.8	144.0
Railway lines[a,e]	6.0	9.3	9.3	18.9	4.2	5.3	6.2	7.7
Telephone line (per 1000 population)[a]	316.2	351.5	250.7	318.4	353.6	215.0	237.9	291.4
Budget of voivodship – expenditure (in million zlotys)[a]	223.4	320.1	112.7	605.1	244.4	242.0	162.1	365.0

Source: The General Statistical Office (2003, 2004); PAIiIZ (2003, 2004) and authors' own calculations.
[a] As of 31.12.2002.
[b] In percentage of the national average.
[c] In current prices. General Statistical Office (2003).
[d] Employed full time; per 1000 economically active persons.
[e] Per 100 km^2 of total area in km.
[f] 1999 = 100.

were the reasons to invest in that particular voivodship? The question was close-ended where, following Willits and Saltiel (1995), the degrees of importance were based upon a six-point scale ranged from "not sure" (coded 0)[3] to "extremely important" (coded 5). Based on the underlying literature the motives were then classified into five groups of explanatory variables. In order to examine the inter-relationship and confirm both the relevance and significance of those variables for the analysis, a confirmatory factor analysis was performed (Table 2).

[3] By using a 6-point scale with the option "not sure", the researcher can allow respondents a way out of answering a question, when he or she feels threatened by admitting that the answer to that question is not important. As a result, the researcher can still quantify the response (Sounders, Lewis, & Thornhill, 2000; Willits & Saltiel, 1995).

Table 2
Confirmatory factor analysis on motives for investing in the Polish regions.

Motives*	Factors**				
	"fgeography"	"fagglom"	"fefficien"	"fknowledge"	"fmarket"
I. Geographical factors = "fgeography"					
(1) Low transportation costs (e.g. shipping)	0.79308				
(2) Geographic conditions favourable for physical distribution (i.e. geographical distance)	0.82489				
(3) Good quality of local infrastructure (i.e. the quality and availability of roads and highways)	0.74006				
II. Agglomeration factors = "fagglom"					
(1) Supporting industries already exist for supply of parts and components		0.60849			
(2) A number of other companies from the same country were already operating there		0.69263			
(3) A number of other companies in the same industry were already operating there		0.82432			
III. Efficiency-seeking factors = "fefficien"***					
(1) Availability of labour			0.81811		
(2) Low labour costs			0.82708		
(3) Availability of raw materials at low cost			0.48402		
IV. Knowledge-seeking factors = "fknowledge"					
(1) Educational level in the region (e.g. foreign languages)				0.75631	
(2) Local universities and research centres				0.75761	
V. Market-seeking factors = "fmarket"					
(1) Economies of scale					0.77321
(2) Consumers' demand					0.77205
Observations no.	91	91	91	91	91
Eigenvalue	1.85710	1.52951	1.58763	1.14794	1.19214
Proportion of variance explained	0.6190	0.5098	0.5292	0.5740	0.5961

Source: Authors' own calculations.
* After the motives were coded they were grouped into five factors, based on the literature, prior to the confirmatory factor analysis.
** Name of the explanatory variables used in the analysis.
*** Availability of raw materials at low cost has been included under efficiency-seeking as opposed to natural resource-seeking as the latter refers primarily to FDI associated with mining, minerals, agriculture and tourism.

The factor analysis confirmed the variable structure that we identified. More specifically, we obtained five meaningful factors, according to the criterion for the eigenvalues to be greater than unity (Kim & Mueller, 1978). For the explanatory variables, we use the extracted factor scores for *f*geography, *f*agglom, *f*efficien, *f*knowledge and *f*market (Table 2), as the general measures of the location determinants for the inflow of FDI. The explanatory variables in the model are investor specific. Table 3 shows that multi-collinearity is not present between the motivation factors (Gujarati, 2003).

3.5. Control variables

Altomonte (2000) shows that the time dummies have a significant effect on the number of investments undertaken by an MNC in the CEE region. Thus, time dummies were included in the model in order to control for time variation arising from the economic changes common to all CEECs. In addition, many studies have observed that the entry mode choice impacts FDI inflows (Agarwal & Ramaswani, 1992; Brouthers, 2002; Brouthers & Nakos, 2004; Mayer, 2001). Thus, we include such a variable in our model. Furthermore, Pusterla and Resmini (2005) and Resmini (2007) state in their work that sector-specific factors affect the choice of final location of MNCs in CEECs. Hence, the dummy variable for the industry in which a specific firm operates (high-tech or low-tech) was also introduced. The classification of manufacturing industries was based on the NACE Rev. 1 codes and is presented in Table 4.

Using the explanatory and control variables discussed above, the probability of either investing or not in any given region based on Eqs. (4) and (5) of MNLM has the following form:

$$\begin{aligned}\text{choice}_{n,j|i} = {} & \beta_{0,j|i} + \beta_{1,j|i} f\text{geography}_n + \beta_{2,j|i} f\text{agglom}_n + \beta_{3,j|i} f\text{efficien}_n + \beta_{4,j|i} f\text{knowledge}_n + \beta_{5,j|i} f\text{market}_n \\ & + \beta_{6,j|i}\text{DUM}_{93-96n} + \beta_{7,j|i}\text{DUM}_{97-00n} + \beta_{8,j|i}\text{DUM}_{01-04n} + \beta_{9,j|i}\text{DUM}_{\text{GFields}n} + \beta_{10,j|i}\text{DUM}_{\text{ht}n} \end{aligned} \quad (6)$$

where $j = 1, \ldots 5$ (i.e. 1 for the North–West region, 2 for the North–East region; 3 for the Mazowieckie region; 4 for the South–East region; and 5 for the South–West region); $i = 3$ as the comparison category and $n = 1, \ldots 91$. The time dummies consider the period from before 1992 to 2004 inclusive, with the exclusion of the period before 1992 in the set of time dummies in order to avoid collinearity. The entry mode choice dummy represents 1 for greenfield investments and 0 otherwise. The

Table 3
Correlation matrix: motives for investing in the Polish regions.

		Geographical factors			Agglomeration factors			Efficiency-seeking factors			Knowledge-seeking factors		Market-seeking factors	
		1	2	3	1	2	3	1	2	3	1	2	1	2
Geographical factors	1	1.0000												
	2	0.4760	1.0000											
	3	0.3623	0.4206	1.0000										
Agglomeration factors	1	0.2310	0.3000	0.2860	1.0000									
	2	0.2463	0.2867	0.1884	0.1071	1.0000								
	3	0.2797	0.3433	0.1539	0.3009	0.3659	1.0000							
Efficiency-seeking factors	1	0.1463	0.1551	0.341	0.2836	−0.0991	−0.0118	1.0000						
	2	0.3139	0.3801	0.2679	0.2093	0.1666	0.0424	0.4659	1.0000					
	3	−0.0042	0.1299	0.2245	0.3582	0.062	0.0668	0.1629	0.1828	1.0000				
Knowledge-seeking factors	1	0.2018	0.2012	0.1238	0.1227	0.0433	−0.0183	0.4177	0.3557	−0.0977	1.0000			
	2	−0.1513	0.2472	0.1390	0.0413	0.1205	0.1679	0.1334	0.1437	0.0120	0.1479	1.0000		
Market-seeking factors	1	0.0920	0.2165	0.1552	0.1237	0.2167	0.1209	−0.1583	−0.1077	0.3173	−0.2885	0.0600	1.0000	
	2	−0.1647	−0.289	−0.0161	−0.0161	0.1200	0.1666	−0.2414	−0.2693	0.0106	−0.1962	−0.0025	0.1921	1.0000

Note: The numbers under each group of factors correspond to the numbers listed in Table 2 under the column "Motive".
Source: Authors' own calculations.

industry dummy represents 1 for high-tech industry and 0 otherwise. Moreover all the explanatory variables in the model are investor's specific. Table 5 summarises the variables used in the model, their measurement and summary statistics.

4. Empirical results

Based on the multinomial logit model with investor's specific characteristics and the variables discussed above, two separate models for the location choice of the inflow of FDI in Polish regions were estimated. The results are presented in Tables 6 and 7.

Model 1 shows the results of the estimation of the explanatory variables, time dummies and the entry mode choice dummy used in Eq. (6) above, and refers to the complete sample of companies. In regression 1 of that model the findings for the comparison of the choice of location between the North–West region and the Mazowieckie region indicate that only one variable *f*efficien is positively significant at the 1% level. This means that the North–West area, in contrast to the Mazowieckie region, is more attractive for foreign investors if low input costs as well as the availability of labour and resources are considered to be important motives for investing in Poland (Hypothesis 5). The results also show that *f*knowledge and *f*market are statistically significant but negative at 1% and 10% level, respectively. This suggests that the North–West region is less attractive than the Mazowieckie area for foreign investors for whom market-seeking and knowledge-seeking are important motives for establishing their business (Hypotheses 3 and 4).

Table 4
Industry classification, frequencies and percentages.

High-tech/low-tech	Industry classification		
		Frequency (%)	NACE Rev. 1.1
High-tech	Radio TV and communication equipment	4 (7.84)	32
High-tech	Medical precision and optical instruments	1 (1.10)	33
High-tech	Pharmaceutics	1 (1.10)	24.1
High-tech	Chemicals (excluding pharmaceuticals)	4 (4.40)	24
High-tech	Motor vehicles trailers and semi-trailers	11(12.07)	34
Low-tech	Food products	4 (4.40)	15
Low-tech	Tobacco products	2 (2.20)	16
Low-tech	Leather products	2 (2.20)	18
Low-tech	Paper products	3 (3.30)	21
Low-tech	Cole refined petroleum products and nuclear fuel	2 (2.20)	23
Low-tech	Rubber and plastic products	4 (4.40)	25
Low-tech	Metal products	1 (1.10)	27
Low-tech	Other non-metallic products	8 (8.77)	26
Low-tech	Furniture products	2 (2.20)	36
Low-tech	Recycling	2 (2.20)	37
Total		51 (56.04)	

Source: The General Statistical Office (2006, 2005) and authors' own calculations.

Table 5
Explanatory variables, their measurement and summary statistics.

Variables	Explanatory variables	
	Definition	Mean (SD)
*f*geography	Factor score for 1990–2004 (see Table 2)	−4.77e-09 (1)
*f*agglom	Factor score for 1990–2004 (see Table 2)	8.11e-09 (1)
*f*efficien	Factor score for 1990–2004 (see Table 2)	−4.30e-09 (1)
*f*knowledge	Factor score for 1990–2004 (see Table 2)	4.58e-09 (1)
*f*market	Factor score for 1990–2004 (see Table 2)	−1.49e-08 (1)
DUM_{93-96}	Dummy: 1 if MNC invested in Poland between 1993 and 1996; 0 otherwise	0.407 (0.494)
DUM_{97-00}	Dummy: 1 if MNC invested in Poland between 1997 and 2000; 0 otherwise	0.198 (0.401)
DUM_{01-04}	Dummy: 1 if MNC invested in Poland between 2001 and 2004; 0 otherwise	0.110 (0.314)
$DUM_{GFields}$	Dummy: 1 if Greenfield; 0 otherwise	0.275 (0.449)
DUM_{ht}	Dummy: 1 if MNC invested in high-tech industry; 0 otherwise	0.4117 (0.497)*

Source: Authors' own calculations.
* 51 obs.

Further, the findings for the comparison of the choice between the North–East region and the Mazowieckie region, in regression 2, show that only three of the variables used in the model are positive and statistically significant. The first two are the explanatory variables, *f*efficien and *f*geography which are significant at 5% and 10% level, respectively. This suggests that the probability of the inflow of FDI into the North–East area is higher than to the Mazowieckie region, if transportation costs, quality of the infrastructure, distance between the home and host country and the availability of labour at low costs are considered important motives by foreign investors (Hypotheses 5 and 3). Finally, the time dummy variable DUM_{01-04}, significant at the 10% level. Hence in the years closest to European Union (EU) membership, there is some limited probability of investing in the North–East rather than in the Mazowieckie region because this is the region which shares its borders with other countries that were going to join the EU. Similar to the above regression the results indicate that *f*knowledge and *f*market are statistically significant at the 1% level. This may indicate that the Mazowieckie area is more attractive for FDI if market size and knowledge-seeking investment are of particular importance to investors (Hypotheses 3 and 4).

The results in regression 3 for the comparison of the choice between the South–East region and the Mazowieckie region show that only two variables turned out to be statistically significant. The first one is *f*efficien which was positive and statistically significant at the 1% level. Therefore the South–East region, like the North–West, is a more attractive location for FDI than the Mazowieckie area when labour costs and the availability of both resources and labour are important factors for investing in Poland (Hypothesis 5). Conversely, the variable *f*market was statistically negative at the 5% level, indicating once again that if market factors are important motives for investing in Poland, then the Mazowieckie region is the most attractive area for the inflow of foreign capital (Hypothesis 4).

Finally, the results in regression 4 for the comparison of the choice between the South–West region and the Mazowieckie region reveal again the predictor *f*efficien is positive and statistically significant at the 1% level. This demonstrates that the South–West area, like the South–East and North–West areas, is the most desirable region to invest in compared the Mazowieckie region (Hypothesis 5). In addition, out of the four available regions to investors, the South–West area seems to have the highest probability for investment associated with low input costs and the availability of resources.[4] The results for the variables *f*agglom and *f*knowledge are both negative and statistically significant at the 5% level, suggesting that the South West region is less attractive than the Mazowieckie area when agglomeration and knowledge-seeking factors are important investment motives (Hypotheses 1 and 3).

In contrast to the previous model, *Model 2* demonstrates the results of the estimation of the explanatory variables and the industry dummy used in Eq. (6) above. As shown in Table 5, this model is regressed on only 51 observations, representing the sample of foreign investors operating in the manufacturing sector in Poland.

In regression 1 of this model the results for the comparison of the choice of location between the North–West region and the Mazowieckie region show that only two variables are significant. The first variable is *f*efficien and it is positively significant at the 1% level, indicating that the North–West area, in contrast to the Mazowieckie region, is more attractive for foreign investors from the manufacturing sector for whom labour costs and the availability of both resources and labour are important factors (Hypothesis 5). The second variable *f*knowledge is negatively significant at a modest 10% level (Hypothesis 3).

The results for regression 2 concerning the comparison between the North–East region *and* the Mazowieckie region indicating that only one variable *f*market is statistically significant at the 10% level and it has a negative sign (Hypothesis 4).

Regression 3 compares the choice between the South–East region *and* the Mazowieckie region with the variable *f*efficien being positively significant at 5% level. Hence the South–East area, like the South–West and North–West areas, is more attractive place to invest as compared the Mazowieckie region (Hypothesis 5).

Finally regression 4 compares the choice between the South–West region and the Mazowieckie region with three variables are statistically significant. The first is *f*efficien which is positive and significant at the 1% level, indicating that the South–West region is more attractive than the Mazowieckie area for manufacturing investment (Hypothesis 5). The second

[4] In order to obtain the odds, the coefficients ($\beta_{j|i}$) from Table 6 needs to be exp($\beta_{j|i}$).

Table 6
The choice of Polish region: the multinomial logit model[a].

Choice of a region	Model 1	Model 2
(1) $P_1\|P_3$		
Constant	0.841 (0.807)	0.929 (0.803)
*f*geography	0.452 (0.528)	0.425 (0.824)
*f*agglom	−0.752 (0.558)	−0.663 (0.792)
*f*efficien	2.358 (0.638)*	2.885 (1.125)*
*f*knowledge	−1.427 (0.511)*	−1.883 (1.043)***
*f*market	−0.712 (0.431)***	−0.645 (0.759)
DUM_{93-96}	0.228 (0.921)	
DUM_{97-00}	−0.252 (1.304)	
DUM_{01-04}	0.915 (1.673)	
$DUM_{GFields}$	−0.066 (0.950)	
DUM_{ht}		1.961 (1.728)
(2) $P_2\|P_3$		
Constant	−1.096 (1.228)	−0.862 (0.982)
*f*geography	1.384 (0.749)***	1.333 (0.976)
*f*agglom	−0.795 (0.687)	−1.017 (0.881)
*f*efficien	2.236 (0.939)**	1.141 (1.292)
*f*knowledge	−2.062 (0.752)*	−1.562 (1.157)
*f*market	−2.167 (0.872)*	−1.862 (1.022)***
DUM_{93-96}	−1.105 (1.503)	
DUM_{97-00}	0.473 (1.511)	
DUM_{01-04}	3.341 (1.940)***	
$DUM_{GFields}$	−0.698 (1.319)	
DUM_{ht}		−0.124 (2.035)
(3) $P_4\|P_3$		
Constant	−1.787 (1.369)	−1.382 (1.356)
*f*geography	0.724 (0.706)	1.329 (1.118)
*f*agglom	−0.631 (0.648)	−0.679 (0.966)
*f*efficien	2.240 (0.875)*	3.053 (1.461)**
*f*knowledge	−0.404 (0.630)	−1.505 (1.237)
*f*market	−1.017 (0.553)**	−0.701 (0.926)
DUM_{93-96}	0.759 (1.477)	
DUM_{97-00}	2.451 (1.576)	
DUM_{01-04}	2.037 (2.085)	
$DUM_{GFields}$	0.558 (1.013)	
DUM_{ht}		2.944 (2.074)
(4) $P_5\|P_3$		
Constant	0.203 (0.899)	0.068 (0.916)
*f*geography	0.340 (0.550)	0.701 (0.862)
*f*agglom	−0.957 (0.570)**	−0.769 (0.818)
*f*efficien	2.535 (0.663)*	2.885 (1.150)*
*f*knowledge	−1.100 (0.510)**	−1.674 (1.061)***
*f*market	−0.589 (0.441)	−0.343 (0.773)
DUM_{93-96}	0.953 (1.012)	
DUM_{97-00}	1.050 (1.322)	
DUM_{01-04}	1.479 (1.714)	
$DUM_{GFields}$	−0.536 (1.013)	
DUM_{ht}		3.440 (1.781)**

Source: Authors' own calculations.
P_3 – Mazowieckie region is the comparison group, $P_1|P_3$ – North–West region vs. Mazowieckie region, $P_2|P_3$ – North–East region vs. Mazowieckie region, $P_4|P_3$ – South–East region vs. Mazowieckie region, $P_5|P_3$ – South–West region vs. Mazowieckie region.
* $p \leq 0.01$.
** $p < 0.05$.
*** $p < 0.10$.
[a] Standard errors in parentheses.

Table 7
The multinomial logit models statistics.

Models statistics	Model 1	Model 2
Log-likelihood	−97.368	−58.088
Model LR χ^2	84.73 (36)*	39.695 (24)**
Observations	91	51
Pseudo R^2	0.303	0.272

Source: Authors' own calculations.
* $p \leq 0.01$.
** $p < 0.05$.

is *f*knowledge which is negative and statistically significant at the 10% level. This shows once again that the Mazowieckie area is more attractive than the South–West region if knowledge-seeking investment even in the manufacturing sector is important factor for investing in Polish market (Hypothesis 3). The third variable is the industry dummy DUM_{ht} which is significant at the 5% level. This might indicate that the South–West region in relation to the Mazowieckie region is the most preferable location for foreign investors from high-tech industries.

The overall explanatory ability of those two models, discussed above is satisfactory, as the models' statistics shown in Table 7.

4.1. Discussion

The results indicate that that there are differences in the attractiveness of Polish regions, when the initial inflows of FDI are evaluated.

It is shown that if input costs and the availability of labour and resources are seen by investors as important factors for investing in Poland, then all regions are more favourable for the inflow of foreign capital than the Mazowieckie area. However, the South–West region is the most preferable area for those kinds of motives. A possible explanation can be that this particular region has the highest unemployment rate within the country and is rich in natural resources. The high unemployment level may make people place a higher value on their current job, with the result that they are willing to work for lower wages and perhaps show greater commitment. This could explain why Friedman et al. (1992) and Billington (1999) find that high unemployment increases FDI inflows. The availability of resources acts as an encouragement for the inflow of FDI in that region due to the fact that during the communist regime this area was "the heart" of the economy; the majority of the textile industries (the Łódź voivodship) as well as all mining production (both the Dolnośląskie and Śląskie voivodships) were based there (Churski, 2002; Dornisch, 2002).

Only one area, the North–East region, seems to be the preferable location (in comparison to the Mazowieckie area) for the inflow of FDI when geographical factors are important motives for investors. Access to the Baltic Sea and to new members of the EU, make this area very attractive for foreign capital (Górzelak, 2002; Nandakumar & Wagué, 2001). Geographical proximity and local infrastructure imply lower communication costs and fewer difficulties in managing business activities (Hodgkinson, Hyland, & Pomfret, 2001; Louri et al., 2000; Woodward, 1992).

If agglomeration is an important factor for investing in Poland, then the Mazowieckie area is the most attractive location for foreign investment, and more highly ranked than the North–East and South–West regions which are also considered by investors. This result is not surprising, because the centre of this region, Warsaw, is the leading area for finance, business services and real estate in Poland. As stated by Maskell and Malmberg (1999) "agglomeration of firms within a given business sector in a region will make the area especially suited to meet the specific location requirements. Even assuming that a new firm is completely free in its choice of location, the optimal location would usually be a region with a long track record of servicing firms" (pp. 175). Indeed, the seminal work of Wheeler and Mody (1992) makes a strong empirical case for agglomeration and market size in US investors' location decisions; while Resmini and Altomonte (2001), using panel data for the period 1995–1998 to analyze the determinants of FDI inflow to Poland, find that the presence of agglomerations stimulated foreign investment into Poland. Similar conclusions were obtained by Cieślik and Ryan (2005) when using a Poisson model for the estimation of location determinants of Japanese multinationals within Poland during the period 1991–2001.

In addition to agglomeration, the strong cultural and R&D centres of the Mazowieckie region, place this particular area as the most favourable location even if three other regions (the North–West, North–East and South–West) are also considered for the initial inflow of FDI. The justification can be the fact that this voivodship has the highest number of R&D institutions and universities as well as the largest amount of expenditure devoted to R&D by the government (Table 1).

Furthermore, the Mazowieckie region is the most attractive location for FDI when market factors are viewed as important motives, even if other regions such as the North–West, North–East and South–East are also taken into consideration by investors. This finding is hardly surprising, because the Warsaw metropolitan area is the largest market within the country (Table 1). As Vernon (1974, 1979), Dunning (1993), Agarwal (1980) and others have pointed out, large market size has a positive impact on the inflow of FDI.

5. Conclusion and policy implications

In this paper we examined the motives for the initial inflow of foreign capital in Poland at the regional level.

We found that those investors, for whom agglomeration, knowledge and market factors are the main motives for investing in Poland, tended to choose the Mazowieckie region despite the fact that other regions were also considered. However, investors for whom low input costs, availability of labour and resources and geographical factors are significant motives for setting up a business activity in Poland, favour other regions than the Mazowieckie area. These findings confirm that Polish regions do indeed differ substantially in attracting foreign capital and that regional characteristics matter in the selection of primary location choice in Poland.

This research contributes to the literature on the determinants of spatial location of FDI in developed countries (Carlton, 1983; Coughlin, Terza, & Arromdee, 1991; Crozet et al., 2002; Dunning, 1998; Friedman et al., 1992; Head et al., 1995; Louri et al., 2000); and the growing literature in the same field focusing upon transition economies (Bevan, Estrin, & Mayer, 2004; Campos & Kinoshita, 2003; Galego et al., 2004; Mayer, 2001). A further contribution of this research stems from the fact that

this study represents one of the first attempts to test the motives of the initial inflow of foreign capital into Polish regions, using a multinomial logit model incorporating investor's specific characteristics. The final contribution of this research stems from the quantitative and cross-sectional nature of the study.

The paper's findings suggest that the relative autonomy of Polish regions has led to differences in their attractiveness for inward FDI, the exploitation of regional potential, and economic development. While generally outside the scope of this paper, there are potentially significant public policy implications derived from the spatial distribution of FDI in Poland. Indeed these implications extend beyond Poland to other countries where the capital city/region is dominant in respect of levels of economic activity.

Regional policies in Poland are focused upon the creation and management of 14 Special Economic Zones (SEZs) designed to address regional imbalances. As Fig. 1 shows, these SEZs are located in the regions where, for instance, efficiency-seeking FDI motives are prevalent. Hence the SEZs appear to be correctly targeted to areas of economic need. While the SEZ incentives emphasize employment creation as well as capital investment outlays through investment grants, investment incentives have been criticized as "a crude, discriminatory and expensive tool for the attraction of inward FDI" (Tavares & Young, 2005, pp. 4). Authors have argued instead that governments should focus upon short- and long-term measures designed to strengthen economic fundamentals and the institutional system. The local governments of those Polish regions that are least attractive to FDI may be advised to consider improving the investment climate through political, economic and institutional reforms.

The evidence in the paper relates to FDI determinants as opposed to FDI quality. Nevertheless, there may be an assumption, for example, that where low input costs and labour availability are important motives for investment, FDI may be dominated by labour-intensive, c operations. Conversely, the importance of agglomeration and knowledge-seeking factors (as in the Mazowieckie region in Poland) may suggest higher-value added and integrated MNC operations, which in turn could further exacerbate regional inequalities in Poland. Further research is clearly required to test these proposed relationships.

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Appendix A

See Table 8 and Fig. 2.

Table 8
Sample characteristics.

	USA	EU	Others	Total
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Investment type				
Greenfield	4 (33.33)	18 (25.35)	3 (37.50)	25 (27.47)
Joint ventures	4 (33.33)	28 (39.44)	5 (62.50)	37 (40.66)
M&A	4 (33.33)	25 (35.21)	0 (0.00)	29 (31.87)
Sector of economic activity				
Industry	7 (58.33)	41 (57.75)	3 (37.50)	51 (56.04)
Agriculture, hunting and forestry	1 (8.33)	2 (2.82)	0 (0.00)	3 (3.30)
Construction	1 (8.33)	11 (15.49)	1 (12.50)	13 (14.29)
Trade and repair	0 (0.00)	2 (2.82)	1 (12.50)	3 (3.30)
Hotels and restaurants	0 (0.00)	2 (2.82)	1 (12.50)	3 (3.30)
Transport, storage intermediation	0 (0.00)	3 (4.23)	0 (0.00)	3 (3.30)
Other services	3 (25.00)	10 (14.08)	2 (25.00)	15 (16.48)
MNC's no. of employees in Poland				
50–149	0 (0.00)	1 (1.41)	0 (0.00)	1 (1..10)
150–249	0 (0.00)	2 (2.82)	0 (0.00)	2 (2.20)
250–349	0 (0.00)	1 (1.41)	1 (12.50)	2 (2.20)
350–449	2 (16.67)	5 (7.04)	0 (0.00)	7 (7.69)
450–549	4 (33.33)	16 (22.54)	2 (25.00)	22 (24.18)
More than 550	6 (50.00)	46 (64.79)	5 (62.50)	57 (62.64)
MNC's size (domestic and foreign employment)				
850–1049	1 (8.33)	3 (4.23)	0 (0.00)	4 (4.40)
1049–1249	0 (0.00)	1 (1.41)	0 (0.00)	1 (1.10)
1250–1449	3 (25.00)	10 (14.08)	1 (12.50)	14 (15.38)
More than 1450	8 (66.67)	57 (80.28)	7 (97.50)	72 (79.12)
Total	12 (100)	71 (100)	8 (100)	91 (100)

Source: Authors' own calculations.

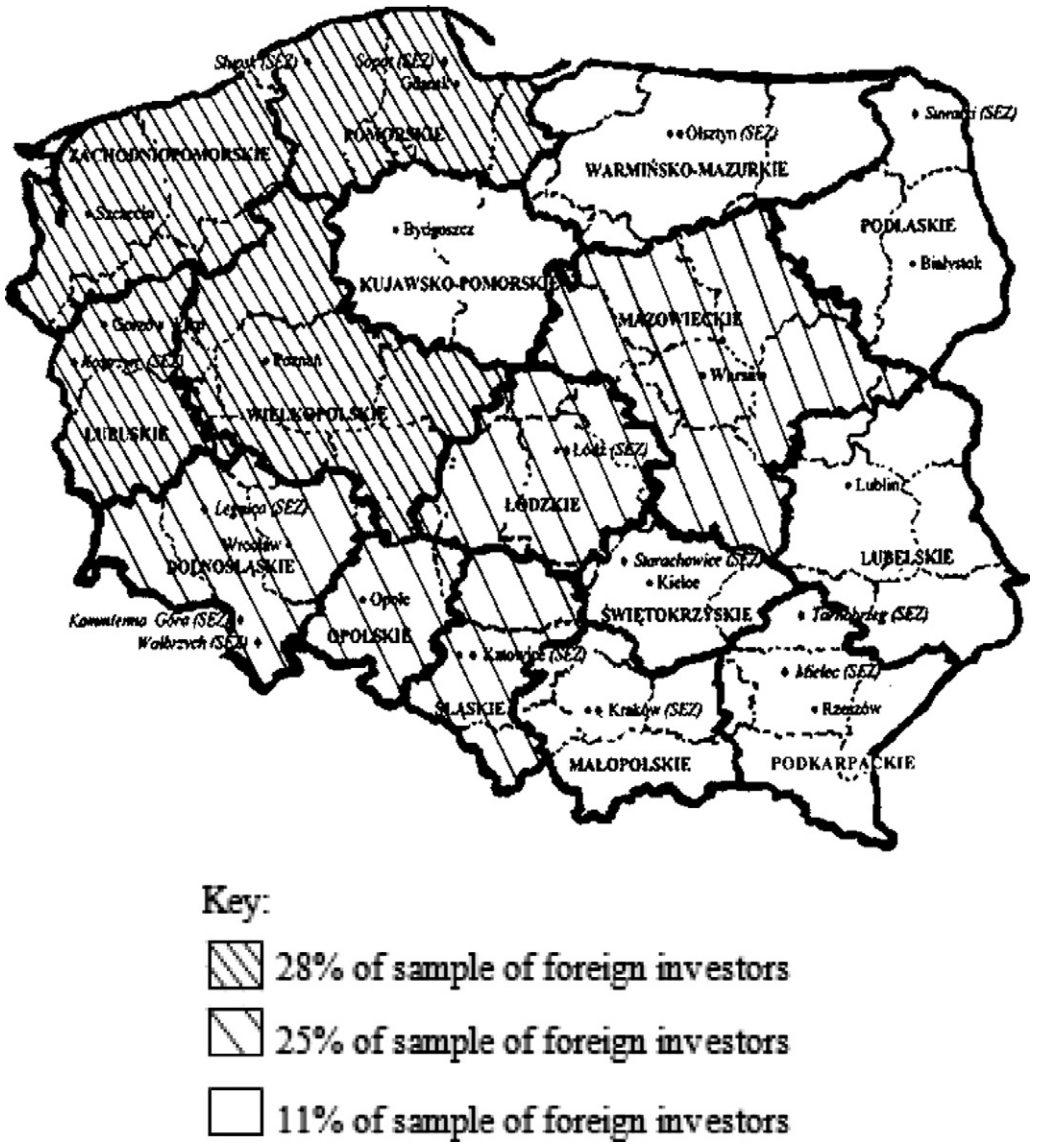

Fig. 2. Distribution of foreign investors in data sample.

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