# FOREIGN INVESTORS AS SIGNPOSTS OF CHANGE? *AN EMPIRICAL ANALYSIS OF THE COLLOCATION OF FOREIGN ENTRANTS INTO THE NEW MARKET ECONOMY OF POLAND*

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***Abstract.*** *The new market economies in Eastern Europe give a unique opportunity to study how agglomeration occurs due to the shift from a planner- constructed to a firm-driven economy. This paper it is investigated how foreign direct investment affects the existing economic geography. How are these changes taking place within the existing landscape of agglomerations inherited from socialism? Do foreign investors sustain existing patterns of agglomeration or are they signposts of change? A conditional logit model is implemented on a representative dataset combining the firm and regionallevel. Controls are made for region- and firm-specific factors such as market access, pre-existing industrial concentrations, regional policy and firm size. The results suggest that foreign investors are agents of both gradual and radical change in a new market economy such as Poland. With the exception of the capital region of Warsaw, past agglomerations are on the reverse and new ones are emerging; however, industrial inertia is quite strong outside Warsaw. Results also show that agglomeration economies in the make are significantly affected by cognitive distance. Foreign firms are more likely to go where other proximate peers (in terms of home country, industry and both) are going or have already gone.*

***Keywords:*** *foreign direct investment, new market economies, location choice, agglomeration, collocation, conditional logit.*

## Introduction

In mature market economies, the role of agglomeration economies cannot be overestimated. Globalization reduces the anchoring effect of the location on firms and hence also puts at risk each location's access to knowledge flows and workplaces. Agglomerations or local pools of knowledge, whether in industrial districts or through more diversified producer and user communities, may provide persistent local anchorage for firms and hence workplaces. However, we know relatively little about why and how these agglomeration economies come about in the first place. (Maskell, Malmberg, 2007; Feldman, 2006). In this perspective, it is interesting to look at the new market economies for an alternative empirical evidence on the emergence of agglomeration economies that

are the result of firms' location choices. This might be of interest for reasons other than that of a purely historical nature.

In this paper, I try to investigate the location choices and collocation behaviors of foreign investors in Poland. Are they signposts of the new market economy resulting from the country's many reforms that are gradually removing the role of economic planning for economic geography? More specifically, can the existing agglomeration economies explain the choice of foreign entrants and/or what is the role the aggregate choices of other foreign investors (or we could call it the internal collocation structures among the foreign entrants themselves) play for subsequent entrants?

There are several reasons why foreign direct investments may significantly alter economic geography in the former socialist world. There is no foreign – owned firms (joint ventures) inherited from socialist times. Fifteen years later the role of FDI in the reform process, especially with respect to industrial restructuring going on in old as well as in new firms, which is quite significant, not only in terms of the number of firms influenced, but even more so with respect to de facto industrial restructuring, technological change and related structural changes taking place in the economy. These factors together suggest a very significant impact of foreign investors on economic geography as well. This is not unique for Poland but true for many of the new market economies both in Eastern Europe, the Middle East, the Far East and Latin America.

## Background

Three different streams of literature have produced knowledge about the location behavior of foreign investors in business and economics. The leading perspective adopted by most researchers is that of economic geography and the persistence of agglomeration economies. Secondary perspectives have been rendered by industrial organizations and international business studies respectively. Maybe these perspectives on collocation are not necessarily contradictory, but instead some theories (behavioral and strategic) potentially provide the foundation for agglomeration economies to arise in the first place.The psychic, or cognitive, distance does appear to play a major role in the observed behavioral patterns across countries (Johanson and Vahlne, 1977, Madsen and Servais, 1997). However, these underlying arguments for collocation behavior have only been weakly connected to the literature on the regional location choices of firms. This section serves to give a brief overview of the insights offered by these different approaches to the question about location choices of foreign investors.

The theoretical arguments for collocation in the economic geography literature are those associated with agglomeration economies: linkages among firms, technological spillovers and the access to shared pools of resources in industrial districts or clusters (Marshall, 1919).

The evidences of collocation as a regional location strategy among foreign investors abound in this literature (Wheeler, Mody, 1992; Head et al., 1995; Disdier, Mayer, 2004; Crozet et al., 2004; Alcacer,

Chung, 2007). Overall findings suggest that the location choices of other foreign firms are dominant when foreign investors are making decisions about their own location choices within a country. Most often, however, it is difficult to separate this behavioral pattern from the other general factors of agglomeration (such as internal and aggregate industry concentrations). Most of the samples studied focus on a singular home country nationality in terms of collocation decisions (e.g., Japanese investors in the US) or do not emphasize the investor home country specifically, except for the recent study by Crozet et al. (2004).

Crozet et al. (2004) study the regional location strategies of multinational firms in French manufacturing, combining data on regional economic characteristics with firm characteristics such as investor nationality. Besides generally sustaining agglomeration economies, the French study finds that foreign investors are more likely to invest on the other side of their national border if they come from neighboring countries, and that foreign investors are generally attracted to where other foreign investors have already gone.

The industrial organization and strategic management literature builds on more traditional arguments within the structure–conduct–performance paradigm of how different location strategies affect the relative market power of firms. A number of works in this literature have also been preoccupied with collocation. Chung and Kalnins (2001) study the investment behavior of Indian entrepreneurs in the Texas lodging industry. The main argument for collocation in this literature is strategic behavior through coordinated localized pricing decisions of firms in a monopolistic market structure. Furthermore, the strategic management literature also questions the realization of agglomeration economies for all types of firms. (Noticing that the meaning of an agglomeration economy effect is that there is a de facto positive impact on the performance of individual firms. Industrial organization theory, with its emphasis on both collusive and antagonistic strategizing, directs the attention to the potential downsides or negative externalities that there may be from collocation (Chung, Alcacer, 2002; Chang, Parks, 2004). This is especially obvious in service industries as studied by Chung and Kalnins (2001) since pricing here is strongly location-specific. Hence, collocation may make an inroad on market power, especially in services that need to be produced locally. Studies in this tradition also give evidence on collocation behavior among foreign investors (Shaver et al., 1997). In a more recent study, Shaver and Flyer (2000) show that with the assumption of heterogeneous firms, the best or technology-leading firms are less likely to choose a collocation strategy relative to weaker firms.

Other explanations of collocation have also emerged from the strategic management literature. For example, several papers point to a dubious or not evident cause–effect relationship between collocation and performance for other reasons than those just mentioned above. For example, Chung and Kalnins (2001) suggest that the observed behavioral patterns may be due in equal share to ethnicity and inherited social norms of firms or groups of firms. Along the same lines, Shaver et al. (1997) suggest

that collocation may be a collusive strategy of alleviating location disadvantage among foreign investors rather than exploring real externality benefits.

At the regional level (in country studies), the international business literature offers fewer insights. Most studies along these lines have been conducted at the national level, perhaps due to the dominant focus in the international business literature on national culture (Yu, 1990;Benito, Gripsrud, 1992; Barkema et al., 1996). Besides traditional location factors associated with market cost, benefits and risk (Dunning, 1998), an interesting perspective offered is the rational aspects of strategy processes bound with firms (Johanson, Vahlne, 1977). At the national level, the imperfections created by cultural differences are the main argument why firms employ what appears to be non-rational strategies such as adopting extraordinary entry modes in new types of markets (Yadong, 1999). The same arguments could in principle apply to collocation behavior observed at the regional level. Within the international business tradition, Mariotti and Piscitello (1995, 2001) have shown that the collocation strategy may be especially effective among firms lacking resources related with firm size, international experience or country specific experience.

Few studies have addressed the question about location choices of firms outside the mature market economies. The main hypothesis in the paper is that the inherited patterns of industrial concentration among the former socialist countries have only a weak impact on the location strategies of new entrants such as foreign investors. This is the most risky but also a plausible hypothesis in the context of the research, simply because all empirical research outside the former socialist world to date would suggest the opposite. However, some contradictory results also exist. Some studies find that agglomeration economies are an important factor of regional location choice in Eastern Europe (Disdier, Mayer, 2004). Recent evidence from the old EU member countries also suggest that even here direct foreign investment may serve as a signpost of change. Although existing agglomerations play a role, and especially due to the frequency of investments made with existing firms (acquisitions), studies in France and Italy suggest that also here emerge new foreign-owned firm economy signposts of change in the existing economic landscape (Crozet et al., 2004; Roberto, 2004).

The main argument for this hypothesis is that industrial concentrations in the former socialist countries may not represent de facto agglomeration economies. Hence, new entrants perceive few benefits of locating there. Furthermore, socialist countries had a problem with industrial renewal since the economy was not built out by planners in new industries in the same way as entrepreneurs start up entirely new industries in the market economy (Kornai, 1992; Bivand, 1999).

## Methodology

The data used in the paper are from the *Amadeus Databank* published by Bureau Van Dijk in the Netherlands. The databank comes in several formats and sizes. The download for the paper is based on the 2005 edition of the databank and involves unconsolidated data (plant level data). It includes

all firms operating in Poland with 10 or more employees where financial information is made available to the public. This is the largest possible sample in *Amadeus* and the least biased in terms of firm size.

The total size of the original sample downloaded is 3,837 firms identified as being under foreign majority control (the definition of foreign ownership in the paper). However, the requirement that the year of entry of the foreign investor must be available reduces the sample to 2,531 firms. Adding the firm characteristics of size (measured with sales) and entry mode (investing in a new firm or an existing firm through the acquisition of firm-specific assets) reduces the sample further down to 2,413 observations. Finally, the inclusion of region-specific factors limits the ability to include in the analysis entrants that arrived before 1995, further reducing the sample to 2,102 observations. (The backwards recalculation of Polish regional data to fit the administrative reforms implemented in 1998 only extends as far back as 1995. Using data from before 1995 raises too many validity concerns since, for example, major cities were not treated as separate regional entities prior to those reforms.)

Juxtaposing the *Amadeus* sample with other sources on foreign direct investment in Poland, such as the *Polish Regional Databank*[1] and the *List of Major Foreign Investors in Poland*[2] adds information to the original sample. For all investments made with existing Polish firms (acquisitions), the year of entry is unknown. Hence, other secondary data sources are used, such as the *List of Major Foreign Investors*. In half of the sampled cases, primary data were obtained using company websites. Also, information about the home country of the investor is added using the *List of Major Foreign Investors* when it is missing from *Amadeus*. In case of inconsistency across secondary data sources, *Amadeus* is chosen as the vindicating source.

Table 1 gives information about the representativeness of the sample in terms of regional sample fractions and the regional distribution of the population of foreign – owned firms in Poland. The *Amadeus* sample is drawn non-randomly (only including firms for which financial records are made public) and is estimated to represent an average of 15–20% of its population. This is quite a high sample fraction for this type of population, and it surpasses the minimum sample number of 800 necessary when correlation testing is involved.

The next three columns give some initial descriptive statistics about the concentration of foreign investors across Polish regions. The calculated Herfindahl index suggests quite a low concentration of foreign investors in Poland. However the Warsaw and 3 and 5 city concentration ratios show that 30% of foreign investors are concentrated in the capital city, around 40% are concentrated among the three major cities, and around 50% are concentrated among the five major cities (the latter concentration ratio is not shown in Table 1). Interestingly the cities making up the top destinations

[1] Available from www.gov.stat.pl. This source gives a panel for firm populations in Poland including separate data by ownership type (including one category for firms with 'foreign capital participation').

[2] Current issues are available from www.paiz.gov.pl. The list used here is an unpublished consolidated version that includes information about the year of entry of each foreign investor.

*Table 1.* ***Sampling and concentration of foreign investors***

| Year | $n_{rt}/N_{rt}$ | Herfindahl | Warsaw | 3City |
|---|---|---|---|---|
| | *mean (SD)* | *Index (%)* | *CR (%)* | *CR (%)* |
| 1995 | 0.086 (0.067) | 11.5 | 30 | 41 |
| 1996 | 0.117 (0.076) | 11 | 30 | 40 |
| 1997 | 0.138 (0.084) | 10.5 | 29 | 39 |
| 1998 | 0.152 (0.088) | 10.5 | 29 | 39 |
| 1999 | 0.167 (0.094) | 10 | 28 | 38 |
| 2000 | 0.176 (0.097) | 10 | 28 | 38 |
| 2001 | 0.195 (0.105) | 10 | 28 | 38 |
| 2002 | 0.202 (0.103) | 10.5 | 29 | 39 |
| 2003 | 0.201 (0.103) | 10.5 | 29 | 39 |
| 2004 | 0.194 (0.098) | 10.5 | 29 | 39 |
| | | | | |

*Notes*

***Column 1.*** The true sample fraction is unknown and is based on a correction of the population total using a 75- percentage rule (that at least 75% of the population of firms will have less than 10 employees – these firms are not part of the population studied in the paper since they cannot be sampled using *Amadeus*. Comparison with the size characteristics of Polish firms also suggests that this rule is conservative.

***Column 2.*** The Herfindahl Index measures concentration, it is the sum of the squared concentration ratios of each region.

*Sources*. *Amadeus Databank* published by Bureau van Dijk, Holland and the *Polish Regional Databank* published by GUS at www.stat.gov.pl.

for foreign direct investment, change over time; for example, the top three cities are besides Warsaw, Szczecin and Gdansk in the early years and Szczecin and Katowice in the later years. Among the five major cities are, besides those mentioned in the top three, Wroclaw and Poznan in early years and Warszawski (Greater Warsaw) and Poznan in later years.

Comparing the sample against aggregate employment statistics by industry and home country, compiled by the OECD (OECD, 2007), the sample is not particularly skewed in any of these dimensions. With respect to industry, there is some overrepresentation of firms from the food industry. With respect to home country, Swiss and Italian investors are slightly underrepresented, whereas British and Danish investors are overrepresented, which may be due to different rules concerning public disclosure of financial information.

The general descriptive statistics for the sample are given in Table 2. Even though the dataset is presented in a panel, it is not explored as a panel in the present paper, simply due to the fact that the focal point of interest is the location choice and the factors that motivate the location choice of a firm. Hence, summary statistics are not made as is customary for a panel with variables reported for each consecutive year in a sample. It should be also stressed that the summary statistics are not presented

for that of a simple pooled sample. Rather, from the original panel an entry dataset has been created where to each firm attached are the data that ware in vigor upon its date of entry.

The present work is based exclusively on the so-called Nuts-3 regional level following the European Union classification. At the Nuts-3 level, Poland is divided into 45 regions. Regional data in Poland have undergone several administrative upheavals in preparation to the accession to the European Union in 2004. (Regional divisions are of high political importance in the EU because it is on the basis of these divisions that the benefits of the regional policies are distributed.) Among others, the country underwent major regional administrative reforms in 1998. This has created many challenges for the collection of panel data on regions. However, Poland's National Statistical Office (GUS) has recently published a new panel which follows the new administrative reforms, but with recalculation of most data series back to 1995. It is these data series that are now available in the *Polish Regional Databank* (see also Footnote 1).

The first column shows the mean across the regions for the sample-to-population ratio (with standard deviation in parenthesis). These two numbers together give a fair snapshot of the representativeness of a sample across the regions and over time. The sample is representative of its population with a fraction of 10% for the early years and 20% for the late years. There are two biases in the sample. The first is the size bias, simply because financial information is more likely accessible for larger firms. The other bias is due to data censoring. Bureau van Dijk may have more difficulty covering early and late entrants in the sample.Especially early entrants appear to be underrepresented. This could also owe to a survivor bias in the sample, which could only be documented by accessing earlier records of Bureau van Dijk.

Table 2 consists of three separate sections, starting with the firm-specific and ending with the region-specific data. In between, a set of characteristics that are neither exclusive to an individual firm nor general for a region is reported. Rather, these characteristics depend on or are shared among certain groups of firms within regions. Such groups include industries, investor nationality (or home country) and the mode of entry (the investment is made in a new or an existing firm). The data on firms are largely self-explanatory, including just the basic characteristics such as size (turnover or employment), entry mode (acquisition or Greenfield) and industrial affiliation. The variables covering regions and combinations of firms and regions are explained in the Methodological Appendix in detail.

## Statistical analysis

Results of estimating a conditional logit with nests are shown in Table 3[3]. The condi-

[3] The estimated equation is the following:

$$P_{it}(r \in R) = \frac{e^{\alpha_1 IAGLOM_{irt} + \alpha_2 ACCIND_{irt} + \alpha_3 SEZ_{irt} + \beta_1 nfhi_{irt} + \beta_2 nfh_{irt} + \beta_3 nfi_{irt} + \beta_4 nff_{irt} + \beta_5 nfa_{irt} + \beta_6 nfai_{irt}}}{\sum_{r=1}^{R} e^{\alpha_1 IAGLOM_{irt} + \alpha_2 ACCIND_{irt} + \alpha_3 SEZ_{irt} + \beta_1 nfhi_{irt} + \beta_2 nfh_{irt} + \beta_3 nfi_{irt} + \beta_4 nff_{irt} + \beta_5 nfa_{irt} + \beta_6 nfai_{irt}}}$$

*Table 2.* ***Descriptive statistics***

| Sample Size: 2,531 firms | Regions: 45 (Nuts-3) | Years: 12 (1991–2004) | |
|---|---|---|---|
| Note! All data are reported at the time of each firms' entering the Polish market | | | |
| Firm-specific characteristics | Median | Mean | SD |
| SIZE $I_{it}$: Turnover, mio PLN | 22,294 | 198,019 | 805,037 |
| SIZE $II_{it}$: Employment, number of workers | 58 | 273 | 1.617 |
| $BIRTH_{it}$: Year of incorporation | 1996 | 1991 | 24.3 (years) |
| $ENTRY_{it}$: Year of entering Poland | 1997 | 1997 | 2.6 (years) |
| MODE | Acquisition | Greenfield | NA |
| Obsevations by mode, number of firms | 417 | 1,996 | 118 |
| Median SIZE I by mode, mio PLN | 73,795 | 15,746 | 45,489 |
| INDUSTRY | SERVICE | MANUF. | NA |
| Observations by industry, number of firms | 1,454 | 1,077 | 0 |
| Median SIZE I by mode, mio PLN | 17,449 | 30,170 | - |
| Firm-region specific characteristics[1] | Median | Mean | SD |
| $NFHI_{irt}$: Number of very proximate peers | 0 (0) | 1.4 (3.6) | 2.7 (9.3) |
| $NFH_{irt}$: Number of other home country peers | 1 (4) | 3.6 (18.4) | 5.7 (32.8) |
| $NFI_{irt}$: Number of other industry peers | 1 (3) | 6.9 (30.4) | 12.4 (62.5) |
| $NFF_{irt}$: Number of other foreign peers | 8 (45) | 26.3 (155) | 32.6 (227) |
| $NFAI_{irt}$: Number of ACQ industry peers | 0 (0) | 0.9 (2.2) | 1.4 (5.4) |
| $NFA_{irt}$: Number of ACQ foreign peers | 2 (4) | 4.5 (14.3) | 5.4 (22.9) |
| Region-specific characteristics | Median | Mean | SD |
| $IAGLOM_{r1990}$: Industrial concentration in 1990 | 1.80 | 3.81 | 3.11 |
| $ACCIND_{rt}$: Market access index | 45.74 | 53.35 | 35.49 |
| $SEZ_{rt}$: Special economic zone dummy | - | - | - |

*Notes:*

[1] In parentheses are stated the cumulative variables from time t0 until time t-1 included.

*Source*: *Amadeus Databank*, Downloaded in December 2005, Bureau Van Dijk, Holland.

where on the left-hand side is the probability that the $i^h$ firm entering Poland at time $t$ chooses the region $r$. On the right-hand side is a fraction that weighs the attributes of region $r$ at time $t$ that is hypothesised to explain the choice of region $r$ of firm $i$ as compared against the same values for all other regions. Instead of a linear relationship, the probability distribution is assumed to follow a sigmoid pattern (which is why the estimated equations are transformed using the exponential function) since it is more useful for describing categorical data that take only discrete values (either the firm choses the region or not; it cannot choose, for example, half of it). The actual specification in SAS involves the construction of a dataset where all the hypothetical values (cases) of explanatory variables for each firm–region pair are calculated.

*Table 3.* ***Main regression results – conditional logit model***

| | EQ1 (All regions) | EQ2 (Warsaw excl.) |
|---|---|---|
| Industrial concentration in 1990 (IAGLOM) | -0.014 | 0.226••• |
| Market access index (ACCIND) | 0.010•• | -0.009•• |
| Special economic zone dummy (SEZ) | 0.112 | 0.088 |
| Very proximate peers (NFHI) | 0.149••• | 0.075••• |
| Other home country peers (NFH) | 0.030••• | 0.026••• |
| Other industry peers (NFI) | 0.053••• | 0.030••• |
| Other foreign peers (NFF) | 0.009••• | 0.003•• |
| ACQ industry peers (NFAI) | 0.262••• | -0.353••• |
| ACQ foreign peers (NFA) | 0.021 | -0.085••• |
| | | |
| NESTS: | | |
| Warsaw | 0.057••• | - |
| All other regions | 0.325••• | - |
| | | |
| Number of observations | 2,102 | 1,384 |
| Number of cases | 94,590 | 62,280 |
| McFadden's LRI | 0.246 | 0.044 |
| Log Cikelihood | -6,036 | -5,034 |

The estimated parameter is significant at the ••• 0.01 percent level, at the •• 5 percent level, at the • 10 percent level.

tional logit was been used to analyse similar questions about location choices of firms (see, e.g., Crozet et al., 2004) but includes a variety of applications in microeconomics (Train, 2002). The conditional logit is generally appropriate when, for example, emphasis is on the economic characteristics of the regions that the firms choose. On the contrary, if an emphasis is also on the characteristics of the firms that make the choices, a mixed logit is appropriate. In this paper, also firm heterogeneity is addressed, but a more *ad hoc* approach is chosen as explained further below. A nested logit is appropriate when the Independence of Irrelevant Alternatives (IIA) is violated (Train, 2002). What this means in terms of the present choice situation is that there is an assumption that each investor sees each alternative as good as another when their economic characteristics are the same. Specifically, for capital cities such as Warsaw, Mexico City or Paris this assumption is likely to be violated (because these cities offer urbanisation economies beyond what any other region can offer in terms of access to markets and resources, institutions and other political resources). However, once a nest is included, it is expected that the same explanatory factors apply within each nest.

The first step in the analysis was to check whether this is a valid assumption of firms' decision-making when choosing between Warsaw and the other 44 regions of Poland. Results hereof are reported in Table 3. The first column shows the results for the nested logit. The second column shows the results for the conditional logit excluding the 718 firms in the sample that have chosen to locate in Warsaw. The results suggest that the pure economic characteristics of Warsaw are generally less relevant, and this affects the results for the whole sample. In fact, it turns out that this is central with respect to one of the main explanatory variables central to the hypothesis addressed in the paper about the importance of past industrial agglomerations (note that the alternative variable for industrial concentration, which could be measured within the dataset – that is the percentage of manufacturing in regional value added in 1995 did not show this result – hence it is suspected that already in 1995 it is endogenously affected by developments subsequent to 1989). In the nested model with Warsaw as a separate choice, it gives inconclusive results for this central study variable (industrial concentration in 1990). However, for all other ordinary conditional logit models estimated without the sub-sample of firms choosing Warsaw, a strong, positive and significant result for this variable is obtained (but with a lot of variation in size and significance for some of the aspects of firm heterogeneity subsequently addressed.)

Hence, the main result of the study with respect to the impact of past industrial agglomerations on present-day choices of foreign investors is that this effect is weak in the sample as a whole, but only because the socialist period led to an underallocation of investments towards the capital city (this is generally true also for other socialist countries such as Russia, China and Cuba: labour, for example, was not allowed to be freely mobile, and planners could easily control the amount of investment allocated towards the capital city).

The study shows quite a strong impact of the peer variables on location choice. Across the sample as a whole, collocations are a stronger explanatory variable relative to the influence of past indsutrial agglomerations. Also, for the sub-sample of all other regions except Warsaw this is a strong tendency. The very proximate peers have a strong impact on location choice, but also home country and industry peers individually are important explanatory factors. This may show the importance of the cognitive distance when choosing the type of information to rely on among entering firms outside their normal home country environment. Also, this result is not unique for Poland (see for example Crozet et al., 2004).

However, relative to other studies, only a very weak role is assigned to the explanatory factor of market access. In the subsample without the firms entering Warsaw, this effect is even estimated to be negative. One reason for this result may be firm heterogeneity with respect to investor strategies (only some firms invest to cater to the host country market, whereas others mainly invest to export back to the home country or abroad). Regional policy as captured with the Special Economic Zones variable has little bearing on location choices of foreign investors according to these results.

Summarizing the main results, foreign investors are changing the economic landscape of Poland for several reasons. Firstly, they favour much more the capital city relative to the preferences of socialist planners. Secondly, even though many investors sustain past agglomeraitons outside Warsaw, also many do not because the choices of other investors matte, and this effect must be read partly as a substitution effect of that of past industrial agglomerations (note also that none of the correlation coefficients among explanatory variables is above 0.8; the correlation matrix is not reported in the present version of the paper). If collocation was entirely complementary to that of past industrial agglomerations, then there should be a very high multicollinearity between the past industrial agglomerations and the present day collocations, which is not the case.

Finally, robustness checks are made for the above reported results with respect to firm heterogeneity. There is a number of ways that firm heterogeneity can be controlled for. The mixed logit is an example of a model that allows the inclusion of both individual-specific and region-specific variables in the same model (see, for example, Rouwendal, Meijer, 2001). However, when there are large differences in the levels of the explanatory variables, as is the case in the present study, and especially when there is a much larger variation in the firm-specific relative to region-specific variables, the model may be difficult to interpret. Hence, more traditional strategies for investigating firm heterogeneity are pursued.

Differences across entry modes and industries are investigated by simply dividing the sample. Firm heterogeneity is addressed only for the sub-sample that excludes Warsaw entrants for the reasons discussed above; e.g., the results suggest that Warsaw is chosen for other reasons than those emphasised with the model. Results for entry mode and industries are reported in Table 4 and Appendix Table 2, respectively. Also, differences in choices across firm sizes are investigated, in this case by expanding the model with individual coefficients for different firm sizes (small, medium and large). These results are reported in Appendix Table 3.

Table 4 shows results for the estimated equation 2 in Table 3, but in this case dividing the sample into Greenfield (new firms) and acquisition (existing firms) investors, respectively. The sub-sample of acquisition entrants appears to diverge in behavior from Greenfield entrants. Even though the variable for industrial concentration in 1990 is not significant, the results imoly go that acquisition entrants are more likely to locate with past industrial agglomerations. This is a necessary result because the firms they are investing in are located a priori in these areas. Whereas the variable for industrial concentration in 1990 increases in size but is reduced in significance (partially due to the much lower size of the sub-sample), the collocation variables of other acquisition industry entrants or other acquisition entrants generally take on a significant and positive explanatory power. In this particular subsample, the effect of collocation may be crowding out the result for the industrial agglomeration variable because of multicollinearity. Another explanation for the obtained results may be that acquisition

*Table 4.* ***Regression results by entry mode (Warsaw excluded)***

| | EQ3 (New firms) | EQ4 (Existing firms) |
|---|---|---|
| Industrial concentration in 1990 (IAGLOM) | 0.241••• | 0.873 |
| Market access index (ACCIND) | -0.011•• | 0.009• |
| Special economic zone dummy (SEZ) | 0.064 | 0.167 |
| Very proximate peers (NFHI) | 0.080••• | 0.132••• |
| Other home country peers (NFH) | 0.035••• | 0.002 |
| Other industry peers (NFI) | 0.040••• | 0.038••• |
| Other foreign peers (NFF) | 0.007••• | -0.001 |
| ACQ industry peers (NFAI) | -0.491••• | 0.287••• |
| ACQ foreign peers (NFA) | -0.133••• | 0.090••• |
| | | |
| Number of observations | 1,031 | 291 |
| Number of cases | 46,395 | 13,095 |
| McFadden's LRI | 0.064 | 0.029 |
| Log likelihood | -3,671 | -1,075 |

The estimated parameter is significant at the ••• 0.01 percent level, at the •• 5 percent level, at the • 10 percent level.

entrants are naturally attracted to the areas where the firms are located historically (tautological), but also that they are more likely to take this decision when there are other foreign firms that have taken a similar decision to undertake an acquisition in the same locality (and industry).

With respect to the other aspects of firm heterogeneity, results are reported in the Appendix. Generally, the results listed in Table 3 are sustained, especially with respect to the study central variable of industrial concentration in 1990. Controlling for industry (Appendix Table 2) and for firm size (Appe is a ndix Table 3) does not change the obtained results. Not surprisingly it is typically the smaller firms that are affected by collocation structures among the foreign entrants themselves. For smaller firms, the cognitive distance is more important when choosing which firms to rely on for outside information, whereas very large firms are more likely not to depend on outside information to the same extent as do smaller firms (see also Shaver, Flyer, 2000).

## Conclusions

The objective of the paper is to investigate whether foreign investors are affected by economic agglomerations from the previous regime in the new market economy of Poland. The results show that investors enter into the existing economic geography both sustaining and changing the inherited industrial landscape.

Factors of change are mainly due to the much larger importance placed on the capital city of Warsaw when choosing investment location relative to the emphasis placed hereon by socialist planners of the past. Also, collocation among foreign entrants themselves is a factor of change that is gradually reshaping the economic landscape. With respect to the internal colloca-

tion structures among the foreign investors, the results suggest that cognitive distance both in terms of host country and industry is important when investors choose to rely on other firms as informants where it is good to locate outside the safe home country environment. Acquisition investors are more likely contributing to industrial inertia for quite obvious reasons since the objects they invest in are located in the areas designated for industrial purposes in the past.

Besides the factors of change accounted for above, there is quite a strong evidence in the paper against the theoretical hypothesis that past industrial concentrations do not matter or that they do not offer present-day investors with agglomeration economies. Controlling for various aspects of firm heterogeneity, this hypothesis must generally be rejected by the statistical results obtained from implementing a conditional logit on a fairly representative dataset.

A number of policy perspectives for planners in the new market economies may be derived from the study, even though regional policy as such is not the object of analysis in the present study. The obtained results question whether it is a good policy to discard the inherited industrial concentrations and corporate assets from socialism as useless in the market economy. Also, it is questionable whether it is a good policy to build economic zones that are isolated from past industrial concentrations. Finally, if present-day regional planners want to establish Greenfield zones, they should focus on attracting first the central peers or information leaders that are proximate to other types of firms they wish to attract. These are not necessarily the largest or dominant firms in global industries, but perhaps rather entrepreneurial entities from industry clusters in home countries neighboring on the host country.

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## *Methodological Appendix*

The Methodological Appendix explains in detail the region-specific variables and also how the combined data on firms and regions (e.g., Swedish companies in Gdansk or Swiss food processing companies in Poznan, etc.) were derived.

The chosen data for region-specific characteristics reflect data availability from the *Polish Regional Databank*. Two variables for existing agglomeration economies upon the arrival of foreign investors were considered. The first is the concentration of manufacturing industry *INDUS* and captures the supply-side aspect of agglomeration economies. The *INDUS* variable was adopted in its base year (1995 in the present panel). However, due to endogeneity concerns with respect to the study-dependent variable, the final choice was instead to use the percentage of the 500 largest firms located in each region in 1990 *IAGLOM* available from Rogacki (2006). The large-scale character of industrialization under socialism renders this a reasonable approximation for the past industrial concentration.

The second is the *ACCESS* variable which measures, in a very condensed way, the location of a region within the overall demand space (captured with Gross Regional Products (GRPs)). This has been used in several studies in economic geography, for example, by Crozet et al. (2004). To construct the *ACCESS*

variable, Polish regions are placed on the longitudinal and latitudinal grid, using each region's main city as the gravitational point of demand[4]. For each region its relative access to the Polish market is then calculated from the perspective of region *r* by dividing the *GRP* of each R-1 regions *q* with the distance that separates regions *r* and *q* and to that adding the own GRP of region *r*:

$$ACCESS_r = GRP_r + \sum_{q=1}^{4} \frac{GRP_q}{DIST_q} \qquad (1a)$$

Finally, the *ACCIND* index is constructed by dividing each ACCESS number by the regional early maximum (best located region in terms of market access) and multiplying by100 (hence the best location in terms of demand scores 100 and the worst location scores lowest on the index):

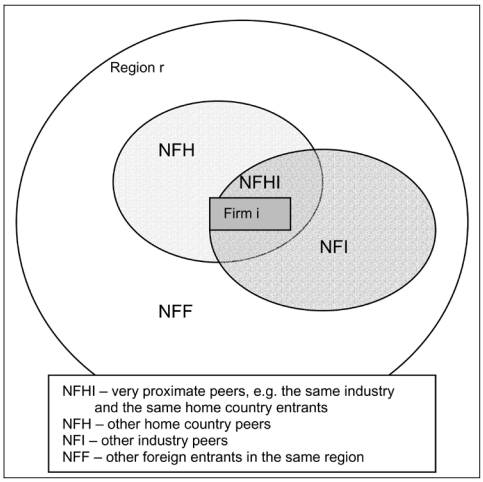
$$ACCESS_r^{INDEX} = \frac{ACCESS_r * 100}{ACCESS_r^{MAX}} \qquad (1b)$$

In addition to these region-specific variables,control is also made for the construction of Special Economic Zones (SEZ) in Poland. This initiative was launched in 1995. Hence, to the data is added a dummy for the regions that have Special Economic Zones. These zones aim in particular at creating attractive conditions for new Greenfield investors outside the existing urbanized areas. They are, therefore, important to control since they might be an underlying but policy-related factor of why the study hypothesis finds confirmation in the data.

Especially the data reported in the middle of Table 2 (firm–region specific characteristics) also need further explanation and definition since these data were generated or constructed by the researcher using the sample as representative of the location entry choices made by foreign investors in Poland. For example, very proximate peers $NFHI_{irt}$ measure the number of foreign entrants that come from the same industry and home country as the $i_{th}$ firm entering Poland in the same region *r* at the same time *t*.

Similarly, $NFH_{irt}$ measures the number of the same home country entrants, $NFI_{irt}$ the same industry entrants, etc. In order to avoid statistical noise, the measures have been carefully corrected; so, for example, a firm itself is not counted in *NFHI*. Hence, in the cases where it takes a value, 1 (the firm itself) is deducted.

[4] Using the online service at www.getty.edu/research/conducting_research/tgn/.




*Appendix Figure 1 .Collocation from the perspective of Firm i*

Also, *NFH* and *NFI* are corrected by deducting *NFHI*, hence, they have the character of other proximate peers in terms of home country and industry that are not in the group of those very proximate (*NFHI*). *NFF* is corrected by deducting *NFH* and *NFI* and adding *NFHI* since otherwise it will be deducted twice. See also Appendix Figure 1 for a visual definition of the variables how they overlap and hence why the corrections are necessary.

There is a possibility to define the collocation variables (*NFHI, NFI, NFH* and *NFF*) as either past choices seen by the firm upon entry,the same period choices at the time of entry, or both. The final choice fell on the latter (both) (even though especially the same period choices were found to be extremely important) to reduce concerns about multicollinearity in the study.

*NFAI* and *NFA* are similarly calculated as industry peers and foreign peers specifically involving foreign entrants that invest with existing firms (acquisitions). Also, these variables are corrected for the firm itself by deducting 1. However, they should otherwise be read as deviations from their corresponding sample aggregates of *NFHI* and *NFF*.

Note that due to the time series character of the data involved it was chosen not to recalculate the data into US dollars (USD). However, the value of Polish Zloty (PLN) expressed in USD at official and purchasing power parity (PPP) exchange rates are shown in Appendix Table 1.

On average, over the period, 1 PLN is approximately equal to 0.3 USD at official exchange rates or 0.6 at the PPP exchange rate. To be precise, we must

*Appendix Table 1. USD exchange rates (Polish Zloty), 1995–2004 Polish Zloty per USD*

| | Official exchange rate | PPP exchange rate* |
|---|---|---|
| 1995 | 2.42 | 1.17 |
| 1996 | 2.69 | 1.36 |
| 1997 | 3.28 | 1.52 |
| 1998 | 3.48 | 1.66 |
| 1999 | 3.97 | 1.74 |
| 2000 | 4.35 | 1.84 |
| 2001 | 4.09 | 1.86 |
| 2002 | 4.08 | 1.83 |
| 2003 | 3.89 | 1.84 |
| 2004 | 3.66 | 1.86 |
| | | |
| Period average | ≈3.6 | ≈1.7 |

* The PPP exchange rate shows the number of Polish Zloty required to buy the same amounts of goods and services in Poland as 1 USD would buy in the United States. The shown conversion factor is for GDP.

*Source*: World Bank (2008), *World Developmnent Indicators,* The World Bank, Washington D.C.

divide the Polish data by 3.6 to get the official USD equivalent (or by 1.7 to get the PPP USD equivalent) over the period covered in the study.

Sample validity is a tantamount for overall validity in this study since it affects both the left -and the right-hand sides of the estimated equations. Especially if the sample is skewed towards the locally searching firms (e.g, firms from neighboring investor countries and small investors), it can lead to a considerable bias in the study, potentially leading to a confirmation of the types of behavior that are only relevant to part of the population and confirming the rules about firms' moves in space, which is not a reflection of the overall location of the full population. However, as discussed above and to the extent it is possible to make checks about representation, the sample does not appear to be overtly skewed, and especially not in the way that works to the benefit of the hypothesis test (because the sample is skewed towards larger investors). One factor of caution, though, is that a survivor bias in the sample may potentially lead to a certain element of self-fulfilling prophecy in the study – i.e. whether firms benefit on their long-term performance or survival from collocating.

Aggregation of data is a serious validity issue to be addressed in all research on spatial concentration and agglomeration economies. The actual limit of the industrial district or cluster is at the discretion of the researcher. Some researchers argue for a localized approach to an industrial district, such as that of the city level (Duranton, Overman, 2006). Other researchers take a gradualist approach to physical space also with respect to agglomeration economies (Crozet et al., 2004). However, for agglomeration economies as a concept to maintain their meaning in research, proximity is an important factor that cannot be ignored. For example, if a firm decides to locate in Normandy or Kalisz, it excludes itself from the agglomeration economies that exist in Ile-de-France or Warsaw. Agglomeration economies cannot be shipped in on a train as the final goods can. To benefit from them, physical presence and proximity are required.

*Apppendix Table 2. Regression results by industry (Warsaw excluded)*

| | EQ5 (Manufacturing) | EQ6 (Service) |
|---|---|---|
| Industrial concentration in 1990 | 0.151••• | 0.192••• |
| Market access index | 0.000 | -0.004 |
| Special economic zone dummy | 0.139 | 0.019 |
| Very proximate peers | 0.610••• | 0.087••• |
| Other home country peers | 0.010•• | 0.030••• |
| Other industry peers | 0.154••• | 0.044••• |
| Other foreign peers | -0.003• | 0.010••• |
| ACQ industry peers | 0.070 | -0.717••• |
| ACQ foreign peers | -0.042•• | -0.141••• |
| | | |
| Number of observations | 774 | 610 |
| Number of cases | 34,830 | 27,450 |
| McFadden's LRI | 0.055 | 0.102 |
| Log Likelihood | -2,784 | -2,085 |

The estimated parameter is significant at the ••• 0.01 percent level, at the •• 5 percent level, at the • 10 percent level.

*Apppendix Table 3. Regression results by size quartiles (Warsaw excluded )*

| | **EQ7 Quartile 1 (Small firms)** | **Quartile 2-3 (Medium)** | **Quartile 4 (Large)** |
|---|---|---|---|
| Industrial concentration in 1995 | 0.288••• | 0.143••• | 0.296••• |
| Market access index | -0.020••• | 0.004 | -0.010 |
| Special economic zone dummy | -0.025 | 0.120 | 0.021 |
| Very proximate peers | 0.045•• | 0.086••• | 0.035 |
| Other home country peers | 0.054••• | 0.019••• | 0.002 |
| Other industry peers | 0.046••• | 0.027••• | -0.000 |
| Other foreign peers | 0.013••• | 0.000 | -0.003 |
| ACQ industry peers | -0.344••• | -0.407••• | 0.004 |
| ACQ foreign peers | -0.203••• | -0.060•• | 0.004 |
| | | | |
| Number of observations | 1,384 | | |
| Number of cases | 62,280 | | |
| McFadden's LRI | 0.050 | | |
| Log Likelihood | -5,003 | | |
| | | | |

The estimated parameter is significant at the ••• 0.01 percent level, at the •• 5 percent level, at the • 10 percent level.

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