FOREIGN DIRECT INVESTMENT IN POLAND:
SUB-NATIONAL DISTRIBUTION AND LOCATION FACTORS, 1989-1997

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ABSTRACT: *Since 1989, Central and Eastern European economic liberalization has created new investment opportunities for foreign firms. As the largest, most populous, and most rapidly liberalizing of the East-Central European countries, Poland is now the leading recipient of foreign direct investment (FDI) in the region. The Polish Agency for Foreign Investment reports that at the end of 1997, 585 foreign firms had each invested at least one million US dollars in Poland. Because of the recent nature of Poland's accelerated investment inflows, geographers have not yet provided an adequate explanation of the distribution of FDI among Poland's Sub-national regions (voivodships). This paper draws from classical location theory and the location component of Dunning's eclectic framework to explain the spatial patterns of FDI in Poland using a regression model. The selection of location variables is guided by five interviews with managers of US-based affiliates in Poland. Location-specific determinants of FDI under examination include variables related to markets, labor, accessibility, government incentives, and quality of life. Nine independent variables are tested against the number of investments by voivodship using multiple regression. The final model indicates that international air accessibility, household expenditures, and adjacency are the most important determinants of FDI location in Poland, together explaining 90.3% of its distribution among 49 provinces.*

INTRODUCTION

The opening of Central and Eastern European countries to Western investment over the past decade has presented new opportunities for geographic research on international production. Despite the magnitude of reforms, a dearth of substantive research exists on the response by transnational corporations to this effective expansion of the global marketplace by some 400 million people. Because the transformation of centrally-planned economies to market economies lacks historical precedent, traditional Western-based theories of international production are instructive in analyzing the context of emergent Poland. As the most drastically reformed economy and the largest market in East-Central Europe, Poland represents an excellent laboratory for inquiry into the nature of foreign direct investment in the post-Communist context. This research is intended to provide a starting point for further investigation into corporate decision-making throughout Central and Eastern Europe.

Problem Statement and Research Questions

Foreign direct investment (FDI) into Poland has grown markedly since the outset of major political and economic reforms in 1989. Because of the recent nature of this FDI inflow, geographers have not yet adequately documented and explained its Sub-national distribution. The present paper introduces hypotheses from economics and geography literatures in order to evaluate the international location decision of all foreign affiliates that have invested at least one million US dollars in Poland between 1989 and 1997.

The paper's underlying research questions are twofold. First, what is the spatial distribution of FDI in Poland from 1989 to 1997? Second, what local attributes attract investors to specific locations in Poland? In addition, the paper broadens the understanding of international production by extending typically Western-based theoretical location variables to the context of an emerging post-

Table 1: FDI in Central and Eastern Europe, 1990-97 (US$ millions)
Adapted from *Business Central Europe*, http://www.bcemag.com/_bcedb/hist_fig.idc, accessed 29.6.1998

	1990	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*Total*
Poland	89	100	300	1715	1493	2511	4000	5678	15886
Hungary	300	1500	1500	2300	1319	4571	2069	2307	15866
Russia	NA	NA	300	682	637	2230	2090	3600	9539
Czech Republic	NA	NA	1000	500	869	2562	1428	1300	7659
Romania	18	37	73	97	568	313	609	1210	2925
Slovenia	4	65	111	111	377	414	190	600	1872
Slovakia	18	82	130	199	185	181	666	200	1661
Bulgaria	NA	56	42	40	214	164	303	510	1329
Ukraine	NA	NA	170	200	151	257	500	NA	1278
Croatia	NA	NA	10	70	100	80	280	510	1050
Latvia	NA	NA	43	51	155	165	236	400	1050
Estonia	NA	NA	NA	156	212	199	110	100	777
Lithuania	NA	NA	25	30	31	42	96	428	652

Communist economy as well as providing the basis for further examination of corporate decision-making in the Central and Eastern European context.

FOREIGN DIRECT INVESTMENT IN POLAND

At the end of 1997, Poland became the leading cumulative recipient of FDI among the newly liberalized states of Central and Eastern Europe (CEE). Poland's attractiveness to investors is attributed to its market size, central location, labor costs and supply, unused natural and productive capacities, rapid pace of reform, and economic growth prospects (Krajewska, 1996). Table 1 illustrates Poland's comparative performance in attracting foreign direct investment since the early stages of its transition to a market economy.

The uneven international pattern of FDI in CEE indicates an increasing economic polarization of the region at the national scale (Michalak, 1993) that is mirrored at the Sub-national (Murphy, 1992) level. Murphy (1992) contends that urban areas and western border regions are strongly favored in attracting investment, and that these advantages have serious implications for regional development. Notwithstanding widespread concerns for regional development, Hamilton (1995, 81) argues that

sufficient historical evidence exists to suggest that investment patterns are routinely uneven in advanced and developing states alike.

Cross-cultural research by Hardy (1994) and Lansbury et al. (1996) concludes that the most important determinants of FDI at the national scale are inexpensive, skilled labor and market access. Lansbury et al. (1996) find that privatization programs, historical links, patents, and cost of capital are also statistically significant attractions. The authors argue that cross-cultural differentials in production costs and tax incentives are unimportant. Hamilton (1995) notes additional advantages for Poland vis-à-vis other European states including its large national market, proximity to EU and Soviet successor markets, historical ties to the West, and abundance of raw materials.

Poland's current role as a regional leader in attracting investment contrasts sharply with the country's recent bleak outlook. Writing at the end of 1992, Michalak (1993) observes that despite its larger population and abundant resources, Poland had attracted less investment than Hungary and Czechoslovakia, both of which are much smaller. Michalak (1993, 1587) attributes Poland's initial slow inflows of investment to information biases and a lack of knowledge about Poland's economic and legal environments. Hamilton (1995) attributes the modest inflow to uncertainty about Poland's commitment for reform, inflation, dubious legal systems, and unreliable infrastructure. However,

during the early 1990s, Poland began to set itself apart from the rest of the region with a variety of policy initiatives targeted at opening the country to foreign capital as a means of bolstering the domestic economy.

The recent acceleration of investment into Poland is largely attributed to the success its reform program known as "shock therapy" or the Balcerowicz Plan (Krajewska, 1996; Sachs, 1997; Balcerowicz et al., 1997). The Balcerowicz Plan hastily implemented radical reforms during the brief period of *extraordinary politics* (unquestioning public mandate) that immediately followed the dissolution of central planning. The reforms include macroeconomic stabilization, price liberalization, privatization, and relaxation of trade and investment restrictions. Shock therapy can be located on the opposite end of the reform continuum from Hungary's *reform gradualism* (Köves 1992, 17-36). While neither of these extremes is inherently superior, each may be more appropriate for a given transitional economy depending mainly upon the country's preconditions.

Largely as a consequence of Poland's aggressive reform package, cumulative FDI stock has risen dramatically since 1989, from eight *million* to nearly eighteen *billion* US dollars over a period of nine years. Figure 1 illustrates the cumulative growth of the *number* of investments in Poland since 1993.
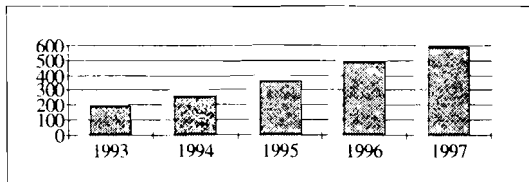

Figure 1: Cumulative transactions of at least US$ one million (Source: PAIZ 1998)

The origins of FDI in Poland are summarized by Figure 2. While the respective leading origins by number of investments are Germany, the USA, and France, by dollar value the USA is the source of 23.1% of total investment, followed by Germany (12.6%), International (11.3%), Italy (11.3%) and France (8.4%). These disparate rankings indicate that US investment

transactions tend to be larger than those from Germany and that International and Italian transactions are larger than those from France. This also suggests that the decision of whether to evaluate the number of transactions or their values is an important methodological issue in any FDI research. The present research evaluates the number of transactions, thereby emphasizing the investment location decision. For research that is more concerned with the economic impact of foreign capital on a host country, it is more useful to consider the *value* of transactions, as demonstrated by Pavlinek (1998).
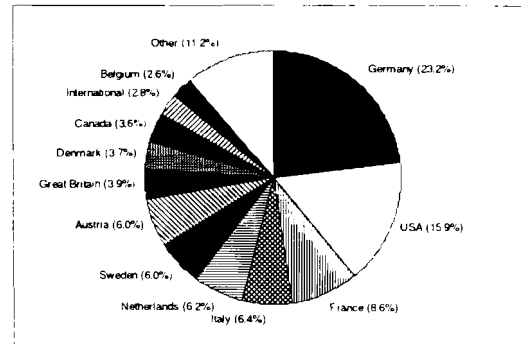

Figure 2: Origins of FDI in Poland as percentage of total transactions, 1989-1997. Data source: Polish Agency for Foreign Investment (PAIZ), 1998.

DISTRIBUTION OF FDI IN POLAND

The preceding introduction provides the background of the international distribution of FDI in CEE as well as the origins and general composition of FDI in Poland. The focus of the present paper now turns to the primary goals of the research: describing the Sub-national distribution of FDI in Poland, building a model for explaining this distribution, and testing the model for FDI between 1989-1997.

Table 2: Distribution of FDI in Poland through
December 1997. Data source: Polish Agency for
Foreign Investment (PAIZ), 1998

Voivodship	Number of investments	Portion of Total
Warszawakie	218	.304
Poznanskie	78	.110
Krakowskie	33	.047
Wroclawskie	31	.044
Lodzkie	30	.042
Katowickie	28	.040
Gdanskie	24	.034
Bydgoskie	17	.024
Szczecinskie	17	.024
Bielskie	15	.021

The distribution of FDI in Poland continues to favor
particular regions of the country, extending the
findings by Murphy (1992) and Hamilton (1995) with
data through the end of 1997. As indicated by Table
2, a majority of projects are clustered in Poland's
large cities, which tend to be located in Western and
Central Poland. Most (68%) of the investments are
concentrated in just ten of Poland's forty-nine
provinces. In contrast, FDI in the eastern reaches of
Poland remains negligible. Of 717 total affiliate
branch locations, 218 (30%) are registered in
Warsaw, while Poznan plays host to 78 (11%),
followed by Krakow 33 (5%). In order to select
location factors to explain this distribution, the
literatures of location theory and foreign direct
investment are consulted.

LITERATURE

Hymer's (1960) seminal work on
international production argues that firms operating
internationally must possess some sort of advantage
in order to overcome the natural advantages of
domestic firms operating in their home environments.
Vernon's (1966, 1979) international product cycle
theory explains that this international production can
take place either through trade or investment,
illuminating many similarities between these two
modes of international business. The Heckscher-
Ohlin factor endowments theory of trade suggests
that firms produce internationally in order to access

natural resources (land and raw materials), labor, and
capital (Ohlin, 1933). These and other explanations
of why firms invest abroad shed light upon the types
of places chosen for international production.
Dunning's (1980; 1989; 1993; 1998) eclectic
paradigm grafts these theories together in an effort to
explain FDI according to ownership, internalization,
and location advantages. Dunning's (1980; 1998)
location-specific advantages underscore the
importance of geography in the explanation of FDI,
but have only been applied at the national scale.
Porter (1990) reveals a tendency for localized
geographical clustering of firms, manifested within a
four component "diamond" of determinants: firm
strategy, factor conditions, demand conditions, and
related industries. These important contributions to
the theory of foreign direct investment have all
traditionally been applied to the Western (capitalist)
nation state.

Geographers (Murphy, 1992; Michalak,
1993; Hamilton, 1995) and economists (Dunning,
1994; Hardy, 1994; Lansbury et al., 1995) have
conducted limited empirical research on FDI in post-
Communist Central and Eastern Europe. Generally,
these studies have documented the early patterns of
FDI in the region including origins and locations.
While a number of authors have speculated upon the
determinants of the distributions at national and Sub-
national scales of observation (Murphy, 1992;
Michalak, 1993; Dunning, 1994; Hamilton, 1995),
others (Lansbury et al., 1996) have transformed
theoretical FDI factors into testable econometric
models. However, even Lansbury et al.'s (1996)
cross-cultural model tests location variables only at
the national scale. For adequate geographic resolution
within any single country, therefore, it is necessary to
focus upon authors' expectations at the sub-national
scale.

Geographers including Murphy (1992),
Michalak (1993), and Hamilton (1995) have
suggested some plausible causes for the uneven
distribution of FDI within Poland. Murphy (1992)
attributes concentrations of FDI to large centers of
population, cultural affinities, and geographic
proximity to the West. Michalak (1993) cites
information biases and perceived commercial risks
that vary not only according to destination of
investment but also based upon the country of origin.
Hamilton (1995, 81) contends that favored areas are
those cities with market access, labor supply and

skills, information, capital, business networks, and lower risks. In Poland these areas include Warsaw, Poznan, Krakow, and Wroclaw in particular.

HYPOTHESIS AND VARIABLES

The present research tests a single compound hypothesis in order to explain the distribution of FDI in Poland. The Sub-national (voivodship) spatial distribution of FDI projects in Poland is dependent upon location-specific advantages relating to markets, labor, accessibility, government, and quality of life. This organization of variables generally follows Laulajainen and Stafford's (1995) typology. The sub-hypotheses are derived from location theory, national-scale analyses of FDI, and interviews. Determinants of corporate location from Western contexts are instructive in formulating the sub-hypotheses because the transition of post-Communist CEE is without historical precedent (Hamilton, 1995). Variable selection is guided by five semi-structured interviews with managers of US-based affiliates in Poland conducted during August 1998. Participant affiliates include Coca-Cola Poland Services Ltd., Lucent Technologies, Amway Polska, Wood-Mizer, and Johnson & Johnson. An additional interview was conducted with a senior research director of the Polish Agency for Foreign Investment (Zurowski, 1998). Following Sayer's (1993) explanation of integrated methodologies, the semi-structured interviews are included in order to guide the choice of variables rather than to generalize these few cases to the entire population of investors. Each independent variable is explained by name below and measured at the voivodship level.

The regression equation is as follows...

FDI = a + b$_1$POPN + b$_2$HEXP + b$_3$GROW (market variables) + b$_4$SKIL(labor variable) + b$_5$FLTS + b$_6$MTR + b$_7$ADJ(accessibility variables) + b$_8$SEZ(government variable) + b$_9$QOL(quality of life variable)

Where: **FDI** = total number of investments made in a given voivodship; a = constant for fitting the

equation; b$_1$-b$_9$ = coefficients for each independent variable.

Markets

Many indicators of market size are used by researchers, including population, household income, value added, and GDP. Culem (1988) finds that host market population is among the three leading determinants of FDI in Europe and the United States. Similarly at the Polish Sub-national scale, it is expected that the number of FDI transactions within each voivodship is positively related to population ("**POPN**", data source: World Online, 1998).

Laulajainen and Stafford (1995) employ household income as an alternative measure of market size. However, household expenditures are a more accurate yardstick for market strength because they measure demand directly rather than assuming its linearity with income. It is expected that the number of investments by voivodship is positively related to mean household expenditures ("**HEXP**", data source: GUS).

While current population and household expenditures provide static measures of market size and spending power, they fail to distinguish among geographic areas of growth and stagnation. The number of new dwellings completed by voivodship is therefore included in the regression analysis to correct this inadequacy. The number of investments by voivodship is expected to be positively related to the number of new dwellings completed during 1993 ("**GROW**", data source: GUS).

Labor

The importance of labor as a location factor is associated with its availability, cost, productivity, and skills (Laulajainen and Stafford, 1995). Among Poland's major attractions at the macro level are its highly skilled, low-cost workforce (Hamilton, 1995). Because labor costs and productivity are relatively uniform across Poland (GUS, 1994), they need not be measured at the province level to determine their effects upon investors. Further, while interview participants were not concerned about labor availability and wages, they indicated strongly that employees with suitable skills for higher-level positions were difficult to find. Business, language,

and interpersonal skills are extremely important, especially for foreign affiliates in service industries. Because these skills are developed in a university environment, the number of investments by province is expected to be positively related to enrollment in professional degree programs ("**SKIL**", data source: GUS).

Accessibility

Hamilton (1995, 73-75) underscores the importance of transportation infrastructure for new economic activities in the inherited socialist economic landscape. Because transportation and communications were regarded as "non-productive" spheres under communism, they lag far behind Western standards. With the advent of market economies in CEE, the cost of overcoming distance is more substantial than in the West and therefore represents a more important location consideration than in the West.

Non-stop international connections represent a crucial development toward Central and Eastern Europe's economic integration with the West (Hall, 1993; Ivy, 1995). Flight service is particularly important for attracting Western executives and tourists (Hall, 1993). Therefore, it is expected that the number of investments in each voivodship is positively related to the number of foreign cities to which daily non-stop international flights are scheduled ("**FLTS**", data source: *OAG Pocket Flight Guide*, June 1998).

While flights are extremely important for facilitating international travel, interviews with executives reveal that the road is the most important mode of transportation for transporting raw materials or delivering goods to market. PAIZ confirms that inadequate road infrastructure remains among the most formidable challenges for investors. Jacek Zurowski (1998), Senior Research Officer for PAIZ, reports that the delay in Poland's long awaited toll motorway construction is among the few disappointments of the country's economic transition. Eventually, the new limited access toll road will be completed to Western standards. Because the existing first-tier motorway and well-publicized toll motorway do not transect all voivodships, they necessarily favor some regions over others. It is therefore expected that the number of investments in

each voivodship is positively related to the binary variable of motorway frontage ("**MTR**", data source: CIA Administrative Map of Poland).

Finally, Hamilton predicts that "the locational advantages of some (Western) border zone areas are being significantly enhanced by their accessibility" ... to newly adjacent markets (1995, 74). This notion also corresponds to Frankel's (1997) inclusion of adjacency in his gravity model as a determinant of trade. The expectation is that the number of foreign affiliates by province is positively related to the binary variable indicating whether the voivodship lies along Poland's western international border with the European Union ("**ADJ**", data source: CIA administrative map of Poland).

Government Policies and Quality of Life

Government policies are an important element in explaining the internalization theory of FDI (Porter, 1990; Brewer 1992). While most government policies apply to entire countries, Poland's fifteen special economic zones are likely to have a positive impact upon Sub-national FDI distribution. Special economic zones are established with the express purpose of attracting foreign capital. It is expected, therefore, that the number of investments by voivodship will be positively related to the number of SEZs per voivodship ("**SEZ**", data source: Commercial Counselor's Office).

The quality of life in each voivodship is expected to be an important determinant of investment. Quality of life is defined here as cultural and recreational attractions. Because tourist industries are location-bound services, cultural attractions are prerequisites for such investments (Boddewyn et al., 1986, 54). It is therefore expected that the number of foreign investments by province is positively related to the number of pages of cultural attractions listings ("**QOL**") in Halikman's (1998) *Let's Go Eastern Europe* travel guide.

METHODS AND MODELS

The models evaluate the distribution of all reported FDI projects in Poland from 1989-1997 valued at one million US dollars or more. The data

for the dependent variable are provided by the Polish Agency for Foreign Investment (PAIZ). PAIZ uses the OECD definition of FDI: equity of 10% of project total, loans by investors to their affiliates in Poland, and the value of re-invested profits. As of 31 December 1997, the value of qualifying projects totaled $17.7 billion, with an estimated additional $2 billion from small projects (less than $1 million each). While the dollar value of FDI is important in terms of effects of FDI upon the host country, the number of investments is used in the present research because it better quantifies the investment location decision, which must be undertaken for *each* transaction regardless of its value.

McConnell's (1980) model of the distribution of FDI among fifty U.S. states sets the methodological framework for the present analysis of Poland's 49 voivodships. While the basis of the model follows the multiple regression conducted by McConnell, the independent variables chosen for Poland are considerably different due to contextual particularities and data availability. Model 1 uses the nine variables defined *a priori* above. Model 2 is a strictly quantitative refinement of Model 1, eliminating variables that contribute little explanation and/or result in high levels of multicollinearity.

Model 1: FDI = .0055 POPN + .01 HEXP + .002 GROW –.239 SKIL + 1.693 FLTS – 2.196 MTR – 14.97 ADJ + 2.856 SEZ – 1.451 QOL –23.662

Although Model 1 yields an r^2 of .917 (p=.000), it is retained for demonstrative purposes only. Multicollinearity is indicated by high correlations between the independent variables, high variance inflation factors (VIFs), and low tolerance in Model 1 (plausibly a dimension of urban-ness). Logarithmic transformations were not practical because of numerous entries of zero in the database. Valence signs are opposite of expectations in the case of SKIL, MTR and QOL likely because of the preponderance of high values of these variables (universities, first-tier highways, cultural amenities) in rural and small urban areas.

In order to reduce the statistical redundancies that are introduced by the theoretically-grounded Model 1, a second model is run using backward regression. Because of high inter-correlations, motorways (MTR), special economic

zones (SEZ), and new constructions (GROW) are removed in Model 2. While SEZs are by definition intended to attract investment, they are established in investment-deficient provinces. The additional exclusion of SKIL, POP, and QOL only decreased the r^2 marginally (by .010). While their inclusion in the model is justified by theory and interviews, these variables are unnecessary in a strictly statistical sense for explaining the distribution of FDI in Poland.

Model 2: FDI = 1.503 FLTS + .00957 HEXP – 14.836 ADJ –19.121

Model 2 is a statistical refinement of Model 1 based upon only three independent variables. Its simplicity notwithstanding, Model 2 performs quite satisfactorily, yielding an r^2 of .903 (p=.000), low VIFs (ranging from 1.020-2.299), and high tolerances (.436-.981). The valence sign of the variable ADJ is negative likely because the voivodships with high values on the most important variables (FLTS and HEXP) are characterized by large urban areas at a substantial distance from the EU border. While POP is theoretically important as a general location determinant (Culem, 1988; Laulajainen and Stafford, 1995) and is perceived as such in the Polish context in particular (Murphy, 1992; Michalak, 1993; Hamilton, 1995) it is omitted from Model 2 due to redundancies with HEXP (r= .521) and FLTS (r=.490). While statistically justified, the omission of POP from Model 2 is problematic theoretically because population is the most common indicator employed by geographers to measure market size (Laulajainen and Stafford, 1995). The availability of first-tier motorway (MTR) is reported by some executives of U.S. firms as prerequisite for the location decision, but motorways alone do not cause investment. In contrast to MTR, the variable FLTS can be justified theoretically as a more appropriate accessibility measure because its high scores generally coincide with populations in large cities, a variable that is absent in Model 2.

CONCLUSIONS

The present paper identifies several location attributes in the post-Communist Polish context that are important for attracting Western capital. Model 1 is grounded in theory and interviews with US executives in Poland, and features nine variables for explaining FDI distribution. Model 2 is based purely upon statistical efficacy, and shows that among the variables in Model 1 international air accessibility, household expenditures, and adjacency are statistically the most important determinants of investment in Poland, together explaining 90.3% of the investment distribution among Poland's 49 provinces. In the formulation of Model 2 through backward regression, population and quality of life variables were also found to be significant, but exhibited more problematic levels of multicollinearity (in particular in combination with flights and household expenditures). The findings reinforce earlier observations of a lopsided FDI distribution favoring urban and western regions (Murphy, 1992; Michalak, 1993; Hamilton, 1995) and generally confirm these geographers' previously untested explanations of its causes. Finally, the models indicate the necessity for Poland to improve its transportation infrastructure and to ameliorate extreme geographic disparities in domestic spending in order to encourage a more balanced distribution of foreign capital throughout the country.

This brief paper offers a starting point for future research on the Sub-national distribution of FDI within CEE countries. It presents two major avenues for further investigation: evaluation of the models in other CEE contexts, and evaluation in the Polish context with specific reference to broad industrial categories. Extractive and manufacturing firms invest for very different reasons than service firms, confounding statistical tests when these categories are aggregated (Boddewyn et al., 1986). Because of the friction of distance, manufacturing firms locate near to their localized resources (material or human), while service firms tend to be either footloose or attracted to markets (Laulajainen and Stafford, 1995 53-55). This distinction underscores the value of re-testing the present models with data that reflect broad industrial orientation.

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