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Abstract

Relatively little is known about the determinants of FDI location in transition economies. We exploit the large inflow of FDI into Romania, after the revolution in 1989, to study this question. Using a conditional logit setup, we find that external economies from service agglomeration are the main determinant of FDI-location. An increase in service employment density by 10 percent makes the average Romanian county 11.9 percent more likely to attract a foreign investor. Industry specific foreign and domestic agglomeration economies and labor conflicts also impact FDI-location. Our findings imply that results are sensitive to the inclusion of locational fixed effects.

JEL classification: P33, R3.

Keywords: Agglomeration economies, foreign direct investment, transition economies.

1 Introduction

The role of agglomeration economies – economies that are external to a firm but internal to a small geographic area – for the location choice of firms and economic growth is one of the most vital questions in urban, regional and international economics. Various theoretical concepts suggest that clustering of economic activities in one form or the other results in cost savings and productivity gains for firms, thereby influencing their location decisions.

In this paper we focus on the importance of different types of agglomeration economies for FDI location outcomes in a *transition economy*. Specifically, we investigate location decisions of foreign manufacturing plants in Romania between 1990 and 1997, the period following the overthrown of Ceausescu and his communist regime in 1989. Before the 'Romanian Revolution' the country has had exceptionally autarchic policies, thus being completely unattractive to FDI. Only after the fall of the communist regime in 1989 the country *de facto* opened up to foreign investors leading to a large influx of foreign capital over a relatively short period of time. We exploit this setting to explore *whether* agglomeration economies (and other local characteristics) are relevant for location choices of foreign investors in a transition economy and *what types* of agglomeration economies are most important. Specifically, we consider the impact of industry specific domestic and foreign economies, service economies and economies arising from diversification as well as the border-county variants of these four agglomeration variables.

The location of FDI in *transition economies* is a seriously understudied research area.[1] Transition economies differ from developed countries in many respects and findings of FDI-location studies for developed countries may therefore not apply to transition economies. For example, economies arising from *service agglomeration* are often ignored in location choice studies of foreign manufacturing plants. However, easy access to – and competition among – various local service businesses (e.g., accountants, lawyers, banking and communication

services, consultants, translators) may be particularly important in transition economies, where foreign investors often face vital problems related to opaque and corrupted bureaucracies (e.g., tax authorities, customs clearance), incoherent and unstable legal systems, local contractors (involving issues of reliability), unreliable communication infrastructure, immature financial institutions (with inadequate credit systems) and cultural issues and conflicts.[2] A high service employment density can facilitate solving these issues.

The main purpose of this study is to assess the relative importance of the various types of agglomeration economies for the location of foreign firms in a *transition economy* and to reconcile our findings with those of the existing literature. In doing so, our study may provide useful guidance for the design of effective regional policies aimed at attracting FDI to transition economies and at addressing regional inequalities.[3]

Our empirical setting and rich data also allow us to *simultaneously* address many drawbacks identified in previous research. In particular, we consider only greenfield plants and use a geographical unit of observation—a Romanian county[4]—that coincides reasonably well with MARSHALL's (1898) notion of agglomeration.[5] At the same time, we use a conditional logistic model that controls for unobserved location characteristics by including choice specific (county-level) fixed effects; and, we address the issue of separating (unobservable) endowment effects from agglomeration economies. To our knowledge, none of the previous studies could *simultaneously* address all these issues.

Romania provides an ideal empirical setting for a number of reasons. The country holds a top position in Eastern Europe in terms of the number of foreign start-ups established since the beginning of the 1990's.[6] Almost 50,000 establishments with foreign participation were set up in Romania between 1990 and 1996 alone (VOICU, 2000).[7] This number includes 1540 foreign-owned greenfield plants in the manufacturing sector – the sample used in our empirical analysis. In addition, the availability of detailed data for individual plant

establishments and small localities in Romania, coupled with the use of fixed-effects, allows us to obtain more precise estimates of the impact of different types of agglomeration economies on location decisions than has previously been possible. Finally, the large inflow of FDI over a relatively short time period (between 1990 and 1997) ensures that foreign investors' location decisions are made under relatively similar conditions. This setting has one important advantage over an alternative setting where location decisions of foreign investors are made over a long time period; namely, unobservable determinants of location choices—which may vary significantly over long time periods (decades)—may be relatively constant over a relatively short time period. Hence, while location fixed effects in our setting control for *time-invariant* unobservable characteristics, the 'concentrated character' of FDI inflow into Romania alleviates the omitted variable bias-problem associated with *time-variant* unobservable characteristics that change only slowly and are essentially fixed during our sample period.

The main findings of our study are fourfold. Firstly, service agglomeration economies and – to a lesser extent – industry-specific foreign and domestic agglomeration economies play an important role for the location of foreign manufacturing plants in Romania. Secondly, the impact of within-country differences in labor market conditions is less important than might be expected[8], perhaps because labor market conditions vary more *noticeably* across rather than within countries. While we do find a statistically significant negative effect of labor conflicts, the effect is not very important economically. Other local labor market conditions have no statistically significant effects. Thirdly, our findings imply that results are sensitive to the inclusion of locational fixed effects. Finally, a comparison of our findings with those of other recent studies tentatively suggests that our qualitative results of the effects of service and industry-specific agglomeration are representative of other transition economies of Central and Eastern Europe.

Our paper is organized as follows. Section 2 summarizes the related theoretical and empirical literature and describes its various contributions and shortcomings. Section 3 presents the conditional logit setup. In Section 4 we describe the data and discuss the explanatory variables of FDI location. Section 5 presents empirical results and compares our findings with those of closely related studies. Section 6 provides concluding remarks.

2 Background

Understanding the location of foreign direct investment (FDI) is of importance for two main reasons. First, it is often asserted that FDI benefits domestic firms, particularly in developing or transition economies, and increases the welfare of the citizens by accelerating economic growth in the host country.[9] To the extent this is true; FDI distribution within national borders may play an important role in influencing regional economic disparities.

Second, the location decisions of *foreign* firms may differ significantly from their *domestic* counterparts, and, consequently, the location determinants or their effects may differ between foreign and domestic investors and need to be investigated separately. For example, uncertainty with regard to locational quality and subsequent information and search costs are much higher for foreign compared to domestic investors (CAVES, 1996). Since an existing concentration of foreign firms facilitates the gathering of information on the local environment, either via business relationships or because it demonstrates the location's potential, economies from foreign agglomeration may be very important for international investors but less so for domestic ones (e.g., MARIOTTI and PISCITELLO, 1995; GUIMARÃES *et al.*, 2000). More generally, a number of studies have found that foreign companies value various location factors different than domestic firms (e.g., GLICKMAN and WOODWARD, 1988 and 1989).

The role of multinational firm activity in the global economy and the general determinants of FDI are well documented. See for example the various theoretical and

empirical surveys in BARBA NAVARETTI and VENABLES (2004). Similarly well documented are the micro-foundations of agglomeration economies (e.g., QUIGLEY, 1998; ROSENTHAL and STRANGE, 2001) and the dynamic process generating industrial clusters (e.g., BAPTISTA and SWANN, 1999).[10]

More relevant to the focus of this paper, a number of empirical studies use discrete choice models to investigate the role of agglomeration economies and other factors for the location of FDI. Most of the earlier studies focus on developed countries, mainly the United States. Among the more prominent studies, COUGHLIN *et al.* (1991), WOODWARD (1992) and WHEELER and MODY (1992) all find evidence for the importance of agglomeration economies for the location of FDI in the United States. However, all three studies are based on crude measures of agglomeration economies. COUGHLIN *et al.* (1991) and WOODWARD (1992) use manufacturing employment density and total manufacturing establishments, respectively, as proxy for agglomeration economies that should be at least in part industry-specific. WHEELER and MODY (1992) use agglomeration benefit indices based on measures of infrastructure quality, degree of industrialization and level of FDI as measures of agglomeration economies.

HEAD *et al.* (1995) also focus on the location of FDI in the United States. However, compared to the earlier studies, the methodology is more persuasive. Specifically, the empirical model includes *direct* measures of *different types* of agglomeration economies (domestic and foreign industry-specific ones) and it distinguishes between industry-level agglomeration economies and endowment effects, thereby preventing potentially biased estimates of the impact of agglomeration economies. Endowment effects represent an alternative mechanism through which localization can arise. Specifically, traditional trade theory suggests that firms in a given industry will cluster in regions with favorable factor endowments for that industry.[11] However, firm-specific cost savings associated with an

endowment-rich location diminish with the number of firms; as firms congregate, the location becomes less appealing since competition for a scarce input among users bids up the price of the input. Finally, HEAD *et al.* (1995) is one of the few studies that includes choice-specific fixed effects in the empirical setup, thereby controlling for unobservable location characteristics which may cause omitted variable biases.[12] Incorporating all these improvements and using a conditional logit setup, the main finding of HEAD *et al.* is that industry-level agglomeration benefits play an important role in location decisions, even when controlling for endowment and choice specific effects. One shortcoming of the study is that it relies on a choice set that consists of very large regions – US states – which stretch the MARSHALLian (1898) concept of agglomeration.[13] While large regions may be particularly inappropriate for a study of agglomeration economies, they may also be inadequate in accounting for labor market conditions and other factors that may, too, apply locally.

There has been little empirical research on FDI location within Europe and even less within the transition countries of Central and Eastern Europe. Among the few European studies spanning several nations, HEAD and MAYER (2004) examine the location choices of Japanese firms within 9 Western European countries. Their results imply that an increase in market potential (i.e., the summation of markets accessible to a point divided by their distances from that point) raises the chance of a region being chosen. However, agglomeration variables retain a robust influence. One limitation of this study – similar to HEAD *et al.* (1995) – is that it relies on a location choice set of very large (NUTS 1) regions.[14]

A few FDI location studies focus on specific European countries and location choice sets that consist of small areas. For example, MARIOTTI and PISCITELLO (1995) analyze the location decisions of foreign investors among Italian provinces. Their main finding is that spatial distribution of FDI is mainly governed by information costs. One drawback of the study is that it only considers foreign acquisitions. However, firms have much more discretion

regarding the location of new plants (greenfield investments) than with other types of investment.[15] Finally, GUIMARÃES *et al.* (2000) investigate the location decisions of foreign-owned manufacturing plants in the urban areas and outlying regions of Portugal – using small regions (concelhos) as location choices – and conclude that agglomeration economies, especially urban service agglomeration economies, are decisive location factors.

Very few FDI location studies (DISDIER and MAYER, 2004; PUSTERLA and RESMINI, 2005; CIESLIK and RYAN, 2004; CIESLIK, 2005a and 2005b; BEKES 2005 are to our knowledge the most notable ones) focus on transition economies in Central and Eastern Europe. Given the particular relevance of these studies, we compare their setups and main findings with ours in a separate section (Section 5.2).

3 Methodology

We model the location decision of foreign manufacturing plants using a conditional logistic setup where the dependent variable is the county chosen by each investor. Following McFADDEN (1974), we assume that at time *t*, investor *i* selects the county *j* that would yield the highest profit. The conditional logit model stipulates that the profit can be decomposed into the sum of a measured term, M_{ijt}, and an unmeasured term, ε_{ijt}. If ε_{ijt} is distributed independently and according to a Weibull distribution, the probability that any particular county is chosen out of the choice set of size *K* is

$$\text{Prob}_{ijt} = \frac{e^{M_{ijt}}}{\sum_{k=1}^{K} e^{M_{ikt}}} \tag{1}$$

Previous theoretical work summarized above implies that M_{ijt} is influenced by a set of location characteristics. Consequently, we can estimate the effect that these characteristics have on location choice. The empirical specification can be formulated as follows:

$$M_{ijt} = \sum_{l=1}^{L} \beta_l X_{ijt}^{l} + \sum_{k=1}^{K} \gamma_k D_k , \tag{2}$$

where X_{ijt}^{l} denotes the l^{th} location specific independent variable. Relevant factors for the site selection decision usually include (but are not limited to) agglomeration effects, prices of inputs (land, labor, and capital), market demand, and availability of infrastructure. In the data section below we describe in detail the set of explanatory variables which we use in the empirical analysis.

Since it is unlikely that the variables we use adequately capture all location characteristics which influence profits, our specification also includes a set of county-specific dummy variables, D_k, to control for any unobserved time-invariant county features that may affect location decisions. The inclusion of these fixed effects alleviates omitted variable biases in the coefficient estimates of the included regressors, and, as discussed above, represents an important innovation compared to most of the previous literature. Moreover, these choice-specific effects also control for the existence of unobservable correlation across choices, thus alleviating concerns that the Independence of Irrelevant Alternatives (IIA) assumption of the conditional logit model (i.e., identical and independent error terms) may be violated.[16]

Endowment-driven localization suggests that industry-specific agglomeration variables may be correlated with unobserved industry-county specific factor conditions which are not captured by the county fixed-effects and thus are part of the error term, ε_{ijt} (see HEAD *et al.* (1995) for a more detailed discussion of this possibility). As a result, the agglomeration coefficient will incorporate both agglomeration economies and endowment effects. To separate the two types of effects, we essentially follow the approach suggested by HEAD *et al.* (1995). Specifically, we include in our specification two industry-specific agglomeration variables – the count of foreign firms and the count of domestic firms in the same industry as the investor. The geographical distribution of the domestic establishments in a particular industry is assumed to incorporate all the relevant information on the abundance of endowments and the intensity of resource-use in that industry. Consequently, a significant and

positive coefficient on the *foreign* agglomeration variable, after controlling for the domestic pattern, should provide evidence for the existence of agglomeration economies.

4 Data and Variables

4.1 Data

To estimate the model outlined above, we obtained unique data from four Romanian sources. First, the "Statistical Abstract of Romania" (which is also the basis for the World Bank's and OECD's statistics and reports on Romania) provides detailed information on many of the county-level characteristics that are expected to play a role in the firms' location decisions (e.g., employment and average net monthly earnings by economic sector, unemployment rate, number of labor conflicts, school population of various levels of education, railway lines in operation, public roads, land area, population density). Second, we obtained data from the Romanian Development Agency (RDA). The RDA maintains the most complete and reliable list of establishments with foreign participation for Romania, as it registers each and every establishment with foreign participation, which opened in the country.[17] Specifically, the RDA provided us with information on the date of establishment, county of location, partners, amount of foreign and total capital invested, and relevant industry for all foreign manufacturing subsidiaries with at least $10,000 in foreign capital which were established in Romania between 1990 and 1997.[18] In order to ensure that the sample of foreign plants used in the analysis includes only greenfields, we eliminated all establishments in which the Romanian partner was a juridical person (i.e., a firm).[19] Third, we supplemented our data with plant-level information from the Chamber of Commerce and Industry of Romania (CCIR), including the county of location and two-digit industry code for all domestic manufacturing plants with at least 20 employees for 1994 and 1996. Finally, we derived sector specific regional annual employment data and regional GDP data from the National Institute of Statistics.

Table 1 shows the spatial distribution of the 1540 foreign-owned greenfield plants in our sample.[20] Notice that the overwhelming majority of these investments (61.2 percent) are concentrated in the capital city, Bucharest. Other more popular locations include several counties in Transylvania (Arad, Bihor, Brasov, Cluj, Sibiu, and Harghita), one on the Western border (Timis) and one on the Black Sea Coast (Constanta).

Table 2 describes the FDI temporal trends for our study period, 1990-1997. Post World War II, Romania was among the first East-European countries to (re-)open the door to FDI. In 1972, a law was passed that allowed the establishment of international joint ventures with no more than 49 percent of foreign ownership. However, the effective outcome of this policy was very meager for reasons such as Western companies' natural suspicion of communist governments and fears of new changes of the political situation, bad regulations, bureaucratic inefficiency, etc. *De facto* our study period—which starts with year one after the overthrown of the communist regime—captures the very beginning of FDI in Romania.[21] Several things are apparent in Table 2. First, the FDI activity had a slow start following the events that led to the overthrown of the communist regime in 1989; only 21 foreign-owned greenfield plants were established in 1990, and less than 100 were set up in each of the following three years. The foreign investors' initial reluctance to invest in Romania can be attributed, at least in part, to the country's political and economic instability during that period, as well as to a very slow start of the economic reforms. Second, starting in 1994 and continuing over the next couple of years, there was a strong surge in the number of foreign start-ups; for example, in 1994, 360 new greenfield establishments were established—over four times more than in the previous year. This sharp increase was likely driven by the beginning of macroeconomic stabilization in 1994.[22] Finally, in 1997 there was a significant drop in the number of new foreign establishments. While we can only speculate about the causes of this decline, it is likely that the beginning of a recession and the slower-than-expected pace of economic reform played an important role.

The distribution of FDI by industry is presented in Table 3 and shows priority towards food (40.0 percent) and light industry (24.6 percent), which includes textile, clothing, leather, and shoes. These are all labor intensive industries with a long tradition in Romania. They likely captured the attention of foreign investors through a promise of cheap but skilled labor force.

4.2 Explanatory Variables

As suggested in the previous section, the probability that a foreign firm selects a particular county depends on the levels of the county's characteristics that influence profits relative to the levels of these characteristics in other counties. These local characteristics can be categorized as affecting firms' revenues or costs. Table 4 defines and summarizes the location (county-specific) factors which are used as explanatory variables in the conditional logit model. The correlation matrix for these variables is shown in Table A1 in the Appendix.

Agglomeration Variables and Border Effects

The focal variables of our model are four measures that capture different types of agglomeration economies. Our first measure is the log of the number of plants with foreign participation in the same industry as the investor. This variable captures industry-specific foreign agglomeration economies, a form of localization economies. Foreign firms may be attracted to counties with existing concentrations of foreign-owned firms in the same industry due to technological or pecuniary externalities. As mentioned at the outset, pecuniary externalities from foreign agglomeration may include not only economies from specialized labor-pooling and the existence of intermediate suppliers but also substantial reductions in the information and search costs associated with foreign investors' high uncertainty about the local environment.

Our second agglomeration measure is the log of the number of domestic plants in the same industry as the investor. This variable captures industry-specific domestic agglomeration economies (another form of localization economies), but also endowment effects.[23] As

mentioned in the methodology section, the main role of this variable is to control for endowment effects, thus allowing us to obtain a more accurate estimate of industry-specific foreign agglomeration economies. Given the availability of data on the number of domestic plants for two years, 1994 and 1996, foreign investments until 1994 are matched to 1994 domestic counts; later investments are matched to 1996 domestic counts.[24]

Our third measure is the log of total employment in the tertiary sector (business and financial services) per square kilometer. This variable captures service agglomeration economies. As RIVERA-BATIZ (1988) demonstrates in a formal setting, such economies should positively affect firm location. This is because, in equilibrium, the larger the number of service sector firms in the market, the more specialized the producer services that they can provide, the smoother the industrial production that can be sustained and the higher therefore the productivity of the industrial sector. WOODWARD (1992) argues that economies arising from urban service agglomeration may be particularly important for foreign investors as professional services (such as accountants and lawyers) and a diverse range of cultural amenities are crucial input factors in production for them. As argued in the introduction, this reasoning may be particularly applicable to transition economies, as the various non-core business problems that require professional services are more pronounced in these countries.

The fourth variable is the log of a Herfindahl index of the diversity of the counties' industrial structure. The index equals $\sum_{i=1}^{n} E_i^2$, where n equals the number of economic sectors and E_i equals the proportion of county employment that is located in the i^{th} sector.[25] A decrease in the index implies an increase in diversity. The measure is included to account for inter-industry knowledge spillovers and diversity externalities (economies arising from cross-fertilization of ideas across industries).[26] CANTWELL and PISCITELLO (2005) provide evidence for four Western European countries (Germany, UK, France and Italy) that diversity externalities make a region more likely to attract foreign-owned technological

activities. We would not expect, however, these externalities to play a major role for the location of foreign investors in labor-intensive production processes in transition economies.

The recent empirical literature on agglomeration effects has provided evidence that they cross administrative borders (see, for example, HEAD *et al.*, 1995; CANTWELL and PISCITELLO, 2005). Thus, we add border-county variants of the four agglomeration variables described above, that capture inter-regional spillovers. The two border-county measures of industry-specific agglomeration are computed by summing the number of firms in adjacent counties. The border-county service agglomeration measure is obtained by dividing total employment in the tertiary sector in all adjacent counties by the total land area of these counties. Finally, the border-county Herfindahl index measure is computed using the same formula as for the within-county measure (with n = total number of industries in all adjacent counties; E_i = proportion of firms in all adjacent counties located in the i^{th} industry.)

Other Location Factors

Our empirical model includes a number of additional factors that are expected to affect the location decisions of foreign firms. On the cost side of the profit function, labor market conditions quickly come to mind - they affect the prices of local inputs including labor itself, as well as any locally supplied intermediate goods. Wages, the labor-management environment, and the availability of labor are important labor market characteristics – and those which are usually employed in location studies. When measuring wage costs, one needs to account for unit labor costs since workers differ in skills and level of qualification (WOODWARD, 1992). To address this issue, we include the average manufacturing monthly real wage (in log terms), as well as the log of numbers of high-schools and vocational/ apprentice schools per total manufacturing employment as proxies for the educational and skill levels of the local workforce. Higher wages are expected to deter FDI. However, the empirical evidence on the impact of labor costs is mixed. For example, BARTIK (1985) or

COUGHLIN *et al.* (1991) found that higher wages make a location less attractive to foreign investors; on the other hand, for example ONDRICH and WASYLENKO (1993) or GUIMARÃES *et al.* (2000) did not find a statistically significant relationship. We expect the two measures of educational and skill levels to be positively related to the probability of locating a new plant in a county – a usual finding in the literature (see, for example, COUGHLIN and SEGEV, 2000).

The extent of unionized labor is the most widely used indicator of the labor-management environment. Since we lack unionization data, we employ the number of labor conflicts (computed per total manufacturing employment and expressed in log terms), which is largely believed to be closely associated with union strength. COUGHLIN *et al.* (1991) and COUGHLIN and SEGEV (2000) notice that in regions with low unionization rates the degree of unionization is often touted by officials seeking to promote economic development. The argument is that such an environment allows foreign firms to introduce new managerial practices and, more generally, to pursue profit maximization unhindered by union contract restrictions. This view has found empirical support in some studies (e.g., BARTIK, 1985); however, other more recent studies found that the unionization rate does not matter (HEAD *et al.*, 1995; COUGHLIN and SEGEV 2000) or that higher rates are conducive to FDI (COUGHLIN *et al.,* 1991). Nonetheless, as a working hypothesis we expect a large number of labor conflicts to be a deterrent for FDI location.

The last labor market characteristic we explore is the unemployment rate (in log terms). The expected effect of this variable is ambiguous. A high unemployment rate may be conducive to FDI if it indicates labor availability. Findings by HEAD *et al.* (1995) and COUGHLIN *et al.* (1991), among others, are consistent with this hypothesis. However, higher unemployment can also signal less competitive conditions and a lower quality of life that tend to discourage foreign investors (see WOODWARD, 1992, for empirical support).

Land costs represent another potential location determinant on the cost side of the profit function. Direct information on this factor is not usually available. Some authors have used the log of population density to proxy for industrial land costs (BARTIK, 1985; GUIMARÃES *et al.*, 2000), arguing that population density reflects land costs because residential and industrial users compete for land. We do not include this variable in our final model because county-level population density in Romania changes very slowly over time and, thus, is essentially captured by the county fixed effects.[27] (When adding population density to the model, the coefficient on the variable is completely statistically insignificant.)

Capital costs, proxied by the interest rate, represent yet another cost component. However, since they are usually invariant across locations, they are generally not included in location choice models. We also do not include taxes because in Romania, those related to capital costs are set at the national level and thus do not vary across counties.

On the revenue side, GDP is a usual measure of market size that proxies for the market access as a major determinant of the location of economic activities. It is often argued in the literature that the market served by foreign firms is rarely limited to a 'location', especially if the 'location' is small, like the Romanian counties in our study (e.g., COUGHLIN and SEGEV, 2000 and MARIOTTI and PISCITELLO, 1995). Hence, we include the (log of the) broader regional GDP rather than the county-level GDP in order to more accurately measure market potential. Regional GDP is not available for all years and had to be imputed. Details on the imputation method are reported in the notes of Table 4.

Infrastructure availability is often considered a factor of relevance in firms' location decisions, as well-developed infrastructure leads to higher regional productivity and may thereby increase firm profits. The empirical evidence usually supports the expectations of a positive relationship between infrastructure variables and FDI (e.g., BARTIK, 1985; COUGHLIN *et al.,* 1991; COUGHLIN and SEGEV, 2000). Infrastructure is captured in our

models with two variables measuring the road and railway densities (in log terms). Note, however, that we exclude the two infrastructure availability indicators in our fixed effects models. This is because the two variables remained unchanged over our study period and therefore are perfectly collinear with the county dummy variables.

For all other time-variant explanatory variables, we use average values over the two years immediately preceding the year of the foreign plant set-up.[28] We believe that the use of lagged variables is justified for at least four reasons: 1) location choices are important strategic decisions which firms make, and thus require a thorough preliminary study of the local markets; 2) it takes some time to register and open the business once the location choice is made, given the logistic and bureaucratic hurdles associated with this process (which in a transition country like Romania may be quite significant); 3) agglomeration economies with pre-existing foreign direct investment will only start to occur with firms that have been present for some time; and 4) lagging of variables alleviates potential endogeneity bias.

For some of the explanatory variables, data was not available for the beginning of our study period: employment in the tertiary sector (service agglomeration) and unemployment rates were not available for 1990; the number of labor conflicts was not available for 1990 and 1991; and wage rates were not available for 1990-1992. Given that all these factors, except wages, changed very little in the few years immediately following the collapse of communism, we imputed the missing values of these variables with their values for the first available year of data. We imputed the missing wage values via extrapolation of the available years of data based on the average annual wage growth during these years.

5 Empirical Results

In the following, we first discuss the results of our conditional logit model. Next, we compare our results with those obtained in related studies for economies of transition.

5.1 Estimation Results

Our main goal is to obtain consistent estimates of the agglomeration effects, and we believe that the inclusion of county fixed effects along with other observed time-variant location factors in the econometric model is crucial for this purpose. However, we begin by presenting results for a baseline specification without county fixed effects, similar to the ones used in many previous empirical studies. Starting with such a model, we can check whether the results for Romania differ significantly from estimates that have been found previously for other countries. Additionally, estimating this typical specification enables us to assess the role that the inclusion of location-specific fixed effects plays in alleviating omitted variable bias.

Parameter estimates and elasticities[29] for the baseline model (Model 1) are reported in the first two columns of Table 5. To begin with, as expected, we find that the coefficients on the industry-specific (foreign and domestic) and service agglomeration variables have a positive sign and are statistically significant at the 1 percent level. Not surprisingly, given the nature of manufacturing production in Romania, the only within-county agglomeration measure that is not statistically significant is the variable capturing economies arising from diversification. The estimates of the border-county agglomeration effects provide little evidence that agglomeration externalities cross county borders: only service agglomeration border effects are statistically significant, albeit with a negative sign (perhaps an artifact of strong omitted variable biases). Among the other location variables only a few are statistically significant; the ones on unemployment rate, high-schools, and railway density. The negative effect of the unemployment rate on the county's attractiveness seems to suggest that higher rates are indicative of lack of competition and/or lower quality of life. But, again, it may also be simply a result of omitted variable bias. Contrary to our expectations, the coefficients on labor costs, labor conflicts and regional GDP are all statistically insignificant. Nonetheless, these findings may, too, be driven by omitted variable bias.[30]

We turn next to our preferred model, which adds county-specific fixed effects. Coefficient estimates for this model, which are reported in column (3) of Table 5, clearly indicate that the inclusion of county fixed effects strongly affects results. First, there are noticeable changes in the estimates of the agglomeration effects. While the coefficients on the industry-specific agglomeration variables are still positive and statistically significant (at the 6 percent and 1 percent level, respectively), their magnitudes drop notably compared to those from the baseline model. The average probability elasticities, shown in column (4) of Table 5, indicate that if the number of foreign plants and the number of domestic plants in a given industry within the average county increase by 10 percent, the probability that a subsequent investor in that industry will locate in that county increases by 1.5 percent and 3.5 percent, respectively. In contrast, the magnitude of the effect of economies arising from service agglomeration substantially increases when county fixed effects are accounted for. The effect of service agglomeration is statistically highly significant (with a p-value of 0.018) and the elasticity estimate implies that a 10 percent increase in service employment density in a county increases the probability that a foreign investor chooses that county by 11.9 percent (compared to 4.2 percent in the specification that does not include choice specific fixed effects). No other determinant of FDI-location is similarly meaningful in economic terms. Finally, the coefficient on the industry diversity measure remains statistically insignificant even when county fixed effects are controlled for. The estimates of the border-county agglomeration effects again suggest – with one exception – that agglomeration economies do not cross county borders. The exception concerns the effect of the border industry-specific domestic agglomeration measure, which is positive and statistically significant. The elasticity estimate implies that a 10 percent increase in that measure makes the average Romanian county 5.8 percent more likely to attract a foreign investor. This effect is economically quite meaningful and, interestingly, it is larger than the corresponding within-county effect of

industry-specific domestic agglomeration. Overall these results suggest that industry specific and service agglomeration economies do affect FDI-location locally but only *domestic* industry specific agglomeration economies appear to cross county borders.

Second, notice the changes for some of the labor market characteristics. The coefficient on the labor conflicts variable now has a negative sign, as hypothesized, and is statistically significant. However, the impact of the variable on FDI-location is not very meaningful quantitatively. A 10 percent increase in the measure decreases the likelihood that a foreign investor chooses the county only by 0.8 percent. In contrast to the results reported for the specification without fixed effects, the unemployment rate now no longer has a statistically significant impact on FDI location. All other labor market related variables and regional GDP – a measure of market potential – remain statistically insignificant.

The substantial differences in estimates between our fixed effects specification and the baseline model underscore the great potential for omitted variable bias in models that do not include choice-specific fixed effects.

5.2 Comparison of Findings with those Obtained in Related Studies

To put our results in perspective, we compare our findings with those of other recent studies of FDI location in the transition economies of Central and Eastern Europe.

To begin with, DISDIER and MAYER (2004) compare agglomeration economies for Eastern and Western Europe inward FDI. Using countries (and combinations of countries) as locational choices, they find that agglomeration economies matter more for Western Europe (although the gap is declining over time). This finding mirrors the comparison of our results with those for the U.S. in HEAD *et al.* (1995) to which our study is most closely related in terms of methodology. Their results furthermore indicate that high labor costs deter FDI location. However, similar to our findings, unemployment rate has a statistically insignificant effect. PUSTERLA and RESMINI (2005) study the location choices of foreign manufacturing

plants in Bulgaria, Hungary, Poland and Romania using a nested logit model and NUTS 2 regions as locational choices. They also find that agglomeration forces matter. However, contrary to our results, their estimates indicate that foreign agglomeration effects are significantly larger than domestic ones.[31] Moreover, they find that both measures appear to be more important for the low than the high tech sector and foreign investors prefer locations with lower labor costs but not necessarily with higher skill levels.

A few studies focus on specific transition countries. CIESLIK and RYAN (2004) investigate the location determinants of Japanese companies within Poland, with a focus on the effects of Special Economic Zones (SEZ). Using a choice set of 16 NUTS 2 regions[32] and controlling for a number of regional characteristics (but not choice fixed effects) they find no evidence that SEZs attract inward Japanese FDI. Similarly, urbanization, industrial agglomeration and service agglomeration economies do not appear to be important factors. However, two follow-up studies by CIESLIK (2005a and 2005b), which use a similar setting but a larger choice set of 49 smaller regions, find positive and significant impacts of service and industry agglomeration on FDI location.[33] Interestingly, the effect of service agglomeration on FDI location is highly significant not just in a statistical but also in a quantitative sense. Among dissimilarities to our study, both studies find negative effects of labor costs, unemployment rate and railway network, and a positive effect of road network. Finally, BEKES (2005) analyzes decisions by foreign firms about their location within Hungary using both discrete choice and count data models and using – like our study – NUTS 3 regions (Hungarian counties) as locational choices. Interestingly, the existence of agglomeration effects (measured only indirectly by location dependent, non-wage factors of the locally consumed production such as communication infrastructure and by some access variables) is one of the few robust results. Moreover, using a fixed-effects specification similar to ours, the author finds that higher local average labor costs make a location more

attractive to foreign investors, perhaps because the study does not control for skill levels or service agglomeration. However, locations with higher wages in the foreign investors' own industry are less attractive choices.

To sum up, industry-specific agglomeration economies appear to be common determinants of FDI location within transition countries, although the relative magnitude of foreign and domestic agglomeration effects may vary across these countries, and they may be weaker than in Western Europe and the United States. Studies that include measures of service agglomeration tend to find insignificant effects if the location choices are large areas but statistically significant and highly meaningful effects if the location choices are small areas, suggesting that service agglomeration economies may be geographically quite localized but a very important determinant of FDI location outcomes. This result does not appear to be confined to transition economies but also applies to developed countries. In fact, our findings are most comparable to those by GUIMARÃES *et al.* (2000) for Portugal, a study that, like ours, focuses on relatively small areas as location choices. GUIMARÃES *et al.* (2000) also find that service agglomeration has the strongest impact on FDI location, implying that perhaps service agglomeration is an important location determinant for foreign investors but the impact of the variable may only be appropriately measured when using small areas as location choices. Another common finding in studies on transition economies is that measures of diversity or urbanization externalities either have no effect or a negative impact on FDI-location, suggesting that JACOBS-type externalities may be rather irrelevant for the location choice of foreign investors in transition economies. Among other location factors, the evidence whether labor market conditions affect FDI-location in transition economies is mixed. Most studies (but not ours) find that labor costs play an important role, with higher wages acting as a deterrent for FDI.[34] However, most studies on transition economies

(including ours) find no effect of the unemployment rate and of skills and education of the workforce.

6 Conclusion

This study investigates the magnitude of different types of agglomeration economies and assesses their importance for location decisions of foreign firms in Romania. Using a conditional logit model which controls for choice-specific effects and endowment effects, we find evidence of service agglomeration effects as well as industry-specific foreign and domestic agglomeration effects, and demonstrate that these effects are economically meaningful. Service agglomeration effects are particularly strong; a 10 percent increase in the service employment density in the average county increases the likelihood that a subsequent foreign investor will choose that county by 11.9 percent. We find no evidence however that increased diversity of the industry structure attracts foreign investors. Moreover, we only find partial support for the hypothesis that agglomeration effects cross Romanian county borders. Consistent with the view that most foreign investors outsource *labor-intensive* production processes into Romania, we find some evidence that local labor conflicts deter foreign investors, however, we find no evidence that there is any impact of within-country differences in wages on FDI location decisions.

Robustness tests reveal that controlling for choice-specific fixed effects has an important impact on the estimates. For example, the elasticity for service employment density increases from 0.42 to 1.19 when adding fixed effects to the specification. This suggests that previous studies that do not control for choice-specific fixed effects may have underestimated the impact of economies arising from service agglomeration.

Finally, a comparison of our findings with those of other recent studies indicates that our qualitative results on the effects of service agglomeration and industry-specific agglomeration are likely representative for other transition economies in Central and Eastern Europe.

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Summary Statistics and Regression Tables

TABLE 1
Distribution of Manufacturing Establishments with Foreign Participation by County, 1990-1997

County Name	Major City/Cities in County	Number	Percent
BUCHAREST	**Bucharest**	942	61.2
TIMIS	**Timisoara**	82	5.3
BIHOR	*Oradea*	56	3.6
CLUJ	**Cluj-Napoca**	45	2.9
CONSTANTA	**Constanta**	45	2.9
ARAD	*Arad*	35	2.3
HARGHITA	Gheorghieni, Odorheiu Secuiesc, Miercurea-Ciuc	35	2.3
BRASOV	**Brasov**	33	2.1
SIBIU	*Sibiu*	33	2.1
MURES	*Tirgu Mures*	22	1.4
DOLJ	**Craiova**	21	1.4
BACAU	*Bacau*	20	1.3
IASI	**Iasi**	20	1.3
PRAHOVA	**Ploiesti**	19	1.2
ARGES	*Pitesti*	16	1.0
COVASNA	Sfantul Gheorghe, Targu Secuiesc	15	1.0
MARAMURES	*Baia Mare*	10	0.7
SUCEAVA	*Suceava*	8	0.5
DIMBOVITA	Targoviste	8	0.5
BISTRITA-NASAUD	Bistrita	7	0.5
HUNEDOARA	Deva	7	0.5
GALATI	**Galati**	7	0.5
NEAMT	*Piatra Neamt*	7	0.5
VALCEA	*Rimnicu Vilcea*	7	0.5
BRAILA	*Braila*	6	0.4
VRANCEA	*Focsani*	6	0.4
GIURGIU	Giurgiu	6	0.4
CARAS-SEVERIN	Resita	6	0.4
SATU MARE	*Satu Mare*	6	0.4
ALBA	Alba Iulia	5	0.3
IALOMITA	Slobozia, Fetesti	5	0.3
TOTAL		*1540*	*100.0*

Notes: The statistics in this table include all manufacturing establishments with at least $10,000 in foreign capital which are either 100 percent foreign-owned or have a physical person as a domestic partner. *Source*: Authors' calculations based on data from the Romanian Development Agency. Cities in **bold** have a population >250.000. Cities in *italic* have a population between 100,000 and 250,000. All other cities have a population between 50,000 and 100,000.

TABLE 2
Distribution of Manufacturing Establishments with Foreign Participation by Year of Establishment

Year	Number	Percent
1990	21	1.4
1991	30	2.0
1992	57	3.7
1993	78	5.1
1994	360	23.4
1995	377	24.5
1996	359	23.3
1997	258	16.8
Total	*1540*	*100.0*

Notes: The statistics in this table include all manufacturing establishments with at least $10,000 in foreign capital which are either 100 percent foreign-owned or have a physical person as domestic partner. *Source*: Authors' calculations based on data from the Romanian Development Agency.

TABLE 3
Distribution of Manufacturing Establishments with Foreign Participation by Industry, 1997

Industry	Number	Percent
Metal products, machinery & equipment	73	4.7
Electronics & electric apparatus	121	7.9
Chemicals	163	10.6
Wood	163	10.6
Light industry [i)]	378	24.6
Food	616	40.0
Publishing & printing	18	1.2
Nonmetallic minerals	8	0.5
Total	*1540*	*100.0*

Notes: The statistics in this table include all manufacturing plants with at least $10,000 in foreign capital. [i)] Includes textile, clothing, leather & shoes. *Source*: Authors' calculations based on data from the Romanian Development Agency.

TABLE 4
Description of Explanatory Variables

Variable	Definition	Expected Sign	Source	Descriptive Statistics of the Untransformed Variable	
				Mean	Std. Dev.
Industry-specific foreign agglomeration	Log of number of plants with foreign participation in the same industry as the investor	+	RDA, yearly data from 1990 to 1996	71.27	98.68
Industry-specific domestic agglomeration	Log of number of domestic plants with 20 or more employees in the same industry as the investor	+	CCIR, 1994 and 1996	56.78	46.80
Service agglomeration	Log of total employment in the tertiary sector (business and financial services) per km^2	+	Annual Statistical Abstract of Romania, yearly data, 1991 to 1996	35.16	27.41
Diversity of the economy	Log of Herfindahl index[1]	-	TEMPO database (https://statistici.insse.ro/shop/?lang=en), yearly employment data, 1991-1996	0.19	0.04
Border industry-specific foreign agglomeration	Log of sum of number of plants with foreign participation in the same industry as the investor in all counties bordering the county of choice.	+	RDA, yearly data from 1990 to 1996	11.06	22.84
Border industry-specific domestic agglomeration	Log of sum of number of domestic plants with 20 or more employees in the same industry as the investor in all counties bordering the county of choice.	+	CCIR, 1994 and 1996	68.38	43.79
Border service agglomeration	Log of total employment in the tertiary sector (business and financial services) in all counties bordering the county of choice per km^2.	+	Annual Statistical Abstract of Romania, yearly data, 1991 to 1996	0.98	0.65
Border diversity of the economy	Log of border Herfindahl index [2]	-	TEMPO database, yearly employment data, 1991 to 1996	0.20	0.02
Labor costs	Log of manufacturing monthly real wage (in 1990 lei)	-	Annual Statistical Abstract of Romania, yearly data, 1993 to 1996	1,960.15	278.89
Unemployment rate	Log of unemployment rate (as share)	?	Annual Statistical Abstract of Romania, yearly data, 1991 to 1996	0.06	0.03
Labor conflicts	Log of number of labor conflicts per 100,000 employees in the manufacturing sector	-	Annual Statistical Abstract of Romania, yearly data, 1992 to 1996	15.18	8.95
High-schools	Log of number of high-schools per 100,000 employees	+	Annual Statistical Abstract of Romania, yearly data, 1990 to 1996	15.73	5.93

TABLE 4—*Continued*

Variable	Definition	Expected Sign	Source	Descriptive Statistics of the Untransformed Variable	
				Mean	Std. Dev.
Vocational/apprentice schools	Log of number of vocational/apprentice schools per 100,000 employees	+	Annual Statistical Abstract of Romania, yearly data, 1990- 1996	8.59	3.48
Regional GDP	Log of regional real GDP (in billion 1990 lei)	+	Territorial Statistics, 1997, (https://statistici.insse.ro/catalog/?page=publD&lang=en&publ_id=162) yearly regional GDP data for 1995 and 1998, and Annual Statistical Abstract of Romania, yearly national GDP data from 1990 to 1996	165.96	60.30
Railroad density	Log of (railroad length/county area)	+	Annual Statistical Abstract of Romania, 1990	0.13	0.06
Road density	Log of (road length/county area)	+	Annual Statistical Abstract of Romania, 1990	0.38	0.07

Notes: As indicated in the Source column, for some variables, data was not available for the beginning of our study period. We imputed the missing values of all these variables, except labor costs (wage) and regional GDP, with their values for the first available year of data. We imputed the missing labor cost values via extrapolation of the available years of data based on the average annual wage growth during these years. We imputed the missing GDP values as follows: first, we computed the share of each region in total GDP for 1995 and 1998, and the annualized change in these shares between 1995 and 1998 (i.e., (share1998-share1995)/3); second, we applied the annualized change in shares to the 1995 shares, to impute the shares for 1990-1996; finally, we used the imputed regional shares and the total GDP to compute the regional GDP for1990-1996. The untransformed variables, for which the statistics are shown, represent average values over the two years immediately preceding the year of the foreign plant set-up. The industry-specific foreign and domestic agglomeration variables are computed respectively as log of one plus the average number of foreign plants in the establishment's industry over the previous two years and domestic establishments in that industry, to avoid taking the log of zero for counties with no prior investment. This specification follows HEAD *et al.* (1995), and is consistent with the idea that prospective agglomeration includes the prospective investor. For the same reason, the Unemployment Rate variable is computed as log of 0.001 plus the average unemployment over the previous two years; and the Labor Conflicts variable is computed as log of 0.1 plus the average number of conflicts per 100,000 employees over the previous two years.

[1)] Herfindahl index = $\sum_{i=1}^{n} E_i^2$, where n=the number of economic sectors (up to 17 sectors), and E_i = the proportion of county employment that is located in the i^{th} sector.

[2)] Border Herfindahl index is computed using the same formula as above, where n=the total number of economic sectors in all counties bordering the county of choice, and E_i = the proportion of employment in all counties bordering the county of choice that is located in the i^{th} sector

TABLE 5
Conditional Logit Estimates

Variables	Location Choice = County			
	Model 1		Model 2	
	Coefficient	Elasticity	Coefficient	Elasticity
	(1)	(2)	(3)	(4)
Industry-specific foreign agglomeration	0.5102 ***	0.4937	0.1590 *	0.1538
	(0.0614)		(0.0819)	
Industry-specific domestic agglomeration	0.5327 ***	0.5155	0.3632 ***	0.3514
	(0.0885)		(0.0927)	
Service agglomeration	0.4350 ***	0.4210	1.2344 **	1.1946
	(0.0962)		(0.5230)	
Diversity of the economy	-0.3727	-0.3607	1.1275	1.0911
	(0.2717)		(1.1756)	
Border industry-specific foreign agglomeration	0.0556	0.0538	0.0374	0.0362
	(0.0757)		(0.0899)	
Border industry-specific domestic agglomeration	0.0478	0.0462	0.6032 ***	0.5837
	(0.1030)		(0.1305)	
Border service agglomeration	-0.3850 **	-0.3726	0.0481	0.0465
	(0.1586)		(1.0232)	
Border diversity of the economy	0.4540	0.4394	3.4747	3.3626
	(0.4251)		(2.9795)	
Labor costs	0.3659	0.3541	-1.0628	-1.0285
	(0.4766)		(1.2919)	
Unemployment rate	-0.3908 ***	-0.3782	0.0828	0.0801
	(0.1186)		(0.1807)	
Labor conflicts	0.0055	0.0054	-0.0874 *	-0.0845
	(0.0341)		(0.0514)	
High-schools	1.5987 ***	1.5471	-0.5218	-0.5050
	(0.4215)		(1.2583)	
Vocational/apprentice schools	0.1213	0.1174	0.7058	0.6831
	(0.4136)		(0.8672)	
Regional GDP	0.1373	0.1329	-1.7221	-1.6666
	(0.3034)		(2.3776)	
Railroad density	0.3650 **	0.3532		
	(0.1575)			
Road density	-0.0174	-0.0169		
	(0.2721)			
County fixed effects	No		Yes	
Log likelihood	-2838.9		-2772.0	
Number of choices	31		31	
Number of investors	1519		1519	

Notes: *** denotes 1% significance level; ** denotes 5% significance level; * denotes 10% significance level. Standard errors are in parenthesis.

Appendix

TABLE A1
Correlation Matrix of Explanatory Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Industry-specific foreign agglomeration (1)	1															
Industry-specific domestic agglomeration (2)	0.5011	1														
Service agglomeration (3)	0.5462	0.3406	1													
Diversity of the economy (4)	-0.1002	0.1289	0.0578	1												
Border industry-specific foreign agglomeration (5)	0.2541	0.2061	-0.0532	-0.0499	1											
Border industry-specific domestic agglomeration (6)	0.1502	0.6615	-0.0188	0.0621	0.5827	1										
Border service agglomeration (7)	-0.0463	-0.0959	0.0615	0.0908	0.5913	0.2747	1									
Border diversity of the economy (8)	-0.0898	0.115	0.0969	0.5658	-0.0422	0.2048	0.1363	1								
Labor costs (9)	0.3241	0.0122	0.171	-0.0808	0.2698	-0.0191	-0.1026	-0.3045	1							
Unemployment rate (10)	0.0017	-0.0805	-0.2019	-0.1593	0.2311	0.0233	-0.037	-0.2135	0.2787	1						
Labor conflicts (11)	0.1647	0.0718	0.1516	-0.2507	-0.1551	-0.1459	-0.3224	-0.1554	0.1393	0.0172	1					
High-schools (12)	-0.1018	-0.1389	-0.6234	-0.009	-0.0226	-0.164	-0.2214	-0.334	-0.0122	0.2629	-0.0037	1				
Vocational/apprentice schools (13)	-0.2519	-0.2171	-0.7329	-0.0257	0.185	0.0113	-0.0535	-0.1548	-0.0184	0.3237	-0.171	0.7677	1			
Regional GDP (14)	0.1757	0.0148	0.3746	0.0797	0.4385	0.2109	0.745	0.2687	0.0566	-0.1733	-0.2498	-0.5188	-0.3702	1		
Railroad density (15)	0.484	0.2085	0.5762	0.0234	0.0532	-0.0091	0.1512	0.0067	0.128	-0.2584	-0.0801	-0.2608	-0.3965	0.1755	1	
Road density (16)	0.2701	0.1611	0.5366	0.1045	0.0684	0.0816	0.2012	0.1344	0.1251	-0.0883	-0.1365	-0.4268	-0.4127	0.4093	0.2205	1

TABLE A2
Economic Sectors used to Define the Economic Diversity Measure

1	Agriculture, hunting and forestry
2	Fish farming and fishing
3	Forestry
4	Manufacturing Industry
5	Extractive Industry
6	Utilities (energy, gas, water)
7	Constructions
8	Trade
9	Hotels and restaurants
10	Transportation
11	Financial intermediation
12	Real estate, renting and business activities
13	Telecommunications and postal service
14	Public administration and defence
15	Education
16	Health and social security
17	Other activities

Notes

[1] This is mainly due to data limitations in most Central and Eastern European countries.

[2] See for example BITZENIS (2006) for an assessment of the main barriers (from the viewpoint of foreign investors) that affect multinationals' business in a transition country.

[3] Of course, regional disparities cannot be addressed solely by attracting FDI; rather FDI should accompany domestic efforts. However, these issues are beyond the scope of this paper.

[4] Romania consists of 41 counties plus Bucharest. However, our choice set only consists of 30 counties plus Bucharest. Following HEAD *et al.* (1995) we eliminate 11 counties that received fewer than 4 foreign Greenfield investments. This reduces the number of estimated parameters by 11 while reducing the sample size by only 26 observations. The reduction in the choice set should not affect the other parameter estimates, given the independence of irrelevant alternatives assumption associated with the conditional logit model used in this paper. A Romanian county has on average a surface area of 5,792 km^2 and a population of 544,637.

[5] While the surface area of the average Romanian county seems large for the MARSHALLian notion of agglomeration (which has been traditionally associated with the notion of industrial district), it should be noted that the vast majority of Romanian counties in our sample can be considered as clear-cut 'agglomerations' with one dominant city/district (and abundant hinterland). Only 3 counties (out of 31) consist of two or three smaller cities with a population between 50,000-100,000. For details see Table 1. It should also be noted that the choice set in this study coincides better with the typical notion of agglomeration than most other studies.

[6] See the statistics from UNCTAD (2004, p. 274) and PUSTERLA and RESMINI (2005).

[7] This number includes establishments with foreign participation of all types (including joint ventures), in all economic sectors (not only manufacturing), and regardless of the amount of invested foreign capital.

[8] Transition economies with their low labor costs and large supply of skilled manufacturing workers are likely to attract foreign firms with labor-intensive production processes. Since labor market conditions are critical for the performance of labor-intensive firms, these conditions may be relatively more important determinants of FDI location in transition economies than in developed countries.

[9] See DE MELLO (1997 and 1999) for a comprehensive survey on the relationship between FDI and growth and AITKEN and HARRISON (1999) for a critical assessment of the claim. The empirical research on the FDI-growth relationship in transition and developing countries suggests overall that FDI has a positive

impact on economic growth (e.g., BORENSZTEIN *et al.,* 1998, BALASUBRAMANYAM *et al.,* 1999, and VOICU, 2000). DRIFFIELD (2006) provides evidence for the significance of externalities from inward FDI but suggests that these externalities are more localized than has previously been believed.

[10] BAPTISTA and SWANN (1999) provide direct empirical evidence on firm entry. Their empirical findings for the computer industries in the US and UK suggest that, unlike the case of incumbent growth (where firm growth is fostered by the strong presence of firms in the same sectors where the firm is active), cross-sectional effects seem to have a significant effect on new firm entry.

[11] In this context it is important to note that manufacturing industries in Romania have clustered in resource rich areas (e.g., wood-processing factories are located in wood-rich areas, oil refineries and chemical plants that use oil or oil derivatives as inputs have clustered around oil fields) even during communism. That is, even though under the communist regime the firms were not maximizing profits for shareholders, they nevertheless tried to minimize transportation costs in order to maximize the revenue that could be used for purposes other than distribution to investors. Post 1989 we can assume that both foreign *and* domestic investors choose the location that yields the highest profit.

[12] GUIMARÃES *et al.* (2004) and BEKES (2005) also control for choice specific fixed effects. CROZET *et al.* (2004) and CIESLIK (2005a) also include fixed effects, however, these are estimated for a geographic unit that is larger than the one used to differentiate location choices.

[13] Many FDI location studies rely on choice sets that consist of large regions (e.g., U.S. states or even countries), which stretch the Marshallian concept of agglomeration.

[14] NUTS is the official classification for EU regions. NUTS 1 are typically very large regions. For example, Portugal or Ireland are NUTS 1 regions. NUTS 2 are smaller geographical areas but they often still significantly stretch the Marshallian notion of agglomeration in the sense of 'industrial district'. Only three European countries (Germany, the UK, and France) consist of more than 20 NUTS 2 regions. Romanian counties are NUTS 3 regions , which appear to be the most accurate geographical area, at least in the case of Romania, most closely reflecting the notion of 'industrial district'.

[15] Other studies (e.g., COUGHLIN *et al.*, 1991) mix Greenfield investment with other types of FDI such as joint ventures, mergers and acquisitions.

[16] TRAIN (1985) shows that the inclusion of choice-specific effects allows for the use of a conditional logit model in the presence of some forms of IIA violation. In particular, our empirical specification is valid as long as foreign investors have uniform perceptions of the substitutability between counties.

[17] The RDA was established in 1991, as a specialized body aiming at supporting the economic reform by attracting foreign direct investment. In 1996, the RDA became a founding member of the World Association of Investment Promotion Agencies, an international organization created at the initiative of UNCTAD with support from OECD, World Bank and World Trade Organization (see ROMANIAN DEVELOPMENT AGENCY, 1996 for more details about the role and accomplishments of the RDA).

[18] Industries recorded by RDA are either at the two-digit level or are aggregations of several two-digit industries.

[19] RDA staff indicated that while many of the establishments with a firm as domestic partner are Greenfield investments, some may represent joint ventures or acquisitions.

[20] In the regression models, the number of observations (choosers) is slightly smaller (1519) since we exclude the plants setup in 1990. However, the plants established in 1990 are used in the calculation of the foreign agglomeration variable for all subsequent setups.

[21] Prior to the onset of communism in 1945, there was a significant number of foreign firms doing business in Romania; however, they were all taken over by the state as a result of the communists' nationalization policy.

[22] In 1994, GDP increased by 3.4 percent relative to 1993, exports increased by 22.6%, imports decreased by 5.5%, personal savings doubled, inflation dropped to 61.7% (from 295.5% in 1993), and the private sector share in GDP reached 35% (VOICU, 2000).

[23] Localization economies from domestic agglomeration usually result from technology spillovers, the existence of intermediate suppliers, and labor-pooling.

[24] Given that the pace of economic restructuring reforms was slow in Romania for much of the 1990s, there was fairly little variation in the number of domestic manufacturing enterprises, especially during the first half of the decade. Therefore, the two years for which the domestic plant counts are available should be enough to adequately capture domestic agglomeration economies over the whole study period.

[25] The 17 economic sectors used to compute the Herfindahl index are listed in Appendix Table A2. As an alternative to the Herfindahl index, we also computed an *entropy* measure of diversity externalities. Our main findings are virtually unchanged if we use this alternative measure.

[26] JACOBS (1969) first described the idea of economies arising from knowledge spillovers from outside the core industry. Following JACOB's logic, large diversified cities should be more attractive to firms than less diversified locations.

[27] In addition, population density is highly correlated with the service agglomeration measure and, thus, its

inclusion would likely generate multicollinearity problems.

[28] We use average values over two years to reflect that the various effects may extend over a period of time. For foreign plant set-ups in 1991, we use the 1990 values of the time-variant explanatory variables. Alternatively, we could exclude plant set-ups in 1991 from our analysis. However, this approach would reduce the temporal variation in our data. This would be particularly problematic given that our dataset only includes seven years of data and given that in our county fixed effects specification most coefficients are estimated based solely on the temporal variation exhibited by the explanatory variables (the only exceptions are the industry-specific foreign and domestic agglomeration coefficients which use both temporal and industry variation in their corresponding variables).

[29] The coefficients of a conditional logit model are not directly tied to the marginal effects and, thus, their magnitude is not straightforward to interpret. One way to assess their magnitude is to calculate average probability elasticities. This computation is particularly easy to perform for a log-linear specification of the profit function, like ours (see HEAD *et al.*, 1995 and COUGHLIN *et al.*, 1991, among others, for detailed elasticity calculations). These elasticities enable us to assess by how much each of the explanatory variables affects location choice probabilities.

[30] HEAD *et al.* (1995) and COUGHLIN and SEGEV (2000) find similar results for unionization rate and wage, respectively, and they, too, allude to potential biases due to omitted variables.

[31] Interestingly, HEAD and RIES (1996) get a similar result when investigating the location choices of foreign investors in China. Their findings suggest that agglomeration effects greatly magnified the direct impact of China's open door policy, which created incentives designed to attract FDI into special economic zones.

[32] The population size of the average NUTS 2 region in Poland is roughly 4 ½ times larger than that of an average Romanian county (NUTS 3 level).

[33] CIESLIK (2005a) additionally controls for 'large region' effects, while CIESLIK (2005b) controls for country-specific border effects (though neither study includes choice specific fixed effects).

[34] This finding contrasts the findings of most studies that focus on Western Europe or the US; these studies typically find insignificant or even positive effects of wage on FDI-location (e.g., HEAD *et al*., 1999; GUIMARÃES *et al.*, 2000; CROZET *et al*., 2004).