Do regional development and local policies affect the location of multinationals? Evidence from Hungary ⋆

Abstract

Using a national dataset on firms for the period 1992-2003 and a recent survey of municipal policies, this paper tests the effect of local development as well regional and local policies on the location decisions of foreign owned firms in Hungary. Unlike most papers in the literature, the data at hand allows to test a large set of policy variables together. Policies are tested in a new economic geography framework where key location choice variables such as labor market or the presence of other firms are controlled for. Among others, density of road network, local concessions to firms and a somewhat larger size of administration are found to have positively influenced location choice.

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1 Introduction

Various economic policy decisions influence corporate behaviour: measures may be taken at municipal, regional or national level. From a policy perspective, corporate reaction to economic policy measures and development incentives has a great significance. First, European Union development policies will either target firms directly or influence them as a by-product of cohesion efforts. Second, while several empirical papers discuss the linkages between firms and policy in the US or Western Europe(such as Basile (2004) or Woodward (1992)), the topic has rarely been discussed in the context of a less developed country.

In particular, we are interested in the effect of local development as well as regional and local policies on the location decisions of firms. We argue that policies should, *inter alia,* be evaluated on the basis of their impact on improving the economic environment and business conditions for firms in manufacturing. State involvement in the economy is related to the provision of public goods (such as the road network) and promotion of economic activities. Measures would influence other actors of the economy, such as nearby firms or related industries.

Development indicators, which would capture these externalities, also appear as cost factors for firms, and include local research and development activity, telephone network or education. Policy decisions used in this study encompass for example tax rates, municipal and national investment expenditures or investment incentives.

The study builds upon a large national panel of firms. Rather than following sectoral patterns, this dataset allows us to analyse firm behaviour directly. We use several sources for policy and development variables, and a recent survey on municipal policies is used in addition to previously available sources of county-level data. In the paper, we investigate the effect of local development, regional and local policies on the location decisions of foreign owned firms in Hungary. The aim of this research is survey the literature to map how and which development and policy variables affect firms' decisions. Then we use the Hungarian corporate panel (for 1992-2002) to determine which variables and policies have any relevance in terms of the location choice.

The paper is organised as follows. First, we give a brief summary of the key theoretical underpinnings of the research as well as surveys of the empirical findings of previous papers. This is followed by a presentation of the econometric model along with a description of the datasets and variables in section

three. Section four present the results and some conclusions are drawn in section five.

2 Related literature

In this paper, we focus on location choices of foreign firms in manufacturing. Such companies have chosen a relatively small number of locations for their production between 1991 and 2003. Indeed, a key stylized fact is the presence of concentration at the national level: a few counties attracted the majority of investment.

In models of economic geography, location decisions would be based on three types of factors. Choices will be influenced by some geographic properties of counties such as size or presence of mountains and rivers - this is called the "*first nature" geography* and these features would change very slowly or not alter at all. Location choices as well as behaviour of other firms determine "*second nature" geography* with sales between various firms becoming a key pulling factor. The second nature properties of a county may change rather quickly - as the experience of transition in Central Europe would suggest. In addition to these, location choices are influenced by the "*one and a half nature"*: roads, universities or administration capacities that change more slowly than firms' activity but nevertheless, adapt to corporate needs as well as shape firms' behaviour. [1] This paper tries to evaluate the impact of the this "one and a half nature" features - while emphasising the important role "second nature" geography plays.

The empirical investigation is built upon a group of new economic geography models using input-output linkages among firms [2]. We assume that location choice of firms at the county level is unaffected by first nature geography in a small and plain country like Hungary. Labor costs are of course a key determinant, and second nature geography is important: various market access and agglomeration variables will be created and used as regressor. One and a half nature geography will be investigated in detail including regional development, accessibility and transportation network as well as local taxes and policies. Before turning to the analysis of our data, let us survey empirical

[1] For more on this, see Baldwin (2004)

[2] A detailed description of a Krugman & Venables (1995) type model may be found in Békés (2005). An excellent survey of key hypotheses emerging from models of new economic geography and their mixed empirical support can be found in Head & Mayer (2004).

evidence from various developed and less developed countries and note some recent results from Hungary.

2.1 Agglomeration and market access

Most models of new economic geography (or NEG) aim at uncovering the essential reasons behind both agglomeration and dispersion of economic activity by taking into account "second nature" geography features, such as access or proximity to potential consumers as well as suppliers of intermediate goods necessary for production.

As for the access to markets, the key idea that firm location depends on the proximity of demand was introduced a long ago, as early as in 1954, Harris devised the simplest aggregate market-potential function. Market potential has been first investigated in an international context; proximity to key markets and suppliers has been explicitly featured in empirical works explaining overall economic activity or per capita income. Redding & Venables (2004) argue that a country's wage level (proxied by per capita income) is dependent on its capacity to reach export markets and necessary intermediate goods cheaply.

Agglomeration externalities were first emphasised by Marshall, and formalisation of most such externalities may be found in Fujita et al. (1999, Ch. 16.). Here we emphasise four such agglomeration forces. First comes labour migration: an increased population generated greater demand inviting more firms to settle in a larger city, and this allowed for a lower import bill and hence, lower living costs in general. The second driver of co-location of firms comes from the potential of supplier-buyer link between firms, i.e. one firm's output is the intermediate good of another as in Krugman & Venables (1995). Thus, firms try to locate close to other firms, hence lowering transaction costs. The third reason for agglomeration is the presence of knowledge spillover: proximity allows to exchange inventions while technology spillovers help increase productivity using other firms' knowledge. Fourth, labour pooling may be important as firms would enjoy the presence of a larger set of labour pool where the specific knowledge required by the firm can be fished out easily Amiti & Pissarides (2001).

There have been several papers dealing with location decisions of foreign investors and clustering of these firms. Head & Mayer (2005) look at Japanese investments carried out in the European Union; results show that market potential measures as well as agglomeration variables turn out to be signifi-

cant determinants. Crozet et al. (2004) study location of FDI in France and find that firms of the same nationality like to group together, locations close to home country are chosen more frequently, and some industries (like car plants) have a strong tendency to agglomerate. Similarly, a study by Head & Ries (2001) looks at Japanese investments in the US and finds that firms belonging to the same *keiritsu* tend to settle close to each other. Some studies considered countries of similar size and population to Hungary, for example Barrios et al. (2003) look at multinationals' location choice in Ireland to find that agglomeration forces contributed substantially to location choices but proximity to major ports and airports was also helpful.

Looking at a specific issue of agglomeration, urbanisation, or the density of population, has been a traditional variable to look at (see Baldwin et al. (2003). Urbanisation of the actual location may foster agglomeration by helping face-to-face communication or the spillover knowledge. Of course, high land prices and congestion may be a deterrent factor. Coughlin & Segev (2000) found a positive effect of urbanisation on location of manufacturing plants. Proximity to businesses that provide services for manufacturing firms such as banks or accountancies has been shown to attract investments.

2.2 Development, accessibility and transportation network

In a broader sense, regional development has often been investigated. For example, Basile (2004) showed that public infrastructure and education are attracting forces while crime rate is negatively related to new investments in Italy. Several studies considered the role of transportation per se in a regional setting. Cieslik (2003) looked at 50 Polish regions to find that both proximity of main export targets and road network have been the key magnets for foreign investment.

In the lack of appropriate data, only a few studies investigated the role of settlement level determinants of location choice. Holl (2004) analysed explicitly the impact of road infrastructure on new manufacturing establishments in Spanish municipalities. The paper suggests that infrastructure development affects municipalities differently even within one region and agglomeration forces operate within a relatively small geographic scope. Holl posits that a new motorway will positively affect productivity of firms in the very proximity of the motorway but adds that a negative spillover to more distant areas is likely as they loose out on investments. Results suggest that apart from the size of the settlement, share of educated workforce and proximity to

major cities attract new investments, while competition presents a deterrent force. In contrast with other studies showing positive spill-over effects from co-location within a region or country, at a lower level of aggregation, competition overweighs these externalities. Most interestingly, it is shown that there is an average 14% increase in firm entry for municipalities located within 10km from the new motorway. Outside this 10km corridor, distance from motorways plays a small role only. Woodward (1992) took local transportation linkages as a separate variable to measure accessibility of regional and national markets. Here, interstate highway connection was taken as proxy to good access, and the positive and significant coefficients confirmed hypotheses.

Another way to look at transportation infrastructure is to estimate the impact of road density. A more developed network should help firms trade with other companies in the neighbourhood as well as transport final goods to cities. Hence, good transportation within regions allows for agglomeration externalities to yield greater profits form specialisation and economies of scale or technological spill-overs. In Indonesia for example, Deichmann et al. (2005) found that road density positively influences location choice for most of the industries. For China, Amiti & Javorcik (2003) found strong evidence of the importance of railway network.

By theory, the impact of access to key transportation channels may not serve as an attraction force. Recent models of new economic geography [3] suggest that providing a new transportation link between a rich and a poor region may exacerbate agglomeration tendencies, leading to new investment in the agglomerated (richer) area and hence, a greater divergence.

2.3 Labour market

In previous studies, various labour market variables have been investigated including gross wages, income tax rates, unemployment or the composition and skills of the labour force. Theoretically, lower wages reduce production costs and higher unemployment provides the necessary labour supply for new investments, thus, both should attract FDI. Studies of international location choice certainly support this position, while results are quite mixed when considering intra-national choice. For example, in Figueiredo et al. (2002) local wage has the expected sign, but in other studies like Holl (2004), the wage coefficient is insignificant.

[3] See Baldwin et al. (2003), Head & Mayer (2004) or Martin (1999).

There may be various explanations for ambiguous results. Labour migration within one country may be strong thus alleviating differences. Different industries would use different types of labour in terms of skills and profession. The share of blue-collar workers may vary a great deal among sectors and furthermore, their wage may differ greatly depending on how skilled they are. Hence, the industry profile of a region may well influence the average wages. An insignificant or a positive coefficient may just imply that investors are bringing in superior technology and hence, require more skilled and educated (i.e. more expensive) sort of labour reflected in higher wages.

2.4 Local taxes and regional policies

There have been a few studies looking at local and regional taxes as well as regional policy initiatives. Woodward (1992) analysed a period of booming Japanese FDI activities in the US, focusing on greenfield start-ups that, unlike foreign acquisitions, require an explicit location decision. Location of 540 plants were analysed with firms assumed to have freely chosen a US state and a county. Interesting explanatory variables include various tax rates, the presence of industrial policy (at the state level) and manufacturing agglomeration, racial and educational mix of population and labour market features (at the county level). High taxes did serve as a deterrent at the state level but the local property tax seemed to have no direct effect.As for the county level regressions, labour market variables proved to be important determinants of location choice.

Measuring state policy towards FDI was not easy. Woodward (1992) used an index developed by Luger (1987) and it included land and building subsidies, debt and equity capital support, job training, infrastructure improvement and site preparation. Another instrument is the presence of state-level investment and export promotion offices operating in Japan. In the early eighties only 15 US states had such office, but by the end of the decade most states had established such institution. Interestingly state effort had no significant impact while, an office in Japan proved an efficient tool to attract investments. For the late eighties and early nineties, Kim et al. (2003) considered new manufacturing FDI plants in the US to analyze the effect of industry promotion programs [4] by states. The impact of expenditures on FDI attraction programs

[4] In the US, there exists a central database, the "State Export Program Database" that collects state programs prepared by the National Association of State Development Agencies.

was estimated and found to have a positive and significant effect. Moreover, Kim et al. (2003) suggested that promotion expenditures may be used to offset the lack of agglomeration.

Another way of looking at regional policy is to consider national initiatives to attract FDI into certain areas of the country. Barrios et al. (2003) find evidence that higher public incentives in Irish designated areas have increased the probability of multinational investment. In the United Kingdom, Devereux et al. (2003) examine whether discretionary government grants influence firm location. It is found that policy instruments in the form of regional grants do have some effect in attracting new firms to supported location, but this effect is rather small.

In several Central and Eastern European countries, special industrial zones were created to attract foreign investors. Several studies argued that zones would have a favourable impact. However, for Poland, Cieslik (2003) found that when controlling for access and agglomeration variables, the existence of such zones had no considerable impact on the number of investments.

Spending on incentives and infrastructure should have a favourable impact, but bureaucracy as a potentially important impediment to investment must be taken into account as well. Deichmann et al. (2005) investigated the impact of local bureaucratic costs of doing business in Indonesia and found that the occurrence of local interventions has a small negative effect, especially for regulation sensitive industries, such as tobacco.

Although local taxes have been found to be a deterrent force for firms (Bartik 1985, Papke 1989), sensitivity was often found to be rather low and highly variable among industries and firm size (Freidman et al. 1992). Looking at growth of establishments in Maine (USA), Gabe (2003) found that the local (personal) property tax rate has a negative effect on establishment growth but local government expenditure variables show little or no correlation with firm development. Local taxes in particular have an adverse effect, but the coefficients are almost negligible in size.

2.5 Hungarian results

Agglomeration of investments and a spatial polarization have also been visible phenomena in many sectors. For example, manufacturing of electronic devices by firms in Central and Eastern Europe can be found in a fairly narrow band from north Poland through the Czech Republic, West Slovakia, West and

Central Hungary down to North Slovenia and Croatia [5] .

To our knowledge, the impact of such variables on firm location in Hungary has not been investigated in detail. However, various agglomeration forces have been described and shown to be in work in Hungary and several policy and infrastructure variables were used to explain development patterns.

Barta (2003) described regional differentiation in post-transition Hungary giving a good example of agglomeration forces in work in the automotive industry. In Hungary, suppliers to the car plant of Suzuki are shown to be settled in neighbouring counties of Komarom-Esztergom megye, where the Suzuki plant is located. Further, second wave of suppliers that settled directly to service the plant are on average much closer to the factory than the suppliers during the first half of the nineties.

There have been several studies discussing the role of accessibility in influencing municipal and regional development in Hungary. Németh (2004) examined which variables could explain income per levels and unemployment rates in NUTS4 "kistérség" regions. Unemployment rates were substantially lower in regions close to the Western borders as early as 1990 and the East-West division remained an important explanatory variable throughout the nineties. Apart from the usual measures of income (education or age), proximity to the capital city as well as the Western border have been key in explaining higher wages. Proximity to other borders proved to be insignificant.

Fazekas (2003) is closer to this research as it considers FDI and not development in general. In the focus of the paper lays the impact of FDI from a labour market perspective to study the impact capital inflow had on the regional structure of the country. The paper finds that concentration pattern of foreign-owned enterprises is just marginally higher than that of the domestically owned ones. However, FEs are concentrated in a different pattern, being located closely to the Western border. The approach of this paper is somewhat different to Fazekas (2003) in that it uses firm level data and investigates the agglomeration patterns of foreign firms only.

[5] For details see Barta (2003).

3 Econometric model

3.1 The estimation problem

Firms choose a location by maximising the (expected) profit function that depends on several explanatory variables. Let us introduce $ypc_{r(t-1)}$ as the measure of county level income and $wage^{j}_{r(t-1)}$ for county level wages. For parsimonious notation, the vector of variables $\mathbf{ACC}^{j}_{r(t-1)}$ includes all industry specific access variables. All measures that refer to regional development (such as the size of road network or university students) are included in the $\mathbf{DEV}_{r(t-1)}$ vector. Investment variables are picked up $\mathbf{INV}_{r(t-1)}$ vector. Survey based averages of municipal level policy variables are captured in the $\mathbf{POLICY}_{r(t-1)}$ vector. As a result, our expected profit function for a firm i is:

$$\begin{aligned}\pi^{j}_{r(t)}(i) = \quad & \alpha_1 wage^{j}_{r(t-1)} + \alpha_2 ypc_{r(t-1)} + \alpha_3 \mathbf{ACC}^{j}_{r(t-1)} \\ & + \beta_1 \mathbf{DEV}_{r(t-1)} + \beta_2 \mathbf{INV}_{r(t-1)} + \beta_3 \mathbf{POLICY}_{r(t-1)} + \zeta^{j}_{r(t)}(i) \quad (1)\end{aligned}$$

where the error term, $\zeta^{j}_{r(t)}(i)$ includes all the non-observed variables.

Note that explanatory variables that have a time dimension are lagged one year. The economic rationale (see "time-to-build" models) is that firms may be assumed to spend a year between investment decision and actual functioning (that is picked up by the data). The econometric support stems from a requirement to try to avoid endogeneity, and lagging will free the model of simultaneity bias. In addition to lagging, we also need to assume that firms at time t considering values of explanatory variables at time $t-1$, pick a county independently of each other. Agglomeration works as firms locate close to other firms that had settled previously, but there is *no* strategic interaction between firms settling at time t. This is a necessary assumption for using simple discrete choice model.

In our econometric structure, firms base their location decision on expected profits conditional on choosing a particular location, but they make errors due to unobserved features of the various regions/settlements as well as inability to make perfect decisions. However, the likelihood of choosing a particular location does indeed depend on the expected profit there. This gives the basis of the Random Utility Maximisation (RUM) models such as ours. The econometric model that follows from RUM models is the McFadden (1974) type conditional logit. However, for several setups, it may be shown to be equiv-

alent to the Poisson model and Figueiredo et al. (2004, p. 203.) shows that the Poisson concentrated log likelihood is "identical to the conditional logit likelihood with some constraints." [6] Given their easy applicability, no wonder that both the Poisson and the negative binomial model have been used in location research. [7]

In our count data models, the dependent variable represents the number or frequency of a particular event, in our case, the number of investments in a particular county for a given year and industry. In these models, coefficients explain why $x\%$ more projects took place in county A relative to county B.

Define $n^j_{r(t)}$ as the number of investments in industry j, region r and time t. The expected value of the number of projects is:

$$E(n^j_{r(t)}) = \lambda^j_{r(t)} = \exp(\beta\prime X^j_{r(t-1)}) \tag{2}$$

The probability of the actual number of investments being $n^j_{r(t)}$ is:

$$Pr(n^j_{r(t)}) = \frac{e^{(-\lambda^j_{r(t)})}(\lambda^j_{r(t)})^{n^j_{r(t)}}}{n^j_{r(t)}!} \tag{3}$$

where the Xs are the explanatory variables. For every year, firm entry data were aggregated by industry and county, and Poisson regressions were run with the same set of explanatory variables used at logistic regressions.

The Poisson model has the advantage of being closely related to the conditional logit, but it assumes that the conditional variance of the dependent variable, λ equals the conditional mean of λ. However, equidispersion is a rare property of firm level data, and for most cases, the variance is larger than the mean. Overdispersion may be treated, but only in a more general, negative binomial model that allows to test the null hypothesis of equidispersion. [8] The negative binomial distribution may be considered as a generalized Poisson, where the mean does not equal the variance. This deviation is represented with a dispersion parameter, α. The case with $\alpha = 0$ corresponds to equidispersion, and in that case the model collapses into a Poisson model.

[6] One advantage of count data models is their applicability for large choice sets. In this paper, we use count data models to get results that may later be comparable with results on settlement level decisions.
[7] For example, see Basile (2004), Holl (2004)
[8] Importantly, the negative binomial model yields more efficient test statistics and prevents us from drawing overly optimistic conclusions (see Cameron & Trivedi (1998)).

3.2 Data and variables

To study location choices, we distinguish four types of forces. First, classic variables include gravity type variables (size, income par capita) and labour market measures as well as economic geography variables that are centered around two key determinants of location: agglomeration externalities and market access. Second, we use several municipal and regional infrastructure and development variables. Third, public investment from various sources is measured. Fourth, policy variables from the municipality survey (such as local tax rates) are included. Due to data availability, empirical results in this paper are based on county level data.

Classic determinants include the measure of income per capita as well as labour market features such as the average regional wage. To measure consumer demand, two variables were created as the total income is taken as income per capita multiplied by size of population. In addition to this, foreign demand is estimated with a proxy of access to foreign markets. Wage is measured by the average county level wage or the industry specific county level wage.

Economic geography variables are based on the concept of market access that posits that firm location depends on the proximity of demand. Building on the previous chapter, input-output linkages between firms are taken into account and several corporate access variables are estimated, including access to suppliers and corporate customers. These access variables measures proximity to firms that may be relevant for a new company, and the access variable is sum of output by firms weighted by distance and share in inter-company trade. To take of various measurement issues, we use a total of eight variables to capture the role of proximity to firms: six for relationships in industry, one in services and one for trade with companies abroad. For a formal description of the access variables, see the appendix.

We know that a better municipal infrastructure in general lowers transaction costs of firms operating at or in the proximity of the actual settlement. As a result, higher expected profits should attract more firms in the areas. Below, variables of the vector $DEV_{r(t-1)}$ are discussed.

First, we take Hungarian Statistics Office (KSH) data on county aggregates to measure human infrastructure such as the presence of research activity and administration capacities. R&D is measured by the number of research centers (at universities or elsewhere), the number of employees at such centers, and the annual expenditures at these centers. The role of universities is also captured by the number of students enrolled at high education institutions in the given

Table 1
List of variables

Variable	Relationship	Area	variable
Demand	Access to corporate customers	within county	MA_loc
Demand	Access to corporate customers	outside county	MA_nat
Supply	Access to corporate suppliers	within county	SA_loc
Supply	Access to corporate suppliers	outside county	SA_nat
Own industry	Access to firms in same sector	within county	IP_loc
Own industry	Access to firms in same sector	outside county	IP_loc
Services	Access to business services firms	within county	BA_loc
Foreign	Access to markets abroad	outside Hungary	FMA

Variables are calculated from firm-level data. See Appendix.

Table 2
DEVELOPMENT variables

Variable	Relationship	Area
telephones	Number of telephone lines	county
Uni students	Students in higher education	county
Road density	Size of national roads per county size	county
R&D employment (log)	Number of people at R&D institutions	county
admin employment	local administration employment p.c.	county
admin employment in IT	local administration employment in IT	county

Source: CSO

county. All these variables are taken relative to the population of the county.

Second, administration capacities are measured by the size of personnel as well as expenditures on information technology in general and in particular, the number of computers. In addition to this, investment in physical capital at government and local institutions are both measured directly.

Third, the transportation infrastructure within counties is captured by the number of telephone lines and the density (i.e. km/area) of various types of road networks (total, motorways, other roads).

The $INV_{r(t-1)}$ variable measure investment in public services. It has three variables. The first one measures investment carried out locally (in the county), ranging from sewage repair to schools and hospital and is financed from local sources. The second one measures project financed by the central government. The distinction between these two may unveil an attitude toward free money (as firms may anticipate higher taxes to cover locally financed projects). Third measure captures a specific investment, one into information technology at IT administration. This latter my give an idea about the sophistication of the administrative staff an investor faces.

Local policy variables are generated from the survey data. The IEHAS/Median

Table 3
INVESTMENT variables

Variable	Relationship	Area
investment by local	Investment financed by local funds	county
investment by national	Investment financed by national funds	county
admin IT investment	investment in IT at local administration	county

Source: CSO

municipality database is composed of two surveys. The first one includes answers to questions on drivers of municipal activities with responses from the Mayor's office. The second survey is filled in by the municipal administration and questions are related to financial features. [9] Below, variables of the vector $POLICY_{r(t-1)}$ are discussed.

Given that economic activity in each counties are centered around one city, types of policies are often harmonized in towns and villages in its neighborhood. Competition for investments made tax rates converge in close neighborhood first. Hence, for all other data in this analysis are set at county level, we took a simple average of responses from various settlements within each counties. Picking the largest town per county and adding others with a weight of population had no large impact on results.

This is of course imperfect for several firms are not located in surveyed settlements, and for example, actual local taxes may be quite different from one area to another. Accordingly, insignificant parameters would either signal the lack of explanatory power in economic sense or suggest that settlement level heterogeneity is substantial even within counties that prevents inference.

As for the first survey, the costs of fixed investment is captured by land prices that are given for 1995, 2000 and 2004, so missing years had to be estimated based on these three points using a simple linear method. Prices are related to areas for industrial activity, with utilities and a road connecting the settlement and the area. Not all municipalities gave figures but there were enough to estimate county level averages.

Tax policy is captured both by the nominal tax rates and presence of concessions. As for the taxation variable, the local tax is a turnover tax for companies (i.e. its is based on their output and not the profit). The rate is given by the municipalities ranging between 0% and 2%. The survey included figures for 1992, 1995, 2000 and 2004, so missing years had to be estimated based on these four points using a simple linear method. In addition we have special variables to take into account various concessions offered by municipalities to

[9] The survey included districts of Budapest but unfortunately, excluded Zala county.

Table 4
POLICY variables from survey

Variable	Relationship	Area
local tax rate	Turnover tax for companies	municipality
local land price (log)	Average price for sites	municipality
infrastructure projects	Number of infrastructure development projects	municipality
site discount	investment site offered free or at deep discount	municipality
tax allowance	tax allowances promised for new investors	municipality
training subsidies	training subsidies offered for new investors	municipality

Source: Survey. Municipal data are aggregated by counties.

investors. The first such variable refers to occasions when an area for manufacturing purposes were provided free or with a deep discount for new firms. For every settlement, another dummy takes on 1 where a special tax allowance was promised for new firms (for "recent years") and so it refers to a general approach toward new manufacturing plants. A further concession dummy takes unity when the municipality offers training for new firms.

Finally, a variable is created to measure the importance of large-scale infrastructure related investments between 1995 and 2004. This includes projects defined as "road construction/improvement", "infrastructure development", "transportation development" or "industry parks/areas". The variable ranges between 0 (if there was no infrastructure related investment carried out) and 4 (if four out of five major projects were such investments).

4 Results

In this section, we present individual and group results for our key groups of variables: classic decision, access, development and policy such as administration, tax and investment. Robustness of results are also discussed. Details of results are presented in tables 2 and 3 of the Appendix.

As far as the classic decision variables are concerned, Poisson results (equations [1], [3]) suggest that high per capita income implies more new firms. Of course, when various explanatory variables of development are included in the regression, size and significance of the per capita variable decline. Lower labor costs persistently lead to more new investments as well.

Access variables are important determinants of firm decisions. Substantial pro-

duction of firms belonging to the same industry is the most stable determinant, but national access to suppliers and customers is also important. The negative sign of the presence of local firms, excluding those operating the same industry, may reflect a strong input competition, while the negative sign of the national presence of firms in the same sector points toward output competition that is not offset by positive externalities. Distance from foreign markets is always one of the strongest determinants of location choice confirming the importance of locating close to export markets. Importantly, the entry of various county feature variables hardly affects the access variables, save the access to business services that is highly correlated with other measures of development.

Looking at the development variables, road network is reassuringly positively related to location choice. [10] Similarly, a positive effect is generated by the development of the telephone network, while a positive but weaker effect is generated by the number of students at local universities. Employment in research and developments centers is also an important factor, while the introduction of other R&D variables provides no significant information any further.

Although the Poisson specification comes from the Random Utility Maximisation framework, the likelihood ratio test of equidispersion fails for all specifications we have tried, and the overdispersion parameter ranges mostly between 0.3-0.4. Thus, we turned to the negative binomial specification that allows for overdispersion. Importantly, qualitative results are mostly unchanged (see equations [1] versus [2] or [3] versus [4]) although the significance level would sometimes differ substantially between the two methods [11] . Note further, that when we include many variables that are correlated with the average wage variable, its the significance would disappear (as in equation [5]). To remedy this, we included an industry specific county wage that is available for 91% of all industry-year-county combinations. Indeed, the wage variable becomes negative and significant once again ([6], [7]).

Apparently, administration capacities (available for 1995-2002 only) matter as the total employment of public administration offices enters strongly sug-

[10] When estimated separately, motorways alone enter with a strongly significant coefficient. However, the best explanatory variable is generated by including all types of roads. Results are available on request.

[11] This robustness is not unusual in the literature, for example Smith & Florida (1994) finds a similar pattern for Poisson, negative binomial and even for the Tobit model. In this paper, we mostly presented results with the negative binomial regression. Note that despite the statistical advantage of the negative binomial model, one may prefer the Poisson given the proximity of actual results and the model's direct link to theory. Results with the Poisson are available on request.

gesting that firms appreciate cities that offer decent administrative services (see equations [6] or [10]). Interestingly, other features such as employment or investment in information technology, seem to have no impact [12].

Higher local taxes are shown to be a deterrent of new firms. In addition to altering taxes, cities can improve business conditions by providing concessions for new firms. The provision of explicit tax allowance has a very strong positive impact and offering education subsidies looks like a decent signal of business friendly environment, too. In contrast, the number of infrastructure related projects seems to be incapable of picking up the pace of development in an area.

The effect of higher land prices in most cases is slightly negative but insignificant - this may be taken as proof that municipalities may give various concessions but leave land prices to market forces. The dummy for special industrial area is very unstable and mostly insignificant. We suspect that a favourable property deal may be offset by signals of a poor area. Remember that these results (equations [4], [8] or [10]-[11]) being based on the municipal survey should be taken with care due to the scarcity of data for several counties.

Finally, we looked at the impact of public investment variables (available for 1996-2002 only) that pick up investment carried out first by the central government and second by the local one. It was found that local expenditure is strongly negative while the central government effort is mostly positive but insignificant.[13] This suggests that firms perceive the costs that local investments incur while disregard those in case of central efforts (equation [12]).

Overall, our research objective was to investigate if regional development and local policies influences foreign companies location decisions. To directly test this, we run several LR tests, results are shown in Table (5). It turns out that each group of variables add some additional explanatory power - both in the Poisson and in the negative binomial models. Overall, these results confirm that all types of variables do indeed influence location choices.

Eventually, location choice features may have changed through time. For several cases, we included year dummies to treat some of these problems that may have been masking important effects. Due to the lack of data for several years, a few variables may have lost explanatory power when data is anal-

[12] As expected, IT expenditure and number of PCs are closely correlated, and individually both enter with the same sign.

[13] Investment at a regional level is a relatively poor measure and it is biased towards human capital. Thus, it may have little correlation with actual investment in physical capital.

Table 5
Do variable groups increase explanatory power? Evidence from LR tests

	Poisson		Negative binomial	
Group	LR chi2	P-value	LR chi2	P-value
A. ex dummies	250.06	0.000	138.15	0.000
B. ex incentives, taxes	105.68	0.000	48.61	0.000
C. ex development	53.60	0.000	31.07	0.000
D. ex access	566.24	0.000	282.68	0.000
E. ex administration*	31.68	0.000	20.30	0.000
Compared to full model.				

**admin. variables refer to shorter period (1995-) and compared to Model B.*

ysed for a sub-period only. For example, the standard deviation of local tax rates between 1993 and 1998 is half than what it is for 1999-2003. When year dummies are introduced in equation [13], the negative sign for this variable returns even if being significant at 10% only. There is little difference in terms of significance between various models. We believe that equation [9] seems the best description of the full time period, while [12] is supported for the shorter time period (allowing for the inclusion of more variables).

Overall, we have learn that characteristics of development as well as several municipal and regional decisions, policies can affect location choice. The choice of econometric model has some but little impact, but year dummies remained useful elements of models.

5 Conclusions

In this paper, simple count data models were applied to detect the impact of various factors on location choice of firms. We considered manufacturing companies with foreign ownership setting up a new company in Hungary between 1993 and 2002. Using a set of industry specific access variables with intercompany sales, we found that the proximity to sellers and buyers of potentially important intermediate goods influence location choices. In addition to the location of other firms and wages, it was shown that regional development and some public policy measures will influence decisions. The key variables found here include industry specific wages, output of the actual firm's industry, distance from export markets, density of road network, employment in R&D units. Further, local taxes as well as tax allowance policy of municipalities seem to matter.

It is interesting to compare the effect of variables here and their impact on productivity of existing firms. As shown in Békés & Muraközy (2005), several measures of development proved to be significant in both cases. Most importantly, the density of road network (including motorways) positively influenced location choice and productivity as well. Regarding policy, local investment in public infrastructure has a negative effect in both cases, as firms take investment costs into account, while actions of the central government may have a positive impact especially for the productivity of existing firms. A somewhat larger size of administration helps new firms to settle but later on, it has no effect on productivity. However, the intensity of information technology used in offices contributes positively to corporate TFP. As expected municipal concessions offered for new firms would influence location decisions only.

Several of these findings have some policy relevance. For example, well-equipped administration capacities and several concessions at the local level signal a business-friendly environment. The density of transport network that determines the accessibility of plant by nearby labor and supplier is also a key issue for regional development.

6 Appendix

In the Appendix, we present access variables used in regressions, the nature of corporate data as well as its cleaning are described.

6.1 Creation of access variables

All together, we use eight variables to control for trade and relationships with other companies. The exposition of access variables follows Békés (2005) that describes the theoretical background behind these variables as well as gives more details about their calculation. Corporate access variables measure proximity to firms that may be relevant for a new company, and the access variable is the sum of output by firms weighted by distance and share in inter-company trade. From theory, we need one variable to measure demand (MA_r^j) and another one to proxy supplier access (SA_r^j). Here, both these variables are divided into two components: one to pick up access to local (internal or within county) firms and another one for non-local (external or outside the county) firms. [14] We denote internal variables by an "loc", external ones by an "nat" suffix.

Accordingly, corporate demand may be proxied by a local and a national (all regions except for the local one) industry dependent market access variables (local: $MAloc_r^j$, national: $MAnat_r^j$). Coefficients io^{kj} are used to give the share of intermediate goods produced by industry j purchased by other industries k.

$$MA_r^j = \lambda_1 MAloc_r^j + \lambda_2 MAnat_r^j \tag{4}$$

It is fair to assume that firms' relationships differ when they operate in the same sector, a new variable, $IPloc$ is introduced that measures own industry output only. Indeed, this variable is to pick up several aspects of intra-industry transactions: trade, competition and cooperation. In a way, it shows the strength of industrial clustering.

The intermediate good price index is proxied by a supplier access variables, created in the same fashion, but eventually using rows instead of columns (and columns instead of rows) of the input-output table (io^{jk} instead of io^{kj}) that describes input requirements. Importantly, for both supplier and market

[14] The reason for such dichotomy comes from the suspicion that the effect of the relationship between firms is not linear to distance.

access, we limit the input-output coefficients such that $i \neq j$. For cases when $k = j$, $IPloc_r^j$ and $IPnat_r^j$ were introduced.

Business access or BA_r^j picks up access to services such as banking, accounting or lodging, as a special determinant of production costs. For services are likely to be used locally, we only consider access to local business services.

In order to compare firms from one county with firms from another, unit transport costs are used, estimated by assuming a very simple relationship:

$$\tau_{l\_p}^j = dist_{l\_p} * V^j \tag{5}$$

i.e. it depends on the distance and on the cost of transporting one dollar worth of good by one kilometer. All data refer to distance by car, thus the road network that is crucial for transportation of goods is indeed taken into account of.

As a result, we have seven variables to control for the domestic inter-company linkages.

$$MAloc_r^j = \sum_k^J io^{kj}(Y_r^k) \;\; ; \;\; MAnat_r^j = \sum_k^J io^{kj}(\sum_{l \neq r}^R \frac{Y_l^k}{\tau_{l\_r}^j}) \tag{6}$$

$$SAloc_r^j = \sum_k^J io^{jk}(Y_r^k) \;\; ; \;\; SAnat_r^j = \sum_k^J io^{jk}(\sum_{l \neq r}^R \frac{Y_l^k}{\tau_{l\_r}^j}) \tag{7}$$

$$IPloc_r^j = Y_r^j \;\; ; \;\; IPnat_r^j = (\sum_{l \neq r}^R \frac{Y_l^k}{\tau_{l\_r}^j}) \tag{8}$$

$$BA_r^j = BAint_r^j = \sum_k^K io^{jk} Y_r^k \tag{9}$$

where k includes various service sectors of the economy.

Access to foreign markets influencing both demand and intermediate good prices, is measured by a single foreign access variable (FMA_r^j) that reflects distance from various borders weighed by their relative importance per sector.

$$FMA_r^j = \sum_{n \neq r}^N \frac{INC_n}{1 + \tau_{n\_r}^j} + \sum_i^{J+K} io^{ji} \left(\sum_{n \neq r}^N \frac{Y_n^j}{1 + \tau_{n\_r}^j} \right) \approx \sum_{n \neq r}^{N=4} \frac{ts_n}{1 + \tau_{n\_r}^j} \tag{10}$$

6.2 Firms versus plants

A key issue is the exact nature of firm location. For we talk about production, plant level data would be necessary to represent the actual production site. However, only firm-level data are available instead. This may a serious problem. However, in the case of firms in Hungary, especially those owned by multinationals, this is not a serious issue. First, looking at several large companies at the National Corporate Register suggests that multinationals established separate entities for many of their operations, with separate companies created for different activities and sectors. Second, industry-level aggregates suggest that the share of the capital city Budapest (which we feared was overrepresented) is just a few percentage points higher in the firm-level data than in the output data based on plants. Thus, we posit that the application of firm-level data should be of no great concern in our practice.

6.3 Corrections to the data

There has been serious effort invested in cleaning the data and several corrections were made to the original APEH dataset by the Magyar Nemzeti Bank, the CEU Labour Project [15] and the author. Three important steps have been taken.

First, longitudinal links for foreign firms were improved using data provided by Hungarian statistics office KSH on corporate entry and exit. CEU Labour Project looked for other longitudinal links in which the firms did not simply appear under a new id number, but actually split up into several firms or were formed via a merger. These allowed to keep track most but not all of firms under transformation.

Second, the ownership structure of new firms was repaired in many cases to make sure that foreign ownership reflected the most likely case. Information from balance sheets and adjacent years' values were used.

Third, sales data for all firms were checked to avoid typing errors. For many firms, sales data were missing. Further problems I found and/or learned from others working with the same or similar datasets included: (1) 0 is imputed instead of actual figures for sales, (2) thousands written instead of millions, (3) one digit is left out making sales figure be 1/10 of actual data, (4) sales and

[15] For a description, see Telegdy (2004). Details are available from the author on request.

export sales figures swapped. Overall, I made modifications reaching almost 2% of the total dataset. In some cases, sales could be estimated by using other balance sheet figures, and in others, the simple average of sales data at $(t-1)$ and $(t+1)$ was used.

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Table 1. Summary statistics

Variable	Source	Area	Mean	Std. Dev.
BASIC: Income per capita	KSH	County	87.234	27.646
BASIC: Population size	KSH	County	505.85	339.57
ACCESS: local own industry*	APEH, AKM	County	649	2637
ACCESS: national own industry**	APEH, AKM	County	231	501
ACCESS: local suppliers*	APEH, AKM	County	1050	2810
ACCESS: local markets*	APEH, AKM	County	1879	5910
ACCESS: national suppliers**	APEH, AKM	County	35444	57427
ACCESS: national markets**	APEH, AKM	County	62166	104197
ACCESS: business services*	APEH, AKM	County	72692	30586
ACCESS: foreign market distance	KSH, IEHAS	County	254	117.4
LABOUR: average wage	LMS	County	31204	14371
LABOUR: industry wage	LMS	County	30362	16232
DEV: no. telephone lines	KSH	County /settlement	123244	158637
DEV: no. students in university	KSH	County	9803	7332.5
DEV: road network density -total	KSH	County	1526.8	563.77
INV: investment central govt*	KSH	County	18472	35035.5
INV: investment local govt*	KSH	County	8964.6	9951.1
DEV: R&D employment	KSH	County	2067.2	4706.3
DEV: administration employment p.c.	KSH	County	6713.8	14331
DEV: administration employment in IT	KSH	County	3281.3	8370.9
INV: administration IT investment*	KSH	County	1362	6671
POLICY: local tax rate	IEHAS Survey	Settlement average	1.202	.5751
POLICY: land price	IEHAS Survey	Settlement average	38.59	60.09
POLICY: infrastructure projects	IEHAS Survey	Settlement average	.8397	.4619
POLICY: investment site	IEHAS Survey	Settlement average	.7671	.2032
POLICY: tax invallowance	IEHAS Survey	Settlement average	.6357	.2238
POLICY: training subsidies	IEHAS Survey	Settlement average	.6916	.2894
Road distance between cities	IEHAS	Settlement	190.5	103.0

IEHAS Institute of Economics, Hungarian Academy of Sciences, KSH: Hungarian Central Statistics Office, „AKM": Input-output tables, „LMS": Annual Labour Market Survey by Ministry of Labour, APEH: Hungarian Tax Authority's corporate database. NB All variables in estimations are taken in logs.
* in million HUF, ** in million HUF, weighted

Table 2. Location choice - Poisson and negative binomial regressions

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Estimation method	*poisson*	*neg.bin.*	*poisson*	*neg.bin.*	*neg.bin.*	*neg.bin.*	*neg.bin.*
BASIC: Income per capita (log)	0.69***	0.80***	0.76***	0.86***	0.30	0.23	0.32
	(0.15)	(0.19)	(0.15)	(0.19)	(0.24)	(0.24)	(0.27)
BASIC: County size (log)	0.32	0.02	0.36	-0.00	0.56	0.38	0.37
	(0.25)	(0.31)	(0.27)	(0.35)	(0.44)	(0.43)	(0.46)
LABOUR: wage (log)	-0.42***	-0.65***	-0.15	-0.45***	-0.29		
	(0.10)	(0.14)	(0.11)	(0.16)	(0.20)		
LABOUR: sectoral wage (log)						-0.78***	-0.85***
						(0.10)	(0.11)
ACCESS: local own industry (log)	0.24***	0.27***	0.24***	0.27***	0.27***	0.27***	0.26***
	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
ACCESS: national own industry (log)	-0.03*	-0.14***	-0.02	-0.13***	-0.12***	-0.11***	-0.11***
	(0.02)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
ACCESS: local suppliers (log)	-0.08***	-0.15***	-0.12***	-0.19***	-0.20***	-0.21***	-0.21***
	(0.02)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)
ACCESS: local markets (log)	-0.09***	-0.09***	-0.06***	-0.05	-0.08**	-0.04	-0.05
	(0.02)	(0.03)	(0.02)	(0.03)	(0.04)	(0.04)	(0.04)
ACCESS: national suppliers (log)	0.00	0.21***	0.04	0.25***	0.25***	0.29***	0.29***
	(0.03)	(0.04)	(0.03)	(0.04)	(0.05)	(0.05)	(0.05)
ACCESS: national markets (log)	0.16***	0.13***	0.17***	0.14***	0.16***	0.08*	0.09**
	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)
ACCESS: business services	-0.26***	-0.19**	-0.32***	-0.25***	-0.32***	-0.13	-0.15
	(0.06)	(0.08)	(0.07)	(0.08)	(0.11)	(0.08)	(0.11)
DEV: telephones (log)	0.15**	0.20**	0.33***	0.38***	0.40**	0.34**	0.24
	(0.06)	(0.09)	(0.07)	(0.10)	(0.16)	(0.16)	(0.17)
DEV: Uni students (log)	0.68***	0.78**	0.55**	0.71**	0.20	0.15	0.28
	(0.25)	(0.31)	(0.27)	(0.34)	(0.40)	(0.40)	(0.41)
DEV: Road density	0.28***	0.24***	0.32***	0.27***	0.21***	0.12**	0.13*
	(0.04)	(0.05)	(0.04)	(0.05)	(0.06)	(0.06)	(0.07)
DEV: R&D employment (log)	0.06**	0.06**	0.09***	0.08***	0.15***	0.13***	0.14***
	(0.02)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
POLICY: local tax rate			-0.25***	-0.22***	-0.08	-0.08	-0.03
			(0.05)	(0.07)	(0.11)	(0.11)	(0.12)
POLICY: local land price (log)			-0.09**	-0.07	-0.07	-0.02	-0.03
			(0.04)	(0.05)	(0.06)	(0.06)	(0.06)
INV: local investment (log)							
INV: national investment (log)							
DEV: administration employment p.c. (log)					0.48***	0.43***	0.35**
					(0.12)	(0.12)	(0.14)
DEV adminsitration employment in IT p.c.(log)					-0.03	-0.03	-0.09
					(0.04)	(0.04)	(0.12)
INV: administration IT investment p.c. (log)					-0.03	-0.05	0.04
					(0.08)	(0.07)	(0.08)
POLICY: infrastructure projects							
POLICY: investment site							
POLICY: tax invallowance							
POLICY: training subsidies							
ACCESS: foreign market distance (log)	-0.43***	-0.41***	-0.40***	-0.38***	-0.58***	-0.57***	-0.57***
	(0.05)	(0.07)	(0.05)	(0.07)	(0.10)	(0.10)	(0.10)
Year dummies							*yes*
Years covered	*1993/2002*	*1993/2002*	*1993/2002*	*1993/2002*	*1995/2002*	*1995/2002*	*1995/2002*
Number of observations	3000	3000	2850	2850	2280	2091	2091
Model chi-square	7081.70	1874.92	Nov-17	1834.67	1409.24	1324.53	1373.82
Degree of freedom	15.00	15.00	17.00	17.00	20.00	20.00	27.00
Log likelihood	-4839.71	-4365.87	-4611.64	-4158.88	-3192.60	-3054.15	-3029.51
Pseudo R2	0.42	0.18	0.43	0.18	0.18	0.18	0.18
overdispersion alpha		0.42		0.41	0.38	0.33	0.30
log likelihood test of alpha=0		947.69		905.52	565.37	493.05	438.14

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3. Location choice - Poisson and negative binomial regressions (cont'd)

	[8]	[9]	[10]	[11]	[12]	[13]
Estimation method	*neg.bin.*	***neg.bin.***	*neg.bin.*	*neg.bin.*	***neg.bin.***	*neg.bin.*
BASIC: Income per capita (log)	0.03	**-0.10**	-0.12	-0.25	**-0.49**	-0.40
	(0.24)	**(0.25)**	(0.28)	(0.30)	**(0.31)**	(0.32)
BASIC: County size (log)	-0.33	**-0.66***	0.05	-0.27	**-0.87***	-0.89*
	(0.37)	**(0.38)**	(0.47)	(0.49)	**(0.49)**	(0.50)
LABOUR: wage (log)			-0.28			
			(0.21)			
LABOUR: sectoral wage (log)	-0.72***	**-0.84*** **		-0.86***	**-0.72*** **	-0.80***
	(0.09)	**(0.10)**		(0.11)	**(0.11)**	(0.11)
ACCESS: local own industry (log)	0.26***	**0.26*** **	0.27***	0.26***	**0.27*** **	0.26***
	(0.02)	**(0.02)**	(0.02)	(0.02)	**(0.02)**	(0.02)
ACCESS: national own industry (log)	-0.12***	**-0.11*** **	-0.12***	-0.10***	**-0.13*** **	-0.12***
	(0.03)	**(0.03)**	(0.03)	(0.03)	**(0.03)**	(0.03)
ACCESS: local suppliers (log)	-0.20***	**-0.20*** **	-0.19***	-0.21***	**-0.18*** **	-0.19***
	(0.04)	**(0.04)**	(0.04)	(0.04)	**(0.04)**	(0.04)
ACCESS: local markets (log)	0.04	**0.04**	-0.04	0.01	**0.05**	0.04
	(0.04)	**(0.03)**	(0.04)	(0.04)	**(0.04)**	(0.04)
ACCESS: national suppliers (log)	0.29***	**0.30*** **	0.25***	0.29***	**0.28*** **	0.29***
	(0.04)	**(0.04)**	(0.05)	(0.05)	**(0.05)**	(0.05)
ACCESS: national markets (log)	0.04	**0.05**	0.14***	0.07	**0.00**	0.02
	(0.04)	**(0.04)**	(0.05)	(0.05)	**(0.05)**	(0.05)
ACCESS: business services	-0.07	**0.10**	-0.24**	0.00	**0.06**	0.08
	(0.07)	**(0.09)**	(0.11)	(0.12)	**(0.09)**	(0.12)
DEV: telephones (log)	0.27***	**0.41*** **	0.31**	0.13	**0.33***	-0.00
	(0.10)	**(0.12)**	(0.16)	(0.18)	**(0.18)**	(0.23)
DEV: Uni students (log)	1.06***	**0.93** **	0.84*	0.92**	**1.28*** **	1.58***
	(0.36)	**(0.36)**	(0.44)	(0.45)	**(0.46)**	(0.47)
DEV: Road density	0.22***	**0.09**	0.25***	0.14*	**0.19*** **	0.22**
	(0.05)	**(0.06)**	(0.07)	(0.08)	**(0.07)**	(0.09)
DEV: R&D employment (log)	0.11***	**0.10*** **	0.19***	0.19***	**0.09***	0.13***
	(0.03)	**(0.03)**	(0.04)	(0.04)	**(0.05)**	(0.05)
POLICY: local tax rate	-0.25***	**-0.05**	-0.20	-0.13	**-0.06**	-0.34*
	(0.07)	**(0.09)**	(0.13)	(0.15)	**(0.17)**	(0.22)
POLICY: local land price (log)	-0.09*	**0.02**	-0.02	0.07	**0.01**	0.01
	(0.05)	**(0.06)**	(0.07)	(0.08)	**(0.08)**	(0.09)
INV: local investment (log)					**0.20**	0.26
					(0.19)	(0.19)
INV: national investment (log)					**-0.61*** **	-0.45**
					(0.20)	(0.21)
DEV: administration employment p.c. (log)			0.50***	0.31**		
			(0.12)	(0.15)		
DEV adminsitration employment in IT p.c.(log)			-0.01	-0.03		
			(0.04)	(0.12)		
INV: administration IT investment p.c. (log)			-0.09	-0.00		
			(0.08)	(0.08)		
POLICY: infrastructure projects	0.08	**-0.00**	0.07	0.10	**0.10**	0.19*
	(0.08)	**(0.08)**	(0.09)	(0.09)	**(0.10)**	(0.11)
POLICY: investment site	-0.69***	**-0.12**	0.16	0.37	**-0.02**	-0.14
	(0.25)	**(0.29)**	(0.33)	(0.35)	**(0.32)**	(0.37)
POLICY: tax invallowance	0.57***	**0.53*** **	0.51***	0.52***	**0.56*** **	0.62***
	(0.14)	**(0.14)**	(0.16)	(0.16)	**(0.17)**	(0.17)
POLICY: training subsidies	1.16***	**0.83*** **	0.59**	0.63**	**0.71*** **	0.95***
	(0.22)	**(0.23)**	(0.27)	(0.27)	**(0.26)**	(0.28)
ACCESS: foreign market distance (log)	-0.88***	**-0.77*** **	-0.87***	-0.87***	**-0.92*** **	-0.97***
	(0.11)	**(0.11)**	(0.13)	(0.13)	**(0.14)**	(0.15)
Year dummies		***yes***		*yes*		yes
Years covered	*1993/2002*		*1995/2002*	*1995/2002*	***1996/2002***	*1996/2002*
Number of observations	2613	**2613**	2280	2091	**1837**	1837
Model chi-square	1757.64	**1864.66**	1427.20	1398.54		
Degree of freedom	21.00	**30.00**	24.00	31.00	**1135.52**	1179.62
Log likelihood	-3959.81	**-3906.30**	-3183.63	-3017.15	**-2647.77**	-2625.72
Pseudo R2	0.18	**0.19**	0.18	0.19	**0.18**	0.18
overdispersion alpha	0.35	**0.30**	0.37	0.29	**0.35**	0.32
log likelihood test of alpha=0	778.51	**670.54**	552.05	428.70	**445.73**	378.05

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%