

The spatial agglomeration of the Enterprises from the Perspective of Corporate Demographics¹

Bálint Koós

The spatial concentration of the population and the economic activity has a long tradition and it is still affecting the change of the settlement structure and the business investment decisions. However, a great number of publications deal with the process of spatial agglomeration, nevertheless, space still represents the last frontier to economics (Krugman, 1998). Therefore, we make an attempt to create a general model within the population approach - corporate demography – that is capable of grasping the spatial agglomeration processes of economics and its motivations and limitations.

Introduction

The spatial agglomeration of economic activities became a focus of attention in the last decades as the process of agglomeration has become an intensive and worldwide phenomenon. A large number of publications from various schools and aspects dealt with this topic and also formulated a new economic school, the new economic geography which is characterised by the Nobel Prize winner Paul Krugman.

At the beginning of our discussion, we shall outline the tendencies and schools of economics, which discuss the issues of spatiality and the spatial changes of economy. Within economics, it is conventionally location theories that are concerned about the issue of spatiality and seek an answer to the question: which point of space would offer suitable or optimal conditions for the operation of an enterprise for a given activity? Traditionally, three major schools exist in location theories (Hayter, 1997): classical – neoclassical, behavioural and institutional location theories. In the past decades these have been complemented by two additional tendencies: the new economic geography approach and the demography of corporations approach (Carroll-Hannan, 2000). Each of the three classical location theories can perfectly model the spatial agglomeration of the economy; however, due to their company-centred – micro level – approach, they cannot or can only with restrictions model a comprehensive process. A population-centred – corporation demographics – approach seems a more suitable method to apply, because it allows for a more general model, which can grasp the driving forces and constraints of economic agglomeration. This approach, although used in more and more researches in English, and lately, even in French and Spanish speaking areas, has received scant attention in Hungary (Román, 2005).

The theoretical framework for building up the model is based on the corporation demographics approach, therefore, we examine how the number of companies changed and what factors influenced the change with particular attention paid to spatial and neighbourhood influences. Because of applying the corporation demographics approach, the analysis must be narrowed to one population only, i.e. organizations, which can be considered homogenous. After considering several aspects, we chose companies belonging to the wholesale and retail trade supersector (section G). Considering the fact that in our research spatial aspects receive special attention, we are going to apply exploratory spatial data analysis (ESDA) and spatial econometric – mostly spatial autoregressive – models, which have rarely been applied (Varga, 1998, Koós, 2007), or presented (Varga, 2002) in Hungary. For calculations, testing and creating graphs and maps, we extensively used GeoDa version 0.95. The statistical and spatial econometric software package developed by Luc Anselin et al. can be used free of charge for

¹ The research was funded by NKTH, Innotárs. 2008 (Határtalan városrészek)

educational and research purposes. For the calculations, testing two different databases are available (Tstar by the Hungarian Central Statistical Office (HCSO) and Cégközlöny [Official Company Bulletin]).

Historical background

The change in the spatiality of economy can be studied in depth in the former socialist countries, where, in the previous regime, due to the lack of or to the limited level of economic freedom, there was little opportunity for spatial adaptation. As a result of this, almost the spatial structure of the 1930s were characteristic of the socialist countries of Central and Eastern Europe. Therefore, the technological development, and the changing patterns of price relations could not be extended to the spatiality of the economy. Following the Soviet economic patterns meant an enforced development of the industry, especially that of the heavy industry, however, this intervention could only marginally influence the inherited spatial structure. Apart from a few large investments, e.g. Tiszaújváros, Dunaújváros the inherited economic structure remained dominant in Hungary (Barta, 2001). The changing of the location system and of the spatiality of enterprises already in operation was not typical since, due to the lack of resources, they concentrated the controls instead of the economic activities themselves. The once independent organizations were united in the 1950s and 1960s on spatial-industrial bases (see Hungarian Mines of Metals and Minerals, Hungarian Rubber Company Limited). The united economic organizations mainly resided in the capital and in metropolitan municipalities. As a result of the process, the Hungarian economy became highly concentrated, in which, surpassing the prevailing small-scale industry of the 1930s, large organizations employing several thousands of employees were producing the goods. Modernization, however, was merely an imitation in many cases as organizing the large number of micro-level and small companies into one middle-sized company was more a tool of statism than an exploitation of the advantages in the economies of scale or the enhancing of efficiency. The socialist price control concealed for a long time the disadvantages of the diffused location structure, the unnecessary parallelisms, the high operation costs of the locations and the high transportation demand. In the period before the change of regime, due to the companies' restricted decision-making power and to the artificially distorted price situation, there was no interest or way to wind up locations that had become "suboptimal" for the dynamic changes in the conditions (e.g. oil price explosion, the development of technology, infrastructural development) or, parallel to this, open up new production locations. (The expressions 'optimal' and 'suboptimal' must be used with caution when not used in market conditions since the decision-makers had to optimize conditions in a world full of distorted information, a world, in which not demand and supply, but politics controlled the prices.) There were also strong political reasons behind the spatial stabilization of the economy and the fact that it was unable to conform: the closing and re-location of plants would have shaken the main pillars of the social standing, i.e. social security and the superiority of planning over competition. Of course, we can find examples of re-location in socialist Hungary, but most of them were realized for environmental (e.g. to move polluting industries away from the capital) and political reasons (to create workplaces) rather than economic ones. Despite all company relocations and liquidations, the location structure of the economy, its spatial organization became obsolete. After the foundation of Great-Budapest in 1950, significant industrial areas were incorporated into the body of the city and so, the manufacturing plants originally built on the edge of the town (such as Ganz, Tungsram, Cable Works, Goldberger etc.) were now integrated parts of the city, which caused problems not only to the residents in the area, but it also limited the development of the company (due to the lack of development areas).

The enterprises now constrained by residential areas were willing to establish locations in the countryside, where both the area for further development: sites for building factory halls, warehouses etc., and the basis to increase workforce was available. As opening locations in the countryside intended the use of further resources (i.e. increase workforce), the increase was basically extensive, and it did not aim at more efficient exploitation of the resources; on the contrary, with the increased transportation demands expenditures rose. For example, the Telephone Factory's seat in Budapest produced and developed the most advanced high-technology product of the era: crossbar telephone exchange systems, whereas, its location in Bugyi did the mass-production of telephones, and warehousing was carried out in Nagykáta. Thus, several plant locations could be "released" from the confined seat in the capital city. An impressive number of workers could be recruited for assembly work that proved hard to find in the capital city already in the seventies. Similar processes have taken place in other economically developed countries as well, however, there the urban-rural manufacturing shift was much higher in volume and intensity and meant the relocation of entire industries (Keeble, 1980, 1986, Norcliffe, 1984). We can conclude that during the socialist era, spatial relocation in many cases only imitated the patterns of the other developed economies, and although followed them in many respects, in its main ideas it was different. The exceptionally fast "alignment" process that followed the change of regime, and which was reducible to the domination of concurring factors proved this fact. Consequently, these effects that were dominant in Hungary after the change of regime and were quite intense, originated from various resources and strengthened, occasionally even predominated over one another.

By the enactment of the new economic laws after the change of regime in 1988, market forces gradually became dominant: this encouraged a spatial relocation of the economy that had taken place in the central areas of the world economy 20-30 years earlier. The external effects had a strong influence on the companies (e.g. price relations, technological development, communication technologies, governmental intervention, infrastructural development, external market relationships) since they had to cope with a lag of thirty years behind the advancement of telecommunication. By enormous state, municipality and private investments, the basic elements of the infrastructural network (telephone, electricity and water) were established in all settlements of the country, which physically enabled the spatial reorganization of the economic activities. However, as opposed to the core areas of the market economy, in the regime change countries, including Hungary, the processes within the companies significantly influenced the spatial reorganization. Most important of these is the appearance of real owners in the economic sector, who put forward their interests, and so, efficiently hosted the development of a real market economy, one in which relationships were mainly guided by economic and not political interests. We must, however, also consider the conditions that reorganized the real estate market more directly. Apart from the change of cost relations (infrastructural and technological developments), the process was influenced by such social phenomena as suburbanisation, change of life-style and the evolution of a different scale of values.

How has the Hungarian economy changed spatially in the past decade? The spatiality of the economy has changed most intensively in the agglomeration of Budapest; it is the most spectacular example of economic agglomeration and decentralisation in the same time. Upon an territory census database analysis of tax returns from enterprises with double entry book-keeping between 1992 and 2003 we can conclude that for enterprises residing in the capital city, the share of net sales income was gradually reducing (from 49.9% to 44.2%), whilst in the settlements of the Budapest agglomeration we can see a gradual increase, from 3.3 per cent to 10.2 per cent. In other words, the agglomeration of the capital as a whole, i.e. the city

of Budapest and the eighty settlements of Pest county belonging to the agglomeration, managed to increase its economic significance further after the change of regime (from 53.2% to 54.9%). Based on the above, we can say that there was no shift towards homogenisation in the examined period; the “expanding” of the economy of Budapest was more relevant. However, it would be an over-simplification to narrow the scope of agglomeration to the capital city only. Undoubtedly, the most intense and geographically largest (that involves most settlements and people) process of decentralisation occurred in that region, still, this process occurred in and around other major towns of the country as well. Apart from Budapest, in the suburban area of Sopron, Szombathely, Győr, Komárom-Esztergom, Székesfehérvár, Kecskemét, Eger enterprises with double entry book-keeping could realize a growth in their net sales revenue at a higher rate than the national average.

Model building

In building up the model, we will put forward 4 hypotheses, which form a logical chain, the links building on the test results of previous hypotheses. To identify the agglomerating zones, we are going to apply the model developed by Boiteux-Orain – Guillain– Le Gallo (2004), where a settlement was considered part of an agglomeration if company density was high (i.e. the number of companies in the wholesale and retail trade supersector (section G) per thousand capita) not only in the settlement but also in its environment; this means a co-movement between the neighbouring spatial units, and positive autocorrelation.

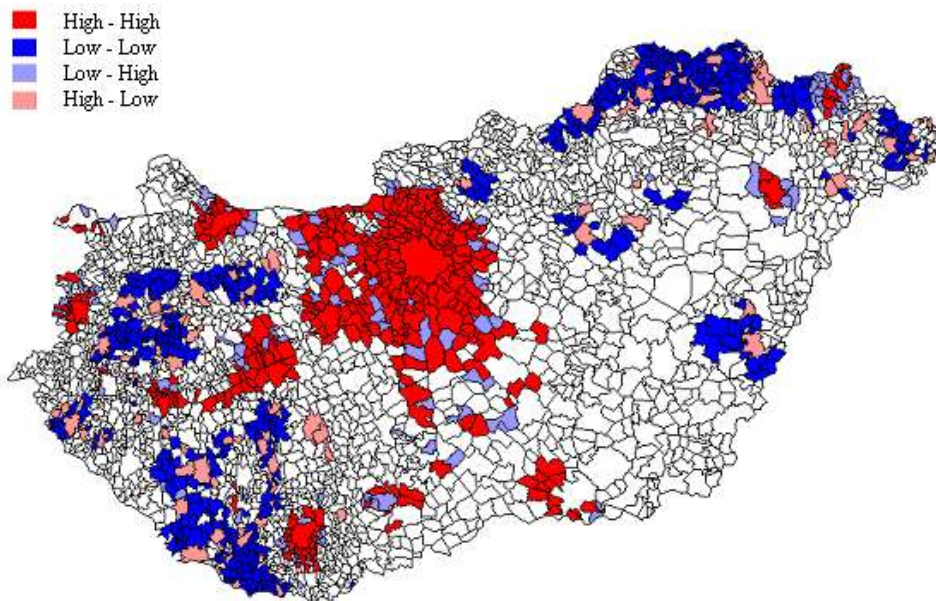
To measure this type of co-movement and autocorrelation, I am going to apply the local Moran’s I statistic (Anselin, 1995),, which can be determined for each ‘i’ observed (spatial) unit in ‘t’ point in time as:

$$I_{i,t} = \frac{(x_{i,t} - \mu_t)}{m_0} \sum_j w_{ij} (x_{j,t} - \mu_t) \quad \text{where} \quad m_0 = \sum_i (x_i - \mu)^2 / n$$

where $x_{i,t}$ is the tested variable in ‘i’ unit of observation, its value in ‘t’ point in time, ‘n’ is the number of units, $w_{i,j}$ is the spatial weight that identifies the type of neighbourhood relationship and μ_t is the mean of the values that the neighbours of unit ‘i’ realize in ‘t’ point in time. If the local Moran’s I statistic is positive, the given spatial unit and its neighbouring units have similar values (below or above the mean), and this means that the examined spatial unit is part of a spatial cluster. If the statistic is negative, the examined spatial unit and its neighbours are not similar to each other; this is independent of the kind of relationship between them, it can be both a high-low or low-high relationship.

The cluster analysis of data from the Cégközlöny met the expectations, and we could identify groups of settlements where company density of the wholesale and retail trade supersector (section G) was significantly higher than in their neighbouring environment. In Map 1, settlements with a (high-high) relationship marked in red have high company density both in their own settlement as well as in their neighbourhood (secondary neighbours); therefore, we can identify these regions as parts of an economic agglomeration.

Map 1: Clusters upon the MORAN-I statistic values based on data from the Cégeközlöny (Complex) in the wholesale and retail trade supersector (section G) per thousand capita in 2004



Source: own editing, using GeoDa 0.95. At secondary neighbourhood relationships, 0.05 level of significance. In the case of a high-high relationship, both in the settlement and, on an average, in the neighbouring settlements company density was high. In the case of a low-high relationship, company density was low in the settlement, while, on an average, in the neighbouring settlements it was high. In the case of a low-low relationship, both in the settlement and in its neighbourhood company density was low. In the case of a high-low relationship, company density was high in the settlement, while, on an average, it was low in its neighbourhood.

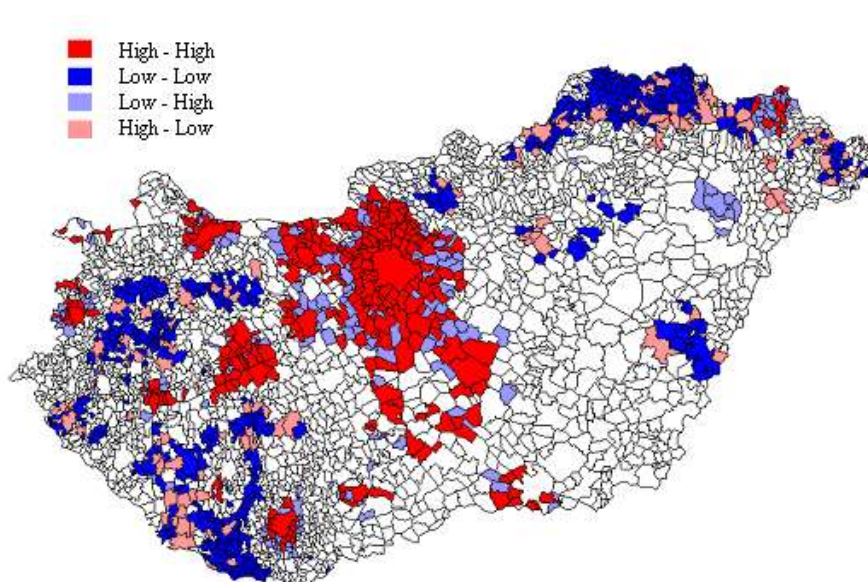
40 per cent of the Hungarian population live in regions where company density is high, i.e. in economic agglomerations, however, nearly two-thirds (61.9%) of companies in the wholesale and retail trade supersector (section G) reside in these regions. By spatial cluster analysis, although not aimed, we could also identify the opposite of economic agglomerations, i.e. the economic periphery, regions smaller or bigger in size, where company density was lower than the national mean. These regions of low-low relationships are mostly in the backward, small village regions of the country (e.g. Dráva-mente, Cserehát, Somogy, Bakony etc.).

While testing the first hypothesis we found that with the chosen methods and data available the economic agglomerations with high commercial company density can be identified (typically major towns and their environment) for the year 2004. However, we can presume that after the change of regime, intensive agglomeration processes evolved. As a result, between 1992 and 2004 the number of settlements belonging to an economic agglomeration with high commercial company density increased. The validity of this statement can be checked by an ESDA method – the bivariate local Moran's I. The bivariate local Moran's I statistic can be calculated the same way as its one variable type, the only difference is that it compares the value of 'x' variable in 'i' spatial unit in 't' point in time (company density in 1992) to the mean value of 'y' variable in the neighbouring spatial units of 'i' (company

density in 2004). When this figure is positive, the value of ‘x’ variable (below or above the mean) in ‘i’ spatial unit and the value of ‘y’ variable (below or above the mean) in the neighbouring spatial units of ‘i’ shifts in the same direction, however, when this figure is negative, they are in opposite relationship, i.e. if the value of ‘x’ variable is above the mean, the value of ‘y’ is below the mean in the neighbouring spatial units. Therefore, if we presume that intensive agglomeration did begin in Hungary in the period after the change of regime in the identified economic agglomerations, then on the periphery of these agglomerations there also had to appear settlements where company density was low in 1992, but in whose secondary neighbourhood, company density was high in 2004.

After identifying the bivariate local Moran’s I statistic and carrying out the cluster analysis for the Tstar database, we found (see Map 2) that in the vicinity of major towns, especially in the Budapest agglomeration, several settlements (e.g. Herceghalom, Maglód) “emerged” to the level of the neighbouring economic agglomeration with high company density between 1992 and 2004. This process was particularly intensive in the vicinity of the capital city, however, it can be detected in the narrower agglomerations of Győr, Székesfehérvár, Tata–Tatabánya, Esztergom, Pécs, Szombathely and Kecskemét. The database Tstar confirmed that in Hungary between 1992 and 2004 economic agglomerations with high commercial company density expanded, and included more settlements at the end than at the beginning of the period. This means that in Hungary, following the change of regime, economic agglomeration took place, which linked new settlements to the core economic areas and agglomerations of the country.

Map 2: Spatial extent of economic agglomerations with high company density between 1992 and 2004, based on data from Tstar database. (*Agglomerating settlements marked in light blue*)



Source: own editing, using GeoDa 0.95. Number of enterprises in the wholesale and retail trade supersector (section G) per thousand capita, at secondary neighbourhood relationships, 0.05 level of significance. In the case of a high-high relationship, company density was high in the settlement in 1992, and it was high in its neighbourhood in 2004. In the case of a low-low relationship, company density was low in the settlement in 1992, and it was still low in its neighbourhood in 2004. In case of a low-high relationship, company density was low in the settlement in 1992, but it was high in its neighbourhood in 2004. In the case of a high-low relationship, the company density was already high in the settlement in 1992, but it was still low in its neighbourhood in 2004.

After the enactment of the new economic laws of 1988 realizing economic freedom, although there were no legal barriers any more, the number of companies did not start to grow dynamically in Hungary. There was a high level of uncertainty about the new situation and after 40 years of socialism, entrepreneurial initiative was low, thus, it is no wonder that the number of enterprises newly established were very low and concentrated mostly in major towns. As people started to have more trust that the political and economic changes will last, more and more companies in the wholesale and retail trade supersector (section G) were established in the economic centres. Furthermore, as the establishment and operation of enterprises became more and more accepted, with shorter or longer lags in time, companies were established in the settlements further away from the centre. Considering that the flow of information necessary to this (sharing and gaining experience) is highly dependent on strong personal relationships (Hedström, 1994, Czakó–Kuczi–Lengyel–Vajda, 1995, Kuczi, 1996, 2000, 2002, Kuczi–Makó, 1996, Csata, 2006), we can assume that the spatiality of these processes can be seen in the data of commuting, as it can show us which settlements are interlinked socially and economically.

Commuting makes a kind of impression of the extremely complex network of connections between the different settlements: they show which settlements are central, how far they extend and how strong the relationships are between the settlements. This fact is highly significant, because in settlements strongly related by commuting on a daily basis, the taking over of innovations (e.g. establishing a company), the sharing of information and experience is much faster than in settlements without such an intensive relationship; therefore, in settlements with such an intensive relationship, the number of companies established is supposedly higher. In other words, innovations, new patterns of behaviour and experience are spread by commuting relationships and, eventually, lead to spatial agglomeration.

When building up our model to test this hypothesis let us assume that the company density in the wholesale and retail trade supersector (section G) for the year 2004 was affected by the number of population in the given settlement, the average income of its residents, the central town's influence on it, the legacy (company density in 1992), the type of settlement and the fact whether it belonged to a popular holiday resort (e.g. Lake Balaton).

Summarizing it in the formula:

$$y_{i,2004} = \alpha x_{i,1} + \beta x_{i,2} + \gamma x_{i,3} + \delta x_{i,4} + \varepsilon x_{i,5} + \phi x_{i,6} + \varepsilon_i$$

where 'y_{i,2004}' is the number of enterprises in the wholesale and retail trade supersector (section G) in 2004 in 'i' settlement, 'x_{i,1}' is the legal status of settlement 'i' (its value in a town is 1, in a township 0). 'X_{i,2}' shows that the settlement belongs to a popular holiday resort (its value for settlements along Lake Balaton is 1, elsewhere 0), 'x_{i,3}' is the income of the residents in the settlement (monthly net income mean value of a personal income tax payer per capita, in percentage of the national monthly net income mean value). 'X_{i,4}' is the number of population in settlement 'i' (natural logarithm value of residents); 'x_{i,5}' is the "gravitational pull" of the economic central settlement (assigning to all settlements the "weight" of its most important target settlement of commuting, i.e. the natural logarithm value of the number of enterprises in the wholesale and retail trade supersector (section G) to the rate of the number of workforce from settlement 'i', who found jobs in the given central settlement in 2001). The

gravitational pull calculated is higher if the number of enterprises is higher in the given settlement and if more people from settlement ‘i’ found jobs there. Finally, ‘ $x_{i,6}$ ’ variable is the historical legacy, i.e. the state of the settlement at the time of the regime change (the number of enterprises in the wholesale and retail trade supersector (section G) per thousand capita in 1992).

Using the estimator of least squares for the parameters of the model we get very good results. ‘ R^2 ’ value was 0.549, which shows that with independent variables in more than half of the cases we can correctly estimate the actual company density of the commercial enterprises. Contrary to the expectations, the testing of the variables showed that the population of the settlement was not an explanatory variable. By removing this ($x_{i,4}$), in a repeated estimation we found that the explanatory variable was hardly reduced, pseudo R^2 was 0.548, in spite of the fact that the number of explanatory variables was reduced by one. As there were no signs of multicollinearity or heteroscedasticity in the tests (Jarque-Bera, and Breusch-Pagan), the results gained are considered undistorted (see table 1). For the purposes of our thesis it is highly important to note that the estimation carried out by the estimator of least squares showed that the economic strength and the intensity of relationships of the central settlement of commuting had a significant and positive effect (0.46) on the commercial enterprises in the settlements. In the settlements where the workforce finds jobs to a high degree in strong economic central settlements (capital city, regional centre or municipality), the number of companies in the wholesale and retail trade supersector (section G) will also be high. Whereas, settlements which cannot link to such a strong economic centre, will have a lower number of commercial enterprises.

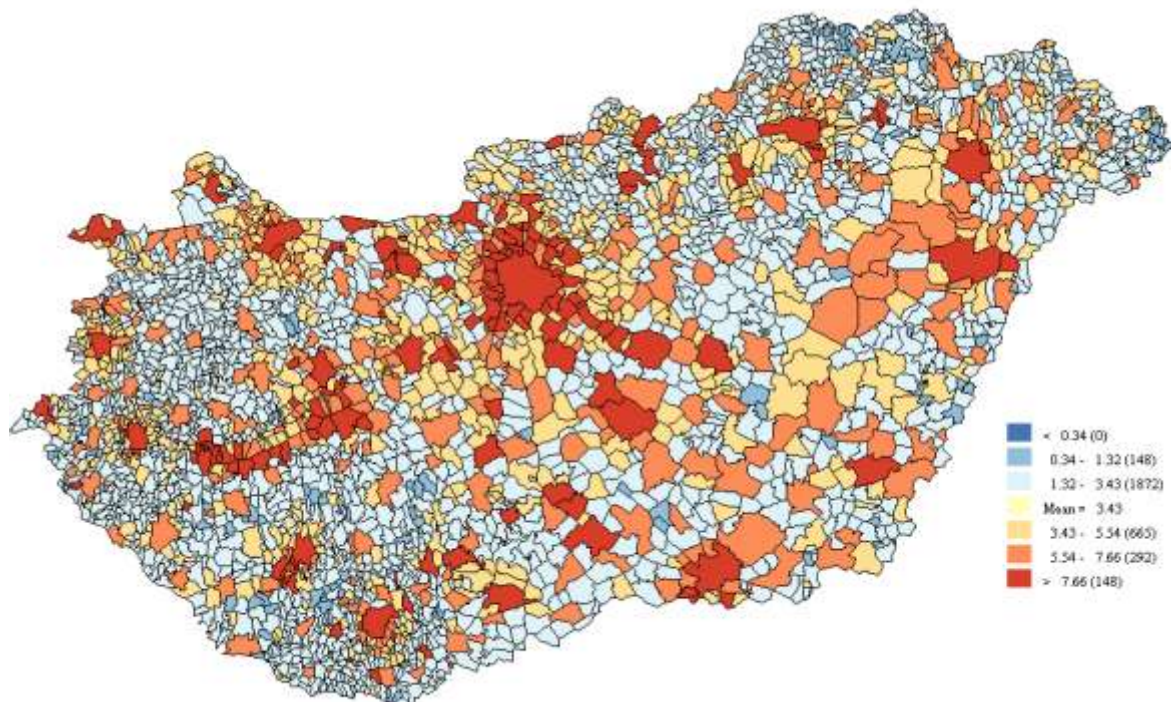
Table 1: OLS estimates for the parameters of the model

Variable	Coefficient	Std.Error	t-Statistic	Probability
$x_{i,3}$	0.01802919	0.001538358	11.71976	0.0000000
$x_{i,1}$	2.748573	0.2566474	10.70953	0.0000000
$x_{i,2}$	2.201195	0.5370377	4.098772	0.0000426
$x_{i,5}$	0.4650379	0.05124747	9.074359	0.0000000
$x_{i,6}$	0.7974209	0.04126668	19.3236	0.0000000

Source: own calculations, using GeoDa 0.95.

The results are in harmony with the assumptions and results of the gravity models and the research of the demography of corporations. The effects of the economic strength of the central settlements were studied and proved by several gravity models, for instance, Bajmóczy–Kiss (1999), Beluszky (1984). Kádas (1976) Nemes Nagy, J (1998), also emphasize the importance of personal relationships and daily commuting that was also emphasized by the research of the approach of corporation demographics. After the estimation and creating graphs of the results (see Map 3), we can conclude that the model-construction was successful, and it harmonizes with the experience of everyday life. Commercial company density, in this model, was also high in the major towns and in the settlements along Lake Balaton.

Map 3: Number of enterprises in the wholesale and retail trade supersector (section G) per thousand capita in 2004, estimated upon the model



Source: own editing, using GeoDa 0.95.

We found that the intensive commuting relationship with the economic centre has a positive effect on the commercial company density of the settlement. This is in harmony with the results of the location studies in corporation literature (e.g. Venkataraman – Van de Ven – Buckeye – Hudson, 1990; Geroski, 1995). New enterprises, on an average, start their operation in the vicinity of the owner’s place of residence (Katona–Morgan 1952; Mueller – Morgan 1962; Cooper – Dunkelberg 1987). This can be explained by the entrepreneur’s social integration, i.e. assuming that the entrepreneur’s social relations (Stinchcombe, 1965) and personal relations that make mobile capital funds, information etc. available are spatially limited (Granovetter, 1985), which influences the spatiality of the new enterprise as well since the enterprise can be successful upon these relationships and upon building different kinds of mobile capital funds from them (Granovetter – Swedberg, 2001). What also affects economic spatiality is that new enterprises are usually brought to life based on the entrepreneur’s former work experience; so he will establish an enterprise in the same industry he used to work as an employee in (Cooper, 1973). This, in itself, refers to the agglomeration of economic activities (Sorenson–Audia, 2000). To establish and operate an enterprise successfully is not only dependent on the different types of capitals, but also on the tacit knowledge of the industry (Polanyi, 1962), resolution and self-confidence that will help the entrepreneur through the hard periods (Bandura, 1986). To gain the necessary self-confidence, one must need to have

an industry-specific experience and the personal reassurance that can be gained through the positive examples of similar people coming from similar conditions (Sorenson–Audia, 2000; Kuczi, 2002). As a result of these, according to enterprise literature, numerous enterprises can operate in the vicinity of economic centres because, on the hand, residents, due to their working in the centre, can gain the necessary skills, practice, self-confidence and connections to launch an enterprise, so their chances of becoming successful entrepreneurs is higher than that of those without such a background. And, on the other hand, the vicinity of the economic centres have that very important advantage of being able to offer appealing location conditions (e.g. extensive development areas, reduced real property prices) for entrepreneurs and enterprises moving out of the centre and mostly the same advantages that a centre can offer, e.g. skilled experts.

All these factors indicate homogenisation, which, however, is not in harmony with the experience of everyday life. Therefore, there must be a factor that restricts the spatial “spreading” of commercial enterprises, because without such barriers (theoretically, at least), there would be total homogenisation commercial enterprises regarding company density. We may assume that there is one factor that restricts global equalisation: enterprises residing in the economic centre are less likely to go out of business than the ones in the periphery.

According to the approach of corporation demographics, the more companies operate in the same niche, the higher competition will be between them for the resources (Carroll – Hannan, 2000). At the same time, an intensive competition between the organizations or companies will lead to the competitiveness of the organizations (Barnett–Hansen, 1996), so they will be likely to persevere in the increased competition from new enterprises entering the market. The advantages of competitiveness stem from the fact that enterprises operating in economic centres have “*prepared and got used to*” competition and the fact that in the regions with high company density external economies of scale or, as Weber used, agglomeration advantages are available (Weber, 1909) that are not offered for those operating in areas with low company density. (Meaning: developed supporting and service industries, skilled workforce, opportunities for specialization etc.) In our assumption, commercial companies in the central areas of economy, where company density is higher, can cope with competition better than their competitors newly entering the market. Enterprises entering the market at a later date and further from the centre lack this advantage (of agglomeration or “experience of competition”), thus, they have a higher failure rate as well.

To test the hypothesis, we can build up a simple model in which, for the given period, the number of enterprises going out of business is determined by the number of enterprises at the beginning of the period, the number of new enterprises established during the period and the balance of migration (i.e. the difference between the number of enterprises moving in and moving away from the settlement) in the examined period. That is, we presume that the number of companies going out of business is basically determined by the change in the number of companies with a seat in the settlement (already existing, moving in or newly established).

Summarizing it in the formula:

$$y_{i,(2001-2003)} = \alpha x_{i,2001} + \beta z_{i,(2001-2003)} + \gamma w_{i,(2001-2003)} + \varepsilon_i$$

where ‘ $y_{i,(2001-2003)}$ ’ is the number of enterprises in the wholesale and retail trade supersector (section G) going out of business in settlement ‘i’ between 2001 and 2003. ‘ $x_{i,2001}$ ’ is the

number of commercial enterprises at the beginning of the period in ‘i’ spatial unit, ‘ $Z_{i, (2001-2003)}$ ’ is the number of newly established commercial enterprises in ‘i’ spatial unit between the examined period of 2001 and 2003. In the model ‘ $W_{i, (2001-2003)}$ ’ is the difference of enterprises in the wholesale and retail trade supersector (section G) moving in and moving out of ‘i’ spatial unit, i.e. the balance of migration of commercial enterprises between 2001 and 2003.

The database *Cég-Kód-Tár* published by the Hungarian Central Statistical Office proved to be a suitable database, since it has provided basic elements on companies (such as company name, seat, date of foundation, NACE Rev.1 code, i.e. supersector section code etc.) since 1997. (Unfortunately, the Hungarian Central Statistical Office has published this database since 1997, thus, we could not register the momentous period of the change of regime, when there was an “urge” to establish new commercial companies.) As could be seen for the variables in the model, we are going to examine the period between 2001 and 2003. By comparing the company-level data, we will be able to identify the number of the important companies that went out of business, were relocated or newly established; their territory census series will be suitable for parameter modelling. “Companies that went out of business” are companies which were present in the *Cég-Kód-Tár* in 2001, but in 2003, they were not; and companies that were established after 2001, but went out of business before 2003, thus are not in the Register. “Newly established companies” are companies, which first appear in the Register in 2003. “Companies relocated” are those companies that changed their seat during the examined period, i.e. the seat in 2003 was different from the seat in 2001, therefore, companies which were established after 2001 and changed their seat before 2003, will appear among the “newly established companies”. The estimation of using the estimator of least squares for the parameters of the model formulated above (see table 2), found the following results.

Table 2: OLS estimates for the parameters of the model

Variable	Coefficient	Std.Error	t-Statistic	Probability
$W_{i, (2001-2003)}$	-8.079814	0.2496987	-32.35825	0.0000000
$Z_{i, (2001-2003)}$	-0.6103396	0.04005573	-15.23726	0.0000000
$X_{i,2001}$	0.3120821	0.004512285	69.16275	0.0000000

Source: own calculations, using GeoDa 0.95.

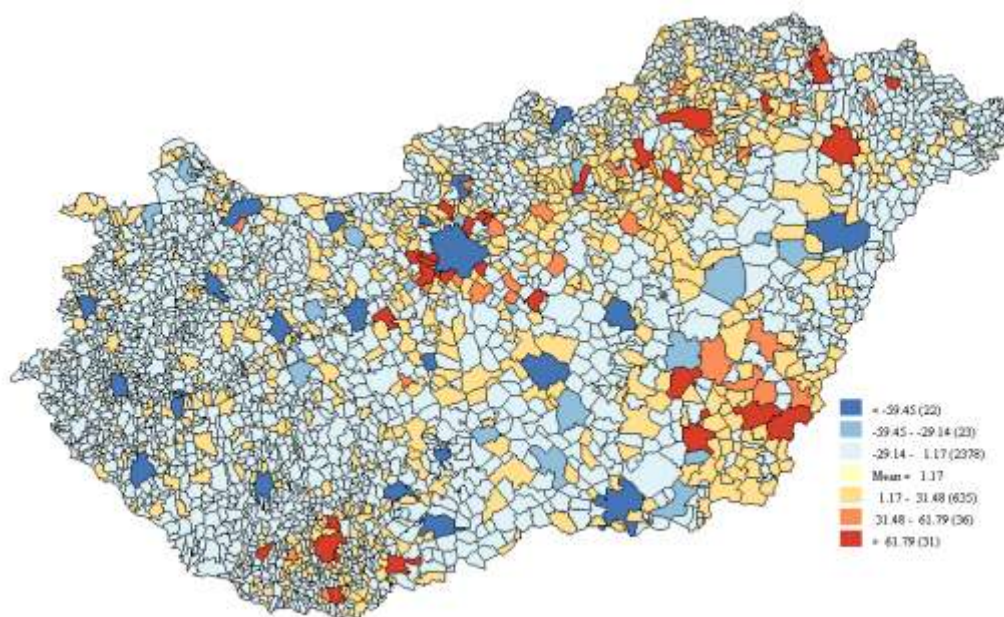
The estimation of using the estimator of least squares for the parameters of the model and the testing of both the model and the estimates show a favourable picture. Multicollinearity could not be detected, the value of multicollinearity (MCN), in our case was 17.6. In using GeoDa, the value over 30 would be highly suspicious, the normality of error terms is provided (Jarque-Bera test), heteroscedasticity could not be detected upon the Breusch-Pagan test. Upon the above we can conclude that the results gained by the estimator of least squares are undistorted.

At a country-level we may assume that nearly one-third of commercial companies that existed in 2001 (0.312) went out of business by 2003, which shows a very dynamic picture. The newly established 15,690 companies could not replace the 33,225 ones going out of business, thus, based on the data from the *Cég-Kód-Tár* of the Hungarian Central Statistical Office, the number of companies in the industry sector fell from 125,329 to 107,794. In such a narrowing number of population it is no wonder that the relationships are special. Commercial

companies relocated to a given settlement did not grow, but reduced the number of companies going out of business. This negative effect is highly significant (-8.079) in the balance of migration. Roughly, we may assume that if a company relocates its seat to the settlement, then it saves 8 local companies. The establishment of new companies has a similarly negative, however, much smaller value (-0.61). The establishment of ten new companies saves six local companies. Simplification, as always, however, is most dangerous. In the examined period, both the numbers of company foundations and the main regions of company relocation were in the major town agglomerations, where, little to our surprise, the number of companies going out of business was lower since company foundation centred in these areas as well. We can say that in this period there was a consolidation of the industry, a lot of enterprises that proved unmarketable went out of business, and new companies were established mainly in regions (in major towns and their agglomerations), where they found a market niche, where the probability of companies going out of business was lower. The main source of reorganization was the foundation of new economic enterprises, but relocation also significantly influenced the process.

To verify our last hypothesis, however, it is not the result that is important, but errors of estimation. In our hypothesis in settlements where company density developed relatively early, we are going to estimate the number of companies going out of business systematically higher, because companies residing in these settlements and regions have an advantage of competitiveness. This advantage is partly due to external economies of scale and due to the fact that they are in a more intensive competition with each other than those companies of the same industry sector, which were established later or which operate in settlements where company density is lower. We have to examine the size and direction of differences between the estimations and the actual facts. The identification of the residual values and the creation of graphs of the results (see Map 4) prove a great help in the interpretation of the results: it helps to recognize repetitions and patterns.

Map 4: Difference between the estimate of companies going out of business and the actual values based on the modified model, between 2001 and 2003



Source: own editing, using GeoDa 0.95. For companies in the wholesale and retail trade supersector (section G), source of data: publications of *Cég-Kód-Tár* from the Hungarian Central Statistical Office from 2001 to 2003

The first and most important statement that we can make is that the actual number of companies going out of business in major towns is lower than the estimated number, i.e. there are signs referring to the fact in these regions, the companies in operation have an advantage of competitiveness. We must add, however, that this advantage is not uniform, because it was not always relevant to the major towns: e.g. in Miskolc, Nyíregyháza and Pécs the projected number of companies going out of business was underestimated. Nevertheless, we see that the settlements where company density was high in 1992 already (e.g. Győr, Tata-Tatabánya, Székesfehérvár, Veszprém, Siófok, Keszthely and Pécs) realized a lower failure rate with the exception of one settlement, which seems to prove our hypothesis. The municipality of Pécs can be regarded as the exception, because although company density was high in the settlement and in its suburban zone in 1992, the number of companies going out of business was higher both for Pécs and for the settlements in its agglomeration between 2001 and 2003. Considering that in the examined period in the other, slowly developing regions and major towns of the country, such as Miskolc, Eger, Gyula, Békéscsaba and Nyíregyháza, the number of companies going out of business was – similarly to Pécs – higher than expected, we may think that some kind of local spatial effect influenced these spatial units; however, some kind of systematic error in the source of data is also possible.

In the verification of the first hypothesis, we identified the settlements in whose neighbourhood there was a spatial cluster with high company density between 1992 and 2004 (see map 2.). From the then classified 44 central settlements, in 42 the failure rate proved to be much lower than the national mean value (26.51%); the two settlements of Tata, 7.4% and Szentendre, 17.6% represented the two absolute values. In the case of the other two towns, however, the situation is different: In Budapest, the failure rate was in accordance with the national mean for the period between 2001 and 2003; but in the case of Pécs, the failure rate was incredibly high, it reached 55 percent. We presume that these results were not only due to real processes, but also to the special features of the database and its incidental errors, therefore, we are going to move these two towns from our examination. Apart from the two unique major towns of Budapest and Pécs, we can conclude that in settlements where company density was significantly high in 1992, the number of companies with a seat in the settlement had a much lower chance (13.2%) of going out of business than in case of any other type of settlements in the period of 2001 and 2003. The settlements where the opposite processes were characteristic, realized the economic periphery. In these regions, the number of failure rate was incredibly high between 2001 and 2003. Nearly 40 percent (39.1%) of all commercial enterprises operating in the periphery did not survive 2003, which shows three times the failure rate of the most advantaged regions. In such circumstances we can conclude that companies established in settlements far from the economic centres lack of competitiveness is so high that this will impede their consolidation and development; and, in the end, they will form part of the settlement's economic peripheralizing process.

Conclusion

The information gained through the testing of the hypotheses enables us to formulate a theory, which describes the agglomeration of business organizations, and perhaps will take us closer to a better understanding of the agglomeration process. We can do this because when we built up and tested the hypotheses, we presumed and demonstrated general, i.e. non-industry specific effects and factors by examining one particular industry. Let us assume that an economic centre exists at the beginning of the period where the seeds of a new economic activity appear, be it silk-weaving or e-commerce. Then the majority of or perhaps all the companies involved in new activities are concentrated in the centre. In the beginning, there is

a great social distrust of those involved in the new activity: this happened in Hungary at the end of the 1980s, or in a historical perspective, at the birth of the capitalist economy. The more people become familiar with the new activity, the more it becomes accepted within the society. Therefore it becomes easier to establish and operate enterprises for the new activity since social opposition weakens or people might even become supportive: this makes it easier to gain the necessary workforce, expertise and capital for the enterprise. Owing to this, more and more enterprises are set up, sometimes even beyond the boundaries of the central settlement.

The human factor plays a particularly important role in this spatial decentralisation. According to enterprise literature, when entrepreneurs start a new activity, they come under the influence of numerous factors that all affect the spatiality of the new enterprise and, although unintentionally, encourage the spatial agglomeration of activities (Sorenson–Audia, 2000). New enterprises are usually brought to life based on the entrepreneur's former work experience (Cooper, 1973), on a location close to his place of residence (Katona–Morgan 1952). This can be explained by the entrepreneur's social integration, and the fact that the entrepreneur's social relations (Stinchcombe, 1965) and the personal relations making mobile capital funds, information etc. available are spatially limited (Granovetter, 1985). Thus, development similar to that of the centre occurs also in settlements, which are in an intensive relationship with the centre (commuting). Resistance to the appearance of new enterprises is, however, is less significant. The success of enterprises in the centre or, at least, their acceptance legitimizes the newly established enterprises in such a way that it becomes easier to launch and operate them. (Enterprises outside the centre can often start operating with the help of capital and professionals coming from the centre itself. An encouraging factor is that costs are lower outside the centre.) As a result of this process the new economic activities, which were earlier characteristic of the centre only, become typical in a larger area, i.e. in the settlements of the developing economic agglomeration.

As the number of enterprises in operation in a given area is increasing, the effects inhibiting the rate of growth is becoming more evident. As the density of enterprises becomes higher, competition for resources (raw materials, workforce, etc.) becomes increasingly frequent, which in turn partly decreases the drive to establish new enterprises and contributes to the growth of the failure rate. The survival chances of enterprises on the market are not equal, though. In regions where the number of enterprises in operation is high enough (i.e. company density is high), certain external advantages of economy of scale form, which means a competitive advantage over other enterprises. (E.g. availability of workforce with special skills, contacts already established with R&D institutions or the provision of special infrastructure). It may also contribute to the competitive advantage that enterprises operating in regions with high company density are "more prepared" as a result of more intense competition. They have the organizational procedures, routines, abilities and reserves necessary to be able to fight off fierce competition even in such conditions. Depending on the branch of industry this competitive advantage, whichever source it has, can be so great that competitors are not able to balance it and the dominance of the previously established economic pole – or rather that of its companies – is maintained.

If no such advantage of competitiveness exists in a given branch of industry in connection with high company density or at such a low level that it can be balanced by other factors (e.g. lower wage costs, different tax burdens etc.), spatial decentralisation of the given economic activity begins. It is not confined only to the immediate vicinity of the economic pole (agglomeration), it also appears further out. However, it is also important to point out that

although the significance of the economic core decreases due to decentralisation partly on the account of its own agglomeration (suburbanisation) and partly because other economic agglomerations gain ground, full equilibrium is rare.

The principal aim of the thesis was to build up a general model, which can describe the spatial agglomeration of business organizations, thus contributing to the extension of the corporation demographics approach to spatial economic processes. By using the model outlined above, it is easier to understand the processes and spatial aspects of agglomeration, this rather complex, social-economic process. A likely field where the results can be used is community (municipality, county, regional and national) development policy. According to the results, it is not regional centres or underdeveloped regions that need to be in the spatial focus of development but economic agglomerations in order to create the external advantages of the economy of scale which improve the competitiveness of enterprises operating in those regions.

List of References

- Anselin L. (1995): Local Indicators of Spatial Association-LISA, *Geographical Analysis*, 27, pp. 3-115.
- Bajmócy, P. – Kiss J. (1999): Megyék, régiók és központjaik – modellek tükrében. In: *Tér és Társadalom*. 1999/1–2. pp. 31–51.
- Bandura, A. (1986): *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, N.J.: Prentice Hall
- Barnett, W.P.– Hansen, M. (1996): The Red Queen in Organizational Evolution, *Strategic Management Journal*, 17, pp. 139-157.
- Barta, Gy. (2001): *Az ipar szerkezetének térbeli változásai Magyarországon (1950-2000)*, Dialóg Campus, Budapest-Pécs,
- Beluszky P. (1984): Vonzáskörzetek lehatárolása gravitációs modellekkel. In: Sikos T. (szerk.): *Matematikai és statisztikai módszerek alkalmazási lehetőségei a területi kutatásokban*. Akadémiai Kiadó, Budapest. p. 167–171.
- Boiteux – Orain, C. – Guillain, R. (2003): Changes in the Intra- metropolitan Location of Producer Services in Ile-de-France (1978-1997): do Information Technologies Promote a More Dispersed Spatial Pattern? LEG Working Paper, n° 2003-06, Université de Bourgogne (France).
- Carroll, G. R. – Hannan, M. T. (2000): *The Demography of Corporations and Industries*, Princeton University Press,
- Cooper, A. C. (1973): *The Founding of Technology-Based Firms*, Milwaukee, Center for Venture Management.
- Cooper, A. C.,– Dunkelberg, W.C. (1987): Entrepreneurial Research: Old Questions, New Answers and Methodological Issues, *American Journal of Small Business* 11, pp. 11–23.
- Czakó, Á. – Kuczi, T. – Lengyel, Gy. – Vajda, Á. (1995): A kisvállalkozások néhány jellemzője a kilencvenes éveke elején. In: *Közgazdasági Szemle*, XLII, 4, pp. 399-419.
- Csata, Zs. (2006): A vállalkozói potenciál területi eltéréseinek társadalmi magyarázatai Erdély rurális térségeiben, *Korunk*, 2006/7, pp. 67-83.
- Geroski, P.A. (1995): What Do We Know About Entry? *International Journal of Industrial Organization*, pp.421–440.
- Granovetter, M. – Swedberg, R. (2001): *The Sociology of Economic Life*. Boulder, Colorado: Westview Press.

- Granovetter, M. (1985): Economic Action and Social Structure: The Problem of Embeddedness. *American Journal of Sociology* 91, pp. 481–510.
- Hayter, R. (1997): *The Dynamics of Industrial Location: The Factory, the Firm and the Production System*, Chichester, John Wiley and Sons.
- Hedström, P. (1994): Contagious Collectivities: On the Spatial Diffusion of Swedish Trade Unions, 1890-1940. *American Journal of Sociology*. 99, pp. 1157-1179.
- Kádas S. (1976): *A regionális modellezés irodalma*. KSH Könyvtár és Dok. Szolgálat, Budapest
- Katona, G. – Morgan, J. N. (1952): The Quantitative Study of Factors Determining Business Decisions, *Quarterly Journal of Economics*, 66. pp. 67–90.
- Keeble, D. (1980): Industrial decline, regional policy and the urban-rural manufacturing shift in the United Kingdom, *Environment and Planning*, 12, 8, pp. 945 – 962.
- Keeble, D. (1986): The changing spatial structure of economic activity and metropolitan decline in the United Kingdom, In: Ewers, H-J,–Goddard, J. B.–Matzerath, H. (szerk): *The Future of Metropolis: Berlin, London, Paris, New York: The Economic Aspects*, Berlin, Walter de Gruyter
- Koós, B (2007): A szuburbanizációs folyamat a magyar gazdaságban, *Közgazdasági Szemle*, pp. 334–349.
- Krugman, P. (1998): Space: The Final Frontier, *Journal of Economic Perspectives*, American Economic Association, vol. 12(2). pp.161-174.
- Kuczi, T. – Makó, Cs. (1996): Toward industrial districts? Small firm networking in Hungary. In: Grabher, G.– Stark, D. (szerk.): *Legacies, Linkages, Localities: Restructuring networks in post-socialist economies*, Oxford, Oxford University Press,.
- Kuczi, T. (1996): A vállalkozók társadalmi tőkái az átalakulásban. In: *Századvég*, 1996 nyár, pp.
- Kuczi, T. (2000): *Kisvállalkozás és társadalmi környezet*. Replika Kör, Budapest, 2000.
- Kuczi, T. (2002): Önállósodás és munkanélküliség - a kisvállalkozók tőkái, In: Csáki, Gy. (szerk): *Kis- és középvállalkozások Magyarországon: A fejlődés esélyei és korlátai*, Budapest, ÁVF, pp. 7-14.
- Mueller, E – Morgan, J. N. (1962): Location Decision of Manufacturers, *American Economic Review*, 52, pp. 204–217.
- Nemes Nagy, J. (1998): *A tér a társadalomkutatásban*. Hilscher Rezső Szociálpolitikai Egyesület, Ember Település Régió sorozat, Budapest.
- Norcliffe, G. (1984): Non-metropolitan industrialization and the theory of production, *Urban Geography*, 5, 1, pp. 25-42.
- Polanyi, M. (1962): Tacit Knowing: Its Bearing on Some Problems of Philosophy, *Reviews of Modern Physics*, 34, 4, pp. 601-606.
- Román, Z. (2005): A demográfia újabb ága: a vállalatdemográfia, *Magyar Tudomány*, 3, pp. 297-300.
- Sorenson, O. – Audia, P. G. (2000): The Social Structure of Entrepreneurial Activity: Geographic Concentration of Footwear Production in the U.S., 1940-1989, *American Journal of Sociology*, 106, pp. 324-362.
- Stinchcombe, A. L. (1965): Social Structure and Organizations, In: March, J. G. (szerk) *Handbook of Organizations*, Chicago, Rand McNally. pp. 153–193.
- Varga A (1998) *University Research and Regional Innovation: A Spatial Econometric Analysis of Academic Knowledge Transfers*. Kluwer Academic Publishers, Boston
- Varga, A. (2002): Térökonometria, *Statisztikai Szemle*, 2002, pp. 354-371.
- Venkataraman, S., – Van de Ven, A., – Buckeye, J., – Hudson, R. (1990): Starting Up in a Turbulent Environment: A Process Model of Failure among Firms with High Customer Dependence. *Journal of Business Venturing*, 5, pp.277-295.

Weber, A (1909): Über den Standort der Industrien, Tübingen, Mohr