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The influence of cluster type economic agglomerations on the entrepreneurship, in Romania

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Abstract. *Regional clusters and entrepreneurship have become very popular research topic in many areas, such as: economics, regional science, and economic geography.*

A large number of scientific papers published in the last years investigate the empirical evidence for clusters, their definition, and their implications for economic policy. Also, a series of working tools for regional cluster analyses have been proposed.

Entrepreneurial activities interact and their characteristics are normally bound to the region. Entrepreneurial activities take place in interaction with other economic activities conducted at the local level, and the interaction between them can be the starting point of an economic cluster.

There are lots of arguments for the hypothesis that existing regional clusters have positive impact on the entrepreneurial activities. But only few analyses exist referring to the relationship between clusters attributes of a region and the entrepreneurial activities in the same region. From my knowledge, it is not such of analyses about Romania.

This paper aims to identify regions with potential industrial clusters, from Romania, and to analyse their impact on the entrepreneurial environment. Data about all the companies acting in Romania, in 2011 are used to elaborate the spatial clusters in the most concentrated Romania industries. A second data set with information about new establishments in last year is used, from the National Trade

Register Office statistics. This data set serves to assess the relationship between regional clusters and entrepreneurial activities. The paper tests the empirically proven hypothesis which stipulates that the existence of one or several cluster type agglomerations in a region has a positive impact on the number of start-ups in the same region.

The results obtained from descriptive and regression analyses have shown that there is a positive relationship between the number of cluster type agglomerations and the entrepreneurial activities.

Keywords: cluster type economic agglomerations; regional entrepreneurship; economic geography; economic impact, GIS.

JEL Codes: R12, L26.
REL Codes: 11G, 16H.

Introduction

The theories developed by Porter (1990, 1998) and Krugman (1991), which support the idea that "cluster type agglomeration of companies is favourable for entrepreneurship development by establishing of new spillover", stimulate a lot of researchers to investigate the empirical evidence for clusters, their definition, and their implications in various economic areas.

In the presence of agglomeration economies, the potential for growth is increasing in the level of economic activity (Glaeser et al., 1992).

This paper examines a particularly important channel through which cluster-driven agglomeration might activate entrepreneurship.

The presence of a cluster of related industries in a location will foster entrepreneurship by lowering the cost of starting a business, enhancing opportunities for innovations and enabling better access to a more diverse range of inputs and complementary products (Porter, 1998, Feldman et al., 2005, Glaeser, Kerr, 2009).

Questions concerning the relationship between entrepreneurship, innovation and regional development have tended to focus on the role played by agglomeration economies in fostering localized learning processes within the economy (Glaeser, 1992).

Even there are a lot of theoretical papers that discuss the relationship between industrial clusters and entrepreneurship, there are very few practical based analyses which evaluate the relationship between clusters within a region and entrepreneurship activities developed in the same region. There are few studies that talk about the local concentration or potential regional clusters available in Romania. Most of them are qualitative based studies, or employ the quantification of industrial specialisation and concentration at NUTS2 regional level, and ignore the spatial size of the regions investigated. But the cluster type agglomerations could be identified at lower levels, like NUTS3 (county) level or even at level of town.

This paper analyses some parts of the relationship between clusters and entrepreneurship. Romania's counties level will serve to exemplify this relationship, using data about companies residing in each county.

Cluster type economic agglomerations in Romania

According to Porter (1990), an industrial cluster is seen as a set of industries related through buyer-supplier relationship, or by common technologies, common buyers or distribution channels, or by common labour.

The regional cluster is defined as an industrial cluster, in which member firms are in close proximity to each other (Enright, 2000). There is no agreed method for identifying and mapping clusters, either in terms of the key variables that should be measured or the procedures by which the geographical boundaries of clusters should be determined (Martin, Sunley, 2002).

These methods investigate first to which degree an industry is spatially concentrated, before we try to localise regional clusters.

In literature (Amiti, 1998, Kim, 1995, Krugman, 1991) the spatial concentration is often described by measurements which specify the degree of spatial division of labour or more simply: industrial specialisation.

There are some statistical methods used to identify the inequality and concentration in distributions, which have been applied to many economic issues. Some examples are: the location quotient, Herfindahl index used to measure the industrial concentration, Gini coefficient which describes geographic concentration, Ellison and Glaeser index and Maurel and Sedillot index, which are designed to measure agglomeration.

The most common tool is the location quotient (Kim, 1995). The location quotient was first defined by Hoover (1936) and depicts the degree of specialisation of a region in a certain industry.

In this paper we applied the Gini's index to determine the overall spatial concentration of industries and location quotient to measure company level concentration at the regional (county) level.

The general formula for location quotient is:

$$Location\ quotient = \frac{\frac{n_{A,R}}{N_R}}{\frac{n_{A,T}}{N_T}},$$

where:

$n_{A,R}$ - the number of employees in industry A in region;

N_R - the whole number of employees, in the region R;

$n_{A,T}$ - the number of employees in industry A, at the national level;

N_T - the whole number of employees, from national level.

Based on this method, a region is considered to have a high degree of specialisation in one industry if the location quotient calculated for that county is greater than or equal to 1.5

For an assessment of the overall spatial concentration of an industry compared to other industries, Krugman (1991) suggested to compute Gini's location quotient.

Gini's method uses the following steps:

• It determines the share of employees in a particular branch, in total employment at the national level, using the following equations:

$$l_i^n = \frac{z_i^n}{z_i},$$

where:

l_i^n – the share of employment in the branch i, of the region n;

z_i^n – the number of employees in industry i, from the region n;

z_i – the number of employees in industry i, at the national level.

• The regions must be descending order to ensure that: $l_i^1 \geq l_i^2 \geq ... \geq l_i^N$

The whole number of regions is equal with N.

• It is necessary the cumulative share of the employees in the branch i and the cumulative share of the employment in the whole branch. The cumulative shares could be represented by so-called Lorenz curves. Gini's location quotient is represented by the surface between the straight line and an angular quotient of 45° and Lorenz curve, and could be determined using the equation:

$$GC = \frac{1}{2}\sum_{i=1}^{N}(u_{i-1} + u_i)g_i - \frac{1}{2},$$

where

GC ∈ [0; 0.5]

The more geographically concentrated the branch of industry is, the higher the value of GC is.

The Gini coefficient compares the Lorenz curve of a ranked empirical distribution with the line of perfect equality. This line assumes that each element has the same contribution to the total summation of the values of a variable. The Gini coefficient ranges between 0, when there is no concentration (perfect equality), and 1, when there is total concentration (perfect inequality).

An important problem related to the identification of an agglomeration and of regional clusters is that there is no "bottom line" against which to interpret the results. The Gini index only indicates the degree to which an industry deviates from a situation where its employment is distributed over regions precisely in the same way as the entire population.

The concentration index, like location quotient and Gini index, is designate to provide information about the degree to which each industry from one country, in our case from Romania, is concentrated in a number of areas, but does not take into account if the areas are close together or not. These indicators measure the degree of variability of the distribution of employment

across observations for a given partition of the space, a feature that in the literature is referred as concentration (Arbia, 2001, Lafourcade, Mion, 2005).

A non-uniform spatial distribution of an industry and hence a certain spatial concentration of firms is the precondition for the formation of clusters. (Sternberg, Litzenberger, 2004)

According to Gini's coefficient, the top of 30 most concentrate industries of Romania's economy look, as presented in Table 1.

To avoid the identifying of a higher concentration industry due only to a lower number of firms compared to the number of counties in which the economic activity is developed, we excluded from my analyses the industries with less then 60 companies.

Table 1

The top of most concentrated Romania's industries

Economic activity (NACE rev. 2 classification) – 2-digit level	Gini's index value	Employ-ment	No. of establish-ments	Counties with a higher level of concentration of economic activity
Undifferentiated goods- and services-producing activities of private households for own use (NACE 98)	0.27	7	3	-
Activities of households as employers of domestic personnel (NACE 97)	0.23	57	27	-
Manufacture of basic metals (NACE 24)	0.23	39336	527	Tulcea, Braila, Galati, Buzau, Olt, Dambovita, Neamt, Bistrita Nasaud, Cluj, Caras-Severin
Crop and animal production, hunting and related service activities (NACE 01)	0.23	65945	13568	Tulcea, Braila, Ialomita, Calarasi, Buzau, Vrancea, Vaslui, Neamt, Teleorman, Olt, Dolj, Alba, Salaj
Manufacture of other transport equipment (NACE 30)	0.23	35060	555	Tulcea, Constanta, Braila, Galati, Bacau, Olt, Mehedinti, Arad
Manufacture of wearing apparel (NACE 14)	0.22	137119	4914	Tulcea, Braila, Buzau, Ialomita, Calarasi, Vrancea, Covasna, Harghita, Neamt, Vaslui, Teleorman, Olt, Dolj, Alba, Arad, Salaj, Satu Mare
Remediation activities and other waste management services (NACE 39)	0.22	525	59	-
Manufacture of chemicals and chemical products (NACE 20)	0.22	31466	1040	Bacau, Neamt, Ialomita, Teleorman, Mehedinti, Valcea, Alba, Mures, Brasov
Mining of coal and lignite (NACE 05)	0.22	20139	55	-
Fishing and aquaculture (NACE 03)	0.21	1947	780	Tulcea, Braila, Constanta, Ialomita, Calarasi, Brasov, Dambovita, Iasi, Vaslui, Salaj, Bihor
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials (NACE 16)	0.21	47901	6708	Suceava, Neamt, Bacau, Vrancea, Covasna, Brasov, Arges, Harghita, Mures, Alba, Bistrita Nasaud, Maramures, Caras Severin, Mehedinti
Veterinary activities (NACE 75)	0.2	3745	1700	Vaslui, Vrancea, Covasna, Buzau, Tulcea, Suceava, Bistrita Nasaud, Maramures, Salaj, Arad, Caras Severin, Mehedinti, Olt , Teleorman
Forestry and logging (NACE 2)	0.2	37509	4009	Tulcea, Bucharest, Vrancea, Covasna, Suceava, Bistrita Nasaud, Hunedoara, Caras Severin

Economic activity (NACE rev. 2 classification) – 2-digit level	Gini's index value	Employ-ment	No. of establish-ments	Counties with a higher level of concentration of economic activity
Manufacture of food products (NACE 10)	0.19	146397	8804	Tulcea, Braila, Ialomita, Calarasi, Ilfov, Buzau, Covasna, Bacau, Vaslui, Suceava, Satu Mare, Alba, Valcea
Manufacture of machineryand equipment n.e.c. (NACE 28)	0.19	51411	1525	Brasov, Dambovita, Prahova, Buzau, Braila, Teleorman, Bacau, Vaslui, Bistrita Nasaud, Alba, Caras Severin
Manufacture of paper and paper products (NACE 17)	0.19	11597	811	Suceava, Neamt, Bacau, Vrancea, Covasna, Cluj, Alba, Valcea, Dambovita, Calarasi
Programming and broadcasting activities (NACE 60)	0.19	6040	604	Bucharest, Gorj, Teleorman
Water collection, treatment and supply (NACE 36)	0.19	28098	228	Constanta, Calarasi, Braila, Galati, Vrancea, Covasna, Vaslui, Neamt, Suceava, Mures, Cluj, Alba, Hunedoara, Caras Severin, Mehedinti, Dolj, Teleorman, Dambovita
Manufacture of textiles (NACE 13)	0.19	28857	1750	Iasi, Vaslui, Neamt, Bacau, Buzau, Harghita, Covasna, Mures, Sibiu, Bistrita Nasaud, Salaj, Arad, Hunedoara, Dambovita, Olt
Water transport (NACE 50)	0.19	3207	509	Tulcea, Constanta, Braila, Galati, Mehedinti
Manufacture of furniture (NACE 31)	0.18	59579	4256	Arad, Alba, Arges, Satu Mare, Salaj, Maramures, Suceava, Harghita, Mures
Manufacture of rubber and plastic products (NACE 22)	0.18	39208	3275	Bihor, Satu Mare, Bistrita Nasaud, Neamt, Sibiu, Vrancea, Buzau, Ialomita, Ilfov, Arges, Olt, Gorj, Mehedinti
Retail trade, except of motor vehicles and motorcycles (NACE 47)	0.18	403433	125287	Suceava, Bacau, Ialomita, Teleorman
Activities of membership organisations (NACE 94)	0.18	277	39	-
Manufacture of fabricated metal products, except machinery and equipment (NACE 25)	0.18	84085	6630	Satu Mare, Alba, Hunedoara, Gorj, Valcea, Arges, Dambovita, Brasov, Buzau, Tulcea
Manufacture of beverages (NACE 11)	0.17	19401	888	Harghita, Vrancea, Prahova, Ialomita, Ilfov
Residential care activities (NACE 87)	0.17	307	80	Salaj, Vaslui, Sibiu, Arges, Bucharest
Manufacture of electrical equipment (NACE 27)	0.17	35223	715	Satu Mare, Maramures, Bistrita Nasaud, Arad, Timis, Sibiu, Arges, Dambovita, Dolj, Timis, Arad
Security and investigation activities (NACE 80)	0.17	98820	2029	Mehedinti, Bucharest
Construction of buildings (NACE 41)	0.17	174293	36313	Satu Mare, Maramures, Suceava, Harghita, Arges

Because the clusters are relative to the economics, geographic and regional situations, there is no agreement which magnitude of spatial concentration in a region, relative to the overall region constitutes a cluster. An exact threshold does not exist. The critical value depends on the scale of the region, the level of the industrial aggregation (Sternberg, Litzenberger, 2004), and on the number of clusters proposed to be identified. In the last column of Table 1 (Counties with a higher level of concentration of economic activity)

there are the names of counties that could be part of an economic cluster in specified economic field. Function on the size of regional clusters, we can have one or more clusters in each activity domain.

Entrepreneurship at regional level

For many years, academic papers explained the entrepreneurial activities abstracting completely the spatial factors. Recently, the consideration of environmental factors in a broad sense, including spatial proximity and features of the regional environment, is becoming more and more widespread and popular.

The totality of individual entrepreneurial activities in a particular region determines the entrepreneurial activity of the region. Not only intraregional environmental factors influence entrepreneurial activities.

According to Feldman et al. (2005), the factors that determine the start-up decision of an individual (entrepreneurial activity) are not identical to those that determine the start-up success and that this success of start-ups is dependent also on the characteristics of its regionally bound determinants.

Because entrepreneurs are essential agents of innovation, a strong cluster environment should foster entrepreneurial activity (Delgado et al., 2010).

This paper tests the hypothesis, supported by Sternberg (2004) and by Delgado et al. (2010), which sustains that existing cluster type agglomerations have positive impacts on entrepreneurial activities.

The main argument for this hypothesis is that the existence and development of start-ups could generate a constructive regional environment, centred on an equally positive entrepreneurial climate. The companies within a geographically concentrated cluster share common technologies, skills, knowledge, inputs, consumers, and institutions, facilitating agglomeration across complementary and related industries.

To analyse the regional level entrepreneurial activities of Romania a data set with information about new establishments in last year (June 2011 – May 2012) is used, from the National Trade Register Office statistics. Based on this data set, we have calculated the geographical distribution of new establishments in last 12 months, in Romania and the results are presented in Figure 1.

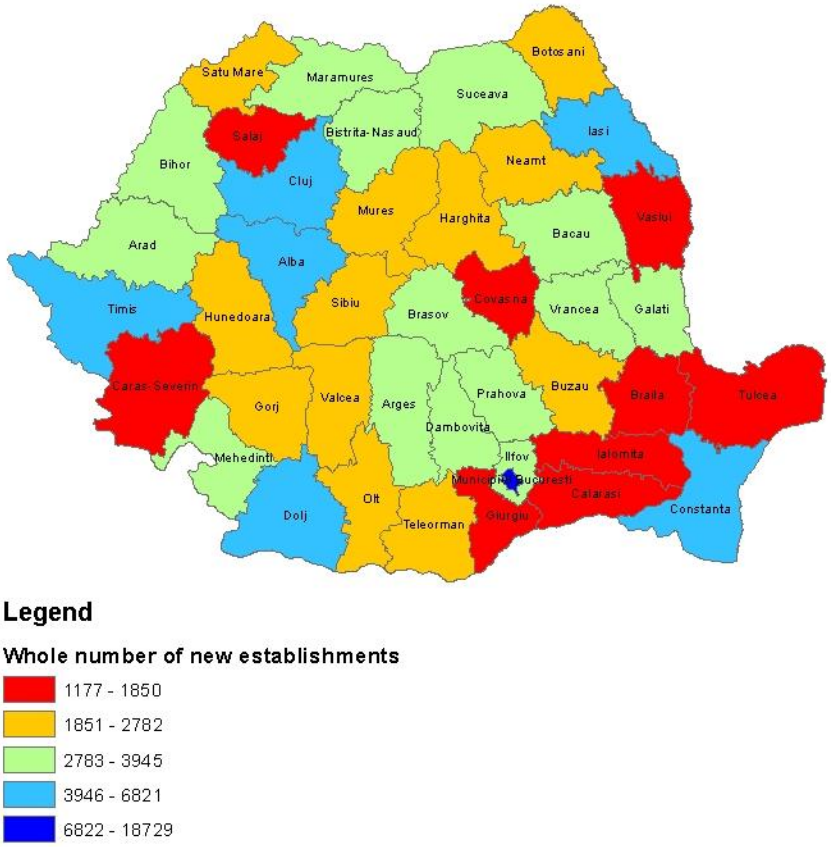

Figure 1. *Spatial distribution of new establishments in the last 12 months, in Romania*

The relationship between cluster type agglomerations and entrepreneurship

The relevant entrepreneurship and new companies establishment literature distinguishes between person-related and environment-related determinants as the main theoretical explanations for an individual's decision to start a new firm (Sternberg, Litzenberger, 2004). Environmental factors include all determinative of the potential entrepreneur's decision that is external to the person. The environmental factors include regional factors, too.

On the other hand, local entrepreneurial activities can be the starting-point for the development of a regional cluster. Entrepreneurial activities interact and their characteristics are normally bound to the region (Bergmann, 2002). Many start-ups lead to a spatial concentration of firms which is the main requirement for identifying a regional cluster.

In Romania, there is no data available about inter-firm co-operation for companies acting in a region or a county. But, when some companies acting in the same industry are grouped together in a spatial proximity, it implies that the employees of one company have relatively easy access to employees from other companies, from the proximity. This allows for frequent direct informal face-to-face contact between employees of various companies, which may allow for tacit knowledge sharing between the individuals.

Empirical evidence on potential cluster type agglomerations and entrepreneurship

Data used to support the researches is provided by two data sources: data about all the companies acting in Romania, in 2011, are used to elaborate the spatial clusters in the most concentrated Romania industries. The location of each company, the number of employees and the NACE classification, used to describe the industry field in which the company is acting, disaggregated to the 4 digits level are used to describe each company. The data are processed and aggregated at the NUTS3 level (county) and at 2 digits level for NACE classification of economic activities.

A second data set with data about new companies established in the last 12 months, between June 2011 and May 2012, provided as part of National Trade Register Office statistics, serves to assess the entrepreneurial activities in Romania and the relationship between regional clusters and entrepreneurial activities.

Based on the data available, we determined the number of industry in which the economic activity is specialised, for each county. The spatial distribution is presented in Figure 2.

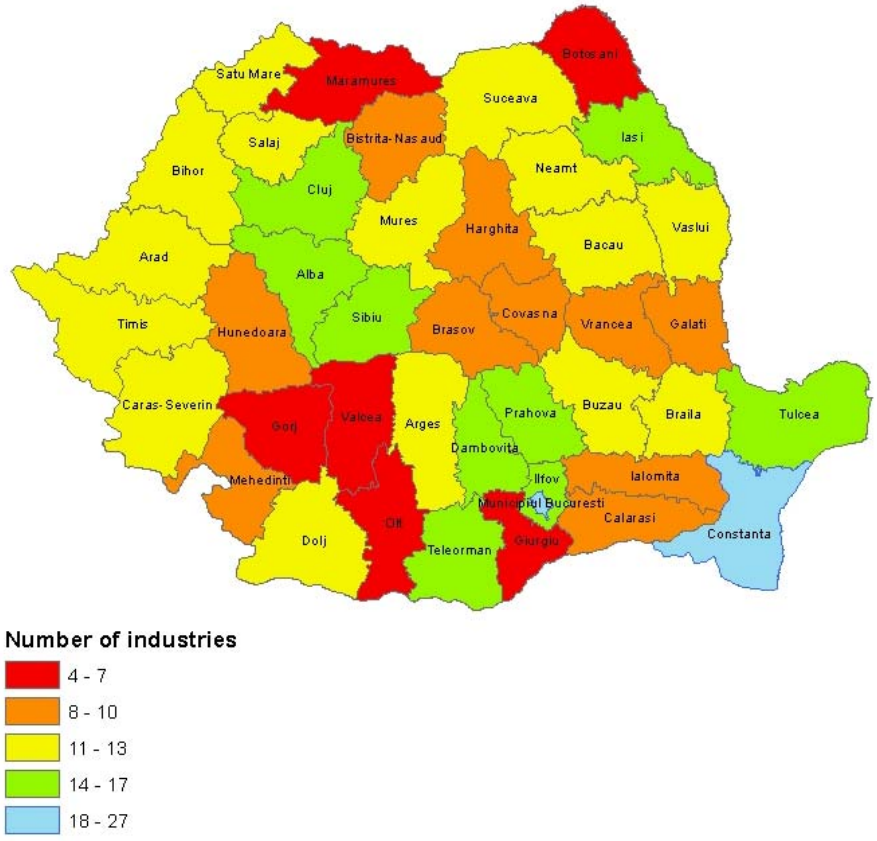

Figure 2. *Spatial distribution of concentrated industries in Romania's counties*

In the next step, we analyse the correlation between the number of new companies established in each county of Romania in the last 12 months and the number of industries in which the corresponding county is specialised.

The scatter-plot chart of data is presented in Figure 3 and suggests a possible positive correlation between the number of concentrated industries and the new establishments from each county.

To test if it is a link between number of concentrated industries identified in each county and the number of new companies established in the last 12 months in the same area, the Pearson correlation coefficient has been calculated. The Pearson correlation coefficient value is 0.7, and the value is statistically significant, Sig value being 0.

Based on linear correlation coefficient (r), calculated to test the intensity of link between the number of concentrated industries form and the number of

new companies established in last year, in each county of Romania, we can observe that the establishment of new companies is explained by the economic activities concentrations in a weight of 49%.

The regression equation will take the form: Number of new establishments = 470 x number of concentrated industries – 2122.

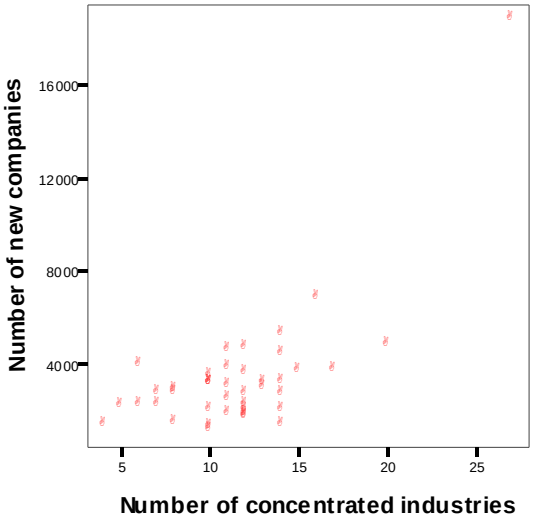

Figure 3. *The scatter-plot chart for relation between concentrated industries and new establishments*

The last step of our analyse follow to identify the correlation between the concentration of economic activity in each industry (expressed by Gini's index) and the number of new establishments from the same industry.

Based on linear correlation coefficient (r) calculated to test the connections intensity between the value of Gini index for top 30 industries analysed and the intensity of entrepreneurial activities in the last 12 months, in Romania, we can observe that the establishment of new companies is explained by the economic activities concentrations in a weight of 35%. The value of correlation coefficient between Gini's index and the number of new establishments in the last 12 months variables is 0.59 and the significance threshold value is 0.001, so the value of correlation coefficient is significantly.

The regression equation will take the form:

Intensity of new establishments = 1377 x Gini's index-243

The Pearson correlation coefficient value is good (value=0.59), and it is statistically significant (p=0.001).

Conclusions

The specialisation in economic activity in the regional area, which could generate cluster type agglomerations, explained around 50% of new companies' establishments in the last year, in Romania.

The concentration of economic activity in various industries is explained by the entrepreneurial activities only in a proportion of 35%.

According with these results, we can conclude that, in Romania, the existence of one or several cluster type agglomerations in a region has a positive impact on the number of start-ups in the same region, but it is only a factor, an important one.

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