SPECIALIZATION AND GEOGRAPHIC CONCENTRATION OF THE ECONOMIC ACTIVITIES IN THE ROMANIAN REGIONS[1]

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Abstract: *The study of regional specialization and of concentrating the economic activities contributes to the identification of the place and role of each economic activity within the national economy and its growth potential. Thus, the possibility to emphasize the contribution brought by each economic activity to the development of each region is created. The aim of this paper is to verify relation between the evolution of the regional specialization and geographic concentration of economic activities in eight Romanian development regions. For this purpose, an empirical study of specialization and concentration was performed, at the level of the eight regions of Romania, before and after the moment of integration in the European Union.*

Key words: *specialization of economic activities; geographic concentration; regional; development; economic growth, European Union Integration*

1. Introduction

The specialty literature makes available a multitude of theories approached the problematic of regional specialization and concentration of the economic activities. From the analysis of the viewpoints expressed by the specialists of the regional development domain, the conclusion can be drawn that the definitions of regional specialization and geographic concentration of the industrial activities are based on the same production structures, reflecting the same reality (Aiginger, 1999). Through the definitions promoted Goschin et al. (2009) best highlights the correlations between the two concepts. Regional specialization expresses the territorial perspective and emphasizes the distribution of the economic activities, while the geographic concentration of an economic activity reflects its geographic distribution.

The scientific literature focused on the evolution of on location of economic activities and regional growth is not always congruent. While Aiginger (1999) supports the correlation of the analysis of regional specialization with the analysis regarding the concentration of economic activities, Dalum et al. (1998) claim that it is possible that regional specialization and the geographical concentration do not evolve in the same

direction and it is probable that their evolution will happen at different speeds. A more radical viewpoint belongs to Rossi-Hansberg (2005), which states that regional specialization and geographical concentration can evolve in even different directions. Following a thorough analysis of the specialty literature, Hallet (2000) reached the conclusion that the consecrated theories are unable to offer comprehensive answers to the questions related to regional specialization, and so, it is expected that empirical studies will bring an addition of information.

Amiti (1997) conducted a study focused both on specialization and geographic concentration of the economic activities, having as purpose to determine whether specialization patterns are consistent with trade theories. The evolution of specialization and geographical concentration in European Union countries was analyzed between 1968 and 1990, using production data in current prices for 27 economic activities. He highlights that during 198 and 1990, Belgium, Denmark, Germany, Greece, Italy, and the Netherlands registered a significant increase of specialization when France, Spain and the UK registered a significant fall in specialization. There was a significant increase in specialization between 1980 and 1990 in all the studied countries. In terms of geographic concentration of industries, the study reveals that 17 out of 27 economic activities experienced an increase in geographical concentration. Six of them registered a fall in geographic concentration.

The aim of this paper is to verify the relation between the evolution of the regional specialization and geographic concentration of economic activities in eight Romanian development regions. According to Marelli's (2007) opinion, many economists agree that Krugman's hypothesis of a growing sectoral specialization is more realistic at the regional level than at the national one. The formulated reason is that, in most of the situations, the smaller the spatial units analyzed, the more specialized they are. This affirmation sustains the relevance of this study conducted at the regional level. The European Union integration would have as implications modifications in the location of the economic activities which is reflected in the evolution of the spatial concentration of the economic activities and in the regional concentration of some of them. This is why, the correlation between the evolution of regional specialization and geographic concentration is analyzed before and after the moment of integration in the European Union.

The measurement of the concentration of industrial branched and of the specialization of regions is performed by processing indicators calculates at different aggregation levels, selected depending on the aspects intended to emphasize. A complex system of indicators is developed by Hallet. He suggests the calculation of indicators for measuring concentration, clusters, centricity and the income index, on the basis of the gross added value, of the gross domestic product, and of the localization elements (Hallet, 2000).

The measurement of the concentration of industrial branches and of regions' specialization is performed by processing indicators calculate at different aggregation levels, selected depending on the aspects that the authors attempt to highlight. Thus, the authors of a study performed at the level of Romania, used the Gross Added Value (Herfindahl Index, Krugman index and the coefficient of structural changes) and the population occupation (Herfindahl Index and Krugman index), at the level of branch and region, in order to measure concentration and specialization (Goschin et al, 2009). The indicators systems that have as basis the population occupation on activities of the local economy and localization elements were developed through the study „Can Cluster Policies and Foreign Direct Investment Offer Viable Solutions to Underdeveloped Regions? Lessons that can be learnt by Romania's Eastern border regions from successful experiences of other transition countries" (Constantin et al., 2010).

In order to explore the main characteristics and the interaction between regional specialization and sectoral concentration in Romania, and to ensure relevance as high as possible for the research performed, this paper proposes a set of indicators for statistical measurement, verified at the level of the Romanian regions.

2. Methodology

Specialization and concentration could be evaluated using absolute and relative measures.

There are several indicators proposed in the existing literature. Following the review of the empirical studies, as well as the limitations due to the statistical data available at the level of Romania, a statistics was elaborated, based on the Herfindahl-Hirschman indexes and on the Krugman Dissimilarity Index. The indexes are computed for the region *i* and for the branch *j* of economic activity. The analysis of the absolute values of these indicators and their comparison to the values recorded at the national level, supply sufficient information to determine the place of each economic branch, and its ties to the other economic activities, at the level of each region in Romania, in view of determining the concentration and specialization of the economic activities.

The first statistical measure that was used within the empirical study is the Herfindahl-Hirschman Index[4], which is one of the indexes of concentration and specialization presented in the most of regional studies and assures an absolute measure. The Herfindahl-Hirschman Index is increasing with the degree of concentration or specialization, reaching its maximum of 1 when the branch of economic activity *j* is concentrated in one region or the region *i* is specialized in only one economic branch. The lowest level of concentration is reached when the ratio 1/n is the same for all regions that means they have equal shares in branch of economic activity *j*. The lowest specialization is reached when the ratio 1/m is the same for all the branches of economic activities that means they have equalled shares in region *i*. Herfindahl Index is sensitive to the number of observations, limiting direct comparisons (e.g. to countries having exactly the same number of regions).

The second indicator is Krugman Specialization Index[5]. This index was used in 1993 by Krugman, in order to compare the level of specialization between European Union and US (Marelli, 2007). The index is used to measure both concentration (K_j^C) and specialization (K_i^S). Krugman Index is a relative measure of specialization and concentration which is employed for comparing one branch of economic activity/region with the overall economy. Its values range from 0 that identifies identical territorial/sectoral structures, to 2 that characterizes totally different structures.

The statistical indicators are computed by processing the statistical information regarding the occupation of the population, on economic activities, and localization elements. The extent and the analytical character of the study are strictly determined by the data supplied by the National Statistics Institute. Thus, for the execution of this study:

- The data is collected at the national level;
- The period considered is of 15 years, between 1994 and 2009;
- The variables analyzed are connected to population occupation;
- The level of thoroughness of regional specialization was set depending on the degree of disaggregation of the statistical data, at the level of ten economic activities (Agriculture, Industry, Constructions, Commerce, Transports, storage and communications, Real estate transactions, Financial intermediations and other

services, Public administration and defense, Teaching, health and social assistance and Other activities of the national economy), for which data was supplied for the eight regions of Romania.

3. South East Region characteristics

Romania is the seventh largest among the European Union countries having almost 22 million of inhabitants. Romania formulated the request to join the European Union in 1995 and the accession negotiations begun in 2000. The accession was scheduled for 2007. Romania has experienced strong economic growth during the last years, as result of the efforts for the preparation of the access in the European Union. In spite of the positive economic evolution, the country is one of the poorest of the EU, with a GDP per capita positioned around 23 per cent of the EU-average in 2007 and 26 percent immediately after accession. The financial crisis period had as consequence the dropping back of the GDP below the level registered in 2007.

In the process of the EU accession, Romania implemented the NUTS system. It was drawn on the existing administrative territorial structure that consists in communes and towns which are grouped in counties. Once that the Law 151/1998 was adopted the territorial structure of the country was redesigned by creating a regional level, without juridical personality. The new regional focused structure was obtained by grouping the 41 Romanian counties which have some common boundaries. As result, were identified the following regions: North-West Region, North-East Region, South-East Region, South - Muntenia, Bucharest - Ilfov Region, South-West Oltenia Region and West Region. These regions are the equivalent of the NUTS II level of the European Union. The boundaries of the new regions are following the boundaries of the counties and of the Bucharest city. The reduction of interregional disparities is one of the major objectives of the regional development assumed by the Romanian governance. Supporting a balanced development and the catching-up of the better developed regions are some of the proposed solutions (Benedek & Horvath, 2008). An analysis specialization and geographic concentration of the economic activities in the Romanian regions could provide an image of the economic development of the regions which support the design of customised solution for the regional development. For this purpose, an empirical study of specialization and concentration was conducted. Its results provide information for the identification of the economic disparities between the eight Romanian regions, as it follows.

4. Specialization of economic activities
at the level of Romania's regions

Analyzing the values taken by the Herfindahl-Hirschman Index in the period 1994 – 2009, presented in Appendix I, it is seen that the values have a descending trend, which signifies the fact that, at the level of the regions in Romania, the level of specialization in a certain economic activity has decreased. Comparing with the data from the period preceding the moment of Romania's accession to the European Union with the data from the period subsequent to the integration moment, respectively from 2004 to 2009, could be noticed a decrease in the level of specialization for all regions. The evolution of specialization at the level of the South-East Region falls within the general trend.
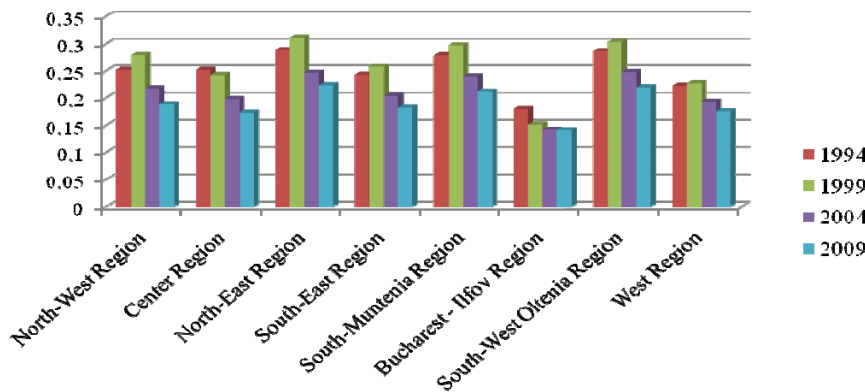
Figure 1. Statistical measures of specialization computed using employment data by Herfindahl-Hirschman Index

Throughout the entire period studies, the Bucharest - Ilfov Region remains the region with the lowest degree of specialization, while the North-East region is the region with the highest specialization degree. In year 2009, the South-East Region ranked fifth out of the total of eight regions, with an economy with a low degree of specialization. From the analysis of the economic evolution of the South-East Region, it can be seen a reduction of the industrial activities, through the decrease of the number of enterprises.

Analyzing the values calculated for the Krugman Specialization Index at the level of Romania, throughout the period analyzed, which are synthesized in Appendix II, there can be seen a tendency to reduce the values recorded by it. The South-East Region records one of the highest decreases. Analyzing the values registered after the moment of Romania's integration into the European Union, no particular trend can be identified, the evolutions going both ways. If the values recorded at the regional level in Romania are related to the EU15 average, based on regional employment data, which is below 0.150, could be observed that the majority are close to it. While the Bucharest Ilfov Region registers the highest deviations from the European average, the South-East Region constantly oscillates around it. Krugman Specialization Index shows that seven Romanian regions have a structure of economic activities performed within them which is close to that characterizing Romania at the country level.
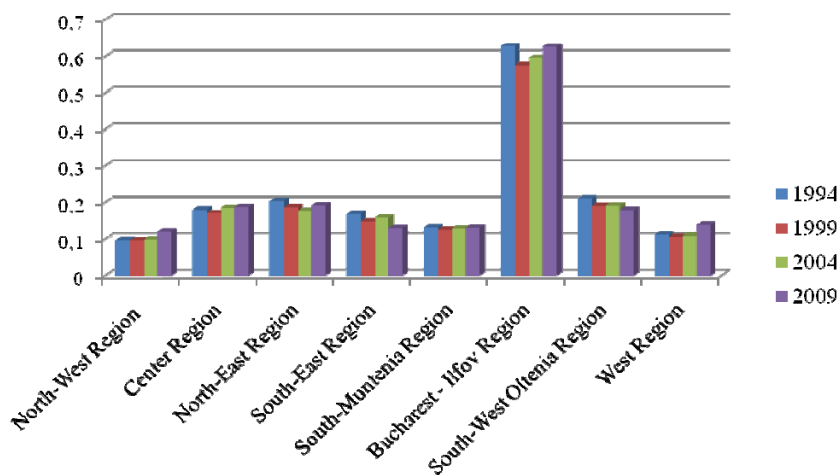
Figure 2. Statistical measures of specialization computed using employment data by Krugman Index

Geographic concentration of economic activities of Romania's regions

Extending the idea according that comparative advantage sustain nations tendency to become more specialized in sectors in which they have a comparative advantage, to the regional level of Romania, it is expected to find some Romanian regions specialized in some distinct economic activities. Analyzing the values in Appendix III, it is seen that, only after the moment of Romania's integration into the European Union, economic activities such as Real estate transactions, Financial intermediations, Transports and Constructions, register an increase of concentration.

An Index computed for concentration shows lower values than the specialization index and little variation in respect to the data employed. Analyzing the values taken by the Herfindahl-Hirschman Index in the period studied, presented in Table 3, it is seen that the values recorded by Agriculture, Transports, storage and communications, Real estate transactions, Financial intermediations and other services and Public administration and defense have a strong ascending trend. A positive evolution, marked also by decreases during certain periods of time, has constructions and commerce, as well as the activities generically grouped into the "Other" activities of the national economy.
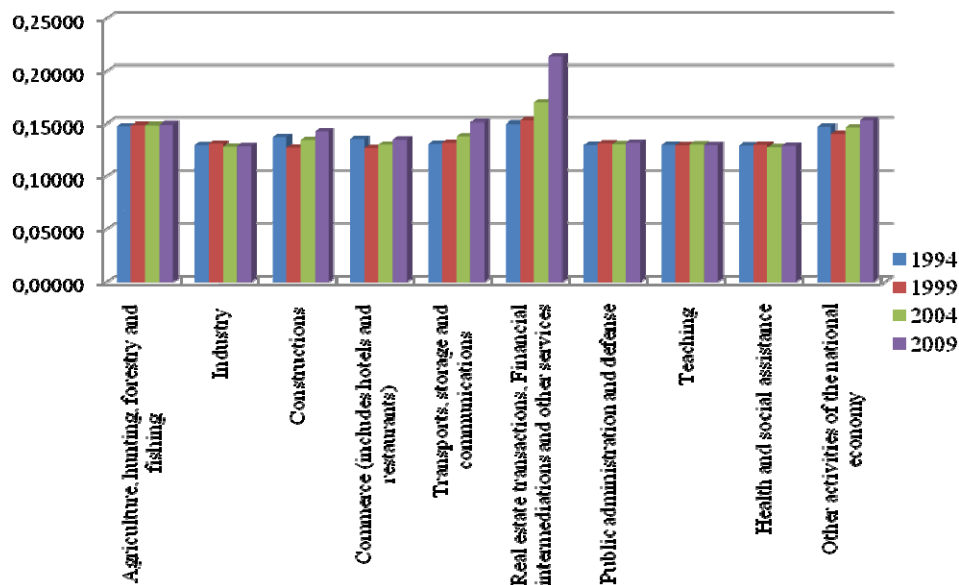

Figure 3. Statistical measures of concentration computed using employment data by Herfindahl-Hirschman Index

According to Morelli (2007), the analysis of the Krugman Specialization Index reveals a prevalent decreasing specialization across the European countries and regions. This result characterizes both old and the new European Countries. Despite an initially high heterogeneity, new integrated countries regions are becoming progressively more similar to the old Europe. A partial exception is given by the Polish regions. Analyzing the value registered by the Krugman Specialization Index for Romania, synthesized in Appendix IV, in the post-accession period one can see, still, slight increases of specialization, more evident

for Real estate transactions, Financial intermediations and other services, Transports, storage and communications and Commerce. At the opposite pole are the social services.
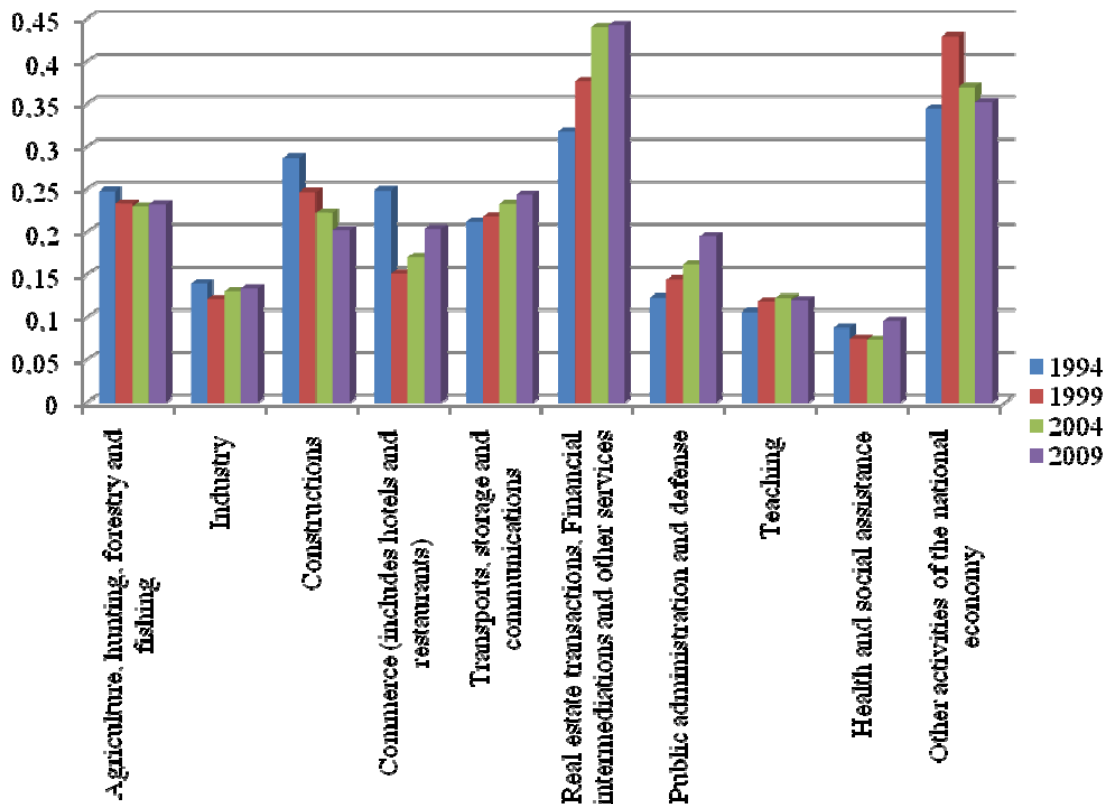

Figure 4. Statistical measures of concentration computed using employment data by Krugman Specialization Index

Conclusions

At the European Union level, through the Economic and Social Cohesion Politics, a balanced development is promoted, reducing regional disparities. As a result of this policy, Marrelli (2007) stated that at the country level there could be observed a convergence across countries. An opposite trend is exhibited by the EU10 group of new members; in particular, increasing regional disparities characterize the first stages of growth of individual countries.

From the analysis of the results obtained following the analysis of specialization and concentration at the level of the eight regions, it is seen that the level of Romania there are no major disparities, and the values of the indexes by means of which specialization and concentration are quantified are close to the averages recorded at the European Union level. The information providing by the existing studies that correlate the moment of Romania's integration into the European Union do not provide the framework for a comparison. This situation is because of the different NACE classifications used in the different studies for the computation of the statistical indicators and because of the periods of the studies which are not convergent. At the moment there is not available a study conducted at the EU 25 countries level that provides information from the pre-ascension and post-ascension periods of EU10 countries. On the basis of the concentration indices calculated for manufacturing

branches in Bulgaria, Estonia, Hungary, Romania and Slovenia were grouped the industries according to the following characteristics: scale economies, technology level, and wages level (Traistaru et al., 2002). The manufacturing classification is according to the Eurostat NACE Rev1 (2 digit classification) for Estonia, Romania, and Slovenia. Employment data have been collected according to national classifications in Hungary and Bulgaria. For these two latter cases aggregations have been made to bring these classifications as close as possible to the NACE classification.

Analyzing the Herfindahl-Hirschman synthesized in the Appendix I, in the period 1994 – 2009 the descendent trend of regional specialization that is seen at the level of all the regions analyzed was interrupted in 1999 for most of the regions. This relative index indicates an continuous evolution of specialization only in the Center Region and in the Bucharest Ilfov Region. Concerning the results registered for the Krugman Index that are synthesized in Appendix II, computed for the same period, show a fluctuant evolution of regional specialization for all the Romanian regions. In what concerns the evolution of concentration, the data in Appendix III and Appendix IV shows that there is no constant trend, each separate activity having a specific evolution, with increases and decreases which cannot be classified within a particular tendency. This proves that in Romania, for a short period of time, which includes stages of economic development specific to passing to the market economy, the pre-accession and post-accession period, regional specialization and the geographical concentration do not evolve in the same direction which verifies the hypothesis postulated by Dalum et al. (1998).

If the analysis is focused solely on the interval 2004 - 2009, which symmetrically covers, both the pre-accession and the post-accession periods of Romania, the values registered by the Herfindahl-Hirschman Index maintain the descended trend recorded at the level of all the regions analyzed, while the Krugman relative index reflects a fluctuant evolution of the specialization. In what concerns the evolution of the geographical concentration, most economic activities analyzed present an ascending trend, even they are measured using absolute or relative indexes. The evolution of the two indexes for short time, which captures the two distinct moments in the integration evolution, verifies the radical hypothesis of Rossi-Hansberg (2005), which states that regional specialization and geographical concentration can evolve in even different directions.

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[4] $H_j^C = \sum_{i=1}^{n} (g_{ij}^C)^2$ and $H_i^S = \sum_{j=1}^{m} (g_{ij}^S)^2$, where: $g_{ij}^C = \dfrac{X_{ij}}{\sum_{i=1}^{n} X_{ij}} = \dfrac{X_{ij}}{X_j}$ and $g_{ij}^S = \dfrac{X_{ij}}{\sum_{j=1}^{m} X_{ij}} = \dfrac{X_{ij}}{X_i}$

Explanations: i represents the region; j represents the branch of economic activity; X represents the employment; X_{ij} represents the employment in the branch of economic activity j in region i; X_i represents the employment in the branch of economic activity j; X_i represents the employment in region i; g_{ij}^C represents the share of region i in the total national value of the branch of economic activity j; g_{ij}^S represents the share of the branch of economic activity j in the total value of region i.

$$^5 \; K_j^C = \sum_{i=1}^{n} \left| g_{ij}^C - g_i \right| \text{ and } K_i^S = \sum_{j=1}^{m} \left| g_{ij}^S - g_j \right|, \text{ where: } g_i = \frac{X_i}{X} \text{ and } g_j = \frac{X_j}{X}$$

Appendix I: Statistical measures of specialization computed using employment data by Herfindahl-Hirschman Index

Year	1994	1999	2004	2009
North-West Region	0.25152	0.27795	0.21810	0.18786
Center Region	0.25150	0.24234	0.19776	0.17287
North-East Region	0.28845	0.31123	0.24645	0.22369
South-East Region	0.24289	0.25719	0.20322	0.18180
South-Muntenia Region	0.27780	0.29707	0.23999	0.21200
Bucharest - Ilfov Region	0.17919	0.15149	0.14191	0.14111
South-West Oltenia Region	0.28613	0.30307	0.24761	0.22022
West Region	0.22308	0.22713	0.19277	0.17549

Appendix II: Statistical measures of specialization computed using employment data by Krugman Index

Year	1994	1999	2004	2009
North-West Region	0.09605	0.09573	0.09779	0.11953
Center Region	0.18007	0.17109	0.18409	0.18668
North-East Region	0.20299	0.18572	0.17587	0.19103
South-East Region	0.16826	0.14735	0.15805	0.12934
South-Muntenia Region	0.13115	0.12466	0.12818	0.13013
Bucharest - Ilfov Region	0.62683	0.57467	0.59473	0.62537
South-West Oltenia Region	0.21025	0.18966	0.19030	0.17979
West Region	0.11185	0.10476	0.10942	0.13867

Appendix III: Statistical measures of concentration computed using employment data by Herfindahl-Hirschman Index

Year	1994	1999	2004	2009
Agriculture, hunting, forestry and fishing	0.14774	0.14865	0.14841	0.14905
Industry	0.12935	0.13083	0.12790	0.12829
Constructions	0.13722	0.12687	0.13446	0.14295
Commerce (includes hotels and restaurants)	0.13538	0.12655	0.12990	0.13474
Transports, storage and communications	0.13060	0.13153	0.13783	0.15129
Real estate transactions, Financial intermediations and other services	0.14981	0.15282	0.17033	0.21351
Public administration and defense	0.12952	0.13104	0.13025	0.13177
Teaching	0.12965	0.12931	0.13002	0.12934
Health and social assistance	0.12897	0.12978	0.12741	0.12864
Other activities of the national economy	0.14739	0.14028	0.14655	0.15273

Appendix IV: Statistical measures of concentration computed using employment data by Krugman Specialization Index

Year	1994	1999	2004	2009
Agriculture, hunting, forestry and fishing	0.24786	0.23293	0.22913	0.23169
Industry	0.13962	0.12130	0.12975	0.13337
Constructions	0.28678	0.24670	0.22276	0.20208
Commerce (includes hotels and restaurants)	0.24853	0.15068	0.16990	0.20377
Transports, storage and communications	0.21135	0.21797	0.23230	0.24404
Real estate transactions, Financial intermediations and other services	0.31753	0.37638	0.44016	0.44242
Public administration and defense	0.12287	0.14447	0.16225	0.19489
Teaching	0.10607	0.11837	0.12247	0.11983
Health and social assistance	0.08704	0,07425	0.07317	0.09538
Other activities of the national economy	0.34493	0.42946	0.36978	0.35151