

## LABOUR FORCE SPECIALIZATION IN ROMANIA - REGIONAL DISPARITIES

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### **Abstract**

*The specialization of the labour force on regional level was determined by using the Onicescu information energy - corrected formula. Assessing disparities in the regional specialization of the labour force was performed on NACE sections, and the results confirm that there are disparities between regions regarding the specialization of the labour force.*

### **Keywords**

average number of employees; Civil economically active population; Onicescu information energy – corrected formula

### **JEL Classification**

C10; E24; J21

### **Introduction**

The objective of this paper is to analyse the labour market from a regional point of view, and to determine the degree of specialization of the labour force in the different regions of Romania over the period of time 1992-2014.

### **Short methodological presentation**

For this analysis I started from the regional data base TEMPO-online in which the labour force index at the NACE sections level is represented by the 15 sections (NACE Rev.1) for the period of time 1992-2008 and by the 19 sections (NACE Rev.2) for the period of time 2008-2014.

Labour market analysis is based on two indicators:

- *civil economically active population*. This population includes all the people who work for an income and whose work is usually done in one of the activities of the national economy, being defined as an economic or social activity, based on a work contract or a free-lance activity (self-employed) in order to get income such as salary, in kind payment, etc. The following categories of people are included:
  - employees who work in one of the activities of the national economy in the public (integrally of state and public of national interest), mixed, private, cooperative and collective;
  - employers - managers of private units - that employ labour force for the activity of their units;
  - self-employed;
  - unpaid family workers.

The civil employed population does not include the armed forces and similar (the personnel of the Ministry of Defence, Ministry of Administration and Interior, Romanian Intelligence Office, conscripts), convicts and political and community organizations employees.

- *The average number of employees.* This number comprises all the people with individual labour contract/agreement for a definite or indefinite duration (including seasonal workers, the manager or the administrator) whose labour contract/agreement was not suspended during the reference year. The average number of employees represents a simple arithmetic mean resulting from summing up the daily number of employees (suspended labour contract/agreement are excluded) from the reference period including the weekends and legal holidays or other non-working days divided to the total number of calendar days. It also includes the employees whose labour contract was suspended by the employer's initiative (in case of temporary work interruptions) and receive an allowance from the basic salary in accordance with the position held at the workplace, as required by the law. In the daily number of employees taken into account for the compilation of the average number are not included: the employees in unpaid leaves, on strike or working abroad. For weekends, legal holidays and other non-working days, the daily number of employees is considered to be the one in the previous day, except for those whose labour contract/agreement ceased that very same day. The employees who do not have a full-time employment contract are included proportionally with the number of working hours stipulated in the labour contract. In the daily number of employees taken into account for the compilation of the average number are included only the employees that are paid.

The degree of specialisation of labour force on regional level, based on the share of NACE sections in the total average number of employees or total civil economically active population, was determined by using the Onicescu information energy – corrected formula. The index measures the degree of specialisation of the labour force from the perspective of the structure of NACE sections and is calculated by using the following formula:

$$E_j = \frac{\sum S_{ij}^2 - \frac{1}{N}}{1 - \frac{1}{N}}$$

where:  $S_{ij}$  = share of average number of employees/ civil economically active population of

NACE section  $i$  in total average number of employees/ civil economically active population of region  $j$ ,

$N$  = total number of NACE sections,

$i \in \{1, \dots, 15\}$  for NACE Rev.1 (between 1992-2008) and  $i \in \{1, \dots, 19\}$  for NACE Rev.2 (between 2008-2014)

$j \in \{1, \dots, 8\}$ .

The index will oscillate in the interval (0-1), and the concentration of the average number of employees/civil economically active population of a region, a small number of NACE sections will result in the value of Onicescu information energy tending toward 1 (reflecting a high degree of specialisation), while labour force dispersion on several NACE sections will make the value of the index tend towards 0 (reflecting a low degree of specialisation, respectively the diversification).

### **The distribution of the labour force per NACE sections**

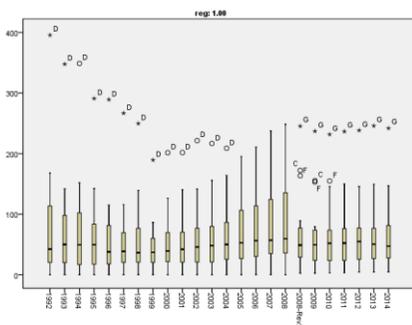
The distribution of the labour force per NACE sections is uneven, with disparities on regional level as well. Thus, considered per regions, the distribution of the civil economically active population per NACE sections is as follows:

- *Bucharest – Ilfov Region*- In the period of time 1992-2004, the civil population working in section *D: Manufacturing industry* represents the highest percentage, as it can be seen in figure 1, meaning 32.9% of the total civil economically active population in 1992 and 21.9% in 2004 respectively, while starting in 2006 the situation changes and most people work in section *G: Trade*, with a percentage of about 19% of the total civil economically active population during the last 8 years.
- *Central Region* - In the period of time 1992-2014, most of the civil population works in sections *A: Agriculture* and *D* (until 2008) and *C* (after 2008): *Manufacturing industry*, these sections including the greatest percentage of the total civil economically active population, as we can notice in figure 1. Thus, 64.1% of the total civil economically active population work in the two sections in 1992, and 47.2% in 2014. Starting with 2002, the percentage of people working in section *G: Trade* increases constantly, reaching 15% of the total in 2014.
- *North – East Region*-Throughout the period subjected to this analysis, most of the civil population works in section *A: Agriculture*, this section registering the highest percentage of the total civil economically active population, as it can be noticed in figure 1, meaning 42.2% in 1992 and 39.5% in 2004 respectively. A significant percentage is also represented by the people working in section *D* (until 2008) and *C* (after 2008): *Manufacturing industry*; thus, 25.7% worked in this section in 1992, and 14.5% in 2014. Starting with 2008, the percentage of people working in section *G:Trade* also increases, reaching up to 12.8% in 2014.
- *North - West Region*- In the period of time 1992-2014, the civil population working in section *A: Agriculture* represents the highest percentage, as it can be seen in figure 1, meaning 37.1% of the total civil economically active population in 1992 and 29.2% in 2014 respectively. Likewise, a high percentage of over 20% is represented by the population working in section *D* (until 2008) and *C* (after 2008): *Manufacturing industry*. Starting with 2003, the percentage of people working in section *G: Trade* increases, reaching a percentage of 13.5% in 2014.
- *South – East Region*- In the period of time subjected to this analysis, most of the civil population works in section *A: Agriculture*, this section having the highest percentage of the total civil economically active population, meaning 36.7% in 1992 and 31.9% in 2014. A great part of the civil population also works in section *D* (until 2008) and *C* (after 2008): *Manufacturing industry*; thus, 28.6% worked in this section in 1992 and 16.0% in 2014. Starting with 2008, the number of people working in section *G:Trade* increases, reaching up to 13.6% of the total in 2014.
- *South Muntenia Region*- Between 1992 and 2014, the civil population working in section *A:Agriculture* represented the highest percentage, as it can be seen in figure 1, meaning 38.2% of the total civil economically active population in 1992 and 35.3% in 2014. A high percentage, about 20%, is

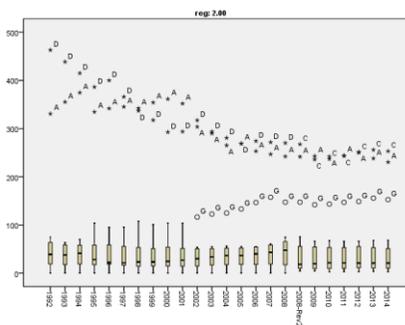
also represented by the population working in section *D* (until 2008) and *C* (after 2008): *Manufacturing industry*. Starting with 2002, the percentage of people working in section *G:Trade* increases, reaching up to 12.4% of the total in 2014.

- *South – West Oltenia Region* – Just as in the case of regions North – East, North – West, South – East and South Muntenia, most of the civil population works in section *A: Agriculture* (it represents 42.2% in 1992 and 38.4% of the total civil economically active population in 2014), as well as in section *D* (until 2008) and *C* (after 2008): *Manufacturing industry*, (19.4% in 1992 and 13.5% in 2014). Starting with 2003, the number of people working in section *G:Trade* increases dramatically, reaching up to 12.3% in 2014.

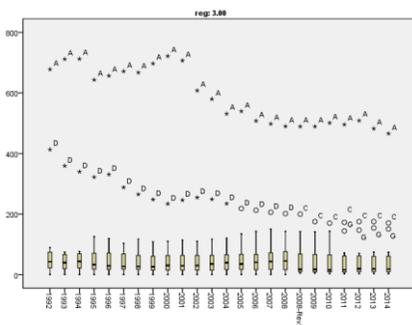
*Bucharest – Ilfov Region*



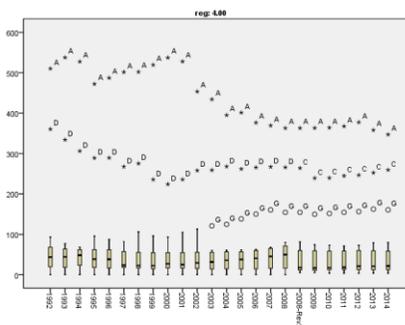
*Central Region*



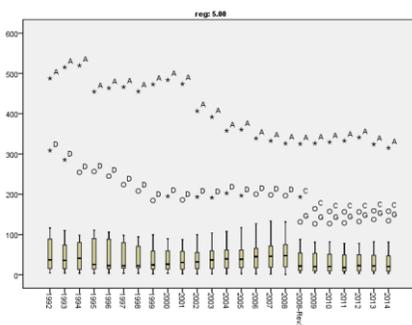
*North – East Region*



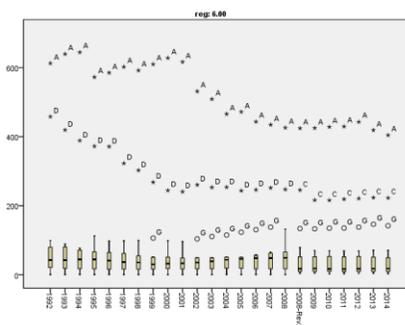
*North - West Region*



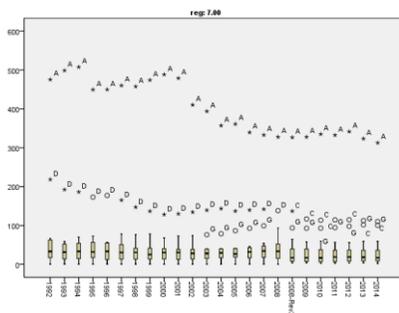
*South – East Region*



*South Muntenia Region*



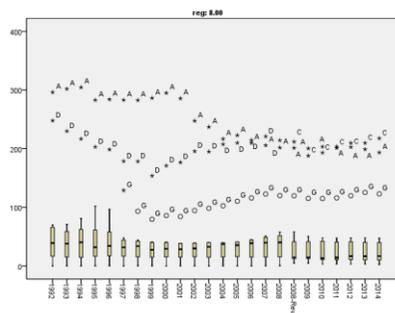
South – West Oltenia Region



For the period 1992-2008 (NACE Rev.1)

A:Agriculture, hunting and forestry  
 D:Manufacturing industry  
 G:Trade

West Region



For the period 2008-2014 (NACE Rev.2)

A:Agriculture, forestry and fishing  
 C:Manufacturing industry  
 G:Wholesale and Retail Trade

**Figure 1. Boxplot for the distribution of the civil economically active population**

Source: processing by the TEMPO-Online

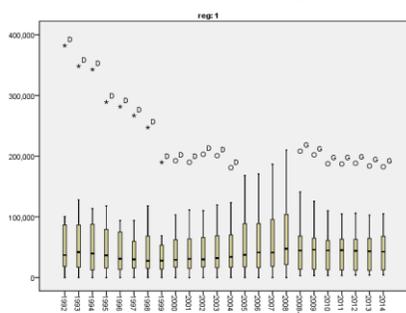
- *West Region* –Until 2005, the civil population working in section A: *Agriculture* represented the highest percentage, as it can be seen in figure 1, meaning 30.3% of the total civil economically active population in 1992 and 26.7% in 2005, while starting with 2006 (except for the period of time 2009-2012) the situation changes and most people work in section D: (until 2008) and C (after 2008): *Manufacturing industry*, which reached up to 25% of the total population. After 1997, the percentage of people working in section G: *Trade* also increases, reaching up to 14.7% of the total in 2014.

As to the distribution of the average number of employees per NACE sections, the situation is different compared to the first indicator subjected to this analysis, the civil economically active population. Thus, per regions and per NACE sections, the distribution is as follows:

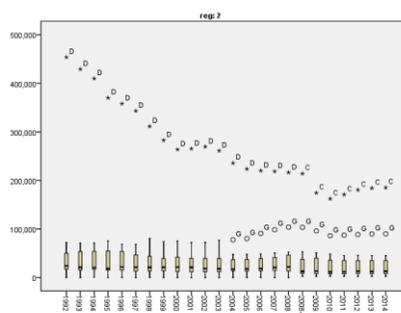
- *Bucharest – Ilfov Region*–During the period of time 1992-2005, the employees in section D: *Manufacturing industry* represented the highest percentage, as it can be seen in figure 2, meaning 39.5% of the total average number of employees in 1992 and 23.8% in 2004, while starting in 2006 the situation changes and most employees work in section G: *Trade*, with a percentage of about 20% of the total during the last 8 years.
- *Central Region*– In the period of time 1992-2014, most employees worked in section D (until 2008) and C (after 2008): *Manufacturing industry*, this section including the highest percentage of the total number of employees, as it can be seen in figure 2. Thus, 50.8% of the employees worked in this section in 1992 and 31.9% in 2014. Starting with 2004, the percentage of employees working in section G: *Trade* also increased constantly, reaching up to 15.5% of the total in 2014.
- *North – East Region*–During the whole period subjected to this analysis, most of the employees work in section D (until 2008) and C (after 2008): *Manufacturing industry*, this section registering the highest percentage of the total average number of employees, as it can be seen in figure 2, representing 43.2% in 1992 and 21.1% in 2014 respectively. Starting with 2008, the percentage of employees in section G: *Trade* increases, reaching up to 12.8% in 2014.

- *North - West Region* –During the period of time 1992-2014, the employees working in section *D* (until 2008) and *C* (after 2008): *Manufacturing industry* represented the highest percentage, as it can be seen in figure 2, meaning 41.9% of the total average number of employees in 1992 and 30.7% in 2014. During the last 10 years, an important percentage of employees - over 15% - was also represented by the ones working in section *G: Trade*.
- *South – East Region* –During the period of time subjected to this analysis, most of the employees worked in section *D* (until 2008) and *C* (after 2008): *Manufacturing industry*, this section including the highest percentage of the total average number of employees, meaning 34.6% in 1992 and 22.3% in 2014. Starting with 2008, the number of employees working in section *G: Trade* also increases, reaching 17.4% of the total in 2014.
- *South Muntenia Region* – Between 1992 and 2014, the employees working in section *D* (until 2008) and *C* (after 2008): *Manufacturing industry* represented the highest percentage, as it can be seen in figure 2, meaning 44.0% of the total average number of employees in 1992 and 28.5% in 2014. Starting with 2008, the percentage of employees working in section *G: Trade* also increases, reaching up to 14.6% in 2014.
- *South – West Oltenia Region* –Just as in the other regions, most of the employees here work in section *D* (until 2008) and *C* (after 2008): *Manufacturing industry* (which represents 32.6% of the total average number of employees in 1992 and 19.9% in 2014). Starting with 2008, the number of employees working in section *G: Trade* increases, reaching up to 16.1% in 2014.

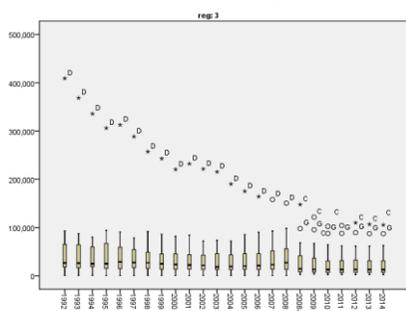
*Bucharest – Ilfov Region*



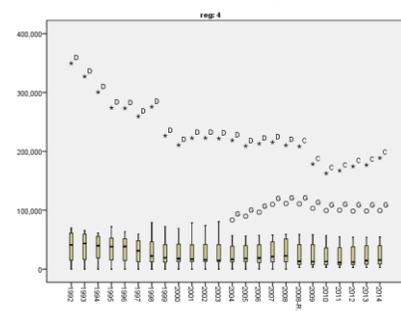
*Central Region*

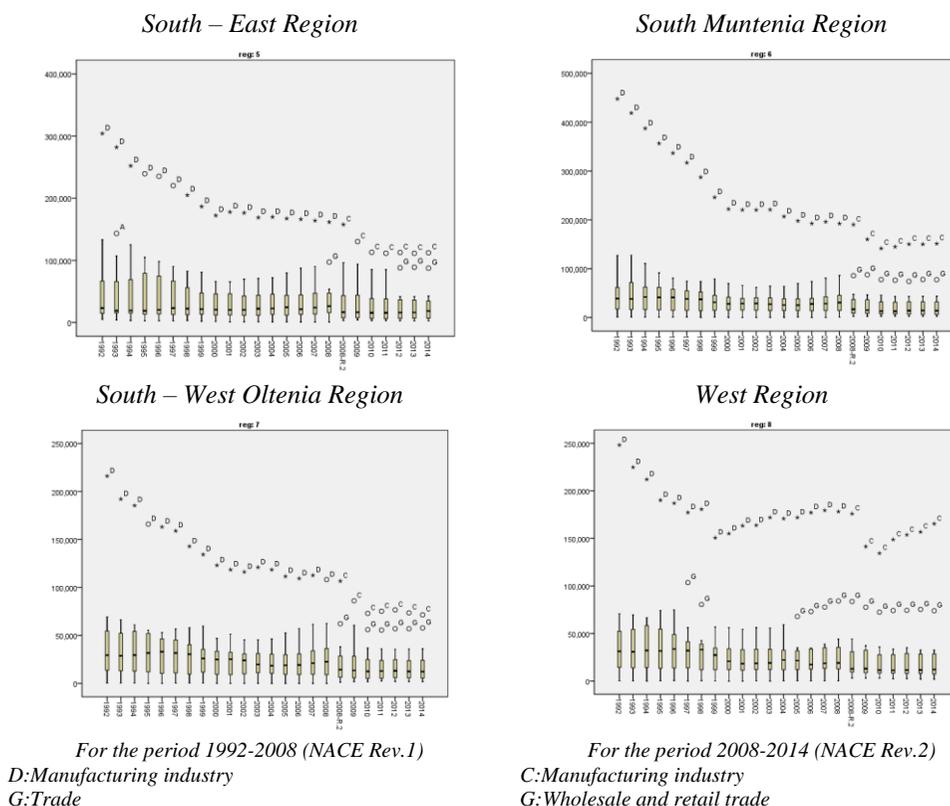


*North – East Region*



*North - West Region*





**Figure 2. Boxplot for the distribution of the average number of employees**

Source: processing by the TEMPO-Online

- *West Region* – During the period of time subjected to this analysis, the employees working in section *D* (until 2008) and *C* (after 2008): *Manufacturing industry* represented the highest percentage, as it can be noticed in figure 2, meaning 36.2% of the total average number of employees in 1992 and 34.0% in 2014. After 2008, the percentage of employees working in section *G: Trade* also increases, reaching up to 15.2% in 2014.

In conclusion, the distribution of the civil economically active population per NACE sections emphasises the fact that, during the period of time subjected to this analysis, in most of the regions (*North – East, North – West, South – West Oltenia, South Muntenia, South – East*) most of the population works in section *A: Agriculture*, while the population working in section *D* (until 2008) and *C* (after 2008): *Manufacturing industry* also represents a high percentage of the total civil economically active population. However, in the *Central and West Region*, the percentages of the population working in sections *A: Agriculture* and *D* (until 2008) and *C* (after 2008): *Manufacturing industry* are about the same, while in *Bucharest – Ilfov Region* the civil population working in section *D* (until 2008) and *C* (after 2008): *Manufacturing industry* represents the highest percentage. It can also be noticed that during the last years the percentage of the people working in section *G: Trade* increased in all the regions. As to the distribution of the average number of employees per NACE

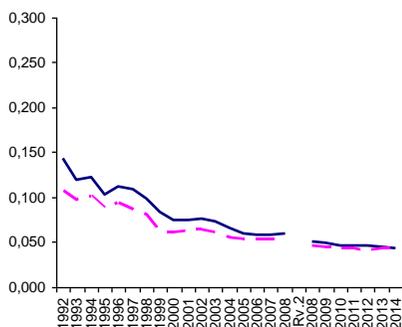
sections, in all the regions most of the employees work in section *D* (until 2008) and *C* (after 2008): *Manufacturing industry*, this section representing the highest percentage of the total, except for *Bucharest – Ilfov Region* where, during the last years, most of the employees work in section *G: Trade*.

### Specialisation of the labour force per NACE sections

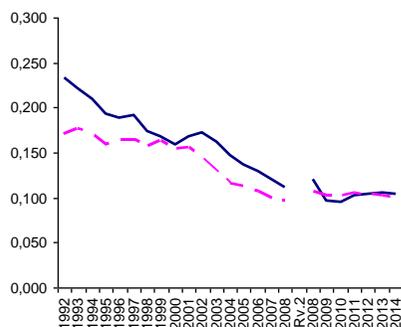
From the point of view of the Onicescu information energy – corrected formula, the evolution of the degree of specialization of the labour force per NACE sections after 1992, on regional level, is as follows, as it results from figure 3:

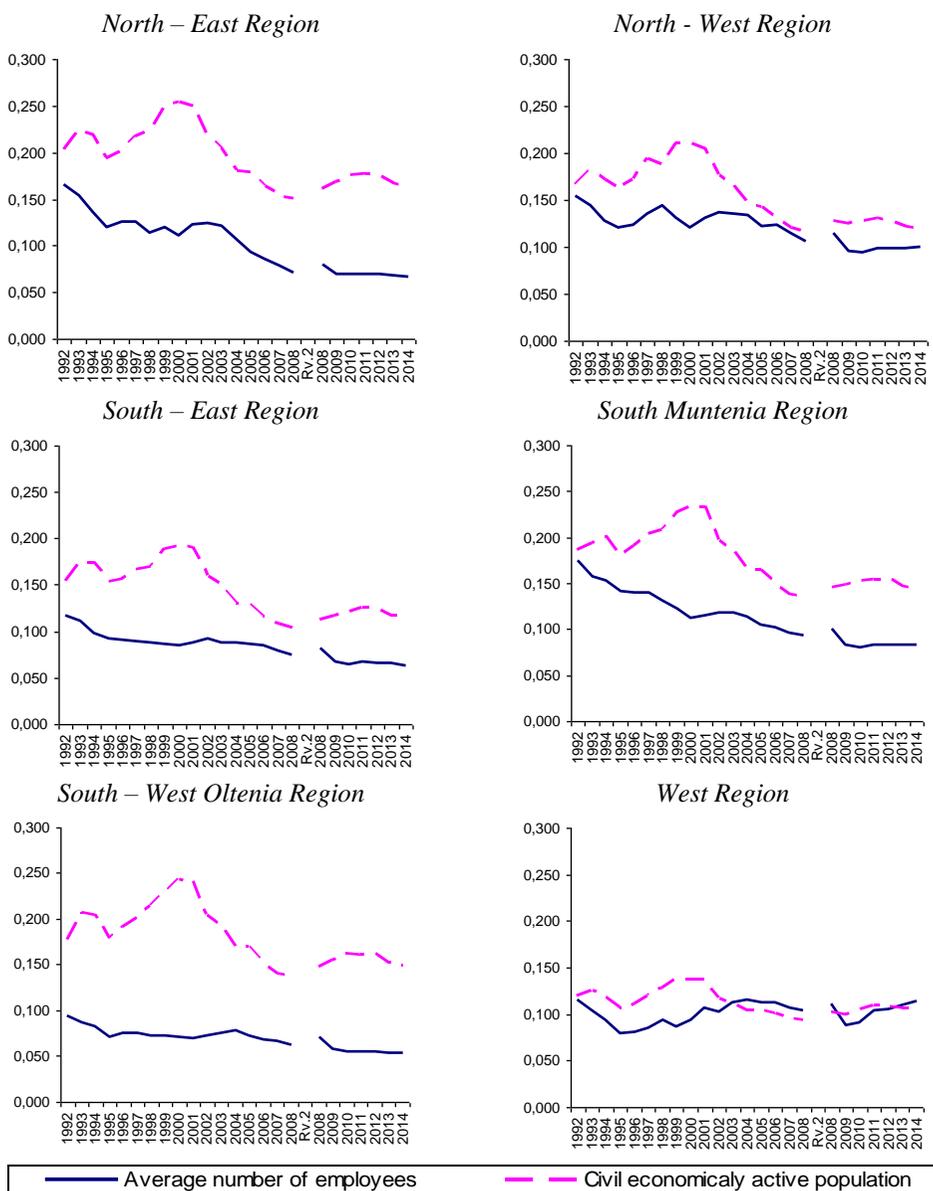
- *Bucharest – Ilfov Region* - In the period of time 1992-2014, the degree of specialization of the civil economically active population constantly decreased (by -59.8% in 2014 compared to 1992) and it was slightly lower compared to the one of the average number of employees. In time, the difference between the two indicators decreased so that, in 1992, the degree of specialization of the civil economically active population was of 0.107 and the one of the average number of employees was of 0.143, while in 2014 the values of these indicators were 0.043 and 0.044 respectively.
- *Central Region*- In the period of time 1992-2014, the degree of specialization of the civil economically active population constantly decreased (by -59.8% in 2014 compared to 1992) and it was slightly lower than the one of the average number of employees. In time, the difference between the two indicators decreased, so that in 1992 the degree of specialization of the civil economically active population was of 0.170 and the one of the average number of employees was of 0.233, while in 2014 these values were 0.101 and 0.104 respectively.
- *North – East Region* – During the period of time subjected to the analysis, the degree of specialization of the average number of employees decreased (by -59.6% in 2014 compared to 1992) and it was lower than the one of the civil economically active population. In time, the difference between the two indicators increased, so that in 1992 the degree of specialization of the civil economically active population was of 0.203 and the one of the average number of employees was of 0.166, while in 2014 these values were 0.161 and 0.067 respectively.

*Bucharest – Ilfov Region*



*Central Region*





**Figure 3. Evolution of the Onicescu index of regional specialization on labour market**

Source: processing by the TEMPO-Online

- *North - West Region* –During the period of time subjected to the analysis, the degree of specialization of the average number of employees decreased (by - 34.5% in 2014 compared to 1992, and it was slightly lower than the one of the civil economically active population. The difference between the two indicators increased by 2000 so that, in 1992 the degree of specialization of the civil economically active population was of 0.166 and the one of the average number of employees was of 0.154, while in 2000 these values were

0.210 and 0.121 respectively. During the last 14 years, this difference between the indicators decreases, so that in 2014 the disparity is of 0.018 compared to 0.089 as registered in 2000.

- *South – East Region* – During the period of time 1992-2014, the degree of specialization of the average number of employees constantly decreased (by -46.1% in 2014 compared to 1992) and it was lower than the one of the civil economically active population. In time, the difference between the two indicators reached a maximum in the period of time 2000-2001 and a minimum between 2007 and 2009. Thus, in 1992 the degree of specialization of the civil economically active population was of 0.153 and the one of the average number of employees was of 0.118, while in 2014 these values were of 0.116 and 0.064 respectively.
- *South Muntenia Region* – During the period of time 1992-2014, the degree of specialization of the average number of employees constantly decreased (by -52.6% in 2014 compared to 1992), and it was lower than the one of the civil economically active population. In time, the difference between the two indicators increased, reaching a maximum in the period of time 2000-2001. Thus, in 1992 the degree of specialization of the civil economically active population was of 0.187 and the one of the average number of employees was of 0.175, while in 2014 these values were of 0.144 and 0.083 respectively.
- *South – West Oltenia Region* – During the period of time subjected to the analysis, the degree of specialization of the average number of employees decreased (by -43.5% in 2014 compared to 1992) and it was lower than the one of the civil economically active population. The difference between the two indicators stayed high during the whole period subjected to this analysis, reaching a maximum in 2000. Thus, in 1992 the degree of specialization of the civil economically active population was of 0.153 and the one of the average number of employees was of 0.118, while in 2014 these two indicators were 0.116 and 0.064 respectively.
- *West Region* – during the period of time 1992-2014, the degree of specialization of the civil economically active population and of the average number of employees maintained approximately the same values, with slightly higher variations at the beginning of the analysed period. The difference between the two indicators is small, and the periods when an indicator is higher than the other alternate.

In conclusion, the degree of specialization of the civil economically active population is higher than the one of the average number of employees in most of the regions (*North – East, North – West, South – West Oltenia, South Muntenia, South – East*), and its evolution during the period of time subjected to the analysis is oscillating having, however, a decreasing trend during the 22 years subjected to this analysis. It can also be noticed in figure 3 that the difference between the 2 indicators is a significant one during the whole period, and the highest disparity between the two indicators is reached between 2000 and 2001. Alternatively, in *Bucharest – Ilfov Region* and in *Central Region* the degree of specialization of the civil economically active population is slightly lower than the one of the average number of employees, and the decreasing trend of their evolution leads to a decrease of the difference between the two indicators. In *West Region*, the degree of specialization of the civil economically active population and the one of the average number of employees maintained approximately the same values, and the difference between the two indicators is low.

## Conclusion

In most of the regions (*North – East, North – West, South – West Oltenia, South Muntenia, South – East*), the high degree of specialization of the civil economically active population (higher than the one of the average number of employees) is the result of the uneven distribution of the civil economically active population per NACE sections, with a higher percentage of the population working in section A: *Agriculture*. On the other hand, in *Central Region, West Region* and *Bucharest – Ilfov Region* the degree of specialization of the civil economically active population is close to the one of the average number of employees, as the percentages of the civil economically active population working in sections A: *Agriculture* and D (until 2008) and C (after 2008): *Manufacturing industry* are approximately the same, and most of the employees work in this section D (until 2008) and C (after 2008): *Manufacturing industry*. The decreasing trend in the evolution of these indicators during the 22 years analysed also emphasises the fact that, on the level of the labour market, there is an un-specialization phenomenon.

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