The Architecture of the Territorial Indexes through the Standardisation Method

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ARTICLE INFO

Article history:
Accepted February 2013
Available online 30 May 2013

JEL Classification
C1, C12, C2

Keywords:
Territorial indexes, „Mutual relationship” index, Statistical analyses in space

ABSTRACT

This research reflects the importance in statistics of the territorial indexes numbers which express the dynamic of the statistical variables in territorial profile. The purpose of this paper consists in to reflect over of the economic life, how we will can to apply some important standardization methods, such as Iughenburgh method, Kazineț method named the standard coefficients method and Peregudov method.

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1. Introduction

I present through this paper a personal scientific contribution which reflects the technique of the construction concerning the territorial indexes through the standardization method. The sections 2 reflects methodology for the achieve the architecture concerning the territorial indexes. In the section 3 we discover the standard coefficients method renowned as luppenburg method. The section 4 expresses the methodology concerning the application for Kazineț method in the case of the territorial indexes. Also, we can to observe in the section 4 Peregudov method which it uses at the achievement of the architecture concerning the territorial indexes. The state of the art in this domain is represented by the essential research belongs to Iughenburgh who elaborated the standardization method for to create the territorial indexes. Then, Kazineț and Peregudov contributed to the improvement of the standardization method for to shape the territorial indexes.

2. The modality of the implementation concerning the standardization method in the models of the territorial indexes

Through the univers of the indexes numbers, the statistical language obtains a new size and it reflects in a fine mode the changes from the social-economic life, the progress or the regress in a certain domain, even there when the changes can not be observed.

The contributions concerning the enlargement and the diversification of the scientific concepts of the indexes numbers and the concerns for the sistem of weights, leaved one’s mark on the development of the indexes scale, with effect over the improvement step by step of the indexes numbers theory.

In our researches, we must to select the indexes which through them synthesis capacity and analytical potential it models very well on the phenomenon analysed. Thus, we can through them calculation to put in evidence the size of the influence concerning the various factors over the variation in time or in space of the level which belongs to the complex variable taked in study.

Certainly, the selection of a certain synthetic index type is tightly binded from the work time concerning the statistical processing of the dates through the technical means which we have at disposition, from the shape of the organisation concerning the evidence of the quantities and the prices products, from several performance criteriums, from the synthesis potential of the variations in time or space concerning the levels of the variables which make the object of the research, as and from the power of analysis concerning the influences of the factors over the variations of the levels for the complex variables researched.

The simplicity and the quickness of the calculation will be the qualities more required in this univers of the indexes numbers. Consequently, it tends to a great share concerning the qualities of the indexes numbers and also, it tends to a economic significance of these.

In the view of the calculation concerning the basis of comparison and the system of weights, in the case of the territorial indexes, it uses very frequent the standardization method. Initial, this method was elaborated by demography for to achieve a comparative analysis of the mortality (between two regions, two countries or two periods of time).

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We suppose that we have for to compare two regions \( A \) and \( B \) and either \( R \) the third region used for standardization.

In the case of the **direct standardization**, the standardization item named and the fixed element, is expressed by the structure of \( R \) region. So, the index with structure fixed presents the next shape [11]:

\[
I_{A/B}^{(x_i)} = \frac{\sum_{i=1}^{n} x_i^A f_i^R}{\sum_{i=1}^{n} f_i^R} = \frac{\sum_{i=1}^{n} x_i^B f_i^R}{\sum_{i=1}^{n} f_i^R} = \frac{\sum_{i=1}^{n} x_i^A f_i^R}{\sum_{i=1}^{n} f_i^R}
\]

(1)

If we apply the **indirect standardization**, the standardization item is represented by the level of \( X \) variable from \( R \) region. Consequently, the index concerning the structural changes reflects the next model [11]:

\[
I_{A/B}^{(f_i/x_i)} = \frac{\sum_{i=1}^{n} x_i^R f_i^A}{\sum_{i=1}^{n} f_i^A} : \frac{\sum_{i=1}^{n} x_i^R f_i^B}{\sum_{i=1}^{n} f_i^B}
\]

(2)

**3. Iughenburgh Method**

For to calculate the territorial indexes, Iughenburgh recommends the standardization method which is named the method of standard coefficients. By means of Iughenburgh, it removes the influence of structural differences concerning the variables researched in the frame of comparative analyses in space.

The advantage of Iughenburgh method consists in the fact that it builds up un system of weights on objective bases, through which we can to reflect the structure on a wide space which cans to include all regions compared. So, we remove the weights which represent the elements of structure which belong to the regions compared [11].

For to exemplify method of Iughenburgh and the next standardization methods, we will consider the nominal distributions of nominal G.D.P. (in current prices for Gross Domestic Product) and of real G.D.P. expressed in thousand millions euro in 2011, on the firsts two countries from Central Europe, respectively from South-East Europe, which make up the nucleus of the central and south-east states from Europe, as well as the values of the inflation rate and deflation index, which are represented in the tables no.1 and no.2:

<table>
<thead>
<tr>
<th>Central Europe</th>
<th>Nominal G.D.P. (thousand millions EUR)</th>
<th>Inflation Rate (%)</th>
<th>Deflationary Index</th>
<th>Real G.D.P. (thousand millions EUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poland</td>
<td>370</td>
<td>27.8</td>
<td>1,278</td>
<td>289,52</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>155</td>
<td>9.1</td>
<td>1,091</td>
<td>142,07</td>
</tr>
<tr>
<td>Total</td>
<td>525</td>
<td>21.64</td>
<td>1,2164</td>
<td>431,59</td>
</tr>
</tbody>
</table>

\* The dates were processed from – EUROSTAT, „World Economic Outlook“, I.M.F., 2012.

<table>
<thead>
<tr>
<th>South-East Europe</th>
<th>Nominal G.D.P. (thousand millions EUR)</th>
<th>Inflation Rate (%)</th>
<th>Deflationary Index</th>
<th>Real G.D.P. (thousand millions EUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Romania</td>
<td>136</td>
<td>35.3</td>
<td>1,353</td>
<td>100,52</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>38</td>
<td>62.1</td>
<td>1,621</td>
<td>23,44</td>
</tr>
<tr>
<td>Total</td>
<td>174</td>
<td>40.37</td>
<td>1,4037</td>
<td>123,96</td>
</tr>
</tbody>
</table>

\* The dates were processed from – EUROSTAT, „World Economic Outlook“, I.M.F., 2012.
If we apply method of Iughenburg in the case of the dates from the tables no.1 and no.2, we will obtain the standard weight under the shape of the average concerning Deflationary Index on Central Europe and South-East Europe:

$$T_{dfl} = \frac{\sum_{i=1}^{4} G.D.P._{\text{no min al,}_i \cdot i} - 370 + 155 + 136 + 38}{\sum_{i=1}^{3} G.D.P._{\text{real,}_i}} = \frac{289,52 + 142,07 + 100,52 + 23,44}{1,2582 \text{ sau } 125,82\%}$$

The index of variation concerning Real G.D.P., in Central Europe in comparison with South-East Europe, will be:

$$I_{\text{G.D.P.}_{\text{real, Central Europe/South-East Europe}}} = \frac{\sum_{i=1}^{4} G.D.P._{\text{real,}} \cdot T_{dfl}^p}{\sum_{i=1}^{3} G.D.P._{\text{real,}} \cdot T_{dfl}^p} = \frac{4817,396,123}{123,96\text{billions EUR}} = 3,4817 \text{ or } 348,17\%$$

We observe that and through Kazineţ method, either the direct method or the indirect method, the value of Real G.D.P. in Central Europe, is more great by comparison with the value of Real G.D.P. in South-East Europe, with 248,17%.

4. Kazineţ Method

L. Kazineţ, like and Iughenburg, recommends at the elaboration of the territorial indexes the standard coefficients method. He proposes the construction of the territorial indexes in a distinct mode, in function of the influence factors: quantitative and qualitative [7].

If we use the dates from the tables no.1 and no.2, we can to calculate the indexes of the variation concerning Real G.D.P. and the indexes of the variation concerning Deflationary Index in Central Europe comparative to South-East Europe:

- the index of the variation concerning Real G.D.P. in Central Europe face to South-East Europe presents the next shape:

  - the direct method:

  $$I_{\text{G.D.P.}_{\text{real, Central Europe/South-East Europe}}} = \frac{\sum_{i=1}^{4} T_{dfl}^p \cdot G.D.P._{C.E.}}{\sum_{i=1}^{3} T_{dfl}^p \cdot G.D.P._{S.E.E.}} = \frac{431,59\text{billions EUR}}{123,96\text{billions EUR}} = 3,4817 \text{ or } 348,17\%$$

  where: $T_{dfl}^p = 1,2561$ or 125,61%

- the indirect method:

  $$I_{\text{G.D.P.}_{\text{real, Central Europe/South-East Europe}}} = \frac{\sum_{i=1}^{4} T_{dfl}^p \cdot G.D.P._{C.E.}}{\sum_{i=1}^{3} T_{dfl}^p \cdot G.D.P._{S.E.E.}} = \frac{525}{1,2164 \cdot 1,4037} = 3,4818 \text{ or } 348,18\%$$

where: $(G.D.P._{\text{real,}})_m = 0,25\%$ - represents the average structure of Real G.D.P. in general collectivity.

We observe that and through Kazineţ method, either the direct method or the indirect method, the value of Real G.D.P. in Central Europe, is more great by comparison with the value of Real G.D.P. in South-East Europe, with 248,18%.
\[ I^{\text{PDG}}_{\text{Central Europe / South-East Europe}} = \frac{\sum_{i=1}^{2} I^{P(C.E.)}_{\text{diff,}i} \cdot (G.D.P.\_\text{real})_{m} - \sum_{i=1}^{2} I^{P(S-E.E.)}_{\text{diff,}i} \cdot (G.D.P.\_\text{real})_{m}}{1.2164 \cdot 1.4037} = 0.8666 \text{ sau 86.66%} \]

- the indirect method:

\[ I^{\text{PDG}}_{\text{Central Europe / South-East Europe}} = \frac{\sum_{i=1}^{2} I^{P(C.E.)}_{\text{diff,}i} \cdot G.D.P.\_\text{C.E. real,}i - \sum_{i=1}^{2} I^{P(S-E.E.)}_{\text{diff,}i} \cdot G.D.P.\_\text{S-EE real,}i}{525 \cdot 174} = 0.8666 \text{ or 86.66%} \]

Consequently, in the case of the variation concerning the qualitative factor named Deflationary Index, if we apply direct or indirect Kazinet method, we observe a diminution of him value, in Central Europe by comparison with South-East Europe, with 14.33%.

Regarding the index of the variation for Nominal G.D.P., in Central Europe by comparison with South-East Europe, which it is a synthetic index, it observes on opinions of Kazinet, that this it cans calculate in two manners:

a) it divides the index of the variation concerning Real G.D.P., in Central Europe by comparison with South-East Europe, calculated through the direct method, at the index of the variation concerning Deflation Index determined through the indirect method, in South-East Europe by comparison with Central Europe:

\[ I^{\text{G.D.P. nominal}}_{\text{Central Europe / South-East Europe}} = \frac{\sum_{i=1}^{2} I^{P(C.E.)}_{\text{diff,}i} \cdot G.D.P.\_\text{C.E. real,}i - \sum_{i=1}^{2} I^{P(S-E.E.)}_{\text{diff,}i} \cdot G.D.P.\_\text{S-EE real,}i}{525 \cdot 174} = 3,0172 \text{ or 301,72%} \]

b) it divides the index of the variation concerning Real G.D.P., in Central Europe by comparison with South-East Europe, calculated through the direct method, at the index of the variation concerning Deflationary Index, in South-East Europe by comparison with Central Europe, calculated through the direct method:

\[ I^{\text{G.D.P. nominal}}_{\text{Central Europe / South-East Europe}} = \frac{\sum_{i=1}^{2} I^{P(C.E.)}_{\text{diff,}i} \cdot G.D.P.\_\text{C.E. real,}i - \sum_{i=1}^{2} I^{P(S-E.E.)}_{\text{diff,}i} \cdot G.D.P.\_\text{S-EE real,}i}{525 \cdot 174} = 3,0172 \text{ or 301,72%} \]

Therefore, the value of Nominal G.D.P. in Central Europe is more great by comparison with the value of Nominal G.D.P. in South-East Europe, with 201.72%.

Also, it observes the existence of a very strong corelation in the system of the territorial indexes achieved by Kazinet, between the territorial indexes of the quantitative, qualitative and derivated factors, with the necessary and sufficient condition that at the calculation of the territorial indexes concerning the factors of quantitative and qualitative influence it musts to apply distinct methods.
5. Peregudov Method

In opinion of V. Peregudov, it appears the requirement concerning the reversibility of the territorial indexes, because in the spatial analyses none from the regions compared or countries can not be definitely determined as „basic“. Thus, the opinion of V. Peregudov is in total contradiction with that of Lughenburg, which it shows that the regions compared „are one better than another“, if in the composition of the territorial indexes it is considered as a base of comparison first a region, then another, with the respect concerning the scheme of weighting established [13].

For to illustrate the methodology for the construction of the territorial indexes according to the opinions of V. Peregudov, we will proceed in the following manner: we construct the territorial indexes using as a basis of comparison, first South-East Europe, while weights will be the levels of the values concerning the variables for Central Europe, and then the basis of comparison will be Central Europe and the weights will be represented by the values of the variables concerning South-East Europe.

- the index concerning the variation of the deflationary index in Central Europe by comparison with South-East Europe will be:

\[ I^{P}_{CE} = \frac{\sum_{i=1}^{2} I^{P(C.E.)}_{diff,i} \cdot G.D.P^{C.E.}_{real,i}}{\sum_{i=1}^{2} I^{P(S-E.E.)}_{diff,i} \cdot G.D.P^{S-E.E.}_{real,i}} = \frac{525}{622,01603} = 0,8440297 \text{ or } 84,40\% \]

- the index concerning the variation of the deflationary index in South-East Europe by comparison with Central Europe will be:

\[ I^{P}_{SE} = \frac{\sum_{i=1}^{2} I^{P(S-E.E.)}_{diff,i} \cdot G.D.P^{S-E.E.}_{real,i}}{\sum_{i=1}^{2} I^{P(C.E.)}_{diff,i} \cdot G.D.P^{C.E.}_{real,i}} = \frac{174}{154,03760} = 1,1295943 \text{ or } 112,96\% \]

It observes that using Peregudov method for the qualitative variation called the deflationary index, the him value, in Central Europe is less by comparison with South-East Europe, with 15,55 %. If we multiply these territorial indexes of the qualitative factor, whose influence is investigated, we will obtain the „mutual relationship“ index. The relative specialization level of the comparable regions it cans be calculate using the geometrical mean for the construction of the „mutual relationship“ index.

\[ I^{P}_{geometric} = \sqrt[2]{\frac{\sum_{i=1}^{2} I^{P(C.E.)}_{diff,i} \cdot G.D.P^{C.E.}_{real,i} \cdot \sum_{i=1}^{2} I^{P(S-E.E.)}_{diff,i} \cdot G.D.P^{S-E.E.}_{real,i}}{\sum_{i=1}^{2} I^{P(S-E.E.)}_{diff,i} \cdot G.D.P^{S-E.E.}_{real,i} \cdot \sum_{i=1}^{2} I^{P(C.E.)}_{diff,i} \cdot G.D.P^{C.E.}_{real,i}}} = \sqrt[2]{0,8440297 \cdot 1,1295943} = 0,9764277 \]

The influence of relative specialization it can be removed by two territorial indexes division of the qualitative factor at the relative specialization index:

\[ \left( I^{P}_{CE} \cdot I^{P}_{SE} \right)^{*} = I^{P}_{CE} : I^{P}_{SE} : I^{P}_{geometric} = 0,8440297 : 0,9764277 = 0,8644057 \]

and

\[ \left( I^{P}_{SE} \cdot I^{P}_{CE} \right)^{*} = I^{P}_{SE} : I^{P}_{CE} : I^{P}_{geometric} = 1,1295943 : 0,9764277 = 1,1568642 \]

It is noted that the product of the territorial indexes, which expressing the absence of the relative specialization, is equal to 1, which it indicates the reversibility requirement:

\[ \left( I^{P}_{CE} \cdot I^{P}_{SE} \right)^{*} \cdot \left( I^{P}_{SE} \cdot I^{P}_{CE} \right)^{*} = 0,8644057 \cdot 1,1568642 = 1 \]

In general form, these territorial indexes following the next expression:
The territorial indexes previously obtained are „ideal indexes“. They are created by Irving Fisher who demonstrated that, in the situation of the comparisons over time of the levels concerning the variables studied, „353 index“ meets the test of reversibility.

V. Peregudov states that, in the case of the analysis in time, the reversibility requirement is purely formal and when it making comparison in space of the levels for the variables researched in the same time in regions which are economically equivalent, it is required „reversibility in space“, otherwise, very often, it can to appear in practice contradictory results because there are differences concerning the structure of production in the regions which are under investigation.

But, the application of the standard coefficients method, at the construction of the territorial indexes, has as effect a great disadvantage. Eliminating the actual structures of the communities which are researched in these regions and introducing the standard structure, it obscures the specific concerning the statistical units whose characteristics are analyzed in space. Thus, it artificially increases or decreases the average levels of those variables whose specific gravity is low across the communities analysed, namely high.

Iughenburg uses the indirect method of the standard coefficients and he achieves „the standardization of the qualitative variable“ and not „the standardization of the structure“, the statistical community studied keeping the actual structure.

The methodological solutions proposed by Kazineţ reflects a highlights progress in the development concerning the theory of the territorial indexes. So, it outlines a delimitation between the territorial indexes of the variations concerning the qualitative factors and the quantitative factors, because these indexes have specific economic content and logical meanings expressed.

On the other hand, the territorial indexes from Kazineţ system calculated through the direct method have a very well-defined economic sense, equivalent to the aggregate indexes. Consequently, these indexes represent average of the individual indexes, unlike the territorial indexes measured through the indirect method which have a different sense and a specific form of the indexes with a single factor with variations of the structure.

It is noted that the territorial indexes constructed by L. Kazineţ, through the direct and indirect method, are reversible.

V. Peregudov was especially concerned about the territorial indexes of the qualitative factors, imposing by their reversibility, which it being observed while the mutual connection index is equal to 1.

Thus, we can to conclude a foregone conclusion in the case of the construction concerning the territorial indexes, namely that, the standardization methods which represent the best rated regarding their viability in practice, are Kazineţ method and Peregudov method [11].
6. Conclusions

We observe common views regarding the methodology of calculation for the territorial indexes at Lughenburg and Kazineț, who recommend the standard coefficient method, and V. Peregudov it stands out clearly through him distincts concepts concerning the composition of the territorial indexes which express variations of the qualitative factors.

References