CHANGES IN THE NUMBER OF VISITORS’ OVERNIGHT STAYS IN HOTEL ACCOMMODATIONS AND CAMPSITES IN THE THIRTEEN ADMINISTRATIVE REGIONS OF GREECE: A SHIFT SHARE ANALYSIS APPROACH

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Abstract
The shift-share method is applied in order to divide a regional value’s change into separate components. The present paper aims to divide the percentage change of the number of overnight stays that took place in hotel and campsite accommodations in the thirteen Greek administrative regions between the years 2003 and 2015 into separate components, by applying the above mentioned method. Arrivals and overnight stays’ data for domestic and international visitors were used for the division of the percentage change of the total number of overnight stays.

Keywords: Shift-share analysis, Arrivals, overnight stays, hotel accommodations

JEL classification: Z30, R58

1. Introduction
The shift-share analysis (Dunn, 1960), in its diverse variations (Kalbacher, 1979, Loveridge et al, 1998), is an extremely popular method for the two following reasons: it’s simple and undemanding in data. The core of the method lies in the comparison of a regional value’s change in relation to the change of the same value in a reference area, usually the whole country (Loveridge, 1995). Of course, the method has received some criticism (Lamarche 2003, Kochanowski 1989, Holden et al 1989, Arculus 1984, Esteban Marquillas 1972). Despite the criticism, the possibility of a first rough approach to the hidden causes that affect the regional variables and, consequently, to a region’s economy that this method offers, renders it, if not a typical analysis method, at least one that cannot be ignored when it comes to a first description of a regional economy. In the tourism sector, the method’s classical approach, static or dynamic, or in its revised form, has been applied in order to analyse an area’s tourism sector or the competitiveness inside the area’s tourism (Shi Chunyun et al 2007, Fuchs et al 2000). In the present paper, the new shift-share analysis approach will be applied in the tourism sector (Artige et al 2014). The new approach has dealt with the points of criticism of the classical method (Dunn 1960), as well as those of the modified method (Esteban 1972). In the present paper, the new method will be applied using data involving all the years between 2003 and 2015, introducing a dynamic character to the analysis (Barff 1988 et al). We will attempt to address the question of whether it is possible to divide the percentage change of the number of overnight stays that took place in hotel accommodations and campsites in the thirteen Greek administrative regions, between the years 2003 and 2015, into separate components. We deem that the use of this method will contribute to its wider introduction in analyzing more variables in the tourism industry (Chun-Yun et al 2008, Shi et al 2007).

2. The model.
If \( A_{jt} = \sum_j A_{ijt} \) and \( N_{jt} = \sum_k N_{ijkt} \) express the total number of arrivals (A) and overnight stays (N) in hotel accommodations in region \( i \) coming from visitor categories \( j = 1, 2, 3, \ldots, k \) at time \( t \) and \( r_{ijt+1} = \frac{A_{ijt+1} - A_{ijt}}{A_{ijt}} \) \( r_{ijkt+1} = \frac{N_{ijkt+1} - N_{ijkt}}{N_{ijkt}} \) express the change rates of arrivals and overnight...
stays by category, then the rate of arrivals and overnight stays in the categories’ total are
\[ r_{i,t+1} = \sum_{j=1}^{N_{i,t}} \frac{1}{k_j} r_{ij,t+1} \quad \text{and} \quad g_{i,t+1} = \sum_{j=1}^{N_{i,t}} \frac{1}{k_j} g_{ij,t+1} \]
respectively. If every visitor category is 1/k of the arrivals’ total and makes up for 1/k of the overnight stays’ total, then we have the average
change rate of arrivals \[ \bar{r}_{i,t+1} = \sum_{j=1}^{N_{i,t}} \frac{1}{k} r_{ij,t+1} \] and overnight stays \[ \bar{g}_{i,t+1} = \sum_{j=1}^{N_{i,t}} \frac{1}{k} g_{ij,t+1} \],
respectively. The rates \( r_{i,t+1}, g_{i,t+1} \) of the arrivals and overnight stays may also be expressed, respectively, as (Artige et al 2014):
\[
\begin{align*}
\dot{r}_{i,t+1} &= \sum_{j=1}^{N_{i,t}} \frac{1}{k} \left( \frac{1}{k} r_{ij,t+1} \right) + \sum_{j=1}^{N_{i,t}} \frac{1}{k} \left( \frac{A_{ij,t}}{N_{i,t}} - \frac{1}{k} \right) r_{ij,t+1} \quad [1] \\
\dot{g}_{i,t+1} &= \sum_{j=1}^{N_{i,t}} \frac{1}{k} \left( \frac{1}{k} g_{ij,t+1} \right) + \sum_{j=1}^{N_{i,t}} \frac{1}{k} \left( \frac{N_{ij,t}}{N_{i,t}} - \frac{1}{k} \right) g_{ij,t+1} \quad [2]
\end{align*}
\]
Taking into consideration that the ratio of the number of overnight stays to the number of arrivals reflects the average number of overnight stays per visitor, number [2] is expressed as:
\[
\begin{align*}
\dot{g}_{i,t+1} &= \dot{r}_{i,t+1} + \left( \frac{g_{i,t+1}}{g_{i,t+1}} - \dot{r}_{i,t+1} \right) + \left( \frac{r_{i,t+1}}{r_{i,t+1}} - \dot{r}_{i,t+1} \right) + \left( \frac{g_{i,t+1} - g_{i,t+1}}{g_{i,t+1}} - \dot{r}_{i,t+1} \right) + \left( \frac{r_{i,t+1} - r_{i,t+1}}{r_{i,t+1}} - \dot{r}_{i,t+1} \right) \quad [3]
\end{align*}
\]
If \( \dot{r}_{i,t+1}, \dot{r}_{i,t+1}, \dot{g}_{i,t+1}, \dot{g}_{i,t+1} \) are, respectively, the arrival and overnight stays’ rates of the reference area, which is usually the whole country, the expression corresponding to number [2] for the whole country is [4]
\[
\dot{g}_{t+1} = \dot{r}_{t+1} + \left( \frac{g_{t+1}}{g_{t+1}} - \dot{r}_{t+1} \right) + \left( \frac{r_{t+1}}{r_{t+1}} - \dot{r}_{t+1} \right) + \left( \frac{g_{t+1} - g_{t+1}}{g_{t+1}} - \dot{r}_{t+1} \right) + \left( \frac{r_{t+1} - r_{t+1}}{r_{t+1}} - \dot{r}_{t+1} \right) \quad [4]
\]
The result of the difference \( \Delta G_{t+1} = (g_{t+1} - g_{t+1}) \) provides the differential growth of area \( i \) in comparison to the reference area. Having available the number of arrivals and overnight stays per category for the points in time t=0,1,2,...,T, the percentage change \( \frac{p_{ci}}{N_{ci}} \) in the number of overnight stays of area \( i \), between the time points 0 and T, is divided into corresponding percentage change epc and deviation units \( DG_i \) that result from \( DG_i = DA_i + MA_i + DO_i + MO_i \). The percentage change \( p_{ci} \) is expressed as:
\[
p_{ci} = epc_{ci} + DG_i \quad [5]
\]
The corresponding percentage change component \( epc_{ci} = \frac{N_{ci} - N_{ci}}{N_{ci}} - 1 \) refers to the change that the area would have if the deviation \( DG_i \) expressed as \( DG_i = \sum_{t=0}^{T-1} N_{i,t} (g_{i,t+1} - g_{i,t+1}) \) was zero. If the deviation is not equal to zero, the deviation units \( DA_i, DO_i, MA_i, MO_i \) reinforce or weaken the corresponding percentage change, depending on their sign.

The component: Dynamics of arrivals
\[
DA_i = \frac{\sum_{t=0}^{T-1} N_{i,t} (g_{i,t+1} - g_{i,t+1})}{N_{i,0}}
\]
refers to the deviation units that are cumulatively attributed to the average change rate of the arrivals. If the component’s value is positive, the average change rate of arrivals cumulatively renders a higher average number of overnight stays in the area, in comparison to the number that would be rendered by the corresponding average rate of the reference area.

The component: Structure of arrivals
\[
MA_i = \frac{\sum_{t=0}^{T-1} N_{i,t} (g_{i,t+1} - g_{i,t+1})}{N_{i,0}}
\]
refers to the deviation units that are cumulatively attributed to the structure of arrivals in the area. If the value of the component is positive, the existing structure of arrivals in the area results in a higher number of overnight stays in comparison to the number of overnight stays that the structure of arrivals in the reference area would have rendered. The sum \( E_i \) of the deviation units \( DA_i, MA_i \) refers to the deviation that may cumulatively be attributed to the competitiveness of the area in terms of arrivals. If \( E_i > 0 \), the effect of the components “dynamics of arrivals” and “structure of arrivals” cumulatively renders a higher number of overnight stays in the area, in comparison to what the corresponding rate and structure of arrivals would have rendered in the reference area.

The component: Dynamic duration
\[
DO_i = \frac{\sum_{t=0}^{T-1} N_{i,t} (g_{i,t+1} - g_{i,t+1})}{N_{i,0}}
\]
refers to the deviation units that are cumulatively attributed to the difference of the average change rate of
arrivals and the average change of the overnight stays’ rate. If the value of the component is positive, the difference of the average rates cumulatively renders a higher average number of overnight stays in the area per visitor, in comparison to the number that would be rendered by the corresponding difference of rates in the reference area.

The component: **Structural duration**

\[
M_{O_i} = \frac{\sum_{t=1}^{T} N_t \times ((\bar{E}_{i,t} - \bar{E}_{i,t}) - (\bar{f}_{i,t} - \bar{f}_{i,t}))}{N_i}
\]

refers to the diversion units that are cumulatively attributed to the existing difference between the structure of arrivals and the structure of overnight stays. If the value of the component is positive, the difference between the structures renders a higher number of overnight stays per visitor in the area, in comparison to what would be rendered by the corresponding difference of the reference area. The sum li of the deviation units DO_tMO_o provides the component of average stay duration and refers to that section of the deviation that can be attributed to the components of dynamic duration and structural duration. The sum li is an indication of the area’s ability to convert the arrivals into overnight stays per visitor, in comparison to the reference area. If \( l_i > 0 \), the difference between rates and structures renders a higher number of overnight stays per visitor in the area, in comparison to the number of overnight stays per visitor that would be rendered by the corresponding rates of the values in the reference area. All of the above are reflected in the table_1 below.
### Table 1 The components and their signs (+) or (-)

<table>
<thead>
<tr>
<th>Component</th>
<th>Structure of Arrivals Component, ( MA_i &gt; 0 )</th>
<th>Structure of Arrivals Component, ( MA_i &lt; 0 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic of arrivals component, ( DA_i &gt; 0 )</td>
<td>1. The deviation of the area is reinforced by the structure of arrivals, as well as the dynamics of the arrivals. 2. The area's rate of arrival cumulatively renders a higher number of overnight stays in comparison to what would be rendered by the corresponding rate of the reference area.</td>
<td>1. The deviation of the area is reinforced by the dynamics of the arrivals. 2. The area's rate of arrival cumulatively renders a higher number of overnight stays in comparison to what would be rendered by the corresponding rate of the reference area.</td>
</tr>
<tr>
<td>Dynamic of arrivals component, ( DA_i &lt; 0 )</td>
<td>1. The area deviation is reinforced by the structure of arrivals. 2. The area's arrival rate cumulatively renders a higher number of overnight stays in comparison to what would be rendered by the corresponding rate of the reference area.</td>
<td>1. The area's deviation is weakened by the dynamics of arrivals, as well as the dynamics of arrivals. 2. The area's arrival rate cumulatively renders a lower number of overnight stays in comparison to what would be rendered by the corresponding rate of the reference area.</td>
</tr>
<tr>
<td>Comparative Ability of converting arrivals into overnight stays 1</td>
<td>Structural Durations Component, ( NB_i &gt; 0 )</td>
<td>Structural Duration Component, ( NB_i &lt; 0 )</td>
</tr>
<tr>
<td>Dynamic Duration Component, ( DG_i &gt; 0 )</td>
<td>1. The deviation of the area is reinforced by the structural duration of the stay, as well as the dynamic duration of the stay. 2. The difference between the change rate of arrivals in the area and the change rate of the overnight stays renders a higher visitors' stay duration in the area, in comparison to what would be rendered by the corresponding difference of the reference area.</td>
<td>1. The deviation of the area is reinforced by the dynamic duration of the stay. 2. The difference between the change rate of arrivals in the area and the change rate of the overnight stays renders a higher visitors' stay duration in the area, in comparison to what would be rendered by the corresponding difference of the reference area.</td>
</tr>
<tr>
<td>Dynamic Duration Component, ( DG_i &lt; 0 )</td>
<td>1. The area's deviation is reinforced by the structural duration of the stay. 2. The difference between the change rate of arrivals in the area and the change rate of overnight stays renders a higher visitors' stay duration in the area, in comparison to what would be rendered by the corresponding difference of the reference area.</td>
<td>1. The area's deviation is weakened by the structural duration of the stay, as well as the dynamic duration of the stay. 2. The difference between the change rate of arrivals in the area and the change rate of overnight stays renders a lower visitors' stay duration in the area, in comparison to what would be rendered by the corresponding difference of the reference area.</td>
</tr>
</tbody>
</table>

3. Application

The [5] was applied in the thirteen administrative regions of Greece in order to divide the accomplished percentage change of overnight stays that took place between the years 2003 and 2015 in each of them, into separate components. The arrivals and the overnight stays have been divided in domestic and international arrivals and overnight stays. The relevant values are presented in the following table.²

---

² \( p_{c,i} = p_{c,i} + DG_i, DG_i = E_i + I_i, E_i = DA_i + MA_i, I_i = DO_i + MO_i \)
Table 2: Change rate of overnight stays, realized (pc), corresponding (epc) and deviation units

<table>
<thead>
<tr>
<th>Administrative Regions</th>
<th>pc&lt;sub&gt;i&lt;/sub&gt;</th>
<th>epc&lt;sub&gt;i&lt;/sub&gt;</th>
<th>DG&lt;sub&gt;i&lt;/sub&gt;</th>
<th>DA&lt;sub&gt;i&lt;/sub&gt;</th>
<th>MA&lt;sub&gt;i&lt;/sub&gt;</th>
<th>DO&lt;sub&gt;i&lt;/sub&gt;</th>
<th>MO&lt;sub&gt;i&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kentriki Makedonia</td>
<td>131,0</td>
<td>68,9</td>
<td>62,1</td>
<td>68,0</td>
<td>-24,9</td>
<td>9,9</td>
<td>9,2</td>
</tr>
<tr>
<td>Kriti</td>
<td>76,0</td>
<td>50,8</td>
<td>25,2</td>
<td>21,9</td>
<td>19,2</td>
<td>-5,0</td>
<td>-19,9</td>
</tr>
<tr>
<td>Attiki</td>
<td>38,2</td>
<td>43,0</td>
<td>-4,8</td>
<td>1,5</td>
<td>-1,0</td>
<td>-0,2</td>
<td>-5,1</td>
</tr>
<tr>
<td>Ionia Nisia</td>
<td>33,5</td>
<td>42,4</td>
<td>-8,9</td>
<td>-14,7</td>
<td>21,3</td>
<td>-11,3</td>
<td>-4,1</td>
</tr>
<tr>
<td>Anatoliki Makedonia,</td>
<td>27,8</td>
<td>41,9</td>
<td>-14,1</td>
<td>12,9</td>
<td>-35,7</td>
<td>-7,3</td>
<td>16,0</td>
</tr>
<tr>
<td>Thraki</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notio Aigio</td>
<td>26,6</td>
<td>37,0</td>
<td>-10,5</td>
<td>-9,7</td>
<td>20,4</td>
<td>-10,6</td>
<td>-10,7</td>
</tr>
<tr>
<td>Dytiki Ellada</td>
<td>21,7</td>
<td>38,8</td>
<td>-17,1</td>
<td>-25,1</td>
<td>-14,8</td>
<td>29,2</td>
<td>-6,3</td>
</tr>
<tr>
<td>Peloponissos</td>
<td>18,9</td>
<td>39,3</td>
<td>-20,4</td>
<td>-16,4</td>
<td>-15,4</td>
<td>15,6</td>
<td>-4,2</td>
</tr>
<tr>
<td>Thessalia</td>
<td>17,6</td>
<td>40,8</td>
<td>-23,2</td>
<td>-8,6</td>
<td>-22,5</td>
<td>7,0</td>
<td>1,0</td>
</tr>
<tr>
<td>Epirus</td>
<td>5,5</td>
<td>34,6</td>
<td>-29,0</td>
<td>-24,9</td>
<td>-15,8</td>
<td>17,3</td>
<td>-5,7</td>
</tr>
<tr>
<td>Voreio Aigio</td>
<td>-1,9</td>
<td>32,2</td>
<td>-34,1</td>
<td>-28,7</td>
<td>0,9</td>
<td>-5,8</td>
<td>-0,5</td>
</tr>
<tr>
<td>Sterea Ellada</td>
<td>-2,1</td>
<td>36,3</td>
<td>-38,4</td>
<td>-29,3</td>
<td>-12,1</td>
<td>9,3</td>
<td>-6,3</td>
</tr>
<tr>
<td>Dytiki Makedonia</td>
<td>-25,2</td>
<td>34,0</td>
<td>-59,2</td>
<td>-67,3</td>
<td>-12,7</td>
<td>15,3</td>
<td>5,5</td>
</tr>
</tbody>
</table>

4. Conclusion

According to table 1 and the numerical results of table 2 concerning the thirteen administrative regions of Greece and the realized percentage change of overnight stays, we conclude the following:

A: Only two regions have realized a percentage change in the number of overnight stays between 2003 and 2015 higher than the corresponding, the deviation (DG) reinforcing the corresponding, according to table 1. Those regions are: Kentriki Makedonia and Kriti. In the rest of the regions, the realized change in the number of overnight stays is lower than the corresponding. In addition, in three regions in this category, the percentage change of overnight stays, between 2003 and 2015, is negative. These regions are: Sterea Ellada, Dytiki Makedonia, and Voreio Aigio.

B: The region with competitive arrivals’ advantage and comparative ability to convert arrivals into overnight stays is: Kentriki Makedonia which is attributed to the dynamics of arrivals and to the structural duration of the stay, as well as the dynamic duration of the stay.

C: The regions with competitive advantage in arrivals but without comparative ability to convert arrivals into overnight stays are: 1. Kriti which is attributed to the structure of arrivals, as well as the dynamics of arrivals and to the structural duration of the stay, as well as the dynamic duration of the stay. 2. Ionia Nisia, Notio Aigio which is attributed to the structure of arrivals and to the structural duration of the stay, as well as the dynamic duration of the stay. 3. Attiki which is attributed to the dynamics of arrivals and to the structural duration of the stay, as well as the dynamic duration of the stay.

D: The regions without competitive advantage in arrivals but comparative ability to convert arrivals into overnight stays are: 1. Thessalia, Dytiki Makedonia which is attributed to the structure of arrivals, as well as the dynamics of arrivals and to the structural duration of the stay, as well as the dynamic duration of the stay. 2. Dytiki Ellada, Peloponissos, Epirus. Sterea Ellada which is attributed to the structure of arrivals, as well as the dynamics of arrivals, and to the dynamic duration of the stay. 3. Anatoliki Makedonia Thraki which is attributed to the structure of arrivals and to the structural duration of the stay.

E: Only the region of Voreio Aigio holds no competitive advantage in arrivals and no comparative ability to convert arrivals into overnight stays.
To conclude, we must point out that the division of the overnight stays’ percentage change into separate components may help lead us towards analyzing the explanatory variables of the components.

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