The use of disaggregated data in the comprehension of the sub-regional diversity and the formulation of policy in Greece

Prodromos-Ioannis (John) Prodromidis
Senior Research Fellow

Purpose of this presentation

• Explore spatial patterns of male and female employment and unemployment.
  – Since most part of this goes undetected in most studies for Greece.
  – Reason: all sub-national analysis for Greece is done at NUTS level 2 or 3, not below.

• Show that we might engage in better focused economic development policies if we take a better look.
Example: The areas of Greece experiencing inordinately high unemployment rates
LAU 1 areas with high unempl. rate among the resident workforce aged 10 or over, exceeding the national average by 50% or more.

The situation at the NUTS 3 level areas at the 40% threshold. (The 50% threshold involves fewer areas.)

Source: 2001 Census
It can be noted

• NUTS-3 regions with unemployment below average may contain localities with very high unemployment.
• NUTS-3 regions with high unemployment may show a large heterogeneity within.
• Hence, if small localities are ignored, many features are never noticed.
• The econometric analysis may allow us to isolate the impact of demographic, educational, specialisation and other factors.
• As a consequence, the territorial development policy mix may have to differentiated.
Advantages of disaggregated data

• It facilitates the delineation of groupings of localities with particular features.
  – For example: travel-to-work areas, strings of localities with low income, micro-regions with high concentrations of certain industries, etc.

The three examples in pictures. →
Example: The travel-to-work areas (TTWAs) of Greece at the 15% commut. threshold

Key for color classifications:

<table>
<thead>
<tr>
<th>TTWAs of 2 or more municipalities with a population of</th>
<th>Urban parts</th>
<th>Rural parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>(&gt;150 inh./km²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 140,000 inhab.</td>
<td>[Black]</td>
<td>[Gray]</td>
</tr>
<tr>
<td>69-155,000 inh.</td>
<td>[Dark purple]</td>
<td>[Light purple]</td>
</tr>
<tr>
<td>50-67,000 inhab.</td>
<td>[Red]</td>
<td>[Pink]</td>
</tr>
<tr>
<td>21-35,000 inhab.</td>
<td>[Blue]</td>
<td></td>
</tr>
<tr>
<td>14-20,000 inhab.</td>
<td>[Orange]</td>
<td></td>
</tr>
<tr>
<td>8 &amp; 9,000 inhab.</td>
<td>[Yellow]</td>
<td></td>
</tr>
<tr>
<td>Self-contained municip.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26-36,000 inh.</td>
<td>[Dark green]</td>
<td></td>
</tr>
<tr>
<td>22-24,000 inh.</td>
<td>[Green]</td>
<td></td>
</tr>
<tr>
<td>5-20,000 inh.</td>
<td>[Light green]</td>
<td></td>
</tr>
<tr>
<td>&lt; 5,000 inh.</td>
<td>[Light yellow]</td>
<td></td>
</tr>
<tr>
<td>Total: 667 TTWAs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: 2001 Census
Example: The areas with high employment in the mining-quarrying and energy-water supply sectors in Greece (ages 10+ exceeding the national average by 25%)

Key for color classification

- **Green**: areas inhabited by people working in mining-quarrying
- **Blue**: areas inhabited by people working in energy-water supply
- **Dark green** (green & blue): areas inhabited by very few people (150 or less)
- **Black**: areas inhabited by very few people (150 or less)
- **Gray**: other areas

Source: 2001 Census
Example: The personal income mosaic of Greece and the country’s regional division

Key for color classifications:
Black and gray, orange and brown, red and pink denote the (a) main urban centers, (b) the main nodes of the transportation system, (c) the poles of mining & energy production, and (d) the principal tourist sites, and their environs with an average income of € 11,310 - 29,700.

Light and dark green, dark and light blue denote the remaining areas with an average income of € 4,505 – 11,309, according to the NUTS 2 classification system.

Source: 2001 Census and the Revenue Service
Advantages of disaggregated data

- It permits the combination of statistics that are usually collected at different territorial levels.

For instance:
- demographic and qualification statistics collected at the municipal level (provided by one agency), and
- income statistics collected at the post-code level (provided by another agency),

Once the two sets are matched we can regress the one in terms of the other. (The case of the previous slide.)
Advantages of disaggregated data

- It improves the quality of empirical analysis vis-à-vis studies using NUTS 2 and 3 data, because it relies on:
  - Fewer assumptions regarding the homogeneity of the territorial units involved.
  - More observations.* (The use of more observations allows for the consideration of a wider set of explanatory variables in the analysis.)

* In the case of Greece we may rely on data from 13 NUTS 2 areas or from 54 NUTS 3 areas, or 1,034 LAU 1 areas, or 6,130 LAU 2 areas.
Advantages of disaggregated data

• It allows corrections for the omission of regressors called for by the theory, by
  – utilizing spatial information extracted from the residuals in order to identify distinctive groupings of localities, and
  – incorporating the spatial patterns in the regression, as proxies for unobserved characteristics.

We illustrate this by setting up a model. →
Male & female employment, unemployment, non-participation population shares i.e., six seemingly unrelated regressions (of which one is estimated as the residual expression of the other five), are explained in terms of:

a) population density,
b) composition (gender, age, formal qualifications), and
c) the presence of industry-and-profession concentration combinations.
Male & female employment, unemployment, non-participation population shares also ought to be explained in terms of:

d) the wage (it is partly explained by the previous factors);

e) local-specific factors (it may be proxied via spatial dummies, e.g., NUTS 2 areas, NUTS 3 areas, TTWAs);

f) non-labor income, culture, domestic technology (which enter the labor supply);

g) the cost of non-labor inputs, output (level & price), technologies of producers, objectives of public sector employers (which enter the labor demand).

However (f) and (g) are not available.
Problem:
The omission of regressors called for by the theory implies that they will be treated as part of the error term. Therefore

• the intercept will be biased, inconsistent;

• the other estimated parameters may be biased and inconsistent, their t-stats will be underestimated.
Solution:

1) Project the residuals on the layout of a map.
2) Identify the areas or clusters of localities whose activity features are not attributed to the factors entering the regression.
3) Construct dummies of the basis of (2). The dummies capture the spatial dimension associated with the unobserved local characteristic linked with the omitted factors (and hidden in the residuals).

Thus, we enrich the relevant literature that:
- focuses on the information contained in the residuals in order to estimate spatial-auto-correlation-corrected coefficients for the conventional determinants, but
- fails to consider spatial coefficients.
In particular...

we run 3 alternative spatial specifications:

• NUTS 2 areas,
• NUTS 3 areas,
• Micro-regional & distinct LAU 1 areas (TTWAs and dummies reflecting the spatial dimension of the omitted variables).

  – The micro-regional patterns often cross administrative lines. In contrast, the more aggregated approaches provide blurred picture of micro-reality.

The latter specification exhibits higher $R^2$s.

It possesses fewer regressors than the 2nd specification.

It is preferable on statistical grounds.
The empirical analysis

Map 1

W. Macedonia

Portrayal of the spatial coefficients when the observations are grouped in terms of NUTS 2 areas.

The margin of error is less that 1%.
The empirical analysis
Map 2

Kastoria pref.

Portrayal of the spatial coefficients when the observations are grouped in terms of NUTS 3 areas.
The margin of error is less than 1%.
The empirical analysis

Map 3

High unemployment

Kastoria plateau

Kozani & Ptolemais plateau

Portrayal of the spatial coefficients when the observations are grouped by microregion, string of communities of distinct community (LAU 1 area).

The margin of error is less than 1%.
Implications (comparing black-colored areas in maps 1-2)

Map 1 portrays the region of **W.Macedonia** (pop. 295 thousand) as an area the communities of which seem to exhibit:

- rather small population shares of employed men & women,
- rather large population shares of unemployed & abstaining men & women.

Map 2 suggests that only the **prefecture of Kastoria** (pop. 54 thousand) appears to exhibit:

- rather small shares of employed men & women,
- rather large shares of unemployed men & women.

The other **NUTS 3** areas of W.Macedonia exhibit different combinations of male unemployment, male or female employment, and female non-participation.
Implications

At a more disaggregated level of analysis (Map 3), the results vary. This may have implications for the national or EU economic development interventions. For instance,

(a) the plateaus of Kozani and Ptolemais (pop. 128 thousand) exhibit rather small population shares of employed men & women, and rather large shares of unemployed men & non-participating women.

(b) the plateau of Kastoria (pop. 51 thousand) exhibits rather small shares of employed and abstaining men & women, and rather large shares of unemployed men & women.

(c) other micro-regions exhibit different profiles.
Implications

Given the smaller shares of abstaining people in (b), it would seem that attempts to reduce unemployment are less likely to draw former/discouraged job-seeking residents into the local workforces than in (a).

It follows that the interventions formulated in order to aid distressed areas ought to be spatially tailored.

We note that the sub-regional economic spaces often cross the country’s formal administrative regional division (NUTS 2 or 3) on the basis of which the national & E.U. territorial development policies are devised, implemented, assessed.

We need to take a fresh look at the use of disaggregated data for the purpose of regional or micro-regional economic policy.