Comparing Alpine socio-economic indicators by Mazziotta-Pareto Index

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Background and aims

With respect to demography and labour market situation, as well as for many other characteristics, the alpine territory is a kaleidoscope of much differentiated realities.

This paper has been realized in the framework of the Alpine Convention that is an international treaty between the Alpine countries (Austria, France, Germany, Italy, Liechtenstein, Monaco, Slovenia and Switzerland) and the EU, aimed at promoting sustainable development in the Alpine area and at protecting the needs of the people living within it. It embraces the environmental, social, economic and cultural dimensions. In particular, under the Italian Presidency (2013-2014) an ad hoc expert group on demographic change (and its drivers) has been created in order to prepare the fifth Report on the State of the Alps.

As of 2013, the Alps were inhabited by 14,232,088 people on a 190,717 km^2 territory, with an average population density of 75 inhabitants per km^2, that makes the Alps one of the less populated areas in central Europe (although Countries such as Greece and Ireland have similar population densities) but also one of the most dense mountain areas worldwide.

To provide an easy-to understand overview of the Alpine complex and colorful picture it can be useful to apply methods and tools such as composite indexes, which are able to summarize in a single average value the multiplicity of characteristic values of each different micro territorial area. In particular, we applied a generalized composite index, denoted as MPI (Mazziotta-Pareto Index), suitable in the case where the components are non-substitutable, i.e., they have all the same weight (importance) and a compensation among them is not allowed (Munda and Nardo, 2005).

Data and methods

The proposed method wants to supply a composite measure of a set of indicators that are considered ‘non-substitutable’, i.e., all the dimensions of the phenomenon must be ‘balanced’ (De Muro, Mazziotta and Pareto, 2011). The MPI is designed in order to satisfy the following

properties: (i) normalization of the indicators by a specific criterion that deletes both the unit of measurement and the variability effect (Delvecchio, 1995); (ii) synthesis independent from an 'ideal unit', since a set of 'optimal values' is arbitrary, non-univocal and can vary over time (Aureli Cutillo, 1996); (iii) simplicity of computation; (iv) ease of interpretation.

It is known that distributions of different indicators, measured in different way, can be compared by the transformation in standard scores. Therefore, the individual indicators are converted to a common scale with a mean of 100 and a standard deviation of 10: the transformed values will fall approximately in the range 70-130. In this type of normalization the 'ideal vector' is the set of mean values and it is easy to identify both the units that are above average (values greater than 100) and the units that are below average (values less than 100). Moreover, normalizing by standard scores allows to release the indicators from their variability and to assign them the same weight.

In such context, a penalty coefficient is introduced that is a function, for each unit, of the indicators' variability in relation to the mean value ('horizontal variability'): this variability is measured by the coefficient of variation. The proposed approach penalizes the score of each unit (the arithmetic mean of the standardized values) with a quantity that is directly proportional to the 'horizontal variability'. The purpose is to favour the units that, mean being equal, have a greater balance among the indicators values (Palazzi, 2004).

The method provides a 'robust' measure and less 'sensitive' to inclusion or exclusion individual indicators (Mazziotta C. et al., 2010).

In order to rank the 4,700 Alpine municipalities taking into account their level of demographic and labour market's situation in the Alps the MPI has been applied to a set of eight demographic and labour market's indicators. The chosen indicators are: Foreign resident population (per 1,000 residents), Population density, Crude birth rate (per 1000 residents), Population growth rate (per 100 residents); Working-age total resident population (per 100 residents), Employment rate (per 100), Unemployment rate (per 100), Variation in employment rate. The subset of indicators included, derived from the wider set of the available indicators, has been defined trying to keep the more significant and non-replaceable ones, preserving also a certain balance between the two main investigated dimensions (demography and labour market). All the indicators are static and they are calculated on the last data available (usually year 2012), except for the population growth and the variation of the employment rate.

Preliminary results

Municipalities with high values of MPI are located in Alto Adige, Val d'Aosta, Carnic Alps and Upper Canavese (in Italy), High Savoie and High Maurienne Valley (in France), Inn and Salzach Valleys, urban part of Carinthia, a part of Tyrol, the area of Vienna and Graz (in Austria). The highest index values actually were registered in the municipalities of Saint-Christol (FR, 118.1), Sivergues (FR, 116.6), Mäder (AT, 114.1), Val-de-Chalvagne (FR, 112.5), Hall in Tirol (AT, 112.0), Lavant (AT, 111.6), Ampass (AT, 111.3), Hard (AT, 111.2), Altach (AT, 111.0), Zirl (AT, 110.8).

Lower values of MPI are in: Maritime Alps (France), Eastern, Higher and Lower Tauren, western Tyrol (Austria), the municipalities on the border between Austria and Slovenia and between Italy and Slovenia. In the last positions of the ranking for decreasing values of MPI index we find Gars (FR, 77.1), La Bâtie-des-Fonds (FR, 75.6), Aucelon (FR, 75.6), Chanousse (FR, 75.5), Oulles (FR, 74.8), Blieux (FR, 73.7), Saint-Léger (FR, 69.1), Montferrand-la-Fare (FR, 67.3), Lesches-en-Diois (FR, 64.3), Vérignon (FR, 63.1).

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