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Research Note

Socio-economical analysis of Italy: The case of hagiotoponym cities



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ABSTRACT

This paper considers joining the economical characteristics of Italian cities with a relevant sociological aspect of the Catholic saints. More than in other countries, a high percentage of Italian cities are toponyms coming from the name of specific saints (hagiotoponym). The link with Italian religious views is distinct. The statistical analysis of the economic contributions that each hagiotoponym city provides to the Italian GDP is considered. Such an analysis is also based on the comparison with Italian data and is considered with the Theil, Gini, and Herfindahl-Hirschman indices. It is obtained that hagiotoponym cities represent a proxy of the overall Italian reality of medium-sized cities in the case of outliers removal.

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indices as measures of various economic specificities are considered below. It is important to note that Theil and

Herfindahl-Hirschman indices are particular generalized

entropy measures and satisfy the same axiomatization

scheme (Dagum, 2008; Magdalou & Nock, 2011; Shorrocks,

1980, **1984**). Here, their calculations are adapted to cities in a country. The concerned distribution relies on the aggre-

gated tax income (ATI) of a city during the years 2007–2011.

Consider *N* cities and denote as y_i the ATI of the *i*-th city, for each i = 1, 2, ..., N, so that the ratio $y_i / \sum_{j=1}^{N} y_j$ represents

1. Introduction

In new economic geography, this study examines the relationships between specifically defined entities and the global and local economies. The wealth flow is one item often considered, beside the various political and geographic constraints. In so doing, the problem of assessing the statistical properties of a country's geographic-economic structure has been widely debated in the last decades (Fan & Scott, 2003). However, economic indicators other than histograms and rank-size plots can be useful. The Theil, Herfindahl-Hirschman, and Gini

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$$Th = \frac{1}{N} \sum_{i=1}^{N} \frac{y_i}{\sum_{j=1}^{N} y_j} \ln\left(\frac{y_i}{\sum_{j=1}^{N} y_j}\right)$$

- the Theil index (Theil, 1967) can be written as:

the GDP share of the *i*-th city.





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- the Herfindahl-Hirschman index (Hirschman, 1964) is given by:

$$HHI = \sum_{i \in J_J} \left(\frac{y_i}{\sum_{j=1}^N y_j} \right)^2$$

where *J* is an integer and L_J is the set collecting the *J* biggest cities in terms of their ATI. The value of *J* is set to 50. This process retains its classical definition in economic reports, for which the value of *J* is limited to at most 50.

Furthermore, *HHI* can be used to calculate the normalized *HHI* index,

$$H^* = \frac{HHI - 1/N}{1 - 1/N}$$

the Gini index (Gini, 1997) can be defined through the Lorenz curve, which in the present case gives the proportion f of the total Italian ATI that is cumulatively provided by the bottom x percent of the cities. The Gini index Gi is the ratio of the area that lies between the equality line and the Lorenz curve over the total area under the equality line. Formally, it can be written as:

$$G_{i} = \frac{\sum_{i=1}^{N} \sum_{j=1}^{N} |y_{i} - y_{j}|}{2N^{2} \sum_{i=1}^{N} y_{i}}$$

The Shannon entropy is:

$$\tilde{H} = -\sum_{i=1}^{N} p_i \ln(p_i)$$

where p_i is the probability of finding some state *i*. Formally, one can introduce the quantity

$$H = -\sum_{i=1}^{N} \frac{y_i}{\sum_{j=1}^{N} y_j} \ln\left(\frac{y_i}{\sum_{j=1}^{N} y_j}\right)$$

Similar to Theil and Herfindahl-Hirschman, such a definition can be seen as a generalized concept of entropy. For simplicity, *H* is called financial entropy.

This result is

$$H = \ln(N) - Th$$

The Theil index is also used to compare the ATI value of each city with the mean value of the whole set. Instead, the Gini coefficient is used to compare the value of each city with the value of every other one. The Theil and Gini indices numerically represent a population's degree of dispersion with respect to a variable (Iglesias & de Almeida, 2012; Miskiewicz, 2008; Palan, 2010). In contrast, the HHI index is applied to describe a company's concentration with respect to the entire market (Alvarado, 1999; Palan, 2010; Rotundo & D'Arcangelis, 2010). It is applied here for measuring city financial aggregation within Italy.

One question this study examines is the cluster effects or sub-levels of the global system on the total. In this respect, it is worth mentioning Fan and Sun (2008) for the inequality measure in China over the period 1979–2006, Walks (2013) for Canada, Bartels (2008) for the U.S.A. To the best of our knowledge, the analysis methods here employed have not often been compared (exceptions are Mussard, Seyte, & Terraza, 2003 and Cerqueti and Ausloos, 2014). This said, the novelty of the present research is to provide a comparison of the whole Italian situation with a specific cluster of Italian cities with a strong socio-cultural meaning.

Cluster and network effects have not previously been considered in depth. This study is concerned with one peculiar cluster where the connections are historical-religious in nature, those with a hagiotoponym. This choice has a precise motivation: to describe the economic reality of such cities which originated in the cult of a saint and compare them to those in the entire nation, Italy. The three mentioned indices are extracted and compared to the total group of Italian cities. This will provide economic insights on the urbanization grounded on socio-religious movements, and this also leads to understanding the relationship between such qualified cluster and the overall Italian situation.

The analysis suggests that hagiotonomynic cities share an economic situation which is comparable all the other Italian cities with the exception of very big and rich cities like Rome, Milan, and Turin. Specifically, the considered sample reflects the overall situation of medium-sized cities. This approach and the findings suggest researchers should also examine such clustering contributions on a global scale at various administrative or economic levels in further work.

2. Data

ATI data are obtained from the Research Center of the Italian Minister of Economic Affairs. Contributions are disaggregated at a municipal level to the Italian GDP for five years: 2007–2011, and averages over the relevant time interval. It is important to know that a municipality or city is denoted in Italy as a commune.

Three technical points are stressed at the methodological level. Italy is organized into regions, provinces, and municipalities. Each municipality belongs to one and only one province, and each province is contained in one and only one region. Some administrative modifications of the Italian political system have led to a varying number of provinces and municipalities during the quinquennium, while the number of regions has remained constant at 20. The ATI data corresponds to a different number of cities every year. In particular, the number of cities has changed from 8096, 8094, 8094, 8092, 8092 yearly from 2007 through 2011, respectively.

The latest one in 2011 is the basic one. In 2011, the number of provinces and municipalities is 110 and 8092, respectively. Therefore, city mergers are taken into account at various times, according to Italian administrative law statements²; 8092 municipalities is the reference number. The resulting ATI cities are linearly adapted as if these final cities pre-date the merging or phagocytosis. All examined data result from an unweighted average of the 5 yearly official data for the 2007–2011 time period.

² The reader is addressed to http://www.comuni-italiani.it/regioni.html.

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