



## Exploring the dynamics of the efficiency in the Italian hospitality sector. A regional case study

Juan Gabriel Brida <sup>a,\*</sup>, Nicolás Garrido <sup>b</sup>, Manuela Deidda <sup>a,d</sup>, Manuela Pulina <sup>c</sup>

<sup>a</sup> School of Economics and Management – Free University of Bolzano, Piazza dell'Università, 39100 Bolzano, Italy

<sup>b</sup> IDEAR – Núcleo Milenio en Políticas Públicas y Ciencia Regional, Departamento de Economía, Universidad Católica del Norte, Antofagasta, Chile

<sup>c</sup> Economics Department (DiSEA), University of Sassari, & CRENoS, Italy

<sup>d</sup> CRENoS, University of Cagliari, Italy

### ARTICLE INFO

#### Keywords:

Data Envelopment Analysis  
Hierarchical clustering  
Economic efficiency  
Dynamics

### ABSTRACT

This paper introduces a methodology to describe and compare the economic relative performance of the hospitality sector of the Italian regions during the period 2000–2004. Dynamics of the hospitality sector of each region is represented by the evolution of its economic efficiency. The investigation involves the following steps: a static Data Envelopment Analysis (DEA) to estimate the pure economic efficiency; two different notions of distances between time series and hierarchical clustering techniques are used to classify the economies in the sample. By using a correlation-based distance, three main clusters are detected, while two clusters are identified when the average distance is used. The trend patterns, identified by employing the correlation distance, can be interpreted in terms of exogenous factors that influence the economic efficiency of the group of regions, causing shocks picked up by the high volatility as well as structural breaks. By employing the average distance, one infers information on the cluster that have had similar efficiency values over the period under analysis. This efficiency can be also interpreted in terms of a particular type of hospitality management as well as the firm structure. Following the analysis, some policy and management implications are presented.

© 2012 Elsevier Ltd. All rights reserved.

### 1. Introduction

The hospitality sector plays an important role in the Italian economy as a revenue generator. [Federalberghi \(2010\)](#) emphasizes that the Italian hospitality sector, expressed in terms of number of hotel rooms, ranks fourth after the United States, Japan and China. Besides, amongst the European countries, Italy is a leader in terms of hotel dimension and quality (number of stars). This motivates the interests of the this paper to examine the economic efficiency of the Italian hospitality sector. This question is particularly important in the light of an increasing awareness of sustainability issues that challenge the need for a further expansion of tourism infrastructure that may exploit finite and no-renewable natural resources (e.g. [Bruni, Guerriero, & Patitucci, 2011](#)). As a matter of fact, within the time span between 2000 and 2004, supply capacity has grown by 7.9%, reaching two million beds-place in 2004 ([ISTAT, 2011](#)). Since the seminal work on Data Envelopment Analysis (DEA) by [Charnes, Cooper, and Rhodes \(1978\)](#), empirical research papers have focused on efficiency in the manufacturing

sector, health services, educational institutions, the services sector and private organizations such as banks. The analysis of efficiency in the tourism and hospitality sector has been growing during the last two decades (see [Barros, 2005a, 2005b](#); [Fuentes, 2011](#) or [Pulina, Detotto & Paba, 2010](#)) for a literature account).

In this paper the dynamic evolution of the efficiency of the hospitality sector in the Italian regions is explored. The dynamic of the efficiency is explored in two steps. In the first step, following the work by [Banker, Charnes, and Cooper \(1984\)](#) a Data Envelopment Analysis (DEA) is applied to all the regions in the temporal window 2000–2004. Assuming a variable return to scale frontier of efficiency, the pure technical efficiency (PTE) is obtained for each region and period. This information allows one to quantify the efficiency level of the regions with respect to its own performance over time, as well as the performance of the relatively most efficient regions and periods. In the second step, the regions are clustered according to the temporal evolution of their efficiency. Two measures of distance between the time series of the hospitality sector in each Italian region are employed: the correlation and the supremum distance. These two measures are complementary to understand the dynamic evolution of the relative efficiency of the regions. Dynamics of two regions are close with respect to the correlation distance ([Gower, 1966](#)) if they have similar trend behavior across the time period. The supremum distance, on the

\* Corresponding author. Tel.: +39 0471 013492; fax: +39 0471 013009.

E-mail addresses: [JuanGabriel.Brida@unibz.it](mailto:JuanGabriel.Brida@unibz.it) (J.G. Brida), [ngarrido@ucn.cl](mailto:ngarrido@ucn.cl) (N. Garrido), [Manuela.Deidda@crenos.unica.it](mailto:Manuela.Deidda@crenos.unica.it) (M. Deidda), [Manuela.Pulina@unibz.it](mailto:Manuela.Pulina@unibz.it) (M. Pulina).

other hand, groups regions in corridors along the whole period of study. If the supremum distance among the efficiency of a group of regions is equal to 10, it means that across the different periods, no one of the regions were separated more than 10 points of efficiency. Whereas the correlation distance gives information about the trends of the efficiency, the supremum distance informs on how different the dynamics of regional efficiency was during the period of study. Then, both distances give complementary information about the dynamics of the regions. On the one hand, if a group of regions have small correlation distance among them, this can be interpreted as economies having similar responses to external shocks affecting their efficiency. On the other hand, if a group of regions are “close” with respect to the supremum distance, this means that they have followed almost the same trajectory during the period under study, although they could have had different trends.

Even though there is an increasing concern with efficiency in the literature of tourism and hospitality (see Barros, 2005a, 2005b; Pulina et al., 2010; Fuentes, 2011 for a literature account), so far a few studies have explored the dynamic evolution of efficiency. Tsauro and Sheng-Hsiung (2001) study the efficiency of the 53 international tourist hotels in Taiwan from 1996 to 1998 and the time effect is introduced computing the average of the inputs and outputs during the three years. Hwang and Chang (2003) compute the efficiency change in year 1994–1998 for 45 Taiwan hotels using the Malmquist productivity decomposition. The authors use this temporal information to organize the 45 hotels into 6 clusters according to the efficiency change during the period 1994–1998 and the final relative efficiency in 1998. Thus, they identify in the two extremes; hotels with high competitiveness and a fast pace of progress as hotels in the “right track” and hotels with low competitiveness and worse pace of progress as firms with managerial deficiencies. Barros (2005b) explores the evolution of the efficiency of a hotel chain through two alternatives: on the one hand he uses a Malmquist productivity index to decompose the total productivity change in technical efficiency change and technological change and, on the other hand, the author analyzes the changes of the total productivity measures across the time with a Tobit model. Assaf and Agbola (2011) study the efficiency of a sample of 31 Australian hotels during the period 2004–2007. They employed the  $31 \times 4 = 124$  observations in one DEA analysis, comparing the efficiency of the same hotels across the temporal window of 4 years. The authors use a truncated regression for showing that large hotels located in Australian cities are the conditions for being more efficient. This finding is consistent with the study by Barros (2006) and suggests that big hotels located in cities tend to be more efficient than those small in remote areas. Barros used information from Portuguese hotels between 1998 and 2002 to estimate a translog frontier model. Stochastic frontier analysis has provided an instrument for exploration of the dynamic, through the data panel study of different specification of cost and production functions. Perez-Rodriguez and Acosta-Gonzalez (2007) explored the cost efficiency and economic scales of the lodging industry on the island of Gran Canaria during the period 1991–2002 using a stochastic cost frontier model. The authors show statistically that efficiencies vary in time and that the mean cost inefficiency decreased over time.

The paper is organized as follows. Section 2 introduces the DEA methodology and applies it to the hospitality sector of the 21 Italian regions. Starting from these results, Section 3 analyses the dynamics of the economic efficiency for these economies by introducing two different metric distances and hierarchical clustering techniques. The final section includes concluding remarks, policy and management implications of the results and future research.

## 2. Static methodology: DEA

DEA is a flexible technique that, in a multiple input-output framework, is reduced to a virtual uni-input-output structure, (for a more detailed discussion, see Banker et al., 1984; Charnes et al. 1978; Cooper, Seiford, and Tone, 2007). Within a given sample of decision making units (DMUs), a subgroup will achieve a relative efficiency equal to 1 (or 100%) and the residual DMU will be considered as inefficient if it has reached a score of less than 1 (or less than 100%). The efficiency ( $Y$ ) of the DMU  $i$  is given by the following expression:

$$Y_i = \frac{\sum_{n=1}^N u_n p_{ni}}{\sum_{k=1}^K v_k x_{ki}}$$

where  $p_{ni}$  is the quantity of output  $n$  produced by the DMU  $i$ ;  $u_n$  is the weight of output  $n$  for the DMU  $i$ ;  $x_{ki}$  is the quantity of input  $k$  employed by the DMU  $i$ ;  $v_k$  is the weight of input  $k$  for the DMU  $i$ . A high value of the input weight ( $v_{ki}$ ) relates to an underperformance of that specific DMU with respect to all the other inputs employed by the DMU. Equivalently, a high value of the output weight ( $u_n$ ) denotes a strength in the production process.

The vectors of weights  $v_i$  and  $u_i$  for each DMU  $i$  are obtained through the solution of the following linear program: The vectors of weights  $v_i$  and  $u_i$  for each DMU  $i$  are obtained through the solution of the following linear program:

$$\begin{aligned} & \max_{u,v} \sum_{n=1}^N u_n p_{ni} \\ & \text{subject to} \\ & \sum_{k=1}^K v_k x_{ki} = 1 \\ & \sum_{n=1}^N u_n p_{nj} - \sum_{k=1}^K v_k x_{kj} \leq 0 \quad \text{para } j = 1 \dots D \\ & u \geq 0, v \geq 0 \end{aligned} \tag{1}$$

where  $D$  is the number of DMUs in the sample under study. In the presence of a multivariate input-output framework, the problem can be solved with either an output-oriented method, by maximizing the numerator while keeping the denominator constant, or an input-oriented method, by minimizing the denominator while keeping the numerator constant.

In this study, an input-orientated firm level model is used as a more appropriate setting when operational and management objectives are involved; for example, when DMUs are more interested in how to reduce their production costs (Cullinane, Song, & Wang, 2004). By adopting a Constant Return to Scale (CRS) framework, it is possible to obtain a DMU technical efficiency ( $TE$ ), while by employing Variable Return to Scale (VRS) pure technical efficiency ( $PTE$ ) is obtained. A ratio of these two economic measures gives scale efficiency scores ( $SE$ ). In this study, the Baker, Charnes and Cooper (BCC) model is adopted, since most of the regions show VRS. Specifically, under VRS, the productive frontier is characterized by a piece-wise linear and concave shape. Hence, the calculated efficiency scores are defined as pure technical efficiency ( $PTE$ ). The pure scale inefficiency is given by deviation from the efficiency frontier since resources are not used in an efficient manner. The  $TE$  is also calculated, under CRS, that measures the maximum level of output produced from a given set of inputs with the prevailing technology. The  $TE$  is composed by the  $PTE$  (under VRS) and the efficiency scores  $SE$ . Algebraically,  $TE$  is given by:

$$TE = PTE * SE \tag{2}$$

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات