EXTENDED ABSTRACT

Title: An Analysis on the Technical Efficiency in the Hotel Industry: the Case of Canary Islands

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Abstract:

Following EUROSTAT Statistics (2017), Canary Islands was the most popular region in the European Union (EU) visited by EU residents in 2015. The combination of a massive sun-and-sand market segment, the absence of seasonality and the availability of a specific natural heritage may be a major reason behind this fact. Particularly Canary Islands received in 2017 about 16 millions of tourists, and the contribution of this sector to the GDP was about 35.2% and over 40% in terms of employment (IMPACTUR, 2017). The other side of the coin is that a sizeable hotel sector emerges with more than six hundred hotels with an average size of over four hundred beds. Furthermore there is a noticeable weight of hotel chains in the accommodation supply in the Canary Islands. A 65% of offered beds correspond to hotels belonging to chains. What is more the average size of these hotels being a part of chains is over 450 beds, i.e., a 43% greater than hotels non-belonging to a chain. With respect to the structure of supply by categories, a 69,4% of beds are supplied by 4 and 5 stars hotels in 2017, while this data for all Spain hardly reaches a 51%. It might indicate that the hotel sector Canary Islands is adopting a strategy focused on high categories.

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Another relevant feature is the spatial agglomeration of accommodation activity. So, more than 62% of these supplied beds are located in two of the seven islands, and about 97% in four of them. In addition spatial agglomeration within islands happens, given that a 92% of hotel supply is located in the 1.7% of the territory (ISTAC, 2015).

Despite the relevance of hotel sector in the economy of the Canary Islands and its particular features, the analysis of the efficiency and its potential determinants has received little attention. Pérez-Rodríguez and Acosta-González (2007) studies technical efficiency but only for the island of Gran Canaria. They use SABI database that excludes hotels belonging to hotel chains, i.e., presenting consolidated accounts. Indeed a noticeable part of previous research uses extensive accounting databases (e.g. SABI for Spain and Portugal, aida for Italy, and AMADEUS for Europe) with consolidated accounts. It does not allow to study hotels belonging to a chain and presenting consolidated accounts in their country of origin. As mentioned above, in the case of Canary Islands this omission may be critical since its noticeable weight in their hotel sector.

This paper focuses on filling this gap by analyzing technical efficiency for the complete hotel sector of the Canary Islands, but also including hotels belonging to hotel chains. Moreover, recognizing the relevance of the figures presented about agglomeration, size of hotels, structure of supply by categories, and labor market, we propose a set of explanatory variables in order to characterize the differences in technical efficiency. Data used in this paper have been collected mainly from *Encuesta de Alojamiento Turístico of Instituto Canario de Estadística* (ISTAC) for the period 2010-2016, even including hotels being part of hotel chains.

Following the comprehensive survey by Assaf and Josiassen (2016), most of contributions of the literature on the estimation of efficiency in the hotel sector are based on a non-parametric DEA approach. Furthermore, in a parametric framework most of literature focuses on the estimation of a stochastic cost frontier. This paper estimates a stochastic production frontier in order to calculate a measure of technical inefficiency of hotels located in Canary Islands and to explore some determinants.

The main contribution of this paper is twofold: (i) ascertaining both the relevance of agglomeration processes and the efficiency wages framework in the explanation of inefficiency in the hotel sector; (ii) putting the attention in a sizeable destination market as Canary Islands, being the main tourist European destination in the European tourism market.

Data used in this paper have been collected mainly from Encuesta de Alojamiento Turístico of Instituto Canario de Estadística (ISTAC) for the period 2010-2016. These data are official and cover almost the whole of the hotel sector in the Canary Islands. In order to get more homogeneity, the database of 635 hotels was filtered for missing values with a definitive sample size of 560 hotels for the empirical analysis. Data referred to municipalities where hotels are located were collected from the ISTAC website.

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their country or region of origin. On the contrary, our database considers both hotels affiliated and nonaffiliated to chains. This is a major issue for the case of Canary Islands where a share of 56% of hotels offering accommodation services are affiliated to national or international chains, and in terms of number of beds this percentage arises to a 65%. Also accounting databases sometimes classify enterprises by aggregated economic activities, mixing different business in the same group. For example, sometimes camping, youth hostels, motels and apartments   are included in the same sector. In our point of view, the production function of hotels is quite different from those associated to these other types of accommodation.

In this paper we estimate a production frontier for the hotel sector of the Canary Islands. This approach avoids some problems associated to cost frontiers, such as the measure of true opportunity costs and the elimination of sunk costs. Following Battese and Coelli (1995), the parametric model proposed in this analysis includes a production frontier, and an equation for the technical inefficiency.

Under the assumption that technical inefficiency of each hotel may be explained from a set of determinants, the variables proposed for the inefficiency equation are the following. Firstly, the quality of services offered by hotels is approximated by prices. In our research Average Daily Rate (ADR), i.e. the average rental income per paid occupied room, is included. Ttraditional vertical product differentiation models and hedonic price models recognize that prices are increasing in quality of products (Gabszewicz and Thisse, 1979; Shaked and Sutton, 1982; Wu, 1998). In this sense, Briggs et al (2007) show the complexity in the definition of hotel quality and point out price as one of the factors followed by customers in order to judge quality. In our view, ADR has the advantage of being a market-driven variable, adding the perception of quality by consumers. Previous literature finds inconclusive results with respect to the influence of quality on technical inefficiency (Arbelo-Pérez et al, 2017; Assaf and Agbola, 2011).

Secondly, the size of hotel approximated by the number of beds has been included as determinant of technical inefficiency. The size of firms is commonly used to explain technical inefficiency (Caves and Barton, 1990; Badunenko et al, 2006; and Widodo et al, 2015). The influence of size on technical efficiency in previous research is not conclusive.

The spatial agglomeration of activity is a less explored area studying the determinants of technical inefficiency. Following Beaudry and Schiffauerova (2009) and De Groot et al (2016), there is a controversy about the measure of the agglomeration economies and the border between them. Glaeser et al (1992) point out three sources of agglomeration economies: specialization (localization), diversity (urbanization), and competition. Specialization economies is the so-called Marshallian trinity where intra-industry transmission of knowledge, reduced transport costs of inputs and outputs, and a more efficient labor market pooling are the three channels for the promotion of efficiency. Diversity economies, also named Jacob's externalities, highlight that the diversity (opposite to specialization) is the main source of fruitful innovations. So the most important engines of knowledge spillovers are external to the industry within which the firm operates. The third type of externality is from competition, as suggested by Porter (1990). So competition in the same market provides noticeable incentives for

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innovations. Similarly, a low degree of competition is recognized as a major external source of the so-called X-Inefficiencies (Lovell, 1993).

In this research we use two variables to estimate the influence of agglomeration economies. The first one points out the potential influence of Marshallian externalities. A share of the number of hotels located in the island over the total in the region (MAR) is introduced. This share could capture the influence of specialization or localization externalities. Bernini and Guizzardi (2016) found evidence of agglomeration economies from a set of proxies. Lado-Sestayo and Fernández-Castro (2019) also obtained an increase of efficiency from a share of agglomeration of population. As a consequence the expected sign for this variable in the regression of equation (2') is negative, i.e. agglomeration economies reduce technical inefficiency. The second one is the degree of competition measured by the Hirchman-Herfindahl Index (HHI). It can range from 0 to 1.0, moving from a high number of very small firms to a single monopolistic producer. The expected sign of the parameter for this variable is positive, which would indicate that the observed behavior of the company is less efficient when it is operating in a market with a low degree of competition.

Additionally this research explores a proxy for agglomeration diseconomies via congestion effects. Congestion is commonly recognized as a source of environmental and social diseconomies from the increased emissions, scrabbling for public infrastructure, constraints to mobility causing wastes of time, and psychological effects from a more stressing way of life. From our point of view, congestion may also affect technical efficiency of hotels. Indeed congestion may become a limitation for the effective management of hotels, given that it increases time required to access to the services consumed by hotels, e.g., bank services, municipality services, supply of inputs. Furthermore productivity of workers may be reduced via stress and frustration. In this sense, Broersma and Oosterhaven (2009) find that congestion may affect negatively to labor productivity growth in a regional level.

Preliminary results seem to indicate that agglomeration economies and diseconomies are relevant factors in the determination of the level of technical efficiency in the hotel industry of the Canary Islands.

Keywords: hotel supply; stochastic production frontier; technical efficiency
JEL codes: D22, L23, L83

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