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Incorporating destination quality into the measurement of tourism performance: A Bayesian approach

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HIGHLIGHTS

- We incorporate destination quality in a dynamic stochastic frontier model.
- We differentiate between short-run and long-run measures of destination quality and technical efficiency.
- A stochastic frontier model with destination quality outperforms other models that exclude destination quality.

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ABSTRACT

Studies on destination benchmarking have so far ignored destination quality in the measurement of tourism performance. Destination quality plays a critical role in attracting tourism outputs (e.g. arrivals, receipts), and hence ignoring it represents an important shortcoming that might bias the benchmarking outcomes. The present paper develops for the first time a Bayesian stochastic frontier model that incorporates destination quality into the estimation of tourism performance. The model we propose benchmarks tourism destinations based on both overall performance (i.e. technical efficiency) and quality performance. We impose a dynamic structure on both technical efficiency and destination quality, and differentiate between short-run and long-run estimates of these measures. We provide ranking of technical efficiency and destination quality for 101 tourism destinations and discuss the implications of our findings.

1. Introduction

The use of frontier methods for the benchmarking of tourism destinations has expanded rapidly in recent years (Barros, Dieke and Santos, 2010; Peypoch, Randriamboarison, Rasoamananjara, & Solonandrasana, 2012). These methods provide two main advantages over simple performance metrics[2]:

1. Multiple Measures: First, they can multiple inputs and outputs in the measurement of tourism performance, hence, providing a better representation of the multiple input and output setting of the industry.
2. Benchmark Best Practices: Second, they provide a benchmark of best practices, also known as the frontier, against which competing tourism destinations can be compared.

The focus on the concept of "frontier" enables tourism destinations to assess the gap between their actual performance and optimal performance, and this is also known as technical inefficiency. These technical efficiency measures can be used either: (1) to assist or assess the government strategies by examining the effects of certain tourism policies on the performance of the industry; or (2) to improve the performance by "identifying best practices and worst practices" associated with the measures of efficiency (Berger & Humphrey, 1997).

The aim of this study is to extend the current literature on frontier analysis in tourism focussing on two important contributions. First, we introduce a new stochastic frontier model that

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[2] Some examples of simple performance metrics used in the tourism industry include number of tourism arrivals and total tourism receipts.

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incorporates the quality characteristics of tourism destinations into the estimation of tourism performance. Despite the rich literature on frontier models in tourism, it is surprising that none of the existing studies has incorporated the quality characteristics of tourism destinations into the estimation of tourism performance. The importance of quality for tourism demand and competitiveness is well documented in the tourism literature (Barros & Dieke, 2008; Mangion, Durbarry, & Sinclair, 2005; Pizam, 1994; Ross, 1993). The quality characteristics of tourism destinations (e.g. infrastructure, human resource, and service) for instance, are at the heart of the tourism competitiveness model by Crouch and Ritchie (1999). They are supporting factors that help generate repeat visitation and return intention to tourism destinations (Tian-Cole & Crompton, 2003). They are also well integrated into the experiential desires of the destination product. In other words, any representation of tourism technology and the measures of tourism performance is not complete unless we incorporate the quality setting in which the generation of tourism outputs take place (Murphy, Pritchard, & Smith, 2000).

Second, we innovate by developing our frontier model in a dynamic fashion following Tsionas and Assaf (2014). Specifically, we allow both technical efficiency and the measures of destination quality to follow a dynamic framework, hence differentiating between short-run and long-run impacts of these measures. The model we develop focuses on several dimensions of destination quality including infrastructure quality, human resource quality, and natural & environmental quality. These are then combined to provide an overall quality index of tourism destinations. For the three dimensions of quality we assume a latent variable or a structural equation model (SEM) in which (a) they depend on observed relevant characteristics and (b) we propose and test a new model in which they are persistent and follow a vector autoregressive scheme (VAR). On top of this dynamic SEM we assume a transformation function which takes traditional tourism inputs and quality measures and transforms them into tourism outputs and a new overall quality (index) measure. Since the model is non-linear in a number of endogenous latent variables we resort to Bayesian inference methods organized around Markov Chain Monte Carlo (MCMC) with special emphasis on the Gibbs sampler with data augmentation. We compare different specifications of the underlying model using the Deviance Information Criterion (DIC) to examine which specification provides a better description of reality.

The remainder parts of this paper proceed as follows: Section 2 presents a review of frontier studies in tourism. Section 3 presents the methodology. Section 4 describes the data. Section 5 presents the results, and finally Section 6 discusses the implications of the study and provides some concluding remarks.

2. Frontier studies in tourism

The frontier analysis for performance benchmarking has gained increased popularity in tourism in recent years. As mentioned, the purpose of frontier research is to estimate a frontier technology of best practices against which relative technical efficiencies are measured. Several methods have been proposed in the literature to estimate the frontier technology. The most common are the non-parametric data envelopment analysis (DEA) method or the parametric stochastic frontier (SF) method. Both methods have been popular in the hotel and tourism literature (Assaf, Josiassen, & Knežević Cvelbar, 2012; Botti, Briec, & Cliquet, 2009; Chen, 2007; Hsieh & Lin, 2010; Yu & Lee, 2009). We present in Table 1 a review of studies that used DEA and SF in the tourism industry. We also highlight whether these studies have incorporated quality and/or the dynamic formulation. In line with this study, we only focus on research that analyses the performance of the tourism industry.[3]

Several gaps are clear from Table 1. First, most studies have only focused on the benchmarking analysis of single tourism destinations such as France and Italy; there is a lack of studies that benchmark tourism destinations using a representative sample that includes multiple tourism destinations. Second, most of these studies are not formulated in a dynamic framework. The DEA method, which was used in most cases, makes it difficult to impose the dynamic formulation or to account for the panel structure in the data. Third, most research did not account for quality in the estimation of tourism performance. The study by Assaf and Josiassen (2012) has used quality, but only as a determinant of tourism performance, and not as part of the estimation of tourism performance.

In this study, we address all the above gaps. First, we use a rich sample that covers 101 tourism destinations, enabling cross-country comparison. Previous studies that relied only on one destination should be interpreted with caution unless the same finding is demonstrated by using a sample that covers multiple competing destinations. In other words, using a sample with multiple destinations enables richer interpretation and higher robustness of the results. As our model also accounts for heterogeneity, destination managers can more realistically assess their position against other international competitors.

Second, we introduce a model that accounts for the quality characteristics of tourism destinations in the estimation of the frontier technology. The use of quality in frontier models has been popular across many applications, including heath care, banking, airlines and airports (Adler and Berechman, 2001; Salinas-Jiménez & Smith, 1996). The existing studies, however, do not incorporate quality directly into the estimation of the frontier technology but mainly as an exogenous variable that is used to explain efficiency (Assaf & Josiassen, 2012). For example, this takes the form of a regression where quality is used to explain variation in efficiency. We propose here a more realistic approach by incorporating quality directly into the non-stochastic component of the frontier model. We allow quality to become part of the estimation of the frontier technology and not just an external factor that has no impact on the efficiency estimates of tourism destinations. In other words, we allow quality to affect directly the transformation of outputs in a production technology. Such approach is more realistic particularly in an industry like tourism, where quality has a direct impact on tourism demand. The measure of destination quality we include is a multi-dimensional characteristic which depends on three dimensions, namely infrastructure quality, human resource quality and natural & environmental quality. We develop this measure in the context of structural equation modelling.

Third, we allow in our model both destination quality and efficiency to follow a dynamic framework. This is an important contribution, as most frontier models currently used in tourism have been formulated using a static framework or a restrictive time-variant framework. The time variant framework should not be confused with the dynamic framework as it does not allow inefficiency to adjust for itself over time (Tsionas, 2006). As recently argued by Tsionas and Assaf (2014), the use of dynamics provides a better representation of the status of competition in a highly dynamic industry such as tourism, where learning to adjust is necessary to avoid being driven out of international competition.

Fourth, and finally, using dynamics, we also differentiate between short-run and long-run estimates of both efficiency and

[3] For a review of frontier studies on individual sectors of the tourism industry such as hotels, tour operators, or Ski resorts, refer to Assaf and Josiassen (2012) and Salman Saleh, Assaf, & Son Nghiem, 2012.