Tourism Management 65 (2018) 131–142

Contents lists available at ScienceDirect

Tourism Management

journal homepage: www.elsevier.com/locate/tourman

The estimation and decomposition of tourism productivity

A. George Assaf [a, *, 1], Mike Tsionas [b, c, 1]

[a] Isenberg School of Management, University of Massachusetts-Amherst, 90 Campus Center Way, 209A Flint Lab, Amherst, MA 01003, USA
[b] Lancaster University Management School, LA1 4YX, UK
[c] Athens University of Economics and Business, Greece

HIGHLIGHTS

- We measure the performance of international tourism destinations.
- We account for heterogeneity between multiple tourism destinations as well as the potential endogeneity in inputs.
- We provide both short-term and long-term productivity measures.
- We decompose productivity into several interesting components.
- We rank tourism destinations based on their productivity and discuss the implications of the findings.

ARTICLE INFO

Article history:
Received 9 January 2017
Received in revised form
26 August 2017
Accepted 3 September 2017

Keywords:
Tourism productivity
Heterogeneity
Tourism destinations
Bayesian

ABSTRACT

This paper estimates a total factor productivity index that allows for a rich decomposition of productivity in the tourism industry. We account for two important characteristics: First, the heterogeneity between multiple tourism destinations, and second, the potential endogeneity in inputs. Importantly we develop our index at the macro level, focusing on cross-country comparisons. Using the Bayesian approach, we test the performance of the model across various priors. We rank tourism destinations based on their tourism productivity and discuss the main sources of productivity growth. We also provide long-run productivity measures and discuss the importance of distinguishing between short-run and long-run productivity measures for future performance improvement strategies.

1. Introduction

> "Productivity isn't everything, but in the long run it is almost everything. A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker" (Krugman, 1994, p.9).

Despite being a high priority on the World Tourism Organization (UNWTO) research agenda, the productivity analysis of the tourism industry has not received much attention in the tourism literature. There is a continuous effort at most tourism destinations to strengthen the productivity of their tourism industry (Cvelbar, Dwyer, Koman, & Mihalič, 2016). As stated by Assaf and Dwyer (2013, p.1234), with the tourism industry often perceived as a low productivity industry, productivity analysis is "crucial to evaluating tourism sustainability and reshaping tourism activities. There is a direct link between productivity and profitability, as when productivity increases, the tourism industry's competitiveness in labour, capital and real estate markets also increase".

The tourism competitiveness literature also highlights the important link between competitiveness and productivity. Dwyer, Forsyth, & Rao (2000, p. 9), for instance, view competitiveness as "a general concept that encompasses price deferential coupled with exchange rate movements, productivity levels of various components of the tourist industry and qualitative factors affecting the attractiveness or otherwise of a destination". Echoing this, Crouch and Ritchie (1999, p.149) have emphasized that ensuring higher destination productivity an effectiveness necessitates from each destination management organization (DMO) "the responsibility to disseminate key market and performance information to its

* Corresponding author.
E-mail addresses: assaf@isenberg.umass.edu (A.G. Assaf), m.tsionas@lancaster.ac.uk (M. Tsionas).
[1] Both authors have contributed equally to the paper.

http://dx.doi.org/10.1016/j.tourman.2017.09.004
0261-5177/

members on a timely basis". Even competitiveness at the firm level can be enhanced through productivity improvements (Dwyer & Kim, 2003). While some research evaluated competiveness from the perspective of productivity, the two are often viewed as separate but related components (Assaf & Josiassen, 2012). The concept of "competitiveness" should not also be used to reflect the productivity of the tourism industry (Assaf & Josiassen, 2012) - productivity is a major driver of "competitiveness", and not "competitiveness" itself (Cvelbar et al., 2016).

Often misleading is the definition of productivity in the tourism industry. The various league tables providing productivity indicators of the tourism industry "neither takes explicit account of productivity in tourism" (Blake, Sinclair, & Soria, 2006, p. 1100). Productivity is a complex phenomenon and involves several components; hence using simple metrics to reflect the overall tourism productivity can be misleading for policy implications (Barros, Botti, Peypoch, Robinot, & Solonandrasana, 2011). Over the last decade, there has been an increasing focus on analysing the performance of the tourism industry using the concept of "technical efficiency" (Assaf & Josiassen, 2012; Barros et al., 2011; Peypoch & Solonandrasana, 2006). However, while technical efficiency is a comprehensive measure of performance, it is only one component of productivity-productivity growth is not driven by technical efficiency alone, but by other factors such as "innovation" and "output growth" (Coelli, Rao, O'Donnell, & Battese, 2005).

In their recent paper, Assaf and Dwyer (2013) emphasized that the highly popular "Travel & Tourism Competiveness Index" published by the World Economic Forum and widely used by tourism destinations does not rank destinations based on their tourism productivity (Cvelbar et al., 2016). There is clearly a need to complement such index with a robust productivity index that takes into consideration the unique multiple input and output characteristics of the tourism industry (Assaf & Josiassen, 2012). The Malmquist productivity index, for example, recently used in the literature to measure tourism productivity (Barros, 2005; Cracolici, Nijkamp, & Rietveld, 2008; Peypoch & Solonandrasana, 2008) is an important step in the right direction; it is a comprehensive index that takes into account multiple inputs and outputs in the measurement of tourism productivity, and can be decomposed into measures of efficiency growth and technical growth.

Motivated by the above, the aim of this paper is to extend the current literature on tourism productivity, addressing several important gaps in the literature. We use a total factor productivity index that allows for a rich decomposition of the sources of productivity growth in the tourism industry. We use the Bayesian approach based on Sequential Monte Carlo/Particle Filtering (SMC/PF) to perform the computations.

Importantly, we introduce four important innovations to the tourism literature. First, we account for heterogeneity between multiple tourism destinations, something that has been completely ignored in related studies. As it is well known that considerable heterogeneity exists between tourism destinations, a failure to account for this can result in biased conclusions (Assaf & Tsionas, 2015). Second, we account for potential endogeneity in inputs using a reduced form equation that also takes into account the fact that productivity and inputs cannot be independent of each other. Third, we develop our index at the macro and not at the micro level, as is the case with most studies in the tourism literature. As stated by Assaf and Dwyer (2013, p. 1235) "for productivity measures to be even more useful and relevant to public policy and regulation, they need to relate to the overall tourism industry, and not just to particular sectors of the industry". Fourth and finally, we focus on cross-country comparisons; our aim is to provide each destination with a more accurate assessment of the international standing of their tourism industry.

The paper will proceed as follow. The next section provides a background of productivity and highlights some of the competing methods. Section 3 reviews the current literature on tourism productivity and highlights some of the existing gaps. Section 4 presents the model. Section 5 and 6 present the data and results and finally section 7 concludes.

2. Benchmarking and productivity

Interest in productivity has revived in econometrics through the work of Olley and Pakes (1996) and Levinsohn and Petrin (2003). Across many industries, productivity remains one of most comprehensive and reliable benchmark (Coelli et al., 2005). While in tourism, studies have benchmarked tourism destinations with respect to several performance indicators such as customer satisfaction (Milman & Pizam, 1995), competitiveness (Kozak & Rimmington, 1999), and market share (Dwyer & Kim, 2003), the use of productivity remains largely limited. For tourism policy makers "all these issues are important, but the problem is that they lead to subjectivity in selecting the true benchmarking parameters" (Assaf & Dwyer, 2013, p. 1235).

A more obvious and established benchmark is productivity (Jones, 2007). Usually measured based on multiple inputs and outputs, productivity provides a more comprehensive benchmark and reduces the subjectivity in comparing between different industry leaders (Barros et al., 2011). To define productivity, we start with a production function of this form:

$$Y_{it} = \lambda_{it} f(X_{it}) \tag{1}$$

where Y_{it} refers to the output, X_{it} is a vector of inputs, and λ refers to "how much output a given input is able to produce from a certain amount of inputs, given the technological level" (Del Gatto, Di Liberto, & Petraglia, 2011, p.952). The total factor productivity index (TFP) at a time period "t" is the ratio of produced output and total inputs used (Del Gatto et al., 2011):

$$TFP_{it} \equiv \lambda_{it} = \frac{Y_{it}}{f(X_{it})} \tag{2}$$

As simple as it looks, the estimation of productivity in (2) is not that straightforward, particularly when there are multiple and outputs, where finding the appropriate weights becomes challenging. There is an array of methodologies, and the distinction between them is not just in terms of whether they use a deterministic vs. a parametric approach, but also in terms of whether they adapt a micro (i.e. firm) vs. a macro level approach (industry/country, etc.).

The early literature on the measurement of aggregate productivity growth started with "the Solow growth theory (1957), in which the pattern of productivity growth essentially mirrors that of the so-called technologies progress (i.e. Solow residual)" (Del Gatto et al., 2011, p.954). Such approach is also known as "growth accounting", and despite the limitations, is still a very popular methodology. Recent extension of this method also includes the "level accounting" decomposition (Caselli, 2005), which has the advantage of providing not only growth measures but also estimates of productivity levels, and the so called "growth regressions" where productivity is not estimated as a residual (like "growth accounting"), and is not dependent on a specific functional form (Islam, 2003). This method has also the advantage of not requiring data on physical capital, which are usually characterized by high measurement errors (For a more detailed review of these methods refer to Del Gatto et al., 2011).

In tourism and other related industries, frontier methods have