Original Research Article

A parametric decomposition of hotel-sector productivity growth

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ABSTRACT

In this paper, we decompose hotel-sector total factor productivity growth into components attributable to changes in technical efficiency, scale effect, and technical change. The hotel-sector production Frontier is approximated parametrically using a primal approach requiring no data on output and input prices while permitting the conduction of statistical tests for the various features of the hotel-sector technology. Our empirical model relies on a flexible *translog* production function which allows to distinguish between *Hicks*-neutral and factor-biased technological progress. Using this framework, we estimate hotel-sector productivity growth and its components in a sample of 25 European countries from 2008 to 2015. Based on the empirical results, a cross-country comparison is performed and the sources of hotel-sector productivity are discussed. Finally, the implications of the study for hotel operators and policy makers are presented and a set of recommendations is developed for improving hotel sector productivity growth.

1. Introduction

With the service sector being the largest contributor to GDP in Europe and the productivity gap between the service-sector and the overall economy constantly increasing in the last years (Van Der Marel et al., 2016; Van Der Marel, 2017), service productivity issues have come to the fore of public and policy discussions within EU (European Commission, 2016; World Bank, 2016). Among the various service sectors, hospitality often takes a central role in controversies over how to raise the economic benefits from this specific industry which constitutes a robust source of revenues and domestic employment for many European countries. This interest on the performance of the hospitality industry has been mainly motivated from the broadly accepted view that hotel-sector productivity rates have been relatively low compared with other sectors of the economy (Witt and Witt, 1989; Johns and Wheeler, 1991; Sigala et al., 2005), and therefore the prospects for a rapid growth there might be extremely high. Driven from this view, World Tourism Organization recently placed productivity issues in tourism at the top of the research agenda in an effort to attract attention from researchers and enhance response actions from policymakers and hotel operators.

Yet, despite the profound interest of EU and international tourism organizations in hotel productivity issues, research to date has not kept in pace with the current challenges and needs in the industry. Indeed,

until now, little is known about the true levels of hotel-sector productivity growth in most European countries and even less has been documented. In addition, the driving factors behind hotel-sector productivity growth remain largely unexplored with important implications when it comes to the design and implementation of effective policies. Both an overall assessment and a cross-country comparison of hotel sector productivity are therefore required in order to gain insights about the overall and relative competitiveness of the hotel sector across European countries. Moreover, a separate assessment of the determinant factors of hotel-sector productivity is needed as a step towards initiating proper response actions from policymakers but also from hotel operators.

Previous research in the field seeks mainly to assess hotel performance using the concept of technical efficiency with the relevant literature including more than 35 studies on this topic (Pulina et al., 2010; Anderson et al., 1999; Assaf and Magnini, 2012; Barros et al., 2010; Barros, 2004, 2005; Keh et al., 2006; Chen, 2007; Hadad et al., 2012).[2] However, while technical efficiency is an important element of economic performance providing useful information about the operation management of the hotels, it should be also acknowledged that by itself is an insufficient measure of performance reflecting only specific aspects of hotels' operation (Barros, 2005). This is because technical efficiency neglects to account for innovation and output growth which undoubtedly constitute key elements of competitiveness (Coelli et al.,

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[2] See Arbelo-Perez et al. (2017) for a recent review of the literature on hotel efficiency.

2005). On the contrary, productivity defined as the ratio of output(s) over input(s) is a multi-dimensional measure which accounts for these aspects along with that of technical efficiency (Coelli et al., 2005; Assaf and Tsionas, 2018). Because of this important characteristic, productivity is widely perceived as the most comprehensive single measure of performance across almost all industries including the hospitality industry (Coelli et al., 2005; Jones, 2007; Assaf and Tsionas, 2018) and further as one of the most reliable indicators appropriate for comparisons (Barros et al., 2011).

Recognizing this advantage, a relatively limited number of studies has emerged in the literature using the more general concept of productivity to assess hotel performance. Within a parametric framework, Brown and Dev (2000) adopted a production approach to measure hotel productivity in a sample of US individual hotels in two prominent hotel chains. Similarly, Chen and Soo (2007) used a stochastic Frontier cost function to measure and decompose parametrically hotel productivity in a sample of 47 Taiwanese hotels. Focusing on UK, Blake et al. (2006) employed a business survey data analysis to measure tourism productivity providing also measurements for hotel productivity. However, this study follows a static approach and therefore cannot account for temporal variations in productivity levels.

There is also an increasing number of studies relying on non-parametric methods to measure hotel productivity growth. Johns et al. (1997) and Neves and Lourenco (2009) used a Data Envelopment Analysis (DEA) to benchmark productivity in 15 UK and 83 hotels worldwide, respectively, while Sigala et al. (2005) used a stepwise DEA approach to measure and benchmark hotel productivity in 300 UK hotels. There are also studies relying on the Malmquist index to analyze total factor productivity (Cordero and Tzeremes, 2017a; Jorge and Suarez, 2014; Barros, 2005; Barros and Alves, 2004; Sigala et al., 2005) and labor productivity (Cordero and Tzeremes, 2017b; Hu and Cai, 2008) at the hotel level. Finally, a few recent studies employed the Luenberger productivity indicator to measure and decompose non-parametrically hotel productivity growth at the micro-level (Peypoch and Solonandrasana, 2008; Goncalves, 2013; Peypoch and Sbai, 2011; Barros et al., 2009).

Table 1 provides a summary of the most representative parametric and non-parametric studies focusing on hotel productivity. Three important observations can be drawn from the table and the review of the literature as presented earlier. First, the majority of the work in the field focuses on efficiency measures to assess hotel performance neglecting to account for broader measures producing therefore assessments which are less useful to public policy. As discussed earlier, changes in productivity are not driven solely by changes in technical efficiency but also by innovation and output growth. This, in turn, implies that the hotel-sector in a country may perform well in terms of technical efficiency but it may lag behind in terms of productivity and vice versa. From a policy perspective, this issue is crucial since much policy-making, especially in EU (for example, EU Cohesion Policy 2014–2020; Lisbon Agenda 2000), is driven by performance considerations. Similarly, several national policies and budget allocation decisions are based on performance indicators. Hence, proper benchmarking of performance using productivity rather than efficiency indexes is important for effective policy decision-making.

Second, all existing work in the field focuses exclusively at the micro level while the few studies analyzing hotel productivity at the aggregate level are country-specific. It would be quite informative though from a policy perspective to produce hotel-sector productivity estimates for a broader set of countries using the same methodology to enable direct cross-country comparisons. This could be particularly of interest to national Tourism Departments/Ministries which assess hotel-sector performance when determining the sector progress against domestic objectives and targets. Such an analysis at the international level would also allow to illuminate features which could be missed by confining the study to a single country. One obvious example is technical efficiency. By focusing on a single country, hotels are benchmarked against the best national practice but not against the best international practice. This, in turn, may provide an overestimation of the true performance of hotels in a country and mask their full productive capabilities. Finally, important lessons can be learned from comparing hotel-sector productivity growth and its components across countries. Identifying the countries that perform better but also those that perform poorly along with the reasons behind this divergence can inform and redirect national strategies and further contribute to the spread of best practices.

Third, existing work relies almost exclusively on DEA approaches to measure and decompose productivity growth while the use of SFA

Table 1
Literature survey on parametric and non-parametric studies on hotel productivity.

Study	Methodology	Sample
Cordero and Tzeremes (2017a)	DEA approach *Malmquist index*	758 Hotels in Spanish Islands
Cordero and Tzeremes (2017b)	DEA approach *Labor productivity index*	758 Hotels in Spanish Islands
Jorge and Suarez (2014)	DEA approach *Malmquist index*	303 Spanish Hotels
Goncalves (2013)	Nonparametric approach *Luenberger productivity indicator*	64 French Ski Resorts
Peypoch and Sbai (2011)	Nonparametric approach *Luenberger productivity indicator*	15 Moroccan Hotels
Barros et al. (2009)	Nonparametric approach *Luenberger productivity indicator*	15 Portuguese Hotels
Neves and Lourenco (2009)	DEA approach	83 Hotels Worldwide
Peypoch and Solonandrasana (2008)	Nonparametric approach *Luenberger productivity indicator*	10 French Hotels
Chen and Soo (2007)	SFA approach *Cost function*	47 Taiwanese Hotels
Barros (2005)	DEA approach *Malmquist index*	42 Portuguese Hotels
Sigala et al. (2005)	Stepwise DEA approach	300 UK Hotels
Barros and Alves (2004)	DEA approach *Malmquist index*	42 Portuguese Hotels
Hu and Cai (2008)	DEA approach *Labor productivity index*	242 USA Hotels
Brown and Dev (2000)	Parametric approach *Production function*	1710 US Hotels
Johns et al. (1997)	DEA approach	15 UK Hotels