Efficiency in Nigerian airports

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A B S T R A C T

This paper analyzes efficiency levels in Nigerian airports using a stochastic frontier model that captures the impact of unobserved managerial ability during the period 2003–2014 based on the methodology presented in Alvarez et al. (2004) – the AAG model. Managerial ability in Nigerian airports is an important issue for sustaining efficiency levels because they are labor intensive rather than capital-intensive facilities. The AAG model was modified in this research to measure two exogenous contextual variables, namely regulation and hub. Under this modified version of the AAG model, inputs and outputs are disentangled in the frontier estimate while simultaneously allowing these contextual variables to control the impacts of managerial ability on efficiency. Results not only suggest that variations in efficiency scores are more sensitive to labor than to capital costs, but also indicate a negative impact of regulation and hub operations on efficiency levels possibly due to the small operational scale of Nigerian airports. Policy implications are derived.

1. Introduction

The study of efficiency in the airport industry can produce relevant insights in terms of competitiveness, unveiling inherent capabilities for performance improvement (Biesebroeck, 2007; Diana, 2010; Bezerra and Gomes, 2016). Previous studies on airport efficiency have either adopted the DEA (Data Envelopment Analysis) model and its variants (e.g. Sarkis, 2000; Sarkis and Talluri, 2004; Marques and Simões, 2010; Wanke, 2013; Tavassoli et al., 2014; Wanke and Barros, 2016) or the SFA (Stochastic Frontier Analysis) model (e.g. Barros, 2009; Pels et al., 2001, 2003). When looking at the details, while the slack analysis of DEA provides insight on resources to improve efficiency discrimination (Olesen et al., 2015), the SFA method focuses on the economic justification of a given production function. Besides, SFA has some advantages as well as disadvantages over DEA because of its parametric characteristics where some distributional assumptions are made regarding the error and the inefficiency terms (Sun et al., 2015). More precisely, DEA falls short with respect to the necessary statistical properties for a robust examination of the roots of inefficiency when using contextual variables (Bogetoft and Otto, 2010). This paper lends a contribution to the literature by analyzing a sample of Nigerian airports using a modified version of the Alvarez et al. (2004) model – AAG model, from here on – for unobserved managerial ability capable of handling the impact of exogenous contextual variables.

There are several motivations to better understand the role of managerial ability in Nigerian airports. First, although airport efficiency has been extensively researched in different countries, research on Nigerian airports is still restricted to a small number of studies (Daramola, 2014; Ismaila et al., 2014; Wanke et al., 2016), which justifies this present research. Second, the focus on African airports offers fertile ground for understanding the role of managerial ability in airport efficiency since they fall short in physical resources seeing that they are more labor intensive than capital intensive (Barros, 2011; Wanke et al., 2016). Third, benchmarking is a way of segmenting productive units in light of common patterns and, therefore, constitutes a relevant source for performance improvement (Hooper and Hensher, 1997; Diana, 2010). Fourth, given the relative importance of labor to the detriment of capital, managerial practices may heavily vary depending upon the airport, being strongly influenced by contextual variables. Finally, this eventual dispersion in efficiency scores, derived from distinct managerial practices and their cross effects upon contextual variables, may also produce what is called “unobserved heterogeneity”, which has been the focus of different researches such as that of Chesher (1984); Chesher and Silva (2002). Heterogeneity is an important source of model misspecification that leads to inconsistent parameter estimation.

The remainder of this study is organized as follows: Section 2 presents the contextual setting of Nigerian airports and the previous scant academic papers focused on them followed by a more general literature...