Measuring the technical efficiency of airports in Latin America

Sergio Perelman a, 1, Tomás Serebrisky b,*

a CREPP, University of Liege, Bd. du Rectorat 7 (B31), 4000 Liège, Belgium
b The World Bank, 1818 H Street NW, Washington, DC 20433, USA

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ABSTRACT
Relying on a unique dataset this paper uses Data Envelopment Analysis methods to compute an efficient production frontier for a representative sample of Latin American airports. Latin America has implemented a wide variety of private sector participation schemes in the airport sector since the late 90s. To assess whether privately operated airports had higher rates of total factor productivity growth than public airports we compute Malmquist indexes for the period 2000–2007. Results indicate that privately operated airports enjoyed higher rates of total factor productivity growth.

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1. Introduction

During the last two decades there has been a growing interest in measuring the efficiency and performance of airports. On one hand, the process of introducing private participation in the management and operation of airports and the birth of regulatory agencies in charge of setting tariffs for the sector brought along the need to assess the way in which airports are being operated. On the other hand, with the liberalization of competition among airlines, airports started competing with each other for connecting traffic (to become hub airports) which prompted them to increase their efficiency.

This interest has spurred a growing literature aimed at estimating the efficiency of the airport sector. To the best extent of our knowledge, there has not been any study that computes the efficiency and performance of a representative sample of airports in Latin America (LAC). This region has implemented a wide variety of private sector participation schemes including concessions of several groups of airports (Mexico), a single concession of a group of airports with more than 90 percent of the air transport market (Argentina), a single airport concession (Chile), and a combination of single and group airport concessions (Peru). The introduction of private sector brought more than 9 billion dollars of investment to the sector between 1998 and 2008. Several hypotheses can be provided to explain why airport efficiency in Latin America has not been the subject of academic research but the most likely reason is the lack of publicly available data.

The main objective of this paper is to fill this gap in the literature. We are able to do so using data collected from a questionnaire that was sent, as part of a World Bank study on airports, to the major airport operators in LAC (World Bank, 2010). It should be noted that the sample assembled for this study is representative of the air transport sector in the LAC region as it accounts for more than 80% of total passengers and aircraft movements in the region and for 70% of total air cargo. Table 1 lists the airports included in the sample, their type of ownership and passengers in 2008. Latin America and the Caribbean account for a small share of the air transport sector worldwide. Based on 2008 figures (World Bank, 2010) this region only accounted for 7 percent of total passengers, 5 percent of cargo and 8 percent of aircraft movements. Airports are relatively small when ranked on a global scale. LAC has a total of just 4 airports among the top 100 airports worldwide and 14 airports among the top 200. Benito Juárez International Airport in Mexico City, ranked 43rd globally, is the most important airport in the region in terms of passenger traffic, handling a total of about 26.2 million passengers in 2008 (approximately three times less than the

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* Corresponding author. Tel.: +1 202 458 2872.
E-mail addresses: sergio.perelman@ulg.ac.be (S. Perelman), tserebrisky@yahoo.com, tserebrisky@worldbank.org (T. Serebrisky).
1 Tel.: +32 43663098.

2 Data obtained from the Public Private Infrastructure database, World Bank. Available at http://ppi.worldbank.org/.
3 The dataset is available upon request from corresponding author.
number handled by first-ranked Hartsfield-Jackson Airport in Atlanta. As for cargo, the entire LAC region handled a total of 4.6 million metric tons in 2008, only 1 million metric tons more than the amount of cargo traffic handled by the global leader, Hong Kong International Airport (3.6 million metric tons) and three times as much as Miami, North America's cargo hub (1.5 million metric tons).

Table 2 presents descriptive statistics for the average LAC airport in our sample and compares it with the average airport in North America, Europe and Asia. Across size categories, airports in LAC tend to be smaller (measured by their terminal size). Labor inputs, measured by employees directly employed by the airport operators, indicate that LAC airports have higher number of employees in smaller and relatively large airports while they have fewer employees in medium airports (5–8 million passengers per year).

The paper first computes a data envelopment analysis (DEA) activity frontier for commercial airports in the LAC region and identifies the peers of each airport (i.e. comparable airports that operate on the efficiency frontier). We then proceed to measure Total Factor Productivity Changes (TFPC) for LAC airports over the period 2000–2007. Section 5 presents some concluding remarks. Section 2 presents a brief review of the existing related literature. In Section 3 we present calculations of a DEA activity frontier for commercial airports in the LAC region and use these results to identify their peers. Section 4 presents Malmquist quantity indexes of TFPC for LAC airports over the period 2000–2007. Section 5 presents some concluding remarks.

2. Literature review

Gillen and Lall (1997) pioneered the use of Data Envelopment Analysis techniques to study efficiency in the airport sector. Their paper uses data from 21 US airports for the period 1989–1993. Using this dataset they define airports as producing two different classes of services — terminal services and movements — and then proceed to compute two different DEA frontiers, one for each of these two services.
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