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Efficiency and productivity changes in Greek airports during the crisis years 2010–2014

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ABSTRACT

The aim of this study is to evaluate the operating efficiency and productivity changes of the Greek airports, during the first years of the severe economic crisis in Greece (2010–2014), by using two methods: Data Envelopment Analysis (DEA) and Malmquist Productivity index (MPI). Findings have shown that, despite the dramatic effects of the economic crisis on the socio-economic life of the country, overall airport efficiency and productivity improved, mainly due to exogenous factors such as international tourism growth. The MPI reveals that over the period of the study, airports have experienced an annual average increase in total factor productivity (TFP) of 0.9% (an increase of 3.6% over the examined period). On examining the components of this productivity change, it becomes evident that this is due to the combination of both positive (a slight progress) annual average technology change (0.5%) and technical efficiency change (0.4%). The results also indicate that 65.8% of airports have an increase in average TFP during the period 2010–2014, ranging between 0.4% and 20%. However, as Greek airports operate at poor levels of efficiency, there is still considerable space for improvements in most of the airports.

1. Introduction

Since May 2010, "Greece has been receiving financial support from Euro Area Member States and the International Monetary Fund (IMF) to cope with its financial difficulties and economic challenges. This support comes in the form of economic adjustment programs, which include measures to support the Greek government's efforts to address economic imbalances, tackle social challenges, and pave the way for sustainable economic growth and job creation" (EU, 2016). In an effort to meet economic reform targets, the Greek Government invited on March of 2013 private investors to submit offers for the concession of the right to use, operate, manage and exploit 14 out of the 38 Regional Airports owned by the Greek State (Hellenic Republic Asset Development Fund-HRADF-2013a,b,c).[1] In December 2015 HRADF (HRADF, 2015) and a consortium comprising of the German group Fraport and Slentel (a unit of the Greek Kopelouzos energy group) signed an agreement for the concession of 14 regional airports. This was ratified by the Greek Parliament in June 2016. The privatization is still in progress and is expected to be finalized in autumn 2016.

Over the years, Greek airports have been owned and managed by the Greek Government through the supervision of the Hellenic Civil Aviation Authority (HCAA-YPA in Greek), which is a public authority under the Ministry for Infrastructure, Transport and Networks. HCAA was established in 1926 and its mission was the organization, development, and control of the country's air transport infrastructure, as well as the research concerning the overall air transport policy. Despite changes that occurred due to Greece entering the EU in 1981, the Greek state has been solely responsible for the maintenance, development and management of Greek airports, with the exception of the new Athens International Airport (AIA) which became the country's first international airport under private management in 1995.

Greece's geomorphology includes 80% mountainous terrain and about 1400 islands, of which about 227 are inhabited and vary greatly in size, population, and development. Due to the insular specificity, Greece has an impressively large number of airports relating to its size: 39 airports used for civil aviation in total country

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[1] The concession process grouped Greek airports into 2 clusters: Cluster A includes the airports of Thessaloniki, Corfu, Chania, Kefalonia, Zakynthos, Aktion and Kavala and Cluster B includes the airports of Rhodes, Kos, Samos, Mitilini, Mykonos, Santorini, and Skiathos. Three of the 14 airports are located on the mainland (Thessaloniki, Aktio and Kavala) while the rest serve insular destinations.

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area of 131,957 sq. km whereas Spain, for instance, has only 50 airports in a total area of 505,951 sq. km (Eurostat, 2014). As a result, air transport is a critical factor both for the social coherence and economic development of the country. It is characteristic that only in 2014 the air transport sector accounted for 807 million Euros of Greek national generated income, recording a 15,7% increase of its contribution over the years of 2010–2014 (Elstat, 2015).

More than its direct importance for the country's development, air transport remains simultaneously the main catalyst for tourism, one of the main production sectors of the country. "Tourism, both for business and leisure purposes, makes a large contribution to the Greek economy, with foreign visitors contributing over €10.2 billion in the Greek economy each year. Over 70% of these visitors arrive by air, so passengers who arrive by air probably spend around €7.5 billion in Greece" (Oxford Economics, 2011). World Travel & Tourism Council (WTTC, 2015) economic data for 2015 estimated a 7,6% direct contribution of tourism to Greek GDP (at market prices) and a total (direct, indirect and induced) contribution of 18,5% of the National GDP. Similar tendencies apply in respect to tourism's contribution to generated employment which, by the end of 2015 accounted for 23% of the country's total (direct and indirect) generated jobs.

Greek tourism endeavours to maintain its pace in a globalized market. In 2015, just the number of international arrivals numbered more than 22 million, which is more than double the country's population, not including cruising passengers and economic immigrants. During the study period, international arrivals increased by a spectacular 46,5%, ranging from 15 million in 2010 to 22 million in 2014 (Elstat, 2014). The ratio of tourist arrivals to population was 2.2 in 2014, compared to 1.23 for Spain, 0.77 for Italy, 0.71 for Portugal, and 0.47 for Turkey (compiled by authors based on World Bank, 2015 accessed through Quandl, 2015).

HCAA data for the period 2010–2014 shows an increase of 16% on the total number of arrivals by air. It is important to underline that this increase is mainly the result of incoming tourists both on scheduled and charter flights. At the same time, Greek domestic traffic decreased by 3% over the same period, mainly reflecting the effects of the economic crisis. So the trends of increasing international tourism flows went in parallel to restricted domestic mobility to tourism accommodation establishments (Eurostat, 2014).

As the above mentioned figures indicate, air transport sector has the potential to strongly contribute directly and indirectly to the economic performance of the country. Until airports privatization is fully implemented, all 38 Greek airports are owned and centrally managed by the HCAA. As a result, they all apply the same policies concerning user charges and, at the same time, they lack commercial strategy and management, as would be applied by business decision making units (DMUs) (Fragoudaki and Giokas, 2016). Following the privatization, HCAA will retain its role as regulator of aeronautical services and provider of air-traffic control services as well as the manager of the remaining airports.

As in the global aviation industry the role of airports has changed, "from places where airplanes land and take off and where passengers and cargo are handled, airports are transformed from simple public utilities into business entities that successfully operate in an increasingly competitive environment" (Oxford Economics, 2011), it is necessary for Greek airports to change their orientation and develop a commercial strategy taking into account the changing external environment. Within this context, this paper aims to evaluate the operating efficiency and productivity changes of the Greek airports during the first five years (2010–2014) of the severe economic crisis in Greece.

The analysis considers all 38 Greek airports currently open to civil aviation, excluding Athens International Airport. According to HCAA (2015a,b) there are three categories of airports: Category I includes 15 "international airports", including Athens International Airport; Category II includes 26 "national airports", that also accommodate international traffic, and Category III includes four "municipal airports". Despite this historical classification, many airports are designated "points of entry and exit", and as such, all but eight airports accommodate both domestic and international traffic depending on tour operator demand. Out of these, 28 are island-based and only 10 are located on the mainland. Finally, 12 of these airports are of mixed civil and military use.

Following this introductory section on the current state and contribution of Greek airports during the first years of economic crisis, Section 2 summarizes literature applications of Data Envelopment Analysis (DEA) and Malmquist Productivity Index on airport performance. After a short presentation of the methodology in Section 3, Section 4 presents the data and discusses the empirical results derived by applying this methodology. Summary and concluding remarks are presented in Section 5.

2. Literature review: airport performance analysis using DEA and Malmquist index

The assessment of relative competitive position and the value of continuous performance appraisal are focal points of airport managers. "Investors and bankers that are interested in airport privatization want to use benchmarking techniques to identify possible business opportunities" (Graham, 2005). As a result, various studies have utilized a variety of techniques for airport benchmarking (Ibid).

Data Envelopment Analysis (DEA) has been applied in many studies aiming to analyze the efficiency of airports around the world. Malmquist index on the other hand has been used to examine productivity changes over time. A number of studies using those methodologies are presented here. DEA was used by Sarkis (2000) to evaluate the operational efficiencies of 44 major US airports and put forward that airlines tend to favor more efficient airports. Martin and Roman (2001) used DEA to measure the efficiency of Spanish airports prior to privatization. Fernandes and Pacheco (2002) used DEA to analyze the capacity of 35 domestic Brazilian airports in order to monitor which of them were efficient in terms of passenger processing and use of airport resources. Yoshida and Fujimoto (2004) used DEA to measure the relative efficiency of Japanese airports and discuss the criticism whether there is any over-investment in Japanese regional airports. Barros and Dieke (2007) analyzed the financial and operational performance of Italian airports with panel data for 2001–2003, aiming to examine the relative roles of dimension, managerial status, and workload unit (WLU) in determining the proximity of airports to the frontier of best practices. Wei and Hongshan (2010) used DEA to compare the productivity of ten airports around the Yangtze River Delta, considering both desirable and undesirable outputs, such as delays, and arguing that there may be a balance between quantity and quality of outputs. Barros (2008) also used DEA, for examining the technical efficiency of airports in Argentina, and analyzed the results in the context of economic crisis during the period 2003–2007. Despite the crisis the eight efficient airports maintained their efficiency during this crisis period. At the same time "major airports were largely immune to the economic crisis, small regional airports emerge as more sensitive".

Barros and Weber (2009) used DEA to estimate the Malmquist input based index of total factor productivity for 27 UK airports during the 2000/1 to 2004/05. Productivity change was factored into an index of efficiency change and an index of technological change, which was further decomposed into indices that measure the bias in the production of outputs, the bias in the employment of