



# US airport ownership, efficiency, and heterogeneity



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## ABSTRACT

All US commercial airports are in the public sector yet not all have the same ownership type. For medium and large hub US airports we use stochastic frontier analysis to analyze the efficiency differences for alternative airport ownership types. We find that while form of ownership may matter for cost efficiency, in general its effect is relatively small. Yet type of public sector ownership does have cost efficiency implications in certain environments. Further, when heterogeneity is not controlled, the results change substantially so that type of ownership matters much more which demonstrates the importance of controlling for cross section heterogeneity.

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## 1. Introduction

An April 1, 2014 headline in the NY Times stated: “Report Traces Port Authority’s Flaws to a Crumbling Business Model”, referring to the lane closures on the George Washington Bridge in 2013. The George Washington Bridge is one of six bridges and tunnels managed by the Port Authority of New York and New Jersey (PANYNJ), a joint venture between New York and New Jersey that also manages the region’s seaports, five airports (including JFK International and LaGuardia (New York) and New Jersey’s Newark Liberty airports), and the trans-Hudson rapid rail system (PATH). Of relevance to this paper is that PANYNJ is one of several types of ownership for commercial airports in the US, all of which are in the public sector. Airport or port authorities (as PANYNJ) own and operate some airports while cities, states, and counties own and govern others. And while there have been a number of studies on the economic efficiency of private versus public sector airports, there have been relatively few studies that focus explicitly on the efficiency of alternative forms of public sector ownership associated with US commercial airports. Are port authorities such as PANYNJ, for example, less efficient as suggested by the article’s title or do port authorities embody a level of expertise that enhance cost efficiencies?

This paper reports the results of a stochastic frontier cost model on a panel (1996–2008) of twenty-four medium and twenty-six large hub commercial airports in the US. The analysis contributes to the literature in three specific ways: we

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analyze the relative efficiency differences across four US commercial airport ownership types (city, county, state, airport authority); we distinguish airport specific heterogeneity due to cost efficiency and, separately, to factors other than efficiency; and we perform a series of counterfactual analyses to analyze the efficiency effects of local ownership, hub size, and multiple airport metropolitan areas.

Based on a single output scenario, where the output is number of departures, our main findings are summarized as follows. First, conditioning on medium hub airports in multi-airport cities, airports owned by city or airport/port authorities have 9.59% (at median) higher variable costs due to cost inefficiency compared to county or state-owned airports. Second, among the medium hub airports owned by the city or airport/port authorities, those in multiple-airport cities have 8.6% (at median) higher variable costs relative to those in single-airport cities.<sup>1</sup> Third, there is not much effect on cost efficiency between medium and large hubs.

Inspired by Hicks' (1935) quiet life hypothesis, we examined the effect of multiple airports in a metropolitan area.<sup>2</sup> For the sample of airports, we find that the median cost efficiency for single-airport and multi-airport cities is 88.2% and 86.9%, respectively, a negligible efficiency difference.<sup>3</sup> In general, when we control for airport specific heterogeneity, the median cost efficiency for the whole sample is 87.6%, which is not very sensitive to ownership type. In sum, it seems that while the form of ownership may not have much effect on cost efficiency individually, their combination may alter cost efficiency levels. The average variable cost differences mostly stem from differences in scale economies for different ownership types. The outcome dramatically changes, however, when we do not control for airport specific heterogeneity. For example, the median cost efficiency for airports with and without local (i.e. city or airport authority) ownership is 80% and 92.6%, respectively. The difference is more dramatic for large and medium hubs (47.3% and 99.5%, respectively). It appears that when not controlling for heterogeneity, the intrinsic characteristics of the airports that are not captured by the existing control variables may be misinterpreted as inefficiency/efficiency in costs.

## 2. Relevant literature

Abrate and Erbetta (2010) and Voltes-Dorta and Lei (2013) provide excellent summaries of the increasing body of research on airport costs, efficiency, productivity, and type of ownership. Although similar to the literature cited in these studies, Table 1 complements these literature reviews in focusing on airport ownership and identifying specific results that relate to alternative ownership types. In general, the bulk of the research reported in Table 1, particularly more recent research, indicates that private ownership is more efficient than public ownership. However, this is a broad generalization and the reported studies also indicate that the effect of ownership depends on a number of factors related to the competitive environment.

In the late 1990s and early 2000 period, Vasigh and Haririan (2003), Parker (1999), and Oum et al. (2003) find little effect of privatization on airport operations. Oum et al. (2003) also notes the importance of managerial autonomy in airport efficiency and Vasigh and Haririan (2003) finds that private ownership produced better financial results. Oum et al. (2006) and Oum et al. (2008) find that privatized airports are more efficient than public sector airports but public sector airports are more efficient than airports with a public-private structure. Consistent with this, Bottasso et al. (2012) finds no productivity effect associated with mixed ownership forms. Related to these studies, Martin et al. (2011) and Martin and Voltes-Dorta (2011) find that multi-airport systems have higher unit costs because they operate under the presence of non-exhausted scale economies.

The general result that privatization enhances efficiency relative to public sector ownership is a 'proof of concept' result, consistent with economic theory. In order to better understand the relationship between types of airport ownership and efficiency, there is a growing body of research that is looking at underlying characteristics of specific types of airport ownership. Two avenues of research focus on regulation and airport use agreements.

Assaf et al. (2012) finds that airline deregulation (i.e. a competitive airline sector) combined with a competitive airport sector precludes the need for airport regulation. Consistent with this, Assaf and Gillen (2012) finds that price regulation is more important than airport ownership per se. Adler and Liebert (2014) also highlights the importance of a competition and finds that regulation, regardless of ownership type, is necessary to ensure a competitive environment. And Vasigh et al. (2014) argues that market structure and competition may be more relevant for productivity and efficiency compared with ownership structure.

In a theoretical paper on airport use agreements, Barbot (2011) explores the predominant types of use agreements, finding that negotiated agreements with the leading airline and long term leases are anti-competitive whereas majority in interest agreements with signatory airlines are relatively more competitive. Arguably, these results are consistent with Martin et al. (2013) that find airline dominance to increase cost flexibility in the US but decrease cost flexibility in Europe.

<sup>1</sup> Cost efficiency is used in the standard stochastic frontier literature language. That is, it is the ratio of the frontier minimum cost to observed cost. A potential reason for such deviation is the principle agent problem that the objectives of administrators may not fully align with cost minimization. Another reason may be optimization mistakes that are done by the decision makers.

<sup>2</sup> Quiet life hypothesis claims that, holding other factors constant, higher competition increases cost efficiency.

<sup>3</sup> Note that efficiency is a relative concept. That is, the efficiency estimates are based on comparison to the best practice. However, since the efficiency is captured by a random component the highest efficiency estimate is not necessarily equals to 100%. When the number of observations is large it may be reasonable to assume that the best practice firm is on the frontier.

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