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Airport partial and full privatization in a multi-airport region: Focus on pricing and capacity

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ABSTRACT

This paper studies the capacity and pricing choice of two congestible airports in a multi-airport metropolitan region, under transition from a pure public, centralized airport system to partial or full privatization. We develop analytical models to investigate three privatization scenarios: public–private duopoly, private–private duopoly, and private monopoly. We find that, airports follow the same capacity investment rule as prior to privatization when capacity and pricing decisions are made simultaneously. Pricing rule after privatization becomes more complicated, with additional factors having an upward effect on the privatized airport(s) and a downward effect on the remaining public airport.

1. Introduction

This paper investigates airport capacity and pricing under privatization in a multi-airport system. Facing air traffic congestion at airports, it is well recognized that airport pricing and capacity investment are two major, intertwined solutions, which are further related to airport ownership forms (Basso and Zhang, 2007a; Zhang and Czerny, 2012). The latter has garnered increasing attentions in the research community given the wave of airport privatization worldwide over the past two decades. Although a large body of literature has been produced which deals with the joint issue of capacity investment and pricing under different ownership forms for a single airport, few studies have examined this in a multi-airport setting (De Borger and Van Dender, 2006; Basso and Zhang, 2007b; Basso, 2008).

In contrast to this scarcity of multi-airport system pricing and capacity literature is the rapid development of metropolitan regions with more than one airport. In the beginning of the 2000s, multi-airport systems worldwide already catered to about one billion passengers, well above half of the global air passenger traffic at that time (De Neufville and Odoni, 2003). The surge of multi-airport system development continues, especially in developing economies (CAPA, 2014). This rapid development, together with the lack of understanding of the way multi-airport systems function, has led to expensive and embarrassing failures in operating such systems (De Neufville and Odoni, 2003).

The combination of the worldwide growth of multi-airport systems and airport privatization gives rise to the question of how privatization will shape the capacity and pricing decisions for each airport in a multi-airport region. While some existing efforts (e.g., De Borger and Van Dender, 2006; Basso and Zhang, 2007b; Basso, 2008) attempted to provide answers,

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they have all relied on making additional assumptions about key components in the airport demand and supply. Whether their findings are generalizable remains an interesting subject to be explored.

Perhaps more importantly, the presence of multiple airports (rather than a single airport) is likely to lead to a more progressive privatization process: for example, starting with privatizing just one airport in the multi-airport system instead of a once-and-for-all switch. Indeed, coexistence of public–private ownership has been seen in a number of existing multi-airport systems, such as in Stockholm, Johannesburg, and Tehran (Bonnefoy, 2007). Two notable recent examples of partially privatizing multi-airport systems are: the proposal of privatizing Chicago Midway airport while leaving intact the public ownership of Chicago O'Hare airport; and the on-going privatization of Kansai airport in Osaka, Japan, where three airports (Kansai, Itami, and Kobe) exist in the metropolitan region. Despite these real world cases, the implications of partial privatization for airport capacity and pricing choice have not been investigated in the academic literature. Examination of such a public–private duopoly case is nonetheless important, as the existing papers have shown that pure profit maximization or pure social welfare maximization may not be appropriate given the way the airport demand and revenue functions are formulated (e.g., De Borger and Van Dender, 2006; Basso and Zhang, 2007b): the former leads to high airport charges while latter leads to government subsidies which are increasingly unlikely nowadays.

The objective of this paper is therefore to scrutinize airport capacity and pricing choice of multiple-airport systems transitioning from pure public ownership to alternative privatization scenarios, including: (1) one airport becomes privatized, while the other remains public, i.e. a public–private duopoly; (2) both airports become privatized and owned by two distinct private agencies, i.e., a private–private duopoly; and (3) both airports are sold to one private company, i.e. private monopoly. This gives rise to our main contribution: that is, our analysis provides comprehensive consideration and comparison of the aforementioned ownership structures in a multi-airport region, which advances existing knowledge about the economic implications of privatizing multi-airport systems. Our second main contribution lies in the development of a general analytical framework for investigating airport capacity and pricing choice.

Our synthetic approach allows us to offer some major insights in a *more unified way across different scenarios*, summarized as follows. First, service price is set equal to marginal social cost under pure public ownership. Once privatized, the privatized airport(s) will disregard the passenger welfare component and tend to increase service price. For the remaining public airport under partial privatization, a markdown is expected due to the competition pressure. Second, somewhat amazingly, the capacity investment rule remains simple as long as pricing and capacity decisions are made simultaneously: optimal capacity sets marginal capacity cost equal to marginal delay reduction benefits. This is invariant to airport ownership forms in a two-airport region. Third, if capacity decisions are made prior to pricing decisions, then optimal capacity is set such that marginal capacity cost equals either marginal profit or social benefit, depending on whether the airport is privatized or remains public. While the exact change in airport capacity, service price, and other supply–demand characteristics after privatization depends on parameter settings, the theoretic insights obtained from our analysis offer new pricing and capacity implications for multi-airport privatization in an intuitive way, thus helping inform policy debates on privatization of multi-airport systems.

The rest of the paper is organized as follows. A review of the theoretical literature on airport pricing and capacity investment, and privatization, in particular in multi-airport systems, is offered in Section 2. Section 3 specifies the airport demand function and examines the base case of a centralized public two-airport system. In Section 4, capacity and pricing decision-making for a two-airport region is investigated under privatization. Three possible full or partial privatization scenarios (corresponding to three different airport ownership structures) are analyzed. Section 5 provides a synthetic discussion on the impacts of privatization on airport pricing and capacity choice in a two-airport region. Concluding remarks and suggestions for future research are given in Section 6.

2. Literature review

The literature on airport pricing and capacity investment can be traced back (at least) to Levine (1969) and Carlin and Park (1970). The theoretic literature has since been significantly expanded to jointly considering capacity investment, airport concession, airport regulation, and airport–airline vertical structure. Comprehensive reviews of work in this field can be found in Basso and Zhang (2007a) and Zhang and Czerny (2012). In what follows we present a brief review of recent work on airport pricing and capacity choice, and multi-airport competition and privatization, with a view of identifying research gaps that we intend to fill in the paper.

Among the long list of studies on airport capacity and pricing choice, one of the most used criteria to categorize the literature is whether the vertical structure between an airport and the airlines using the airport is considered. The traditional approach does not consider the airport–airline vertical structure, following partial equilibrium analysis in which an airport's demand is directly a function of the airport's own decisions (Basso and Zhang, 2007a). In contrast, the vertical-structure approach incorporates airlines' market power and strategic behavior, and passenger demands in a vertical structure. The vertical-structure approach recognizes that airports provide an input for the airline market and it is the equilibrium of this downstream market that determines the airports' demand. Therefore, the demand for airport services is a derived demand. It has been proven that the traditional approach is equivalent to the vertical-structure approach when the airline market is perfectly competitive (Basso and Zhang, 2008). Other than the traditional vs. vertical-structure approach, the literature can be alternatively categorized by whether airport capacity increase is considered as discrete (e.g., Oum and Zhang,