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What drives effective competition in the airline industry? An empirical model of city-pair market concentration

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ABSTRACT

Market concentration is a widely recognized metric for assessing effective competition, as it provides a quantification of the relative success of large, mid-sized and smaller firms in the battle for consumers. Concentration has been a public policy issue in the airline industry since deregulation, due to the long-standing airport dominance by major carriers, which is a concern that is recurrently intensified by merger announcements. This paper develops an empirical model to examine the evolution of concentration in the airline markets. We analyze the case of the Brazilian airline industry, in which the two major carriers acquired a combined market share of more than 90% in the late 2000s and have experienced a sharp reversion since then. We test hypotheses regarding the association of market concentration with market size and service quality, as well as the impacts of vertical relationships after airport privatization. Our results suggest that the entry-attraction effect of market size more than compensates for the economies-of-density effect, while the vertical product differentiation created by the strategic investment in capacity is a key driver of concentration in the airline industry.

1. Introduction

It is well known that contemporary market deregulation has had notable effects on the airline industry. After almost four decades since the Airline Deregulation Act in the United States, it is clear that the American airline market and many others internationally have experienced the benefits of the free economic environment, which has allowed for more-intense cost competitiveness, price reduction and sustained market expansion. As a result, air travel has become one of the most popular items in the consumption basket of millions of families, while market concentration has apparently played a minor role in the opposite direction. For example, in the late 1980s, the U.S. Government Accountability Office (GAO) reported that due to an impressive sequence of twenty-six mergers, the five largest American carriers accounted for 74% of the market share versus 69% in 1978.[1] Notwithstanding that apparent market dominance issue, the national average yield in the early 1990s was one-third lower than that which had prevailed immediately before deregulation.[2] Many years later, in 2014, the same institution stated that the situation had evolved to a dominance of 85% of the market, which this time was only held by the top four carriers.[3] In contrast, the US Department of Transportation in the same year reported a 14.7% decrease in prices in a comparison of the average inflation-adjusted airfare of 2014 to the prevailing rate in 1995.[4] These facts illustrate the challenges that are faced by researchers in the investigation of market concentration in the airline industry, as market structure does not appear to be an impediment to the long-run welfare gains that have thus far been brought about by liberalization.

The international experience of the airline industry has shown that the potential negative effects of market concentration have been more than compensated for by the impacts of the entry and expansion of low cost carriers (LCCs), which have been a major force that ultimately has shaped and driven competition in the air transportation markets. Much of this evidence has been extensively corroborated by the literature - Windle and Dresner (1999), Morrison (2001), and Brueckner et al. (2013). However, despite the emergence of LCCs and, more recently, ultra-LCCs, market concentration continues to be an important characteristic that may undermine contestability in the airline markets. Hofer et al. (2008) use the term "price premium" to define the airfare impacts that have been

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[1] "*Factors Affecting Concentration in the Airline Industry*", U.S. Government Accountability Office (GAO), T-RCED-88-65, Sep 22, 1988.
[2] Morrison and Winston (1995, p. 12).
[3] "*Report to Congressional Requesters - Airline Competition*", U.S. Government Accountability Office (GAO), GAO-14-515, Jun, 2014.
[4] US Department of Transportation - Air Fare Press Releases - 2nd-Quarter 2014 Air Fare Data (Table 1), available at www.rita.dot.gov.

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attributed to both airport and route market dominance and/or concentration. The authors estimated a US $27.6 premium for major carriers, even in the presence of LCC competition. Additionally, the recent US Department of Justice's settlement approving the American Airlines - US Airways merger, which required them to divest more than one hundred takeoff and landing slots to facilitate competition from LCCs, illustrates the authorities' concerns that slot-controlled airports may constitute a venue for market concentration that may be of harm to consumers.[5]

Although the empirical literature on the *consequences* of market concentration in the airline markets is vast, the literature on the *causes* of such concentration is scarce. Indeed, since the deregulation, airline studies have addressed the issue of the relationship of airfares and route and/or airport concentration - Borenstein (1989), Evans and Kessides (1993), and Bilotkach and Lakew (2014). In addition to price, other dimensions of airline service have been linked to the market structure of the air transportation markets. For example, the literature has investigated and found a statistically significant association between airline delays and concentration at the airport and route levels - Mayer and Sinai (2003), Mazzeo (2003), Ater (2012), and Bendinelli et al. (2016). In contrast, the empirical literature related to the inspection of the main determinants of market concentration is confined to Leahy (1994) and Brueckner and Spiller (1994), who provided a cost-based justification based on the economies of traffic density for the increase in airport and industry-wide concentration in the US airline industry. Here, we raise hypotheses regarding the association of market concentration with market size and airline service quality to inspect the validity of the theoretical framework of the strategic behavior of incumbents of Spence (1977), Dixit (1979), Sutton (1991, 1998), and Cohen and Mazzeo (2004).

We consider the case of the Brazilian airline industry in the 2002–2013 period, during which time it was an emerging market that experienced rapid demand growth and two relevant episodes of LCC entry. This industry was marked by an upsurge in market concentration in the first years of deregulation, with the formation of a quasi-duopoly composed of TAM and Gol airlines. These major carriers had a combined domestic market share of 93% in 2008, but they have experienced a sharp decline in their dominance since then.[6] In parallel, the Brazilian air transportation industry has recently been subject to a major change in the governance structure of airports. In the early 2010s, the Brazilian government embraced an airport privatization program that was aimed at promoting investments in capacity expansion, which enhanced efficiency and alleviated congestion. Fu et al. (2011) suggest that the growing trend of commercialization and privatization has induced airport managers to explore new business strategies, with one possibility being the formation of vertical relationships among airlines, for example, by means of long-term contracts that cover the control of key airport facilities, signatory airline status, airport revenue bonds and revenue sharing. We therefore raise the hypothesis that dominant airline-airport vertical relationships may emerge and intensify with the change in airport ownership. Our econometric model tests this hypothesized relationship by estimating the effects of airport privatization on market concentration in Brazil. These analyses have important policy implications, as the regulators and antitrust authorities around the world are typically interested in avoiding dominance, stimulating competition and enhancing the access to major hub airports. Our empirical framework accounts for the endogeneity of traffic density, flight concentration and entry by employing an instrumental variables estimator. We also utilize a Heckit model to control for sample selectivity in the government's choice of airports to be privatized and a difference-in-differences approach that aims to distinguish the concentration effects of privatization on routes with airports that are subject to ownership change ("privatized airports") from comparable routes that may have had a similar evolution ("placebo-privatized airports").

The remainder of this paper is organized as follows: Section 2 presents a literature review on the issue of market concentration. We also raise three hypotheses. Section 3 presents our research design with a description of the evolution of the airline industry in Brazil, the available data set, the empirical model development and our estimation strategy. Section 4 presents the estimation results and a series of robustness checks, followed by our concluding remarks.

2. Determinants of market concentration

In this section, we discuss the literature on the determinants of market concentration, with a focus on the case of the airline industry. We begin with an analysis of some of the most important models established in the Industrial Organization literature. We then move forward to the analysis of the empirical studies available in the airline literature. We raise three hypotheses regarding the determinants of market concentration in airline markets and relate these hypotheses to the existing theoretical framework available in the surveyed literature.

2.1. Market structure in the Industrial Organization literature

According to the neoclassical theory of the firm, market structure, such as the number of firms and their relative sizes, is mainly governed by efficiency considerations.[7] The degree of concentration in a market is a function of the magnitude of the economies of scale relative to the size of the market. If the minimum efficient scale is large relative to market size, then there will not be many cost-efficient market participating firms, and the industry concentration will be high. Market expansion allows the attraction of new viable effective players, which drives concentration downwards, *ceteris paribus*.

The Industrial Organization literature has been concerned with the economic impacts of market structure since its early stages. One of the most prominent frameworks was Structure-Conduct-Performance (SCP), which was mainly concerned with the one-way causation relationship between market structure (industry concentration, for example), the conduct of firms, and market performance (profitability, for example).[8] In essence, the SCP paradigm considers higher concentration in a market a source of higher prices and profits by the established firms, as it allows for less competition. However, as Schmalensee (1989), Bresnahan (1989) and Evans et al. (1993) discuss, the SCP tradition typically considers market structure as exogenous and therefore provides no insights into its key drivers apart from the basic market conditions derived from the neoclassical theory of the firm, such as the nature of the product, the available technology and market size. In an opposite direction of the SCP framework, Demsetz (1973) observed that market concentration might be caused by superior firm performance. The Demsetz critique therefore suggests an inverse concentration-competition relationship, in which the most efficient and profitable firms would be able to achieve higher participation in the market, and consequently, the concentration of firms in the industry would soar. The important consequence of such a reverse causality issue is the introduction of elements of endogeneity in the relationship between market structure and performance in the analysis.

In accordance with the Demsetz critique, the literature has investigated how the strategic behavior of established firms may limit competition and the potential for entry. It has done so first, with the entry deterrence models in which the possibility of a post-entry predatory price war produces a reputation for toughness of incumbents - Kreps and Wilson (1982), Milgrom and Roberts (1982); second, with the capacity commitment framework of Spence (1977) and Dixit (1979), in which excess capacity is used as an effective tool for deterring entry; and third, with the case of contracts as a barrier to entry - Aghion and Bolton

[5] "American Airlines-US Airways Merger Settlement Approved" - Bloomberg, April 26, 2014.

[6] Source: Air Transportation Market Statistical Database - Monthly Traffic Report, 2008.

[7] See Panzar (1989) for a presentation of the neoclassical theory of the firm.

[8] See Schmalensee (1989).

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