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Organization[www.elsevier.com/locate/ijio](http://www.elsevier.com/locate/ijio)Airline horizontal mergers and productivity:  
Empirical evidence from a quasi-natural experiment  
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## ABSTRACT

The identification of possible efficiency gains is a core issue in the analysis of mergers. However, empirical studies are generally subject to bias caused by merger endogeneity. In the early 2000s, the Chinese government pursued a strategy of merging small firms in key industries to create large enterprise groups. Mergers created by this policy provide a rare quasi-natural experiment to investigate the effect of mergers. We take the opportunity to apply the difference-in-differences approach to identify the effect of mergers on the efficiency of Chinese airlines. Overall, our analysis suggests that the mergers increased the productivity of Chinese airlines.

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## 1. Introduction

This study aims to identify the effect of mergers on airline efficiency using the merger cases of Chinese airlines in the early 2000s. Identifying the possible efficiency gains from a merger is a core issue in merger evaluation. The US Horizontal Merger Guideline (U.S. Department of Justice and the Federal Trade Commission, 2010) noted that the “*primary benefit of mergers to the economy is their potential to generate significant efficiencies and thus enhance the merged firm’s ability and incentive to compete, which may result in lower prices, improved quality, enhanced service, or new products.*” Scholars have made great efforts to empirically quantify the effect of mergers on productivity for various industries. A comprehensive review of such studies can be found in Kolaric and Schiereck (2014).

Major airline mergers in recent decades have created some of the world’s largest airlines. These mergers have generated many policy debates around the world. Past studies (Borenstein, 1990; Kim and Singal, 1993; Prager and Hannan, 1998; Bilotkach, 2010; Kwoka and Shumilkina, 2010) have identified anti-competitive effects of airline mergers. However, as Peters (2006) pointed out, these studies normally omit supply-side factors such as cost. In the airline industry, higher traffic volumes allow the use of larger, more efficient aircraft, and more intensive utilization of aircraft, airport facilities, and ground equipment. Such “economies of density” effects have been found in empirical studies (Caves et al., 1984; Brueckner and Spiller, 1991, 1994). Moreover, increasing traffic volume leads to more frequent flights, which reduces schedule delays,<sup>1</sup> a major determinant of service quality for airlines (Anderson and Kraus, 1981; Richard, 2003). An increase in service quality will in turn generate positive feedback that adds to the economies of density.<sup>2</sup> By aggregating the traffic volumes of the firms involved, airline mergers are expected to bring efficiency gains.

However, although a number of studies directly and indirectly investigated the cost and efficiency implications of airlines mergers, empirical results are mixed. Using TFP analysis, Oum and Yu (1995) noted that Air France improved its TFP substantially since the merger with UTA in 1992. With cost function estimation, Johnston and Ozment (2013) concluded that major US airlines enjoyed increasing returns to scale which was one possible explanation for merger activities. The study on the mergers of Delta-Northwest and United-Continental led Gayle and Le (2013) to conclude that there were marginal and fixed cost savings at the route level. Chow and Fung (2012) estimated a stochastic frontier production function for Chinese airlines using an unbalanced panel data during 1997–2001. They identified efficiency improvements associated with airline mergers, although only one output, revenue-ton-kilometers, was used in their analysis. Positive effects on productivity have also been identified by case studies (Schosser and Wittmer, 2015;

<sup>1</sup> Schedule delay was first proposed by Douglas and Miller (1974a, b); it refers to the difference between travelers’ ideal and actual departure time.

<sup>2</sup> Supporting evidence was found for the SAS-Swiss alliance (Youssef and Hansen, 1994) and airline code-sharing agreements in the trans-Pacific markets (Oum et al., 1996; Park, 1997; Oum et al., 2000). Clougherty (2002) showed that US airlines’ international competitiveness could be enhanced through economies of density in the domestic market.

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