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## The effects of corporate governance on airline performance: Production and marketing efficiency perspectives

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### ABSTRACT

This study explores the relationship between operating performance and corporate governance in 30 airline companies operating in the US. First, this study applies a two-stage Data Envelopment Analysis (DEA) to evaluate the production efficiency and marketing efficiency of the airlines. Our findings indicate that, in general, there is not as much dispersion in the relative productive efficiencies of the airlines as there is in their marketing efficiencies. The low-cost airlines, on average, are more efficient carriers than the full-service ones, but less efficient marketers. Secondly, truncated regression is used to explore whether the characteristics of corporate governance affect airline performance. The results demonstrate that corporate governance influences firm performance significantly. Finally, we address the managerial decision-making matrix and make suggestions to help airline managers improve performance.

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## 1. Introduction

Since the United States Congress passed the Airline Deregulation Act in 1978, the air transport market has seen significant changes. This Open Skies policy allowed low-cost carriers (LCCs) to enter the air transport market. LCCs use a simple type of aircraft, secondary airports and simplified routes to reduce their operating costs, which can provide lower fares to the customers. The rapid expansion of LCCs has caused traditional airlines to confront fierce competition. Rising labor costs and volatile fuel prices impact all airlines. Competition in the airline industry is at an all-time high, challenging providers to reduce costs while improving quality. In this environment, the ability to attract new customers while retaining existing ones through superior customer service is not only a key competitive differentiator, but a necessity. Obstacles met in the search for flight information can diminish customers' perception of an airline's capability, decrease the opportunity for future revenue, and open the door for other carriers to win their business. In today's highly competitive markets, airlines are deploying a range of innovations in customer service and support to improve operating performance. The focus has moved from attempts to characterize performance in terms of a simple indicator, e.g., revenues, to a multi-dimensional systems perspective.

The DEA is a linear programming based technique that converts multiple output and input measures into a single comprehensive measure of performance. This is attained by the construction of an empirical-based production or resource conversion

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frontier, and by the identification of peer groups. The philosophy behind DEA is predicated on the fact that a frontier transformation function empirically captures the underlying process defining firms' production activities. The application of DEA is strongly supported in the multitude of empirical analysis methods in different fields of profit (Seiford, 1997; Zhu, 2003; Gattoufi et al., 2004; Cooper et al., 2006). Data Envelopment Analysis (DEA) has also been widely applied in evaluating airline performance (Sengupta, 1999; Barbot et al., 2008; Barros and Peypoch, 2009). The traditional DEA model is based on one-stage activities, which neglect intermediate measures or linking activities (Fare and Whittaker, 1995; Chen and Zhu, 2004; Tone and Tsutsui, 2009). This study establishes a two-stage DEA model to overcome shortcomings of the traditional one-stage DEA. While the production efficiency indicates the relative efficiency of a firm in the production process, the marketing efficiency reflects the relative performance of a firm in the marketing process. This study evaluates the relative efficiency of airlines in the US, in response to the changing nature of the airline market.

Corporate governance is a multi-faceted subject. An important theme of corporate governance is the nature and extent of accountability of particular individuals in the organization and mechanisms that try to reduce or eliminate the principal-agent problem. A related, but separate, thread of discussions focuses on the impact of a corporate governance system on economic efficiency, with a strong emphasis on shareholders' welfare; this aspect is particularly present in contemporary public debates and developments in regulatory policy (see regulation and policy regulation). Since the failures of well-known companies such as Enron, WorldCom, Tyco and Merck, academics and practitioners have shown increasing interest in corporate governance. Corporate governance is the set of processes, customs, policies, laws, and institutions affecting the way a corporation (or company) is directed, administered or controlled. Corporate governance also includes the relationships among the many stakeholders involved and the goals for which the corporation is governed. In contemporary business corporations, the main external stakeholder groups are shareholders, debt holders, trade creditors, suppliers, customers and communities affected by the corporations' activities. Internal stakeholders are the boards of directors, executives and other employees. Chiang and Lin (2007), Bennedsen et al. (2008), Carline et al. (2009) and Sueyoshi et al. (2010) demonstrated that corporate governance is correlated with organizational performance. Gompers et al. (2003) illustrated that good governance positively affects a firm's performance. Several governance factors may affect the performance of airlines. To explore the impact of exogenous factors on corporate performance, Simar and Wilson (2007) verified that truncated regression was more appropriate than Tobit regression.

This study adopts bootstrapped DEA scores with truncated regression to analyze the relationship between corporate governance and airline performance. The significant difference between the present study and the studies mentioned above is that the former adopts a two-stage DEA to explore airline performance and addresses production efficiency and marketing efficiency to better understand the intermediate measures or linking activities. Additionally, this study utilizes a managerial decision-making matrix to help airline managers improve corporate efficiency or strategies rapidly. Finally, this study uses truncated regression to analyze the relationship between corporate governance and performance and guide managers toward competitiveness in the airline industry. The important contributions of this study include: (1) developing an innovative two-stage production process that includes production efficiency and marketing efficiency to assess the operating performance of airlines; (2) implementing truncated regression (Simar and Wilson, 2007) to investigate whether or not corporate governance affects airline performance; (3) integrating production efficiency and marketing efficiency to address managerial decision-making. As a result, management could use the managerial decision-making matrix to set up improvable strategies.

The remainder of this study is organized as follows: Section 2 discusses a literature review; Section 3 describes research design, including two-stage DEA methodology, truncated regression, collection of the sample data and the criteria for variables to evaluate performance; Section 4 presents empirical data and analyzes the results; and Section 5 presents the conclusion.

## 2. Literature review

Contemporary research in the aviation industry has applied DEA to evaluate organization performance. Sengupta (1999) evaluated the performance of seven major airlines from 1988 to 1994 by using the DEA method. Results showed that techniques and allocation efficiency of the airlines changed significantly during this period. Scheraga (2004) investigated whether relative operational efficiency implied superior financial mobility. He used DEA to derive efficiency scores for 38 airlines in North America, Europe, Asia and the Middle East, and found that the relative operational efficiency did not inherently imply superior financial mobility.

Chiou and Chen (2006) employed DEA to evaluate fifteen Taiwanese domestic air routes from three perspectives proposed by Fielding et al. (1978). The results of the DEA model suggested that ten routes were relatively cost efficient, five routes were relatively cost effective and four routes were relatively service effective. The study also performed clustering analysis to categorize the routes into four clusters. Based on the characteristics of each route, the authors addressed directions for improvement.

Barbot et al. (2008) used DEA and total factor productivity (TFP) to analyze the efficiency and productivity of the 49 member airlines of IATA. The study found that low-cost carriers perform more efficiently than full-service carriers, and larger airlines are more efficient than smaller ones. With respect to geographic areas, the author noted that the European and American carriers were more effective than airlines in Asia Pacific and China/North Asia. The result of the DEA analysis illustrated that efficiency and effectiveness are not always correlated. The result of the TFP analysis showed that the airlines

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