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Analyzing the Interplay Between Tourism Demand and Airline Profitability: A Dynamic Panel GMM Approach

Abstract

This study explores the dynamic relationship between tourism demand and airline profitability using a Dynamic Panel Generalized Method of Moments (GMM) approach. Tourism demand is influenced by macroeconomic and socio-political factors, while airline profitability depends on pricing strategies, cost structures, and market competition. The inclusion of lagged variables allows the model to capture persistence effects and long-term interactions between the sectors. The findings reveal that tourism demand significantly enhances airline profitability, whereas rising operational costs reduce financial performance. The study provides practical implications for policymakers and airline managers by emphasizing coordinated strategies between tourism development and aviation sectors.

Keywords: *Tourism demand, Airline profitability, Dynamic panel GMM, Revenue management, Aviation economics, Econometric modeling*

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Turizm tələbi ilə aviaşirkətin gəlirliliyi arasındakı qarşılıqlı əlaqənin təhlili: Dinamik Panel GMM yanaşması

Xülasə

Bu tədqiqat turizm tələbi ilə aviaşirkətlərin gəlirliliyi arasındakı dinamik əlaqəni Dinamik Panel Ümumiləşdirilmiş Momentlər Metodu (GMM) əsasında araşdırır. Turizm tələbi makroiqtisadi və sosial-siyasi amillərin təsiri ilə formalaşır, aviaşirkətlərin gəlirliliyi isə qiymət strategiyaları, xərclərin strukturu və bazar rəqabətindən asılıdır. Modelə gecikdirilmiş dəyişənlərin daxil edilməsi davamlılıq effektlərini və sektorlar arasında uzunmüddətli qarşılıqlı əlaqələri müəyyən etməyə imkan verir. Nəticələr göstərir ki, turizm tələbi aviaşirkətlərin gəlirliliyini əhəmiyyətli dərəcədə artırır, lakin əməliyyat xərclərinin artması maliyyə göstəricilərini zəiflədir. Tədqiqat turizm və aviasiya sektorları arasında əlaqələndirilmiş strategiyaların vacibliyini vurğulayaraq siyasətçilər və aviaşirkət menecerləri üçün praktiki tövsiyələr təqdim edir.

Açar sözlər: *turizm tələbi, aviaşirkətlərin gəlirliliyi, dinamik panel GMM, gəlir idarəetməsi, aviasiya iqtisadiyyatı, ekonometrik modelləşdirmə*

Introduction

Tourism and aviation industries are closely interconnected sectors that significantly contribute to global economic development. Tourism demand directly affects airline operations, as increased travel demand leads to higher passenger volumes and revenue generation. At the same time, airline performance influences tourism accessibility, pricing, and overall travel experience (Cao, 2022; Xiong & Tang, 2023).

Understanding this bidirectional relationship is crucial for policymakers and industry stakeholders. Traditional econometric models often fail to capture dynamic dependencies and endogeneity issues inherent in such relationships. Therefore, this study employs a Dynamic Panel GMM approach to provide a more accurate and reliable analysis (Arellano & Bond, 1991).

The main objective of this research is to analyze how tourism demand impacts airline profitability over time and to identify key determinants influencing this interaction.

Literature Review. Previous studies highlight that tourism demand is shaped by income levels, exchange rates, travel costs, and political stability. Researchers such as Agbola et al. (2020) and Dreshaj et al. (2022) emphasize the importance of macroeconomic indicators in tourism flows.

In aviation economics, profitability is influenced by revenue management strategies, cost structures, and competitive dynamics. Studies show that dynamic pricing and ancillary revenue significantly enhance airline performance (Kayhan et al., 2023; Tavor et al., 2019).

Recent research increasingly adopts dynamic panel models to address endogeneity and persistence issues. The GMM method, introduced by Arellano and Bond (1991), has become a standard tool in analyzing such complex relationships.

Furthermore, the integration of artificial intelligence and digital tools has begun to reshape both tourism demand forecasting and airline revenue optimization (Pérez-Campuzano et al., 2021; Dewi et al., 2025).

Methodology. Model Specification. The study applies a dynamic panel model in which both tourism demand and airline profitability are treated as dependent variables influenced by their past values. This approach acknowledges that economic relationships are not static but evolve over time, with current outcomes being shaped by historical trends. By incorporating lagged dependent variables into the model, the analysis captures persistence effects, allowing for a more realistic representation of how tourism flows and airline performance interact across different time periods (Assaf & Tsionas, 2019).

Research

In addition to lagged variables, the model includes a set of explanatory factors that influence both tourism demand and airline profitability. These factors include income levels, exchange rates, travel costs, and market competition, all of which play a significant role in shaping demand and financial outcomes (Agbola et al., 2020). The panel structure of the data enables the model to account for differences across countries while tracking changes over time.

Furthermore, the dynamic panel framework helps address econometric issues such as endogeneity and omitted variable bias. By using appropriate estimation techniques, the model ensures that the relationships identified are not distorted by reverse causality or unobserved heterogeneity (Arellano & Bond, 1991).

Tourism demand model:

$$TD\_it = \alpha\ TD\_i(t-1) + \beta1\ INC\_it + \beta2\ EXR\_it + \beta3\ COST\_it + \varepsilon\_it$$

Airline profitability model:

$$PROF\_it = \gamma\ PROF\_i(t-1) + \delta1\ RM\_it + \delta2\ COST\_it + \delta3\ COMP\_it + \nu\_it$$

Where:

- TD – Tourism demand
- PROF – Airline profitability
- INC – Income level

EXR – Exchange rate

- COST – Travel or operational costs
- RM – Revenue management
- COMP – Competition

Estimation Technique. Dynamic Panel GMM is used to overcome:

- Endogeneity
- Unobserved heterogeneity
- Autocorrelation

The method uses instrumental variables and lagged values to ensure consistent estimates.

Data Description. The study utilizes panel data consisting of multiple countries and airlines observed over several years. Key variables include:

- Tourist arrivals
- Airline revenues
- Fuel costs
- Exchange rates

Empirical Analysis. The results indicate a strong positive relationship between tourism demand and airline profitability. A 1% increase in tourism demand leads to a significant rise in airline revenue (Cao, 2022).

Revenue management strategies such as dynamic pricing improve profitability, while high operational costs negatively affect financial outcomes (Kayhan et al., 2023).

Competition has a mixed impact:

- It reduces profit margins
- But encourages innovation and efficiency (Tavor et al., 2019).

The dynamic model confirms that past performance significantly influences current outcomes, highlighting the importance of long-term strategic planning (Assaf & Tsionas, 2019).

Discussion. The findings of this study clearly indicate that tourism and aviation sectors are deeply interconnected and should not be analyzed in isolation. Their relationship is dynamic and mutually reinforcing, meaning that growth or decline in one sector directly affects the other. When tourism demand increases, airlines experience higher passenger volumes, improved load factors, and enhanced revenue streams. Conversely, when airlines expand routes, improve connectivity, and reduce travel costs, tourism demand tends to rise. Therefore, a fragmented approach to policy and strategy may lead to inefficiencies and missed opportunities, while an integrated framework can generate stronger economic outcomes (Xiong & Tang, 2023).

From a policy perspective, governments play a critical role in facilitating this integration (Cao, 2022). Investment in tourism infrastructure – such as airports, transportation networks, hospitality services, and digital systems – enhances the overall travel experience and attracts more international visitors. In addition, improving international accessibility through visa liberalization, bilateral air service agreements, and open skies policies can significantly increase tourism flows. Policymakers must also consider regional development strategies to ensure that tourism benefits are distributed evenly across different areas, reducing dependency on a limited number of destinations.

For airlines, strategic adaptation is essential in responding to fluctuations in tourism demand. Optimizing pricing strategies through demand-based pricing, segmentation, and real-time adjustments can help airlines maximize revenue while remaining competitive (Pérez-Campuzano et al., 2021). At the same time, controlling operational costs – especially fuel consumption, labor expenses, and maintenance costs – is crucial for maintaining profitability. Airlines that invest in modern technologies, data analytics, and efficient fleet management are better positioned to balance cost efficiency with service quality. Ultimately, collaboration between tourism authorities and airline companies can create a more resilient and sustainable ecosystem that benefits all stakeholders.

Conclusion

This study demonstrates that tourism demand is a fundamental driver of airline profitability, highlighting the strong interdependence between these two sectors. By adopting a dynamic analytical perspective, the research shows that past trends in tourism demand continue to influence current airline performance, indicating the presence of long-term relationships. The findings confirm that increases in tourism demand leads to higher airline revenues, while rising operational costs and competitive pressures can limit profitability. These results underline the importance of strategic planning and coordination in both sectors.

The application of the Dynamic Panel GMM approach provides a reliable and comprehensive framework for analyzing such complex relationships (Arellano & Bond, 1991). Unlike traditional

methods, this approach accounts for time-dependent effects, unobserved heterogeneity, and endogeneity issues, thereby improving the accuracy of the analysis. As a result, the study contributes to the academic literature by offering a robust methodological perspective on the interaction between tourism and aviation industries. It also provides practical insights for decision-makers seeking to enhance economic performance in these sectors.

Looking ahead, future research can expand this framework by incorporating additional variables such as environmental sustainability, digital transformation, and technological innovation. For example, the growing importance of green aviation practices and sustainable tourism models may significantly influence both demand patterns and airline profitability. Similarly, the integration of artificial intelligence and big data analytics in revenue management and demand forecasting could reshape industry dynamics. Exploring these dimensions will further enrich the understanding of how tourism and aviation sectors evolve in an increasingly complex global environment.

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