An airline revenue management pricing game with seat allocation

Asif Syed Raza and Ali Akgunduz*

Department of Mechanical and Industrial Engineering,
Concordia University,
1455 de Maisonneuve Boulevard West,
Montreal, Quebec H3G 1M8, Canada
Fax: +1 514 848 3175
E-mail: asif_s@encs.concordia.ca
E-mail: akgunduz@encs.concordia.ca
*Corresponding author

Abstract: This paper studies a horizontal fare-pricing competition between two airlines having a single flight leg. Two distinct scenarios are considered. First, the two airlines price competition for the pre-committed booking limits is analysed. The problem is studied under deterministic price sensitive demands. The existence of unique pricing strategies at Nash equilibrium is shown. In the second scenario, a joint seat allocation and fare-pricing competition model for stochastic demand is proposed. A numerical analysis is presented to demonstrate the impacts of various market conditions on the payoffs, booking limits and pricing strategies of the competing airlines.

Keywords: airline revenue management; game theory; Nash equilibrium; pricing; seat inventory control.


Biographical notes: Asif Syed Raza received his PhD from the Department of Mechanical and Industrial Engineering, Concordia University, Canada in 2007. He also holds a Master of Science in Systems Engineering from the King Fahd University, Saudi Arabia and a Bachelors degree in Mechanical Engineering from the NED University, Pakistan in 2002 and 1999, respectively. His research interests include revenue management, pricing, supply chain management, meta-heuristics, and planning and scheduling.

Ali Akgunduz is an Assistant Professor at the Department of Mechanical and Industrial Engineering at the Concordia University in Montreal, Canada. Prior to joining the faculty, he worked in the Revenue Management R&D Group of a major US airline. He obtained his doctorate in 2001 from the University of Illinois at Chicago, USA, his MBA in 1996 from the Illinois Institute of Technology and his BSc in 1992 from the Gazi University, Ankara, Turkey in Industrial Engineering. He teaches courses in facilities design, system simulation, probability and statistics. His research areas include alternative methods to improve airline revenues, and joint price and booking-limit determination under competition, and customer-driven system design. He is a registered professional Engineer at the Professional Engineers Ontario.