

*The Hong Kong Polytechnic University
Department of Logistics and Maritime Studies
Research Seminar*

**Feedback Stackelberg-Nash Equilibria in Mixed Leadership Games
with an Application to Cooperative Advertising**

by

**Prof. Suresh P. SETHI
Eugene McDermott Professor of Operations Management
Director, Center for Intelligent Supply Networks
Naveen Jindal School of Management
The University of Texas at Dallas**

Alain Bensoussan ^{a,*}, Shaokuan Chen ^a, Suresh P. Sethi ^a, Anshuman Chutani ^b

^a Naveen Jindal School of Management, The University of Texas at Dallas;

^b Nottingham University Business School;

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The Hong Kong Polytechnic University

(Conducted in English)

Abstract:

In this paper we characterize the feedback equilibrium of a general infinite-horizon Stackelberg-Nash differential game where the roles of the players are mixed. By mixed we mean that one player is a leader on some decisions and a follower on other decisions. We provide a verification theorem that reduces the task of finding equilibrium strategies in functional spaces to two simple steps: First solving two static Nash games at the Hamiltonian level in a nested version and then solving the associated system of Hamilton-Jacobi-Bellman equations. As an application, we study a novel manufacturer-retailer cooperative advertising game where, in addition to the traditional setup into which the manufacturer subsidizes the retailer's advertising effort, we also allow the reverse support from the retailer to the manufacturer. We find an equilibrium that can be expressed by a solution of a set of quartic algebraic equations. We then conduct an extensive numerical study to assess the impact of model parameters on the equilibrium.

Key words: Subject classifications:- Dynamic programming/optimal control - Markov (infinite state). Games/group decisions - noncooperative. Marketing - advertising/promotion

Bio:

Suresh P. Sethi is Eugene McDermott Professor of Operations Management and Director of the Center for Intelligent Supply Networks at The University of Texas at Dallas. He has written 7 books and published nearly 400 research papers in the fields of manufacturing and operations management, finance and economics, marketing, and optimization theory. He teaches a course on optimal control theory/applications and organizes a seminar series on operations management topics. He initiated and developed the doctoral programs in operations management at both University of Texas at Dallas and University of Toronto. He serves on the editorial boards of several journals including Production and Operations Management and SIAM Journal on Control and Optimization. He was named a Fellow of The Royal Society of Canada in 1994. Two conferences were organized and two books edited in his honor in 2005-6. Other honors include: IEEE Fellow (2001), INFORMS Fellow (2003), AAAS Fellow (2003), POMS Fellow (2005), IITB Distinguished Alum (2008), SIAM Fellow (2009), POMS President (2012), INFORMS Fellows Selection Committee (2014-16), Alumni Achievement Award, Tepper School of Business, Carnegie Mellon University (2015).

Please email to eunice.yt.wong@polyu.edu.hk for enquiries.

All are welcome!