The Hong Kong Polytechnic University
Department of Applied Mathematics

Colloquium

Manufacturer Competition Using Supply Functions in a Retail Supply Chain

by

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Abstract

This paper studies contract design between a retailer and two competing suppliers who each supply one of two substitutable products to the retailer for sales in a consumer market. We consider a setting in which the same contracts are used in each period of a planning horizon. The advantage of this contract is that the suppliers and the retailer do not need to sign new contracts for each order in the planning horizon, which is time consuming and costly. We first show that it is optimal for each manufacturer to offer a cost-plus contract. This result allows us to characterize an equilibrium in which the retailer's choice maximizes the supply chain profit, each manufacturer makes a profit equal to its marginal contribution to the supply chain, and the retailer takes the remaining profit. In addition, the optimal ordering policy of the retailer can be characterized by separate regions that exhibit monotone properties. We extend our baseline model to cases with more than two manufacturers, and show that the optimal supply chain profit as a set function of manufacturer indices is submodular. Using this submodularity property, we demonstrate that the equilibrium results for the two-manufacturer case continue to hold.

Date : 12 March 2019 (Tuesday)
Time : 10:30a.m. – 11:30a.m.
Venue : TU801, The Hong Kong Polytechnic University

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