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Inventory Rationing and Markdown Strategy in the Presence of Lead-time Sensitive Customers

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Abstract

Appropriate customer segmentation, together with tailor-made strategies which dynamically change prices for customers, helps firms allocate resources more effectively. We incorporate markdown tools into the inventory-rationing model with customers segmented by lead-time sensitivity. We characterize the threshold-type optimal commitment policies and propose an efficient algorithm to compute the thresholds.

Keywords: inventory control; dynamic programming; lead-time sensitive customers; markdown strategy

1. Introduction

Customer segmentation allows firms to divide their markets into groups of customers with common product and service requirements, and tailor strategies accordingly. In addition to the traditional pricing tool, firms now often make use of customer needs and preferences to segment the market, among which the lead-time-based differentiation has become increasingly popular. Firms offer customers different delivery lead-time and price combinations, and customers make choices that are in their best interests. One of the key issues for firms to effectively implement this market segmentation approach is how to allocate the inventory among different customer classes. Strategies like markdown give customers more options, change their reactions and therefore can help effectively allocating limited inventory. Offering the markdown option to make customers accept delayed delivery is observed in Toyota China dealerships' practice (see [9]). In this paper, we investigate how the optimal rationing policy changes after incorporating the markdown strategy.

We consider the optimal inventory commitment policy for a retailer in a multi-cycle periodic-review inventory system. Predetermined replenishments arrive in cycles. Between consecutive replenishments, the retailer employs the inventory commitment policy to serve customers with heterogeneous needs. Customers are divided into two classes based on their lead-time sensitivities. Short lead-time customers are high-margin and impatient, and flexible lead-time customers are low-margin and patient. When the retailer has available on-hand inventory, for both customer classes, he/she can choose to satisfy their orders immediately, to reject the orders or to backlog the orders for delayed fulfillment in the next cycle. Note that the retailer has to

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