

Pricing and Ordering Decisions in Revenue Sharing Contracts with Returns and Multiplicative Stochastic Demand

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Abstract

This study addresses the growing issue of returns and exchanges in modern product supply chains. Employing a game theoretical approach, the study proposes strategies for optimizing pricing and ordering decisions within supply chain contracts concluded between a manufacturer and a retailer. The investigation encompasses revenue sharing and cost-revenue sharing contracts coupled with two exchanges handling strategies adopted by either party. Each scenario involves a Stackelberg game between the manufacturer-leader and the retailer-follower who makes decisions based on the maximization of their own expected profit. A new supply chain analytical model is constructed with a multiplicative and stochastic demand applied. That demand is additionally negatively dependent on the cost of returns handling which has to be born by the consumer. Optimal solutions to the problem are derived, demonstrating that supply chain coordination is achievable through cost-revenue sharing contracts but not through revenue sharing ones. Theoretical findings are supported by numerical analyses, providing some insights into which contract has the unique solution and which contract, under specific assumptions, is more profitable for the overall channel profit.

Keywords: revenue sharing, returns, exchanges, Stackelberg game, supply chain coordination