

Option contracts for products with seasonal disruption

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Purpose of this paper: This paper studies the effectiveness of implementing option contracts for the procurement of seasonal products, subject to short selling season, demand uncertainty, and supply-side disruption. The research intends to show how profitability and product availability can be enhanced both locally and globally by combining different supply contracts such as fixed price contracts and option contracts. In particular, the paper aims to identify business settings with respect to disruption parameters, demand uncertainties, and option contract pricing under which the supply contract could improve the overall supply chain performance.

Design/methodology/approach: The normative model for the paper is built on the newsvendor model to analyse the characteristics of the option contract for products with short shelf life (seasonal goods, high-fashion items, COVID-19 vaccines, etc.) in which the buyer (retailer) works with two types of suppliers: Supplier 1 can be characterized as low-cost and offshore, whereas supplier 2 is deemed expensive and local. The buyer can sign multiple contracts with different suppliers to procure items before the selling season for future demand by combining the fixed price contract and the option contract that enable risk hedging as well as profit improvement. Using the traditional fixed-price contract as the base case, this research conducts numerical experiments to assess the effectiveness of implementing option contracts when both the demand uncertainties and the supply disruptions are in place.

Findings: The analytical model and the initial results of the numerical experiments indicate that, compared to the base case, the option contract provides a better risk hedging protection and profitability for both the retailer and the overall system when the supply-side disruption prevails.

Value: Most existing research on procurement management using option contracts is primarily based on the demand uncertainty setting. The main contribution of this research is that it incorporates the impact of the supply-side disruption in addition to the demand-side uncertainty in evaluating supply contracts.

Research limitations/implications: While this paper provides insights on the effectiveness of option contracts for the procurement of products with short shelf life under supply disruptions, its structure of single retailer – two suppliers setting can be considered a limitation. A future research extension can include the study of portfolio contract by adding spot market purchase as a possible option in a multi-retailer setting.

Practical implications: The study of the procurement management of products subject to seasonal disruption can be readily applied to numerous business situations where supply-side disruption could lead to a devastating impact such as the insufficient or untimely supply of COVID 19 vaccines which also show limited shelf life.

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