

[Li, Qing; Zheng, Shaohui](#)

Joint inventory replenishment and pricing control for systems with uncertain yield and demand. (English) [Zbl 1167.90342](#)

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Summary: We study the joint inventory replenishment and pricing problem for production systems with random demand and yield. More specifically, we analyze the following single-item, periodic-review model. Demands in consecutive periods are independent random variables and their distributions are price sensitive. The production yield is uncertain so that the quantity received from a replenishment is a random variable whose distribution depends on the production quantity. Stockouts are fully backlogged. Our problem is to characterize the optimal dynamic policy that simultaneously determines the production quantity and the price for each period to maximize the total discounted profit. We show that the optimal replenishment policy is of a threshold type, i.e., it is optimal to produce if and only if the starting inventory in a period is below a threshold value, and that both the optimal production quantity and the optimal price in each period are decreasing in the starting inventory. We further study the operational effects of uncertain yield. We prove that, in the single-period case, the threshold of replenishment is independent of the yield variability, and, in the multiperiod case, it is higher in a system with uncertain yield than in one with certain yield. In addition, the system with uncertain yield always charges a higher price.

MSC:

[90B05](#) Inventory, storage, reservoirs

[91B42](#) Consumer behavior, demand theory

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