

**Chen, Youhua (Frank); Ray, Saibal; Song, Yuyue**

**Optimal pricing and inventory control policy in periodic-review systems with fixed ordering cost and lost sales.** (English) Zbl 1106.90008

Nav. Res. Logist. 53, No. 2, 117-136 (2006).

Summary: A periodic-review pricing and inventory control problem for a retailer, which faces stochastic price-sensitive demand, under quite general modeling assumptions. Any unsatisfied demand is lost, and any leftover inventory at the end of the finite selling horizon has a salvage value. The cost component for the retailer includes holding, shortage, and both variable and fixed ordering costs. The retailer's objective is to maximize its discounted expected profit over the selling horizon by dynamically deciding on the optimal pricing and replenishment policy for each period. We show that, under a mild assumption on the additive demand function, at the beginning of each period an  $(s,S)$  policy is optimal for replenishment, and the value of the optimal price depends on the inventory level after the replenishment decision has been done. Our numerical study also suggests that for a sufficiently long selling horizon, the optimal policy is almost stationary. Furthermore, the fixed ordering cost ( $K$ ) plays a significant role in our modeling framework. Specifically, any increase in  $K$  results in lower  $s$  and higher  $S$ . On the other hand, the profit impact of dynamically changing the retail price, contrasted with a single fixed price throughout the selling horizon, also increases with  $K$ . We demonstrate that using the optimal policy values from a model with backordering of unmet demands as approximations in our model might result in significant profit penalty.

**MSC:**

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

[90C39](#) Dynamic programming

Cited in **28** Documents

**Keywords:**

pricing; stochastic demand; joint pricing and inventory control; dynamic programming;  $(s, S)$  policy; lost sales; fixed cost

**Full Text:** [DOI](#)

**References:**

- [1] Merchandising systems: The key to differentiation. Grocery HeadQuarters Magazine, 2003 ([www.GroceryHeadQuarters.com](http://www.GroceryHeadQuarters.com)).
- [2] Chen, Oper Res 52 pp 887– (2004a)
- [3] Chen, Math Oper Res 29 pp 698– (2004b)
- [4] A linear inventory model of a monopolistic firm, Ph.D Dissertation, Department of Economics, University of California, Berkeley, CA, 1970.
- [5] Federgruen, Oper Res 47 pp 454– (1999)
- [6] , Pricing and inventory control for a periodic-review system: Optimality and optimization of  $(s,S, \vec{p})$  policy, Working paper, The Chinese University of Hong Kong, 2003.
- [7] Dynamic pricing boosts bottom line, Information Week, October 29, 2001 ([www.informationweek.com](http://www.informationweek.com)).
- [8] , Alternate approaches to important results in inventory and pricing control, Working Paper, IE/OR Dept, Columbia University, May 11, 2004.
- [9] Lau, IIE Trans 20 pp 168– (1988)
- [10] Priced to perfection, Business 2.0, February, 2001.
- [11] Mills, Q J Econ 73 pp 116– (1959)
- [12] Monahan, Manufact Serv Oper Manage 6 pp 73– (2004)
- [13] Petruzzi, Oper Res 47 pp 183– (1999)
- [14] Polatoglu, Int J Prod Econ 23 pp 175– (1991)
- [15] Polatoglu, Int J Prod Econ 65 pp 141– (2000)
- [16] Thowsen, Nav Res Logist Q 33 pp 461– (1975)

- [17] Thomas, *Manage Sci* 16 pp 747– (1970)
- [18] Thomas, *Oper Res* 26 pp 513– (1974)
- [19] Whitin, *Manage Sci* 2 pp 61– (1955)
- [20] , Coordinated pricing and production/procurement decisions: A review, Working paper. *Managing Business Interfaces: Marketing Engineering and Manufacturing Perspectives*, , (Editors), Kluwer Academic, 2003.
- [21] Zabel, *Rev Econ Stud* 37 pp 205– (1970)
- [22] Zabel, *J Econ Stud* 5 pp 524– (1972)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.