Optimal timing of price change with strategic customers under demand uncertainty: A real option approach

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ABSTRACT

This paper proposes a model to determine the optimal markdown timing for a company with strategic customer purchasing behaviour. Since strategic customers are aware of potential markdown under the posted pricing scheme, they may choose to wait longer to maximise their utilisation instead of buying a product and fulfilling an instant surplus. On the other hand, the seller can delay the markdown decision until it is proved to be profitable and hence has an option to determine the timing. In estimating the value of the markdown decision, the seller’s option needs to be estimated. However, the value of the option is hard to be captured by the conventional net present value analysis. Under market uncertainty where potential customer demand evolves over time, the seller’s revenue function is in the form of a stochastic dynamic programming model. Applying a real option approach, we investigate the optimal price path and propose the optimal markdown threshold. Given the markdown costs incurred, we find that the optimal discount timing for the firm is determined by a threshold policy. Furthermore, our results show that if future market becomes more uncertain, the seller needs to wait longer or delay the markdown decision. In addition, the optimal threshold of the markdown decreases exponentially in a declining market, which explains the early markdown policy of some consumer product companies.

Keywords: Strategic customers; Price change; Posted pricing; Markdown; Demand uncertainty; Real option

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Article history:
Received 28 February 2019
Revised 10 September 2019
Accepted 12 September 2019

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