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Free shipping and purchasing decisions in B2B transactions: A game-theoretic analysis

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Free shipping offers by eBusiness companies have become an effective means of attracting and keeping customers. Many business-to-consumer and business-to-business (B2B) companies now offer free shipping to buyers who spend more than a specific amount. In this paper we consider a B2B environment and assume that the buyer may be enticed to increase her purchase amount in order to qualify for free shipping. The seller's and the buyer's decisions (i.e., free shipping cutoff level and purchase amounts, respectively) affect each other's objective functions. Thus, we model the problem as a leader-follower game under complete information where the leader is the seller and the follower is the buyer. We assume that if the cutoff level announced by the seller is lower than the buyer's purchase amount, the seller absorbs the shipping cost. Otherwise, the buyer compares the values of two functions to determine whether she should increase her purchase amount to qualify for free shipping. We first determine the best response function for the buyer for any given value of the seller's cutoff level and present some structural results related to the response function. We then compute the Stackelberg solution for the leader-follower game and discuss the managerial implications of our findings. The results obtained are demonstrated with the help of two examples. We also present a complete sensitivity analysis for the Stackelberg solution and the objective function values for variations in the unit shipping cost.

1. Introduction

Although free shipping started out as a temporary marketing ploy to attract online shoppers to Internet sites during the 1999 holiday season, it has now become an integral part of doing business for many business-to-business (B2B) and business-to-consumer (B2C) companies. In recent surveys of Internet shoppers, the Boston Consulting Group found that along with guaranteed transaction security and price discounts, free shipping was one of the best means of enticing buyers to return to Internet sites (Bayles, 2001). In addition to the free shipping offers advertised by almost every B2C company, a large number of B2B companies also offer free shipping. For example, Natural Sense,[1] a Canadian aromatherapy products company, offers free shipping for online B2B orders over C$300. The printer and fax supplies company B2Bdirect.com[2] provides free shipping for orders over $200 and the trade show display company ShowstopperExhibits.com[3] is offering free ground shipping within the continental United States for any order amount. There is now even a new web site, www.freeshipping.com, that lists over 1000 online stores providing free shipping.

The recent prevalence of free shipping offers by the B2B companies may be partially attributed to the commercial availability of the Internet. Even though the traditional Electronic Data Interchange systems were expected to provide seamless interaction between sellers and buyers, this has not materialized and most companies have turned to the Internet to conduct their businesses online (Johnston and Mak, 2000). We expect the availability of free shipping offers to increase in the coming years in parallel with the continued growth of the Internet.

As different B2B sellers have begun offering free shipping for different purchase levels, a natural question to ask is the following: "what is the best cutoff level for purchase amounts at or above which the buyer receives free shipping?" Choosing a high cutoff level may result in some lost business for the seller since the buyers would have to spend more money than they initially intended in order to qualify for free shipping. On the other hand, setting a low cutoff point may entice a buyer to increase her purchase quantity and may generate higher gross revenues but this may also be costly for the seller since he has to absorb the shipping costs. Thus, the best cutoff level chosen by the seller must provide a tradeoff between the cost of lost business (for high cutoff levels) and cost of shipping (for low cutoff levels).

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[1]http://www.naturalsense.com/naturalsenseb2b.htm
[2]http://www.b2bdirect-shop.com/Store/PolTerms.htm
[3]http://showstopperexhibits.com/