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A free gift card alternative to price discounts in the newsvendor problem

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ABSTRACT

In this paper, we develop a newsvendor model in which the retailer gives "free" gift cards to consumers who purchase a regularly priced product at the end of the selling season instead of discounting the product. The model is developed for a market with patient consumers. We derive the sufficient optimality condition for the retailer's stocking level in the first period and the optimal gift card value in the second period. We also investigate the conditions under which giving gift cards results in higher expected profits than discounting the product. We find that five factors determine the effectiveness of gift cards. The first three factors are consumers' valuation per $1 of gift card, gift card redemption rates, and the average gross margin of the retailer. The last two factors are the degree to which consumers use gift cards to pay for products which they would have purchased from the retailer in the future with cash, and the additional spending above the gift card value consumers make when they redeem the card. The last two factors have a strong interaction. We also find that gift cards can be profitable when patient consumers consistently value each $1 by their redemption probability, even with 100% redemption. Numerical analysis shows that in the presence of patient consumers, increases in the redemption rate may lead to an increase in the expected profit. Similar counter-intuitive behavior of the expected profit occurs with changes in other problem parameters. The analysis also shows that gift cards' profit advantage over discounting increases with the variability of demand. The analysis also indicates that gift cards are most effective for low to medium priced products sold by high margin retailers.

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1. Introduction

Recently, Cachon and Swinney [8] contributed to our understanding of the effect of strategic consumers on inventory and pricing policy of retailers and on their profits. In their model, strategic or rational consumers decide between purchasing the product at the regular price or waiting to purchase later, if the product is available, at a discounted but uncertain price depending on which action maximizes their expected gain. The effect of strategic consumers on retailer pricing and profitability has been the focus of much recent research. Levin et al. [22] distinguished strategic consumers from others by their awareness that pricing is dynamic and by timing their purchases accordingly. Strategic consumers are patient and can weigh the benefit of delaying purchases [5]. Cachon and Swinney [8] concluded from their model that in the presence of strategic consumers it is optimal for the retailer to order a smaller quantity and she will have a lower expected profit than if there are no strategic consumers.

Retailers can use promotions such as "free" gift cards with the purchase of a product instead of discounting the product at the end of the period. Fig. 1 shows three examples of gift cards given free with the purchase of products by large retailers. Gift cards have several advantages for the retailer. When used as a promotional tool, they are not directly linked to a product and, therefore, do not create a perception of reduced value of the product like direct discounts and coupons [11]. The second advantage of gift cards is that they can be given by the recipient to another consumer, and thus have the potential to expand a retailer's consumer base. A third advantage of gift cards is that some consumers may redeem only part of the cards' full value and others may not use the card at all. Reasons for partial or no redemption include loss of cards, expiration of cards, and consumers' relocation. We refer to this partial redemption as slippage. Horne [17] estimates the slippage rate of the cards that go unredeemed nine month after issuance is 19%. This 19% slippage rate is for gift cards which consumers buy and use as gifts. A fourth advantage of gift cards is that consumers redeeming gift cards may spend more than the value of the gift card, creating additional sales. In a survey of more than 500 U.S. consumers conducted by Accenture [1], 45% of respondents said they spend more than the value of the gift card when they redeem it. One estimate of the average spending of consumers beyond the card

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Fig. 1. Examples of product-specific gift cards.

value when redeeming cards is about 20% of card value [30]. Finally, when gift cards are redeemed, the retailer incurs only the cost of the goods sold with the card rather than the full face value of the card. The last two benefits are realized by the retailer when consumers use gift cards to make purchases they would not have made at the retailer in the future with cash. On the other hand, if purchases made with gift cards result in a reduction in future purchases that would have been made at the retailer with cash, then the last two benefits may altogether vanish.

We focus on the use of "free" gift cards to sell excess newsvendor type products in the presence of patient consumers. In our model, patient consumers are similar to strategic consumers in the sense that they act strategically in evaluating their "buy now" vs. "buy later" decision. These patient consumers may not behave strategically in the redemption period because of the temporal separation between the purchase decision and the redemption time. We use the model framework developed by Cachon and Swinney [8] to analyze the effectiveness of gift cards. Using their framework, we derive the sufficient optimality condition for the retailer's stocking level and the optimal gift card value in the presence of patient consumers. We identify the conditions under which offering gift cards outperforms discounting the product. In particular, we analyze how consumers' valuation of gift card dollars, gift card redemption rate, additional spending above the cards' value at redemption, the type of purchases made using redeemed gift cards, and the retailer's profit margin influence the effectiveness of gift cards.

Using our model we address several questions about the use of "free" gift cards. What are the most important factors in determining the profitability of using "free" gift cards to sell excess inventory? Under what conditions do gift cards provide a more profitable strategy for selling excess inventory than discounting? What is the effect of the presence of patient consumers on gift card profitability? How do consumers' valuation for gift card dollars, their gift card redemption rate, spending above the gift cards' value at redemption, and other factors affect the retailer's optimal order quantity and gift card value? How do the results change under increasing redemption rate in gift card value and decreasing consumer valuation for gift card dollars as gift card value increases?

We find that the most important factor in determining gift cards profitability is the proportion of redeemed card amounts used to buy products which consumers would not normally buy from the retailer with cash. When this proportion is large, gift cards' profit advantage over discounting for retailers with high average margin can be substantial. This profit advantage of gift cards over discounting also increases with the variability of demand. When demand variability is high, the retailer can use the gift cards to mitigate the risk of overstocking and, hence, she orders a larger quantity under a gift card strategy relative to the quantity she orders under a discounting strategy.

The remainder of this paper is organized as follows. In Section 2, we review the relevant literature. In Section 3, we describe our model, consumer choice, and demand. In Section 4, we solve the problem with a gift card strategy to sell excess inventory. We extend the gift card model in Section 5 to allow for a step-wise increasing gift card redemption rate and a piece-wise linear concave consumer utility in gift card value. Discussion and numerical analysis are presented in Section 6. The paper is concluded in Section 7.

2. Literature review

Since patient consumers in our model bear some resemblance to strategic consumers, we begin with a review of the literature on the latter. There is a growing literature in Operations Management and Marketing on developing models that incorporate the behavior of strategic consumers [18,22,28,32]. A review of recent work in Operations Management that incorporates strategic consumer behavior can be found in Netessine and Tang [24]. The key feature of strategic consumers is that they can decide to

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