



Optimal ordering and pricing decisions for a company issuing product-specific gift cards[☆]



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ABSTRACT

In this paper, we investigate gift card's influence on retailers' ordering decisions and analyse the benefits of issuing product-specific gift cards. We propose an optimal ordering model for retailers' decision problems with gift cards being issued. We also solve the problem with the analytical forms of optimal order quantities and expected profits. By comparing the results with the classical newsvendor problem, we classify the benefits of issuing gift cards into three categories: (1) the demand stimulating; (2) the pre-payment, and (3) the non-redemption. We step further to explore a retailer's problem on how to determine the optimal discount for gift cards, which is characterized by a joint optimal policy on the ordering quantity and the discount. We derive the optimal condition on this joint policy. Numerical examples are conducted to illustrate the model results and analyse the influences of parameters. A sample average approximation method is also been introduced to solve the optimization model.

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1. Introduction

Pre-paid consumer gift cards are used worldwide. One example is Mooncake gift cards in China. During Mooncake Festival, most companies, universities and government sectors give their employees gift cards issued by moon-cake retailers. Most of these cards are used to exchange the moon-cakes, where the price of such a card is determined by the units of moon-cakes which can be exchanged. Besides this, gift cards are also popularly used in all the other festivals. Wang [21] reported that some large-scale retailer in Shanghai issues nearly one billion RMB (about \$0.165 billion) worth gift cards every year. Gift cards also gained popularity in other countries. In the USA, for example, total sales of gift cards have exceeded \$60 billion in 2005, and the end-of-the-year holiday season is responsible for roughly 30% of annual gift card sales [13]. In Canada, 82% of stores owned by large retailers were offering gift cards in 2005 [1].

Gift cards can be divided into three categories: product-specific, retailer-specific and network-branded. Product-specific gift cards are used to buy a specific product or a combination of products, where the names and quantities of the products are usually printed on the cards. These kinds of cards are widely used for seasonal products. Compared to product-specific ones, retailer-specific

gift cards can be used to buy any product in the stores of the retailer (issuer) who issues the cards. There exists a long history for retailers, like Wal-Mart, Tesco or Carrefour, to issue this kind of gift cards in their daily operations. The third type, network-branded, gift cards are redeemable at any merchant on a credit card system, like American Express Gift Card [3] and Okcard issued by Baillan Group in China. It is not difficult to see that product-specific gift cards are significantly different from the other twos from the following perspectives: the cards are usually issued for some seasonal products and thus short life-durations, and the additional demands in a selling season on a specific product stimulated by the gift cards can be clearly identified. In this paper, we focus our study on the product-specific gift cards.

A product-specific gift card is beneficial to the retailer from three aspects. First, the product demand can be stimulated by attracting new customers who would not buy without gift cards [17]. Secondly, some gift cards may remain unused or not fully used before expiration [13], which results non-redemption benefit for the retailer. Finally, there usually exists a certain period between the purchase and the redemption of the gift cards. Therefore, the retailer can get a substantial amount of cash before delivering their products.

The popularity of the product-specific gift cards raises a lot of questions for the retailers. For example, should a retailer expect a higher demand if he has issued gift cards? If doing so, how significantly his profit level can be improved, and what is the best discount for the gift cards? However, to the best of our

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knowledge, there are very few studies have addressed these issues. In this paper, we try to fill this gap between practice and theoretical research. In particular, we first propose an optimal ordering model for a retailer's decision problem with gift cards being issued and compared it with the classical newsvendor model. After that, we analyze the profit improvements from the additional demand stimulated by the gift cards, the pre-payment at the moment of issuing the gift cards, and the non-redemption of the gift cards. Finally, we derive the retailer's optimal price discount of gift cards and the order quantity of products when he decides them simultaneously.

The main contributions of this paper are as follows. First, we prove that the retailer should increase his order quantity when he issues gift cards. Secondly, we classify the benefits of issuing gift cards into three categories: (1) the demand stimulating; (2) the pre-payment, and (3) the non-redemption, where the pre-payment benefits can be negative or positive, and the other two are proved to be positive. We show that if a retailer has high capital cost or has high profit margin, issuing gift cards gains more benefits. Finally, we derive the retailer's optimal ordering (for products) and pricing (for gift cards) decisions.

The rest of this paper is organized as follows. In Section 2, we summarize the literatures related to our research. In Section 3, we analyze the retailer's optimal ordering decisions and compare the expected profits with and without gift cards to derive the benefits and costs of issuing gift cards. The retailer's optimal pricing and ordering decisions are also derived in Section 3. Section 4 gives some numerical examples and proposes a sample average approximation method to extend our numerical framework. The conclusions are given in the last section.

2. Literature review

This paper is related to two research areas: (1) researches analyzing the practice of gift cards, which are mainly qualitative analyses; (2) researches exploring the operations management decisions with gift cards, which are mostly based on quantitative models.

2.1. Qualitative research

For the practice of gift cards, Bahta et al. [1] conducted a survey to review the issuances of gift cards in Canada, and showed that the popularity of gift card is increasing, especially for the large scale retailers. Horne [3] classified the gift cards into two categories, i.e., closed-loop and open-loop, and summarized the background and the regulatory issues.

To explain the popularity of gift cards, some studies were devoted to the research of the benefits of gift cards for an issuer, where demand stimulating and non-redemption benefits are concluded as the main source of the benefits. For the demand stimulating, Thomas and Dillenbeck [17] made a more insightful analysis, where the result showed that the preferences of potential customers created by the gift cards not only guarantee the use of these gift cards, but also lead to some external purchases. This is also confirmed by Horne et al. [2], who also observed the fact that 10% of all gift cards users have never previously visited the issuer.

The non-redemption of gift card is another important source of benefits for retailers. Maranjian [12] estimated that 10% of gift cards are never redeemed. Offenber [13] further showed that in 2005, Home Depot reported \$52 million of additional income from gift cards because of non-redemption. With the recognition of this point, Thomas and Dillenbeck [17] stated that the non-redemption of gift card is an unexpected windfall for retailers, and reviewed the state regulations, particularly related on the expiration dates, dormancy fees and unclaimed values, with the aim of consumer protection. The analysis in Horne [4] apparently holds a different

view about the non-redemption and presented a persuasive interpretation on how the short-term financial benefits were completely offset by long-term increases in indirect costs and damage to brand equity.

The benefit for the customers who use the cards (recipients) is another point attracting attention. Waldfogel [19] revealed that gift cards give the recipients the rights to select their own gift from a set of alternatives, which increases utility and reduces the dead-weight loss of gifts that do not match the recipient's needs or desires. The author [20] further pointed out that gift cards can avoid the stigma of cash giving. With a different standpoint, Wang [21], reported that the main benefits for the gift cards recipients is tax reduction in China, where gift cards are not included into individual income taxation.

Gift cards also generate some costs for both the retailers and the customers. For the retailers, issuing gift cards may incur some costs, like the costs for printing, selling, and some other associated costs. Thomas and Dillenbeck [17] pointed out that the gift cards program could be "expensive". In addition, gift cards are usually issued at a discount, especially for organizational buyers who buy a large quantity [18]. While for the customers, gift cards may refer to the brands that they don't prefer. Offenber [13] investigated the loss by considering the secondary market of gift cards, and estimated that the loss could be 20%. For further review, we refer the readers to Horne and Bendle [5], which presented a comprehensive review on the study of gift cards.

2.2. Quantitative models

Some papers have discussed the influences of "free" gift cards on retailers' operations management decisions. Here, free means that the gift cards are free to the consumers when their procurement quantities exceed a threshold, or when they buy the products in the second period of the selling season. Khouja et al. [6] developed a model to derive the optimal purchase thresholds and optimal gift card values. Again, the authors [7] compared the price discount with the free gift cards, and investigated the conditions under which giving gift cards results in higher expected profits than directly discounting the product. Khouja et al. [8] further considered the free gift cards offering in a supply chain composed of a manufacturer and a retailer, among which the manufacturer sponsors free gift cards for customers. Our paper considers the situation that the gift cards are not free, and thus the pre-payment effect of gift cards is considered.

More recently, Khouja and Zhou [10] analyzed the channels and pricing decisions of a service provider to sell gift cards for his service through an independent retailer and from his own locations. Khouja et al. [11] is more related to our research, which studied the retailers' optimal decision in ordering and pricing behavior when they issue gift cards.

However, there are two main differences between Khouja et al. [11] and our paper. First, we inclusively consider the retailer's price discount decision in issuing gift cards, which is not considered in Khouja et al. [11]. In practice, an issuer can use the decision on price discount for gift cards as a tool to affect the sale of gift cards and hence the profit. Moreover, this discount decision is always made integrally with the ordering decision under gift card issuances. Secondly, we propose a new model to describe the problem, which includes three distinct sources of benefits: demand stimulation, pre-payment and non-redemption.

3. The model

3.1. Problem description

We consider a retailer's profit optimization problem in selling a type of products with gift cards. In the problem, the retailer determines the order quantity of products and the price discount of

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