Omega 41 (2013) 797–807

Contents lists available at SciVerse ScienceDirect

Omega

journal homepage: www.elsevier.com/locate/omega

# Profitability of loyalty reward programs: An analytical investigation

A. Gandomi, S. Zolfaghari *

*Department of Mechanical and Industrial Engineering, Ryerson University, 350 Victoria Street, Toronto, ON, Canada M5B 2K3*

ARTICLE INFO

*Article history:*
Received 14 March 2011
Accepted 5 October 2012
Processed by B. Lev
Available online 18 October 2012

*Keywords:*
Marketing
Loyalty program
Satisfaction
Valuation
Nonlinear programming

ABSTRACT

Loyalty programs, as a prevalent CRM strategy, aim to enhance customers' loyalty and thereby increase a firm's long-term profitability. Recent analytical and empirical studies demonstrate inconsistent findings on the efficacy of loyalty programs in fulfilling these goals. In this study, an analytical model is developed to analyze the effect of customers' valuation and their post-purchase satisfaction level on a loyalty program's profitability. The results reveal how customers' satisfaction plays a significant role in profitability of loyalty programs. We consider a profit-maximizing firm selling a good or service through two periods. Valuation is modeled as a deterministic parameter, as well as a stochastic variable with two arbitrary distributions. Depending on the customers' valuation distribution, the model results in either a linear or a nonlinear optimization problem. Optimization problems are solved analytically, in terms of the model parameters. The obtained solutions provide some useful insights into the effects of customers' satisfaction on the profitability of loyalty programs. Specifically, it is shown that depending on the customers' satisfaction level, it may be optimal not to offer a loyalty reward.



## 1. Introduction

Loyalty programs are structured marketing efforts [1] that aim to enhance customers' loyalty by rewarding their repeat purchase behavior. Since loyalty buying behavior is thought to be of benefit to the firm [1–4], loyalty reward programs are presumed to increase a firm's long-term profitability. Since the time American Airlines lunched AAdvantage, the first contemporary loyalty program [5], loyalty programs have proliferated in various industries and markets [6,7]. Customers' participation in such programs, on the other hand, has also substantially increased over the past decade [8–10].

Despite the ubiquity of loyalty programs, researchers have not yet achieved consensus on whether these programs actually work [11–13]. In other words, it is not apparent that loyalty programs are able to influence the established buying pattern of customers and increase a firm's profitability. While empirical studies show contradictory findings on the effectiveness of loyalty programs [5,12,14], there are only a few analytical studies on this important marketing field. This fact is evident from Kim et al. [15] (the first published analytical study on loyalty programs), who view their work "as an initial step, and clearly far removed from the ideal model in which the implications directly translate into managerial practice".

Loyalty programs, by offering rewards based on cumulative buying, create switching costs for customers. Thus, literature on the effects of switching cost is also relevant to our work. The effect of switching cost on the market competitiveness was first studied by Von Weizsacker [16]. Using a Hotelling model, Von Weizsacker [16] shows that the price sensitivity of customers and market competitiveness rise with the switching cost. These findings, however, depend on the underlying assumptions that firms are committed to maintaining the same price over time, and also customers randomly change their preferences for the competing goods within a market. However, by relaxing the constancy of price assumption and adding a segment of customers with fixed preferences over time, Klemperer [17] shows that the market may be less competitive than a market with no switching costs. Furthermore, Klemperer [17] concludes that the effect of switching cost on a firms' profitability, similar to market competiveness, depends on the size of the segment with constant preference. Namely, firms may be either better off or worse off with switching costs than without them, depending on the proportion of customers whose preferences remain constant over time. In contrast to Von Weizsacker [16] and Klemperer [17–20], who take the switching costs as exogenous, Caminal and Matutes [21] treat them as endogenous. In essence, switching costs created by loyalty programs are endogenous because firms directly decide upon the amount of reward. Hence, we incorporate the amount of loyalty reward as a decision variable in our model, which distinguishes this study from those of Von Weizsacker [16] and Klemperer [17–20].

This paper builds on previous analytical studies on loyalty programs' profitability, notably Kim et al. [15] and Singh et al. [13],

* Corresponding author. Tel.: +1 416 979 5000x7735; fax: +1 416 979 5265.
*E-mail address:* zolfaghari@ryerson.ca (S. Zolfaghari).

0305-0483/$ - see front matter © 2012 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.omega.2012.10.003

by treating customers' valuation as a random variable. In fact, except for Kopalle and Neslin [22], we are unaware of any other study that has considered valuation in the context of loyalty programs. Kopalle and Neslin [22], using numerical simulation, examine the viability of loyalty programs in a strategic competitive game by incorporating customers' valuation as a logistically distributed random variable. Other previous studies on loyalty programs have either not incorporated the valuation as a factor in customers' decision making (e.g., [13]) or have assumed that the valuation is sufficiently high that it exceeds the product price (e.g., [15]). Similarly, to the best of our knowledge, none of the studies on the switching cost includes a stochastic valuation. For instance, Klemperer [17–20] incorporates valuation as a parameter. Caminal and Matutes [21], who study the endogenous switching cost, assume that customers' valuation is higher than the offered prices. Farrel and Shappiro [23] assume that buyers' valuation is so high that it is not binding and state that their results are affected if the valuation binds. In this paper, however, we incorporate the valuation both as a deterministic and as a stochastic variable.

Moreover, we study the impact of customers' satisfaction with their past purchases on the profitability of loyalty programs. In the previous studies on loyalty programs, the customers' purchase experience is not considered as a factor in their decision to buy. In other words, it is presumed that, no matter whether they are satisfied or dissatisfied with their past purchase, customers return to the firm with either the same valuation or a valuation independent from their past valuations. For instance, Kopalle and Neslin [22] assume that a customer's valuation in each period is a random draw from the logistic distribution. This implies the assumption that a customer's valuation changes independently from his/her previous valuations. In contrast to this underlying assumption, empirical studies have found that satisfied and dissatisfied customers perceive loyalty programs in different ways [24]. Moreover, based on the expectation disconfirmation theory (EDT) proposed by Oliver [25], customers' satisfaction with the actual product or service experience is the primary determinant of their post-purchase intentions [26]. Au et al. [27] also state that customer satisfaction results in repeat business and increases the firm's profitability. Likewise, Nie [28] posits that customer dissatisfaction hurts repeat business and, as a result, jeopardizes the company's long-term profitability. Thus, the customer satisfaction level is an important factor that may affect the effectiveness of a loyalty program in driving repeat purchase behavior and increasing the firm's profitability [29].

As pointed out earlier, some studies on switching costs allow for customers to randomly change their preferences over time. For instance, Klemperer [17] assumes that a fraction of customers change their position on the Hotelling line. Since, customers' taste for the product is represented by their position on the line segment, the shift in a buyer's position can be interpreted as his/her satisfaction level. However, in these studies, customers' locations change randomly and independently from their location in the previous periods. As a result, the spatial distribution of customers in the market will not change in favor of a specific firm in a subsequent period. Thus, none of the firms realizes a change in the market share and profits that stem from the shift in preferences. In contrast, we incorporate the satisfaction level as a parameter in our model that can take on any value. In a Hotelling framework, this would imply that the customers' distribution might become asymmetric, depending upon the firms' relative performance in driving customer satisfaction in previous periods.

In summary, we contribute to the existing literature on loyalty programs by incorporating a stochastic valuation and by analyzing the effects of customers' satisfaction levels on the profitability of loyalty programs. A unique feature of our study is that the models are solved analytically.

The objective of the model is to maximize the firm's profit in term of its decision variables. Assuming a deterministic valuation, the optimization problem turns out to be linear programming. Stochastic valuation, on the other hand, results in nonlinear programming. The models consist of two parameters, and despite their complexities, the analytical optimal solutions are found in terms of the parameters. Structural properties of the optimal solutions yield valuable insight into the profitability of loyalty programs.

The rest of this paper is structured as follows. The model formulation and its underlying assumptions are described in Section 2. Section 3 focuses on solving the model under three different valuation distributions. In Section 4, we extend the model to a case where customers' anticipated change in their future valuation is taken into account. The obtained results are discussed in Section 5. We conclude in Section 6 with a summary of the findings and some directions for future research.

## 2. Model formulation

Consider a firm selling a good or service through two periods. The firm adopts a loyalty reward program based on which customers gain a reward for repeating their purchase. More specifically, if a customer makes a purchase in both periods, he/she earns the loyalty reward of $r$.

Similar to Singh et al. [13], we assume that only a certain proportion of first-period buyers proceeds to the second period. This proportion is modeled as a parameter, $\gamma$. So, $\gamma$ is the probability that a first-period buyer becomes a potential buyer in the second period. As a result, $(1-\gamma)$ fraction of buyers in period 1 fails to proceed to period 2. This is to capture the effect of those who join the loyalty program of the firm, but decide not to return to buy the product in the second period. This fraction does not show up in period 2 mainly because of a low consumption rate.

Customers' decision to buy in the first period is a function of the following factors: their valuation for the product, current and future prices, loyalty reward value and possibility of returning in the second period. These factors are derived based on the assumption that customers are forward-looking in their decision, that is, they consider future (period 2) gains or losses when deciding to buy in the current period (period 1). These factors are summarized in a variable called surplus. A customer's surplus from purchasing a product is, in fact, the value he/she will gain by obtaining the product subtracted by the amount he/she has to pay for it. If a customer gets a nonnegative surplus, he/she will make a purchase. Customers' surplus from buying a unit of product in period 1 is

$$S_1 = [v_1 - p_1] + \gamma[v_1 - (p_2 - r)], \tag{1}$$

where $v_1$ is the valuation of the customer for the product in the first period, $p_i (i = 1, 2)$ is the offered price in period $i$ and $r$ is the loyalty reward value. As can be seen, since customers are assumed to be strategic, $S_1$ is the sum of the first period surplus and the *expected* surplus from buying the product in period 2. The expected surplus in period 2 is the surplus value (*i.e.*, $v_1 - (p_2 - r)$) multiplied by the probability of proceeding to the second period ($\gamma$).

One of the assumptions underlying the surplus formulation in Eq. (1) is that first-period buyers do not anticipate a change in their future valuations. In other words, the shift in customers' valuation is unknown to them at the time of purchase in period 1. This assumption is in line with Klemperer [17] where it is assumed that whether a first-period buyer has a fixed taste for the product, has changing tastes, or leaves the market is not