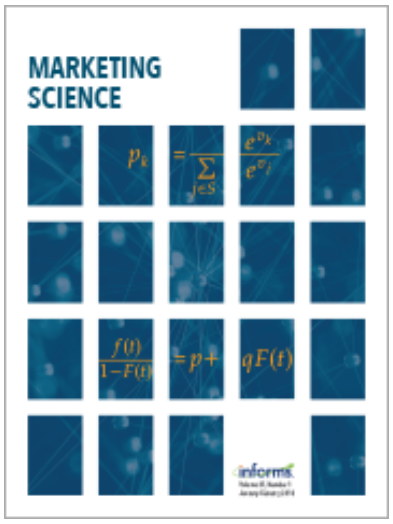


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# Customer Referral Management: Optimal Reward Programs

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## Abstract

Sellers who plan to capitalize on the lifetime value of customers need to manage the sales potential from customer referrals proactively. To encourage existing customers to generate referrals, a seller can offer exceptional value to current customers through either excellent quality or a very attractive price. Rewards to customers for referring other customers can also encourage referrals. We investigate when referral rewards should be offered to motivate referrals and derive the optimal combination of reward and price that will lead to the most profitable referrals.

We define a delighted customer as one who obtains a positive level of surplus above a threshold level and, consequently, recommends the product to another customer. We show that the use of referral rewards depends on how demanding consumers are before they are willing to recommend (i.e., on the delight threshold level). The optimal mix of price and referral reward falls into three regions: (1) When customers are easy to delight, the optimal strategy is to lower the price below that of a seller who ignores the referral effect but not to offer rewards. (2) In an intermediate level of customer delight threshold, a seller should use a reward to complement a low-price strategy. As the delight threshold gets higher in this region, price should be higher and the rewards should be raised. (3) When the delight threshold is even higher, the seller should forsake the referral strategy all together. No rewards should be given, and price reverts back to that of a seller who ignores referrals. These results are consistent with the fact that referral rewards are not offered in all markets.

Our analysis highlights the differences between lowering price and offering rewards as tools to motivate referrals. Lowering price is attractive because the seller ''kills two birds with one stone'': a lower price increases the probability of an initial purchase and the likelihood of referral. Unfortunately, a low price also creates a ''free-riding'' problem, because some customers benefit from the low price but do not refer other customers. Free riding becomes more severe with an increasing delight threshold; therefore, motivating referrals through low price is less attractive at high threshold levels. A referral reward helps to alleviate this problem, because of its ''pay for performance'' incentive (only actual referrals are rewarded.) Unfortunately, rewards can sometimes be given to customers who would have recommended anyway, causing a waste of company resources. The lower the delight threshold level, the bigger the waste and, therefore, motivating referrals through rewards loses attractiveness.

Our theory highlights the advantage of using referral rewards in addition to lowering price to motivate referrals. It explains why referral programs are offered sometimes but not always and provides guidelines to managers on how to set the price and reward optimally.

(*Referral Rewards; Customer Referrals; Customer Delight; Word-of-Mouth*)



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## Introduction

''GET 4 FREE CDs,'' proclaims the headline of a direct-mail piece mailed to members of the BMG music service, ''when you bring a friend into the club.'' The San Francisco Symphony offers two complimentary concert tickets to subscribers who refer new subscribers. American Express, British Telecom, and many long-distance phone companies offer discounts and other rewards to customers who help them sign up new subscribers to their services. Internet users are offered money when a referred friend watches Internet advertising while surfing the Web (e.g., AllAdvantage 1999). The idea of using rewards to motivate current customers to refer other customers is not new. More than 100 years ago, Richard Sears (the founder of Sears-Roebuck) asked his best customers to distribute catalogs to 24 friends and relatives and in return gave them points that could be redeemed for free merchandise.

Companies are increasingly aware of the need to manage referrals (Buttle 1998, Silverman 1997), and the use of ''referral reward'' programs has been growing steadily (Murphy 1997). These programs are designed to motivate consumers to spread positive word of mouth (WOM) about products or services and thus, in essence, to integrate customers into the sales force. Referral reward programs may be a cost-effective way to recruit new customers, because the rewards depend on a referral turning into a sale. However, referral reward programs may not be appropriate for every industry and can be wasteful when not designed properly. Therefore, optimizing the reward program is crucial to its success.

The purpose of this paper is to investigate the profitability of referral rewards and to determine the optimal reward and price mix. We develop an analytical model of referrals and derive the optimal reward and price that should be offered. Our theory highlights the advantage of using a referral reward to motivate referral instead of just lowering price. It can explain why referral programs are offered sometimes but not always. These insights can help firms manage referral programs more effectively.

Our model focuses on referral rewards as a way to recruit new customers proactively. Leveraging WOM by existing customers can have a huge impact on performance (Buttle 1998, Danaher and Rust 1996, Wilson 1994). Previous studies have examined topics such as the effect of social ties (Brown and Reingen 1987), reference group influence on WOM (Bearden and Etzel 1982), and the measurement of consumers' susceptibility to WOM influence (Bearden et al. 1989). The diffusion of innovation literature examined optimal dynamic pricing strategies (i.e., penetration or skimming) in the presence of WOM (e.g., Kalish 1983, Horsky 1990). Our model adds new insights to this literature by considering explicitly how managers can use referral rewards to influence WOM.

Our model is relevant to the customer satisfaction literature. Chu and Desai (1995) and Hauser et al. (1994) have studied how to link profitably compensations (of down stream channels and employees) to customer satisfaction measures. Fornell and Wernerfelt (1988) and Chu et al. (1998) have looked at the use of compensation and refunds in the management of customer dissatisfaction and complaints. We add to this literature by considering the next step in satisfaction management—motivating customers to bring other customers to the seller.

In our model, delighted customers, i.e., customers who achieve a high level of satisfaction, engage in referrals that in turn lead to increased sales. We model delight by using a threshold-crossing formulation whereby, if the customer surplus exceeds a threshold level, she is delighted. We incorporate this formulation into a model of customer referral to investigate how a seller can use price and rewards to delight customers to optimize referrals. We find that a seller should use only a low price to motivate referrals when the delight threshold level is low. A combination of low price and referral reward should be used when the threshold level is intermediate. When the threshold level is too high, the seller should not try to motivate referrals.

The intuition for these findings is as follows: By lowering price a seller ''kills two birds with one stone''; a lower price increases the probability of initial purchase and, at the same time, increases the likelihood of referral. However, lowering price is subject to ''free riding,'' because some customers benefit

from the low price but do not refer other customers. A referral reward only increases the likelihood of referrals but is not subject to ''free-riding'' because of its ''pay for performance'' nature. Free riding increases with a higher delight threshold; hence, motivating referrals through rewards becomes more attractive than lowering price at higher threshold levels. On the other hand, at low threshold values, lowering price is more attractive than rewards, because (1) free riding is less severe and (2) rewards can waste company resources, because some customers receive them even though they would have recommended anyway.

Before presenting the model setup, we review concepts of customer delight that have been advanced in the literature and explain how our formulation relates to them.

## Customer Delight and Word of Mouth

Managers use the concept of customer delight frequently, and some believe that: ''You must delight customers, not just satisfy them'' (Schlossberg 1990). According to Rust et al. (1994, p. 41), delight is possible only when the customer is satisfied from the outset. Delight triggers behavioral outcomes (repurchase, positive word of mouth, etc.) that are substantially better than mere satisfaction can provide. This relationship is nonlinear, meaning that there are thresholds of satisfaction beyond which little benefit is obtained with incremental product enhancements until a certain critical level is reached at which delight is obtained. When this critical point is surpassed, a customer is more likely to purchase again or recommend the product.

Oliver et al. (1997), basing their work on data gathered from wildlife theme park visitors and symphony patrons, suggested that delight results from surprisingly positive performance that leads to arousal, pleasure, and, in turn, delight. The notion that customer delight is based on a pleasant surprise has been criticized, because it ''raises the bar'' of customers' expectations, making it harder to please them in their next purchase. Thus, the exact nature of the antecedents of delight is still debated (see also Rust and Oliver 2000). Regardless, converging evidence suggests that customer behavior changes once a threshold has been passed (Coyne 1989; Oliver et al. 1997; Rust et al. 1995; Zeithaml et al. 1993, 1996), leading to heightened willingness to pay, loyalty, and intention to spread WOM.

We base our formulation on the notion that delight is related to exceeding a threshold in customer satisfaction. First, we model a satisfied customer as one who obtains nonnegative surplus from a purchase. Second, a delighted customer is one who obtains a positive level of surplus that is above a threshold level.[1] Third, a delighted consumer must be satisfied first. We now describe a model of referral reward that incorporates this notion of customer delight.

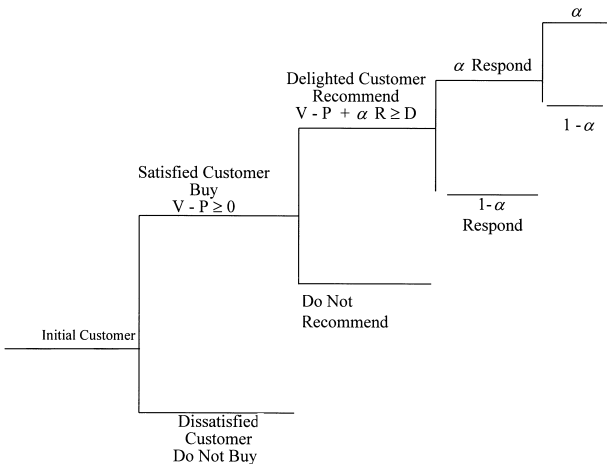
## The Model

The model is designed to investigate how a seller should manage not only the initial purchase decision but also the subsequent process of referrals and, in particular, how a combination of referral reward and low price may be used for that purpose. We consider the situation in which a seller makes an offer to sell a product for a price, $P$. When a consumer buys the product, the seller also offers a referral reward, $R$, for referring new customers.

More specifically, the buying and referral process is modeled as follows (see Figure 1): When the initial customer obtains nonnegative surplus from the product offer, the customer buys one unit of the product. After purchasing, if the customer is delighted (i.e., achieves a high level of surplus above a certain threshold level $D$), the customer refers another customer who, in turn, may purchase the product and, if delighted, refer another person, and so on. This snowballing effect continues until either one person decides not to buy or is not delighted and, therefore, does not refer another person.

[1]Strictly speaking our model does not apply to repeat purchases; thus, the issue of whether a positive surprise can be maintained over time is not relevant.

**Figure 1 Buying and Referral Process**




### Initial Customer Behavior

ASSUMPTION 1 (UTILITY). *The utility the initial consumer obtains from the product itself, V, is a random variable (from the seller's point of view) with the cumulative distribution function F(V).*

Assumption 1 states that, although consumers may differ in the utility they get from the product, each consumer has enough information to assess the product's utility. In addition, the seller cannot observe the true utility a consumer places on the product.

ASSUMPTION 2 (AWARENESS OF REFERRAL PROGRAM). *The consumer is informed of the referral reward program only after purchasing the product.*

Many companies inform consumers of referral reward programs only after they have made a purchase. For example, music clubs send direct mail to new subscribers describing their referral rewards only on the third or fourth mailing. In these cases the consumer is unaware of the referral reward at the time he makes a purchase and, therefore, the purchase decision is not affected by expectations of potential future referral rewards.[2]

ASSUMPTION 3 (THE PURCHASE DECISION). *The consumer buys one unit of the product when the offer gives the consumer nonnegative surplus, i.e., when*

$$V - P \geq 0. \quad (1)$$

Note that the consumer decision to buy the product does not depend on the referral reward because the consumer is not aware of the reward yet.

Given the distribution F(V), it follows from Equation (1) that the probability that the ''initial consumer'' buys is:

$$\text{Probability of initial purchase} = [1 - F(P)]. \quad (2)$$

ASSUMPTION 4 (THE REFERRAL DECISION). *The initial consumer will recommend the product to another person after purchase when the expected surplus from buying and recommending the product exceeds a positive and known threshold level D.*

The parameter D denotes the minimum level of surplus required to delight the customer and, therefore, to motivate the customer to recommend the product. We refer to D as the ''delight threshold parameter.''[3]

The expected surplus from buying and referring consists of the surplus from buying the product itself (Equation (1)) and the expected reward from any referral reward, *R*, offered by the seller, if the customer refers someone who buys the product. Note, however, that given Assumption 2, the referral reward cannot be the sole reason for recommending the product, and a person may not recommend—even with a high reward—when he or she does not enjoy the product. This assumption is reasonable, because recommendations are likely to be given to relatives and friends and, therefore, most people will not act dishonestly, even for a referral reward. Moreover, when recommendations are dishonest, consumers will eventually ignore them, and referrals will not occur (i.e., in equilibrium referrals should be credible.)

[2]In other cases, the consumer may be aware of referral rewards before making a purchase. However, even in these cases, when the potential rewards are not salient, they are unlikely to impact the purchase decision.

[3]The delight threshold, *D*, can also be interpreted as the cost of making referrals. Such cost may reflect the time and effort required to make a referral. A firm may be able to influence *D* by including an easy-to-use referral form, 800 number, etc.

**Referred Customer Behavior**

ASSUMPTION 5 (CONVERSION RATE). *A referred customer will buy the product with probability α. The conversion rate α (α < 1), is known to the consumer and to the seller.*[4]

ASSUMPTION 6 (CUSTOMER DELIGHT). *A referred customer who buys the product is also delighted with the purchase.*

ASSUMPTION 7 (NUMBER OF REFERRALS). *Each buyer may refer only one consumer.*[5]

For now, we assume for expositional purposes that the probability of converting a referred customer to a buyer, α, is exogenous, and that a referred customer who buys the product is also delighted (and, therefore, refers another person.) Later on, we consider the situation when both conversion rate and referral (customer delight) depend on $P$ and $R$.

It follows from Assumption 5 that the expected reward from referring is $\alpha R$, and the initial customer refers another customer when:

$$V - P + \alpha R \geq D. \tag{3}$$

Therefore the unconditional probability of the initial customer making a referral is

$$[1 - F(D + P - \alpha R)] \tag{4}$$

Thus, the probability that the seller will make a second sale (because of a referral) is given by $[1 - F(D + P - \alpha R)]\alpha$, the probability of a third sale by $[1 - F(D + P - \alpha R)]\alpha^2$, and so on (see Figure 1). It follows (based on Assumption 7) that the expected number of buyers from referrals is equal to the sum of the geometric series

$$((1 - F(D + P - \alpha R))\alpha + (1 - F(D + P - \alpha R))\alpha^2 + (1 - F(D + P - \alpha R))\alpha^3 \ldots)$$

which is equal to

*REFERRED* BUYERS

$$= \frac{\alpha}{1 - \alpha}(1 - F(D + P - \alpha R)). \tag{5}$$

The seller's expected profit[6] is:

$$\Pi(P, R) = [1 - F(P)]P + \left[\frac{\alpha}{1 - \alpha}(1 - F(D + P - \alpha R))\right](P - R). \tag{6}$$

The first term reflects the expected contribution from the initial customer purchase. The second term is the expected contribution from referrals (expected number of referrals given in Equation (5) multiplied by the price less the referral award). A higher price would result in a higher profit margin but also in a decrease in the probability that the initial customer will buy and in the expected number of referred customers. A higher reward reduces the profit margin from referrals, but increases the expected number of referrals.[7]

The seller's decision problem is

$$\max_{P,R} \Pi(P, R) \quad \text{s.t. } P \geq R \geq 0. \tag{7}$$

The seller objective is to choose nonnegative values of price, $P$, and referral reward, R, to maximize the profit function (6). Obviously, to ensure nonnegative profits from referrals, the referral reward cannot be higher than the price.

## Optimal Reward Programs

In this section we solve the decision problem in Equation (7) to find the optimal mix of price and referral rewards. We compare that solution to a benchmark solution in which the seller is myopic and ignores the effect of referrals and also to the case when the seller

[4]In a more general model one could explicitly assume that the conversion rate α accounts for some customers who would have bought the product even without the referral reward. As price decreases, the proportion of these customers may increase and, therefore, the importance of the referral reward to attract new customers may decrease.

[5]When the price and reward are linear in the number of referrals, the customer decision to make a referral will be independent of the total number of referrals a customer makes. In this case we can normalize the number of referrals by each buyer to one.

[6]The marginal and fixed costs are not relevant to the analysis and, therefore, are assumed to be zero.

[7]Note that for simplicity we assume that the discount factor is one. We also analyzed the case when this assumption is relaxed and found that the main results are not changed. However, a low discount factor may reduce the attractiveness of referral rewards because of the lower values of future earnings.

**Table 1 Optimal Price, Reward, and Profit as a Function of Delight Threshold (Fixed $\alpha$)**

| Referral Strategy | Range of $D$ | Price, $p^*$ | Reward, $R^*$ | Profit, $\pi^*$ |
|---|---|---|---|---|
| Myopic | $[0, 0.5]$ | $\frac{1}{2}$ | N/A | $\frac{1}{4}\left(\frac{1-2\alpha D}{1-\alpha}\right)$ |
| | $(0.5, 1]$ | $\frac{1}{2}$ | N/A | $\frac{1}{4}$ |
| No-referral reward | $\left[0, \frac{1-\sqrt{1-\alpha}}{\alpha}\right]$ | $\frac{1}{2}(1-\alpha D)$ | N/A | $\frac{(1-\alpha D)^2}{4(1-\alpha)}$ |
| | $\left(\frac{1-\sqrt{1-\alpha}}{\alpha}, 1\right]$ | $\frac{1}{2}$ | N/A | $\frac{1}{4}$ |
| Referral rewards | $\left[0, \frac{1}{\alpha+2}\right)$ | $\frac{1}{2}(1-\alpha D)$ | 0 | $\frac{(1-\alpha D)^2}{4(1-\alpha)}$ |
| | $\left[\frac{1}{\alpha+2}, \frac{\alpha+1}{2}\right]$ | $\frac{1+D}{\alpha+3}$ | $\frac{(2+\alpha)D-1}{\alpha(\alpha+3)}$ | $\frac{1-D(1+\alpha-D)}{(\alpha+3)(1-\alpha)}$ |
| | $\left(\frac{\alpha+1}{2}, 1\right]$ | $\frac{1}{2}$ | 0 | $\frac{1}{4}$ |

accounts for referrals but does not offer a referral reward. To obtain closed form solutions, we will solve this problem assuming that $F(V)$ is distributed uniformly between zero and one.[8]

**Case I: Myopic Seller**

Consider a seller who ignores the effect of referrals on profits, thus selecting $P$ to maximize the profits only from the sale to the initial customer, i.e., the first term of Equation (6). The optimal price and profit expressions are given in the top part of Table 1. Note that for $D$ between 0 and 0.5, there is some effect of referrals on the seller's profit, although the seller does not account for referrals when deciding the price.

**Case II: No Referral Rewards**

Here, the seller recognizes the effect of referrals on profits; however, no referral rewards are offered ($R = 0$). The seller selects $P$ to maximize profits, taking into account the potential profits from referrals. The optimal price and profit expressions are given in the middle section of Table 1.

Comparing this solution to the benchmark solution of the myopic seller, we find the following results:

RESULT 1. *When the seller takes referrals into account,* (a) *profit is higher and* (b) *price is lower compared to that of the myopic case, as long as the delight threshold parameter, D, does not exceed* $(1-\sqrt{1-\alpha})/\alpha$.

In essence, the seller faces a tradeoff between two alternatives: The first is increasing margins through a high price, thus decreasing referrals; the second is providing a higher surplus to leverage on referrals. For small values of $D$, the second alternative is more profitable, because the price reduction necessary to delight customers is relatively small. In contrast, for large values of $D$, the price reduction necessary to motivate referrals is so large that it becomes more profitable to ignore referrals and increase margins focusing on immediate sales.

When a low price is used to motivate referral, cus-

[8]We have used numerical analysis to investigate the solution under different shapes of the general beta distribution and found similar results.

**Figure 2 Optimal Price and Reward**

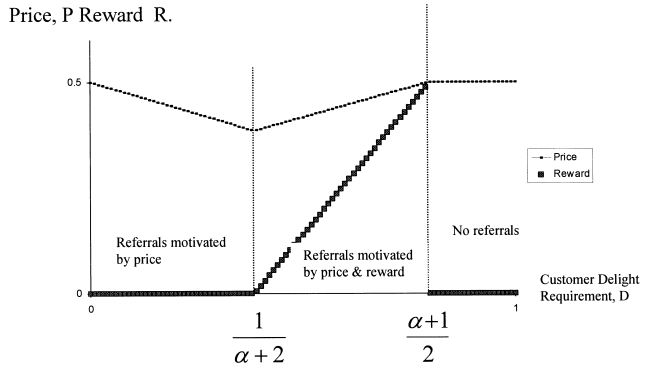
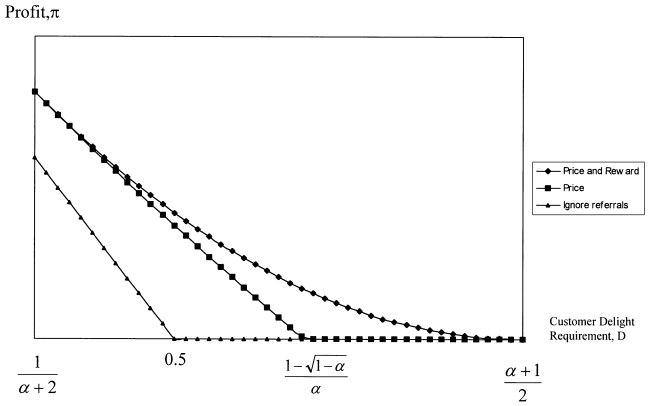



**Figure 3 Profit Under Different Referral Motivation Approaches (Exogenous Case)**




tomers may buy at the reduced price but still not refer other customers. This uncertainty decreases the expected profit from reducing the price to motivate referrals. Consequently, the range of $D$ for which it is profitable to motivate referrals through a reduced price is limited. By offering referral rewards, the seller avoids this uncertainty, because the rewards depend on actual proof of referral. Next, we explore how a seller can optimally use such referral rewards.

**Table 2 Motivating Referrals—Lower Price vs. Referral Rewards**

| | Advantages | Disadvantages |
|---|---|---|
| Lower price | Increase purchase<br>Increase referral | Decrease margin<br>Free riding |
| Referral reward | Increase referral | Decrease margin<br>Wasted resources |

**Case III: Referral Reward**

In this case, the seller uses a referral reward, together with a price reduction to motivate referrals. A reward, $R$, is offered to any customer who refers a buyer. The optimal $P$ and $R$ are set by solving the decision problem in Equation (7). The resulting optimal price, reward, and profit expressions are given in the lower section of Table 1.

We obtain the following results (see Figures 2 and 3).

RESULT 2. *The optimal mix of price and referral rewards falls into three regions:* (a) *Referral rewards are not offered, and the price is lower (compared to the price of a myopic seller) for D smaller than* $1/(\alpha + 2)$. (b) *Referral rewards are offered, and price is lower (compared to the price of a myopic seller) for D between* $1/(\alpha + 2)$ *and* $(\alpha + 1)/2$. (c) *Referral rewards are not offered, and price is identical to the price of a myopic seller for D larger than* $(\alpha + 1)/2$.

Result 2 shows that a seller will use a low price to motivate referrals when $D$ is low, and use a combination of low price and referral reward for medium values of $D$. When $D$ is high, the seller does not try to motivate referrals. The reason the seller uses a different mix of low price and reward depending on $D$ is related to the substantial difference between the two tools used for motivating referrals: low price and referral rewards (see in Table 2). Lowering price, the seller ''kills two birds with one stone'': a lower price increases the probability of an initial purchase and, at the same time, the likelihood of a referral is increased. Unfortunately, a low price creates a free-riding problem, because those who do not refer customers benefit from the low price. As the delight threshold increases, so does the free-riding problem and, therefore, motivating referrals through low price becomes less attractive. A referral reward helps to deal with this problem, because it is ''pay for performance'' (given only to those who actually bring a referred customer.)

Note that when the delight threshold $D$ is low, a large portion of customers will recommend the product even without a reward. Offering a reward to these customers wastes resources, because it reduces the

profit resulting from their recommendations. At low values of $D$ the losses from this waste of resources is greater than the profit from additional profit from rewards; therefore, it is not optimal to offer referral rewards at low values of $D$.

As a result, when $D$ is low (smaller than $1/(\alpha + 2)$) and buyers are likely to recommend the product anyhow, referral rewards are not as profitable, and it is better to use only low price to gain more customers. A low $D$ corresponds to a strong WOM effect. The use of a low price to motivate referrals is therefore similar to the use of penetration pricing to increase diffusion when WOM or imitation dominates the diffusion process (Dolan and Jeuland 1981, Robinson and Lakhani 1975).

When $D$ is large enough ($D > 1/(\alpha + 2)$), the optimal strategy is to combine a low price with a referral reward. In this region, too many consumers become ''free riders'' (i.e., they enjoy the low price but do not recommend the product), so the use of low price alone is not optimal. Instead, the seller starts offering referral rewards that are given only to those who recommend.

As $D$ becomes even larger (larger than $(\alpha + 1)/2$), referral rewards become so expensive that they are no longer profitable. In fact at $D = (\alpha + 1)/2$, the optimal price P is equal to the referral reward $R$, which means that, beyond this point, the seller loses money on each reward given. Also, lowering the price is not profitable, because consumers are so demanding that the extra profit from referrals will be lower than the profit lost from lowering the price to everyone. Thus, the seller should ignore referrals.

RESULT 3. *When the seller motivates referrals through rewards, the reward increases as:* (a) *The delight threshold, $D$, gets larger.* (b) *The conversion rate, $\alpha$, gets smaller.*

Part (a) follows from the fact that rewards become relatively more effective than low price as $D$ becomes larger. As to the effect of $\alpha$: When the conversion rate, $\alpha$, gets smaller, the expected compensation ($\alpha R$) decreases, and the probability of creating customer delight (and referral) decreases. To counteract the lower expected compensation, the seller increases the reward.

RESULT 4. *Compared to the myopic case, price is lower, even when a referral reward is offered.*

The intuition behind this surprising result is as follows: A referral reward increases the probability that the initial customer will be delighted and that, in turn, increases expected profits from referrals. Therefore, the seller has an incentive to increase the likelihood that the initial customer will buy. The only way for the seller to increase the likelihood that the initial customer will buy is by lowering price.

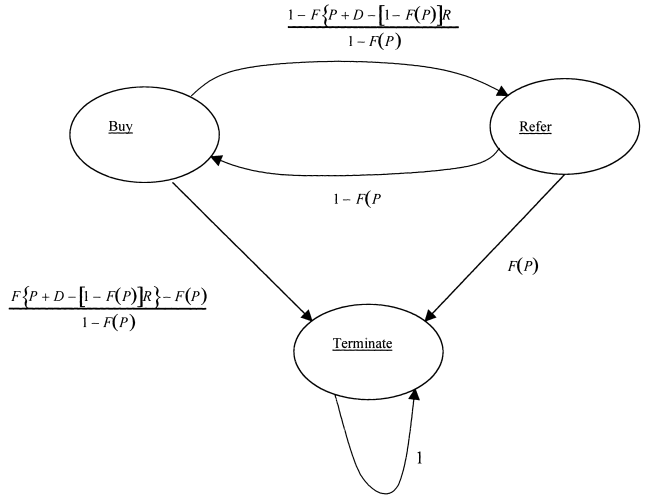
This result suggest that, when offering rewards, the seller does not ''giveth of the one hand and taketh of the other''; rather, the seller gives with both hands—rewards are offered and the price is lowered, compared to the seller that ignores referrals. Note, however, that in motivating referrals, rewards and lower prices are substitutes. The higher the reward is, the less the price discount offered.

## Endogenous Referred Customer Behavior

The simple model has limitations because the behavior of a referred customer was assumed exogenous, with the conversion rate, $\alpha$, fixed. We also assumed that, once a referred customer buys, he or she is also delighted. In this section, we relax these assumptions and find that taking into account the effects of price and reward on the probabilities of buying and referring does not change the main message from that of the previous model.

Here, we assume that a referred customer makes decisions whether to buy and make a referral in the same way that the initial customer makes those decisions (essentially, this assumption requires that each customer is an independent sample from the same population). Thus, a referred customer will buy the product when the surplus from buying is nonnegative, i.e., condition (1) holds. As before, a customer makes a recommendation when the expected surplus from buying and recommending exceeds the delight threshold, $D$ (see Equation (3)). However, in contrast to that of the previous model, the probability of converting a referred consumer to a buyer ($\alpha$) is endog-

**Figure 4 Referral Chain Model**




enous. Because condition (1) determines whether a referred customer will buy the product, α becomes

$$\textit{Endogenous conversion rate} \quad \alpha = 1 - F(P). \tag{8}$$

Therefore, condition (3) for customer delight is replaced with

*Condition for customer delight*

$$V - P + [1 - F(P)]R \geq D. \tag{9}$$

It is convenient to represent the process of buying and referring as a Markov chain (see Figure 4), with the probability that a referred customer will buy being the transition probability from ''refer'' to ''buy''. Similarly, the probability that a buyer will make a referral is the transition probability from ''buy'' to ''refer.''[9] We could also represent the original model in a similar Markov chain, with the transition probabilities being α (from refer to buy) and one (from buy to refer).

Denote by $f_{buy}$ the probability that, starting from the ''buy'' state, the process will reenter the ''buy'' state,

$$f_{buy} = 1 - F\{P + D - [1 - F(P)]R\}. \tag{10}$$

The number of times the process will be in the ''buy'' state has a geometric distribution with mean $1/(1 - f_{buy})$ (Ross 1993, p. 145). Therefore, the expected number of customers (including the initial customer) is[10]

$$Q(P, R) = \frac{1 - F(P)}{1 - f_{buy}} = \frac{1 - F(P)}{F\{P + D - [1 - F(P)]R\},} \tag{11}$$

and the expected profit is

$$\Pi(P, R) = Q(P, R)(P - R) + [1 - F(P)]R = [1 - F(P)]\left(\frac{1}{F\{P + D - [1 - F(P)]R\}} \times (P - R) + R\right), \tag{12}$$

where the second term in the profit function corrects for the fact that no referral reward is payable on the initial purchase.

To find the optimal mix of price and rewards, we solve the seller's decision problem (7), using the profit function (12), with F(V) distributed uniformly between zero and one. The optimal price, reward, and profit expressions are given in Table 3, and they are plotted in Figure 5 (price and reward) and Figure 6 (profit).

As in the original model, we find that it is profitable to offer referral rewards and lower price to motivate referrals. Again, we observe three distinct regions: referral rewards are not offered, and price is lower compared to the myopic case, when $D$ is smaller than ⅓. Referral rewards are offered, and price is lower, when $D$ is at middle levels (between ⅓ and ¾). Referral rewards are not offered, and price is identical to the myopic case, when $D$ is greater than ¾.

The difference between the endogenous and exogenous cases occurs when only lower price is used to motivate referrals. In the exogenous case, price decreases as $D$ gets larger, and in the endogenous case, it increases as $D$ gets larger (see Figures 2 and 5). In the exogenous case, the expected profit from referred customers is fixed (because their purchases and referrals do not depend on the seller's actions); lowering

[9]Note that in the Markov chain one has to use the conditional probability of recommending, given that the product was bought.

[10]The initial probability of being in the buy state is $1 - F(P)$, i.e., the probability that the initial customer decides to buy.

**Table 3 Optimal Price, Reward, and Profit as a Function of Delight Threshold (Endogenous $\alpha$)**

| Referral Strategy | Range of $D$ | Price, $p^*$ | Reward, $R^*$ | Profit, $\pi^*$ |
|---|---|---|---|---|
| Myopic | [0, 0.5] | $\frac{1}{2}$ | N/A | $\frac{1}{2}\left(\frac{1}{1+2D}\right)$ |
| | (0.5, 1] | $\frac{1}{2}$ | N/A | $\frac{1}{4}$ |
| No-referral reward | [0, 0.5625] | $\sqrt{D}\sqrt{1+D}-D$ | N/A | $1+2(D-\sqrt{D}\sqrt{1+D})$ |
| | (0.5625, 1] | $\frac{1}{2}$ | N/A | $\frac{1}{4}$ |
| Referral rewards | $\left[0, \frac{1}{3}\right)$ | $\sqrt{D}\sqrt{1+D}-D$ | 0 | $1+2(D-\sqrt{D}\sqrt{1+D})$ |
| | $\left[\frac{1}{3}, \frac{3}{4}\right)$ | $\frac{\sqrt{D}}{\sqrt{3}}$ | $\frac{2D-\sqrt{3}\sqrt{D}(1-D)}{(3-D)}$ | $1+D-\sqrt{3}\sqrt{D}$ |
| | $\left[\frac{3}{4}, 1\right]$ | $\frac{1}{2}$ | 0 | $\frac{1}{4}$ |

**Figure 5 Price and Reward in the Endogenous Case**

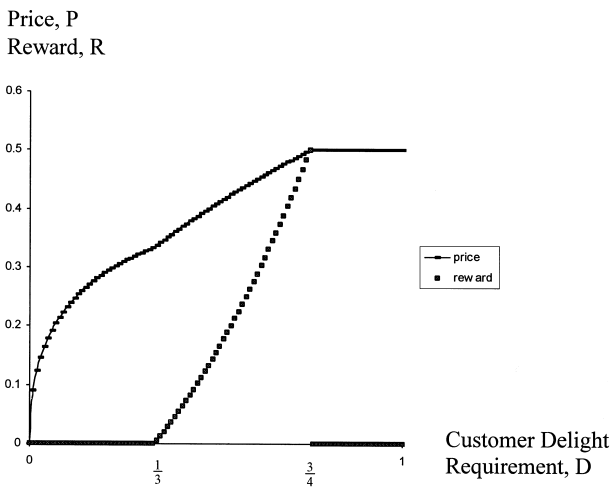
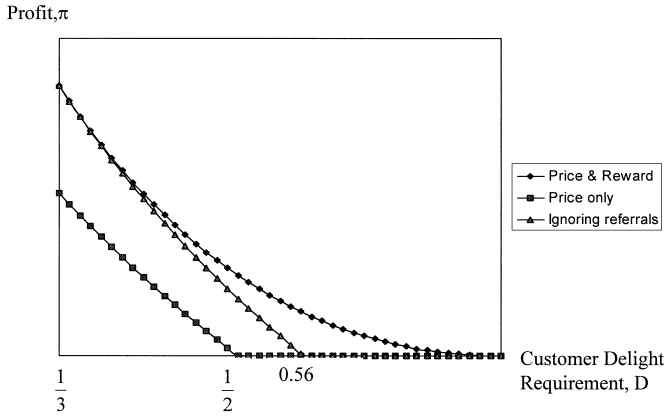



**Figure 6 Profit Under Different Motivation Approaches (Endogenous Cases)**




price only increases the probability that the initial customer will be delighted and the referral process will start. Therefore, as it becomes harder to start the referral process ($D$ gets larger), price decreases. In contrast, in the endogenous case, price not only affects the probability of delighting the initial customer and starting the referral process but also the probabilities of selling and delighting the referred customers. This relationship creates an added incentive to lower price to delight the referred customers. As $D$ gets larger, delighting the referred customers (not only the initial customer) becomes harder which, in turn, decreases the expected profit from referrals. As a result, the sellers' motivation to lower price in order to delight referred customers diminishes, and price increases as $D$ gets larger.

## Summary and Practical Implications

In referral reward programs, a customer is paid for referring buyers. Referral rewards have a very appealing quality—''pay for performance,'' i.e., a reward is given only when another person acts on the recommendation. Yet, even though these programs have been growing in recent years, they are not used in all situations. Our analysis explains why referral rewards are used only in certain situations, points to the factors that managers should consider in deciding on referral programs (delight threshold and conversion rate), and shows how these factors should influence price and rewards. Furthermore, the model provides guidelines for structuring referral programs and optimizing price and reward.

Two tools are available to encourage referrals: offering a low price and offering a referral reward to those who refer others. These tools have different properties and, therefore, will be used in different situations. A practical managerial question is: What tools should be used and when should one tool be emphasized over the other?

We show that the use of referral rewards depends on how demanding consumers are before they are willing to recommend (i.e., on the delight threshold level). Low price motivates more people to purchase and also increases referrals. However, when consumers are very hard to delight, lowering price creates a free-riding problem, in which some consumers enjoy the low price but do not recommend. In contrast, the seller gives rewards only to those consumers who induce purchase by others so free riding is eliminated. However, the seller has little incentive to offer rewards when consumers are easily delighted, because they tend to refer others anyway.

We find that the optimal mix of price and referral reward falls into three regions as follows. When customers are easy to delight, the optimal strategy is to lower the price below that of a seller who ignores the referral effect but not to offer rewards. In an intermediate level of customer delight threshold, a seller should use a reward to complement a low-price strategy. In this region, the higher the reward offered, the lower the price discount offered. As the delight threshold gets higher in this region, price should be higher (to combat the free-riding problem), and the rewards should be raised (to convince hard-to-delight customers to recommend). When the delight threshold is even higher, the seller forsakes the referral strategy all together. No rewards are given, and price reverts back to that of a seller who ignores referrals. These results are consistent with the observation that referral rewards are not observed in all markets. Our paper thus provides guidelines to managers on when to use referral programs and on how to use them. In particular, we show that a seller who uses referral rewards should also charge a lower price, compared to that of a similar seller who ignores referrals.

To implement a customer referral program, a firm needs data on (1) the distribution of customers' willingness-to-pay, and (2) the delight threshold, *D*. There are numerous examples in the marketing literature on how to develop the distribution of customers' willingness-to-pay. In many cases, firms can use historical data to estimate this distribution; in others, market research methods can be used to collect the necessary data (see, for example, Venkatesh and Mahajan 1993).

To estimate the delight threshold, firms can use direct measurement with an affective scale, as was done, for example, in Oliver et al. (1997; see also Larsen and Diener 1992, Watson et al. 1988). Using an indirect approach, willingness to recommend can be used to estimate the delight threshold. A larger percentage of customers who are willing to refer others can be an indication of a low delight threshold (all else being equal).[11] Another possible approach is to assess the portion of new customers actually referred by WOM. A higher portion, all else being equal, can indicate a lower value of the delight threshold.

More in-depth analysis may be needed to understand how to influence the delight threshold, *D*. Product-market characteristics that affect D might include customer behavior characteristics for given product markets, ethnic compositions, product characteristics, level of advertising, etc. Because *D* is not observed

[11]Willingness to recommend is influenced by the delight threshold and by the value consumers derive from the product itself. Thus, to estimate the value of D one needs to control for the product value effect.

directly, to determine the effect of each characteristic on $D$ one could measure the willingness to recommend, product value, and the characteristics of different product markets. Then, a regression analysis can be conducted in which the willingness to recommend (or another proxy for referral intensity) is the dependent variable, and the product-market characteristics plus customer value are the independent variables. The parameter values for each product-marker characteristic represent its effect on recommendation controlling for value. Given the estimated effects of different characteristics, managers can assess which of them can be manipulated to reduce the delight threshold, $D$, and increase referrals.

Managers can also use current knowledge from academic and industry sources on factors that affect the willingness to refer. For example, experience with customer referrals suggests that some customers are more willing to refer others when they are guaranteed that their identity is not disclosed to those being referred (Griffin 1995). In response, firms can guarantee confidentiality to referrers. Another approach is to offer reward also to the referred person, thereby lessening the referrer's anxiety. This may not only decrease the delight threshold, $D$, but also increase the conversion rate of referred consumers into buyers.

Managers also need to understand what the conversion rate ($\alpha$) of referrals into actual buyers is. In markets with new or expensive products, consumers face a high level of risk, and, therefore, they may be more susceptible to recommendations (Rogers 1995). Services tend to be intangible and variable and, therefore, naturally lead to referral seeking (Murray 1991). Finally, cultural norms and susceptibility to interpersonal influence can also significantly affect the role of recommendations (Bearden and Etzel 1989).

**Limitations and Future Research**

In the model, the customer is not aware of the referral program at the time of the purchase decision. This assumption reflects many situations in which consumers are only informed of the program after becoming customers and in which the referral reward is not central to the consumer's decision to make a purchase. However, the model does not address situations when a referral reward constitutes a major part of the customer's decision to join a service, or purchase a product. For example, network-marketing organizations are structured in such a way that many customers join because of the opportunity to make money from referrals (Coughlan and Grayson 1998). Pyramid schemes are another instance in which people join only because of the prospect of making money from referrals.

We assume that referrals depend on the total perceived value from the transaction, which includes both the value from the product and the reward. This approach follows the findings that tie WOM to consumers' satisfaction from the transaction (e.g., Anderson 1998). Alternatively, one can include a separate recommendation threshold based on referral reward alone. Separating the two elements of the transaction will lead to recommendations even when the value from the product is very low. However, such behavior cannot be sustained, because consumers will learn to ignore recommendations.

Consumers may be heterogeneous in their threshold requirement for delight. In this case, a seller may still find it profitable to use referral rewards when enough consumers have threshold levels that are not too high and not too low. To increase the efficiency of the referral program, a seller could target only these customers for referral rewards.

Considering Assumption 5 regarding the conversion rate $\alpha$, one could assume that the conversion probability is unknown or that it varies across consumers. In this case, one could use the mean of this probability in the referral process and offer referral rewards when the average conversion rate is not too small.

Considering Assumption 7, that a buyer may refer only one consumer, referral rewards are likely to be even more profitable when a delighted consumer refers several consumers. In that case, the referral reward region in Figure 1 will become larger.

We did not examine under what conditions referral rewards are preferable to other methods of acquiring customers (except lowering price). In particular we did not consider the advertising expenditure needed for customer acquisition, nor the tradeoffs between

expenditure on customer acquisition relative to customers' referrals. In our model, the seller finds it profitable to acquire the initial customer as long as the acquisition cost is low enough, compared to the net profits from referrals. A more general marketing issue relates to the use of direct large-scale methods, such as advertising to obtain customers, compared to relying on indirect effects, such as referrals. A formal model to compare the two alternatives should include assumptions on advertising effectiveness and is beyond the scope of this paper. However, the results of this paper lead to some insight into factors that should affect the use of referrals, namely, the values of $D$ and $\alpha$. Comparing the two alternatives is an important topic for future research.

Is there a bright future to referral management? Recent technological advancement, especially on the Internet, makes it much easier and more cost-effective for sellers to follow and reward customer referrals on a large-scale basis. This can explain the fast growth of customer referral programs in electronic commerce environments, as evidenced by the large number of sites that use this mechanism, including Internet giants such as Amazon.com. At eTour.com, a web guide to hobbies and specific interests, more than 30% of new members come from referral incentives issued to current registered users, who collect loyalty points they can use to earn discounts and free merchandise. It is reasonable to expect that the growth of e-commerce and the availability of large-scale databases will stimulate the use of referral reward programs.[12]

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