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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 ~~proactively~~ manage proactively the sales potential from customer referrals. To encourage existing customers to generate referrals, a seller must 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 combination of reward and price that leads to the most profitable referrals.

The use of referral rewards is profitable only under certain circumstances. Specifically, if consumers are too "picky," [clarify what it means to be "too picky"]it is too costly to motivate consumers to generate referrals through a reward. However, if consumers are not "picky" enough, [again, what does it mean to be just the right amount of "picky"?] it is not profitable to use referral rewards. Instead, sellers should motivate referrals only by lowering prices.

Our theory highlights the advantage of using a referral reward to motivate referral instead of just lowering price. Recruiting customers through a low price is risky because a seller is uncertain whether a customer will be delighted. If not delighted, the customer would buy at the reduced price, but will not refer other customers. This uncertainty decreases the expected profit from reducing the price in order to motivate referrals. By offering referral rewards the seller avoids this uncertainty because the reward depends on actual proof of referral. Our theory can explain why referral programs are offered sometimes but not always, thus providing guidelines for managing referral rewards programs.

Keywords: Referral rewards, Customer referrals, Customer delight, Word-of-mouth.

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 if a referred friend watches Internet advertising while surfing the Web (e.g., AllAdvantage 1999) [or one month of free service if a friend signs up—see for example JPS.net]. The idea of using rewards to motivate current customers to refer other customers is not new. More than a hundred years ago Richard Sears (the founder of Sears-Roebuck) asked his best customers to distribute catalogs to twenty-four 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 use of "referral reward" programs has been growing over the last few years (Murphy 1997). Their purpose is to motivate consumers to spread positive word of mouth (WOM) about products or services, and thus, in essence, to transform some customers into part of 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 if 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 ~~what is~~ 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 explains why referral programs are offered sometimes but not always. These insights can help firms better manage their customer referrals programs.

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 issues such as the effect of social ties (Brown and Reingen 1987), and reference group influence on WOM (Bearden and Etzel 1982), and on the measurement of consumer's susceptibility to WOM influence (Bearden, Netemeyer and Teel 1989). The diffusion of innovation literature have ~~examined~~ established 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 ~~explicitly~~ considering explicitly how managers can use referral rewards to influence WOM.

Our model is also relevant to the literature on customer satisfaction programs. Chu and Desai (1995), and Hauser, Siemster, and Wernerfelt (1995) have studied how to ~~profitably~~ link profitably compensations (of down stream channels and employees) to customer satisfaction measures. Fornell and Wernerfelt (1988), and Chu, Gerstner, and Hess (1998) 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 achieved a high level of

satisfaction (Oliver, Rust, and Varki 1997; Schlossberg 1990; Zeithaml Berry and Parasuraman 1996), engage in positive WOM. Positive WOM, in turn, leads to ~~more~~ increased sales ~~by the firm~~.

We consider how a seller can use price and rewards to delight customers in order to induce referrals. We show that referral rewards are profitable only under certain circumstances. Specifically, if consumers are too "picky" it is too costly to motivate consumers to generate referrals. However, if consumers are not "picky" enough, it is not profitable to use referral rewards. In the latter case it is more profitable to motivate referrals by only lowering price. Interestingly, when a referral reward is offered, the price is lower compared to the optimal price when a referral reward is not used. [Just like at the beginning, the word "picky" might be more effective if defined more quantitatively.]

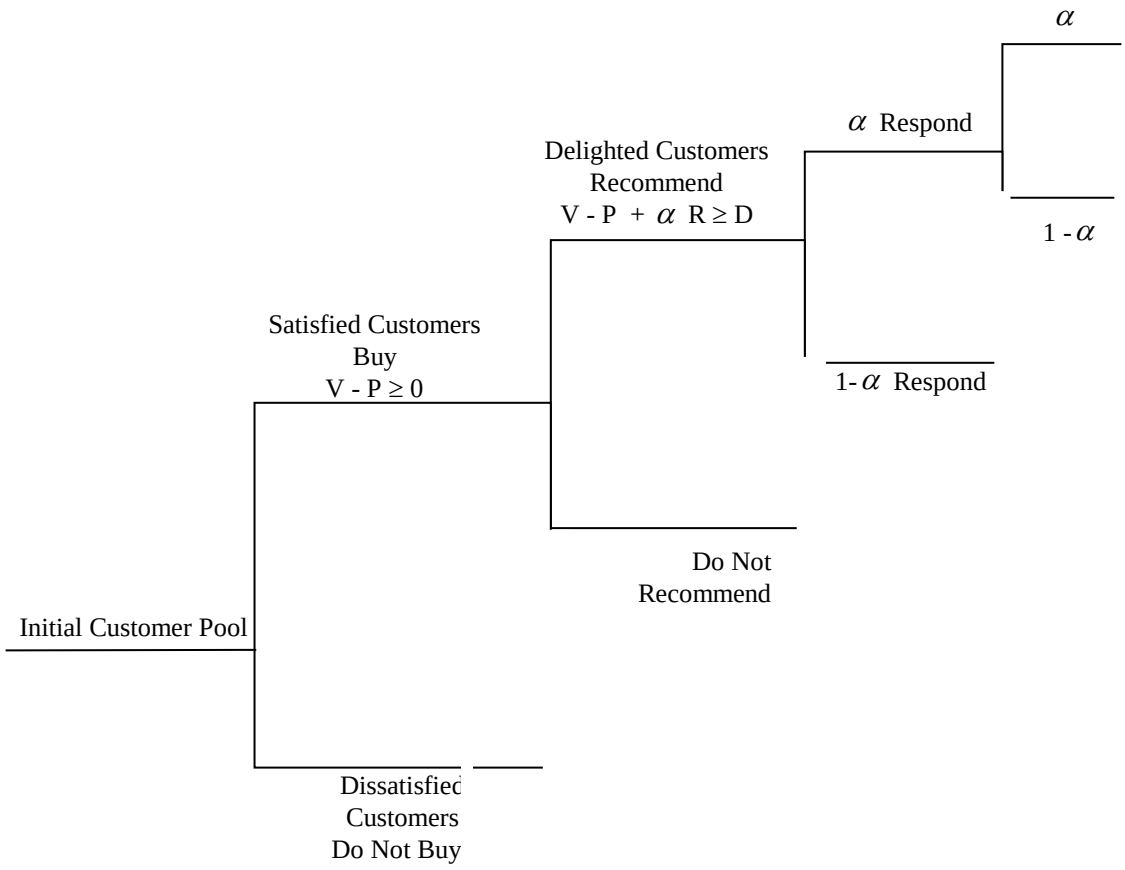
The model

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*. If a consumer buys the product, the seller offers a referral reward, *R*, for referring new customers.

In the model an initial customer ~~that is~~ satisfied with an offer to buy a certain product (i.e., the offer gives the customer nonnegative surplus) will buy it. A customer ~~that is~~ delighted with the purchase (i.e., achieve a high level of surplus) will refer another consumer to the seller (in addition to buying the product). The referred person, in turn, may purchase the product, and, if delighted, will refer another person, and so on. This

~~chain of events~~snowballing effect continues until either one person decides not to buy, or is not delighted, and therefore does not refer another person (see Figure 1).

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 while 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 (the purchase decision): The consumer buys one unit of the product if the offer gives the consumer nonnegative surplus, i.e. if

[1] $V - P \geq 0$.

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 [1] that the probability that the "initial consumer" buys is:

[2] Probability of initial purchase = $[1 - F(P)]$

Assumption 3 (the referral decision): The initial consumer will recommend the product to another person after purchase if 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 customers, and therefore to motivate the customer to recommend the product. We refer to D as the "delight threshold parameter".[1]

The expected surplus from buying and referring consists of the surplus from buying the product itself (Eq. 1), and the expected reward from any referral reward by the seller. After a purchase, the seller may offer the customer a reward, *R*, if the customer refers someone who buys the product.

The customer's decision to refer another customer is a function of the perceived utility from the product and the reward. Combining these benefits from the transaction, implies that the referral reward cannot be the sole reason for recommending the product and a person may not recommend even with a high reward, if 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 want to act dishonestly [this is an assumption—is there any proof for it? Any sources, perhaps?], even for a referral reward. Moreover, if recommendations are dishonest, in the long run consumers will ignore them, and referrals will not occur (i.e, in equilibrium referrals should be credible.)

Referred customer behavior

Assumption 4 (conversion rate): A referred customer will buy the product with probability α. The conversion rate α, is known to the consumer and to the seller.[2]

[1] The reason that customer behavior changes once a threshold is passed is well established in the literature on the behavioral consequences of service quality (e.g., Zeithaml, Berry and Parasuraman 1993, 1996; Coyne 1989). Passing a satisfaction threshold has behavioral consequences such as changes in willingness to pay, loyalty and the intentions to spread of WOM. While there might be different views regarding the exact nature and labeling of these "tolerance zones" effects (see Zeithaml, Berry and Parasuraman 1996) the basic idea of behavioral zones has been supported in most studies in this area.

[2] It is possible that a number of referred customers would have bought the product anyhow. For simplicity we normalized this number to be zero. The nature of our results will not change as long as the probability

Assumption 5 (customer delight): A referred customer who buys the product is also delighted with the purchase.

Assumption 6 (number of referrals): Each buyer may refer only one consumer.[3]

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 4 that the expected reward from referring is αR, and the initial customer refers another customer if:

[3] $V - P + \alpha R \geq D$.

It follows from Equation [3] that the unconditional probability of the initial customer making a referral is

[4] $[1 - F(D + P - \alpha R)]$.

Thus, the probability that the seller will make a second sale (due to 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 than based on assumption 6 that the expected number of buyers from referrals is equal to sum of the geometric series

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

[5] *REFERRED* BUYERS $= \frac{\alpha}{1-\alpha}(1 - F(D + P - \alpha R))$

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that a referred customer would buy anyway is identical across consumers. The conversion rate α can be constructed to exclude those who would buy anyway.

[3] Note that the buyers' decision to make a referral, and the sellers' pricing and reward decisions are independent of the total number of referrals a customer makes. This is because the seller cannot identify in advance which customer is likely to make many referrals. Therefore we can normalize the number of referrals by each buyer to one.

The seller's expected profit is: [4]

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

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 [5] multiplied by the price less the referral award). A higher price would result in a higher profit margin, but the probability that the initial customer will buy, and the expected number of referred customers will decrease. A higher reward reduces the profit margin from referrals, but it increases the expected number of referrals.[5]

The seller's decision problem is

$$[7]\quad \underset{P,R}{Max}\ \ \Pi(P,R) \quad s.t.\ P \geq R \geq 0$$

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

Optimal Reward Programs

In this section we solve the decision problem [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 to the case when the seller accounts for referrals but does not use a referral reward. To obtain closed form solutions,

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

we will solve this problem for the case of F(V) distributed uniformly between zero and one.[6]

Case I: The Myopic Seller

Consider a seller who ignores the effect of referrals on profits. The seller selects P to maximize the profits 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. The seller selects *P* to maximize profits taking into account the potential profits from referrals. However, no referral rewards are offered (*R=0*). The optimal price and profit expressions are given in the middle section of Table 1. Figure 2 plots the relationship between the optimal price and the delight threshold parameter. Note that, initially, the optimal price decreases with *D* because a lower price is required to delight customers as the threshold level D increases. Reducing price in order to induce referrals is only profitable as long as *D* does not exceed $\frac{1-\sqrt{1-\alpha}}{\alpha}$. Above this point the price reduction required to motivate referrals is so large that the added profits from referral is insufficient to cover the losses from lower margins.

Figure 2: Pricing with Referrals (No reward)

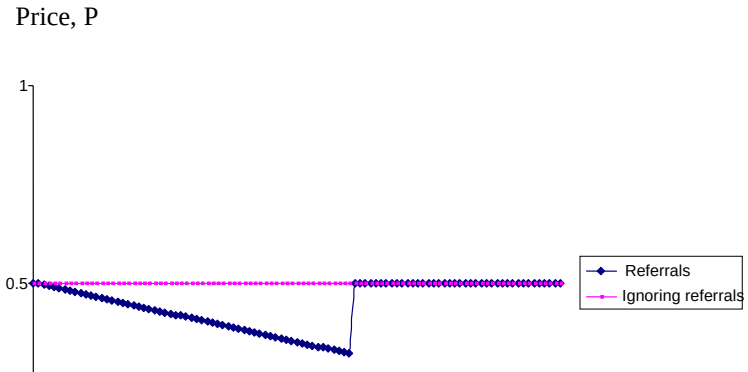

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Table 1: Optimal Price, Reward and Profit as a Function of Delight Threshold (Fixed α)

Referral strategy	Range of D	Price, p^*	Reward, R^*	Profit, π^*
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	$\frac{(1-\alpha D)^2}{4(1-\alpha)}$
	$\left[\frac{1}{\alpha+2}, \frac{\alpha+1}{2}\right]$	$\frac{1+D}{\alpha+3}$	$\frac{(2+\alpha)D-1}{\alpha(\alpha+3)}$	$\frac{1-D(1+\alpha-D)}{(\alpha+3)(1-\alpha)}$

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

	$\left(\frac{\alpha+1}{2},\ 1\right]$	$\frac{1}{2}$	0	$\frac{1}{4}$

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

Result 1. *Compared to the myopic case,* w*hen the effect of referrals is recognized, and as long as the delight threshold parameter, D, does not exceed* $\frac{1-\sqrt{1-\alpha}}{\alpha}$ *:*

(a) Profit is higher.
(b) Price is lower.

In essence the seller faces a tradeoff between two alternatives: The first is increasing margins through a high price and thus decreasing referrals, and 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.

Result 2. *When the seller motivates referrals through low prices, price decreases as:*
(a) *The delight threshold parameter, D, gets larger.*
(b) *The conversion rate,* α*, gets larger.*

Result 2 refers to the range of D in which lowering the price to get more referrals is profitable. In this range, a larger value of *D* means that customers are more reluctant to refer other customers, and therefore the price reduction necessary to motivate referrals increases. A larger reduction in price is also offered when the conversion rate, α, is larger, because a larger α implies higher returns from referrals.

Note that the seller is uncertain whether the reduced price is sufficient to create a referral, because some customers would buy at the reduced price, but will 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 reward is conditioned on actual proof of referral. Next we explore how a seller can optimally use such referral rewards.

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 [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 3 and 4):

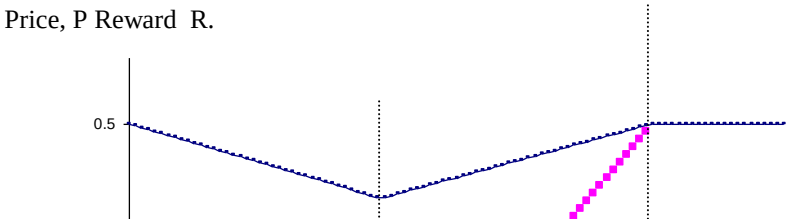
Result 3. *The optimal mix of price and referral rewards falls into three regions:*

(a) Referral rewards are not offered, and price is lower (compared to the price of a myopic seller) for D smaller than $\frac{1}{\alpha+2}$.

(b) Referral rewards are offered, and price is lower (compared to the price of a myopic seller) for D between $\frac{1}{\alpha+2}$ *and* $\frac{\alpha+1}{2}$.

(c) Referral rewards are not offered, and price is identical to the price of a myopic seller for D larger than $\frac{\alpha+1}{2}$.

Figure 3: Optimal Price and Reward



Result 3 shows that a seller will use a low price to motivate referrals when *D* is low, and 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 to motivate referrals: low price and referral rewards. Lowering price the seller "kills two birds ~~in~~ 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.) On the other hand, some-times rewards will be given to customers who would have recommended

anyhow. The lower *D* is the more pronounced this effect becomes, and therefore motivating referrals through rewards becomes less attractive.

As a result when *D* is low (smaller than $\frac{1}{\alpha+2}$) and buyers are likely to recommend the product anyhow, referral rewards are not profitable, and it is better to use only low price to gain more customers.

When D is large enough (D> $\frac{1}{\alpha+2}$), the optimal strategy is to combine a low price with a referral reward. At 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 $\frac{\alpha+1}{2}$), referral rewards becomes so expensive that they are no longer profitable. In fact at D= $\frac{\alpha+1}{2}$ the optimal price P is equal to the referral reward R, and so beyond this point the seller loses money on each reward given. Also, lowering the price is not profitable because consumers are so demanding and the extra profit from referrals will be lower than the profit lost from lowering the price to everyone. Thus, the seller decides to ignore referrals.

Figure 4: Profit under Different Referral Motivation Approaches (Exogenous Case)

Result 4. *When the seller motivates referrals through rewards, the reward increases as:*

(a) *The delight threshold, D, gets larger.*

(b) *The conversion rate, α, 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 α: when the conversion rate, α, gets smaller, the expected compensation (αR) decreases, and the probability of creating customer delight (and referral) decreases. To counteract the lower expected compensation the seller increases the reward.

Result 5. *Compared to the myopic case, price is lower even if 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.

Endogenous Referred Customer Behavior

So far, we have assumed that the behavior of referred customers is exogenous, with the conversion rate, α, fixed, and that every referred customer who buys is also delighted. However, the referred customer's behavior may depend on the price and referral reward offered by the seller. We now explore how the endogenous nature of referred customer behavior affects firms' decisions. We 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 the previous model.

Here, we assume that a referred customer makes decisions whether to buy, and recommend the same way the initial customer makes those decisions (essentially this assumption requires that each customer is an independent sample from the same population) [This sounds strange: you are recommending how customers make decisions]. Thus, a referred customer will buy the product if the surplus from buying is nonnegative, i.e. condition [1] holds. As before, a customer makes a recommendation if the expected surplus from buying and recommending exceeds the delight threshold, D (see [3]). However, in contrast to the previous model, the probability of converting a referred consumer to a buyer (α) is endogenous. Since condition [1] determines whether a referred customer will buy the product, α becomes

[8] *Endogenous conversion rate* $\alpha = 1 - F(P)$.

Therefore, condition [3] for customer delight is replaced with

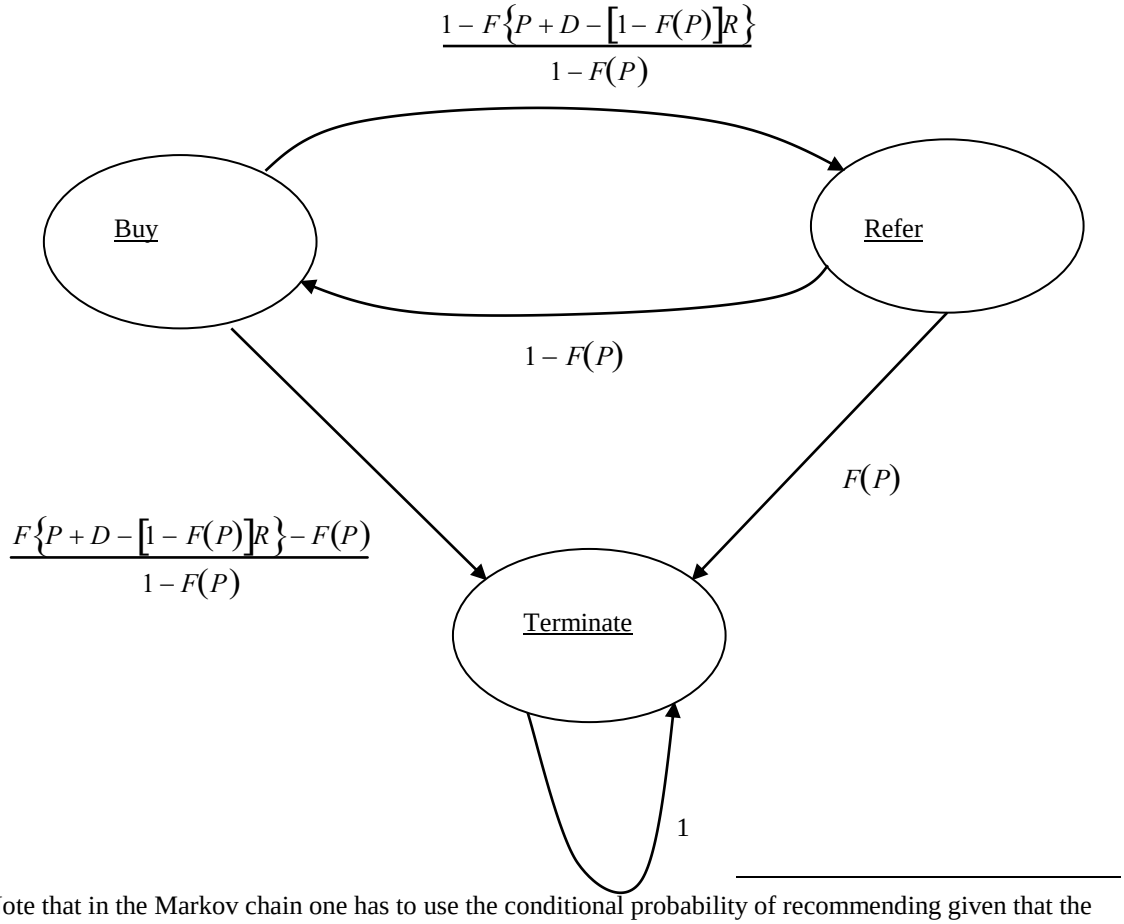
[9] *Condition for customer delight* $V - P + [1 - F(P)]R \geq D$.

It is convenient to represent the process of buying and referring as a Markov chain (see Figure 5), 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."[7] Note that 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,

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

Figure 5: Referral Chain Model



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

The number of times the process will be in the "buy" state has a geometric distribution with mean $\frac{1}{1-f_{buy}}$.[8] Therefore, the expected number of customers (including the initial customer) is[9]

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

And the expected profit is

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

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 2, and plotted in Figure 6 (price and reward), and Figure 7 (profit).

Table 2: Optimal Price, Reward, and Profit as a Function of Delight Threshold (Endogenous α)

Referral strategy	Range of D	Price, p^*	Reward, R^*	Profit, π^*
Myopic	[0, 0.5]	$\frac{1}{2}$	N/A	$\frac{1}{2}\left(\frac{1}{1+2D}\right)$

[8] Ross 1993, pg. 145.
[9] The initial probability of being in the buy state is 1-F(P), i.e. the probability that the initial customer decides to buy.

	(0.5, 1]	$\frac{1}{2}$	N/A	$\frac{1}{4}$
No-Referral Reward	[0, 0.5625]	$\sqrt{D}\cdot\sqrt{1+D}-D$	N/A	$1+2\left(D-\sqrt{D}\cdot\sqrt{1+D}\right)$
	(0.5625, 1]	$\frac{1}{2}$	N/A	$\frac{1}{4}$
Referral Rewards	$\left[0, \frac{1}{3}\right)$	$\sqrt{D}\cdot\sqrt{1+D}-D$	0	$1+2\left(D-\sqrt{D}\cdot\sqrt{1+D}\right)$
	$\left[\frac{1}{3}, \frac{3}{4}\right)$	$\frac{\sqrt{D}}{\sqrt{3}}$	$\frac{2D-\sqrt{3}\cdot\sqrt{D}(1-D)}{(3-D)}$	$1+D-\sqrt{3}\cdot\sqrt{D}$
	$\left[\frac{3}{4}, 1\right]$	$\frac{1}{2}$	0	$\frac{1}{4}$

As in the original model, we find that it is profitable to offer referral rewards and lower price to motivate referrals. Again, we can observe three distinct regions: referral rewards are not offered, and price is lower compared to the myopic case, when *D* is smaller than 1/3. Referral rewards are offered, and price is lower, when *D* is at middle levels (between 1/3 and 3/4). Referral rewards are not offered, and price is identical to the myopic case, when *D* is greater than 3/4.

Figure 6: Price and Reward in the Endogenous Case

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 6). In the exogenous case the expected profit from referred customers is fixed (because their purchases and referrals do not depend on the sellers actions), so lowering 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 is decreased. 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 in order to delight the referred customers. As *D* gets larger it is harder to delight the referred customers (not only the initial customer) and therefore the expected profit from referrals becomes smaller. As a result, the sellers' motivation to lower price in order to delight referred customers diminishes, and price increases as *D* gets larger.

Figure 7: Profit under Different Motivation Approaches (Endogenous Case)

Summary and Practical Implications

In referral reward programs, a customer is paid for referring buyers. Referral rewards have very appealing qualities, which make them a risk-free managerial tool: "pay for performance" ~~–~~-- a reward is given only if another person acts on the recommendation~~, and therefore it is a risk-free managerial tool~~. Yet, even though these programs have been growing in recent years, ~~there are many situations in which they are not used~~they are not used in all situations. Our analysis indeed shows that even when a company wants to motivate referrals, it may elect not to use referral rewards.

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 to ask what tools should be used, and when to emphasize one tool 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) [is this what you mean by "picky" in the beginning?]. Low price motivates more people to purchase

and also increases referrals. However, if consumers are very hard to delight, lowering the price may create a "free riding" problem where many consumers enjoy the low price but do not recommend. In contrast, the seller gives rewards only to those who induce purchase by others, so the free riding problem disappears. 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 relationship between price and referral reward ~~d~~ falls into three regions~~.~~: 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. As the delight threshold gets higher in this region, price should be higher (to ~~battle~~ combat the free riding problem) and the rewards should be raised (to convince hard-to-~~-~~delight customers to recommend). ~~At a further point, where~~Furthermore, when the delight threshold becomes too high, 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 also contributes to the literature on pricing, which has traditionally focused on investigating optimal pricing without explicitly considering the impact of referrals on profits. We have shown that a monopolist who realizes the profit potential from leveraging on referrals will set a lower price compared to a myopic seller who ignores referrals. Thus our model provides more evidence on how concentrating on the value of customer relationships benefits both the seller and the consumer.

To implement a customer referral program, managers need to assess the customers' delight threshold. One approach is to use intentions to recommend questions, a method used in a number of marketing studies (Boulding et al. 1993; Zeithaml, Berry, and Parasuraman 1996). Naturally, the ability to delight customers is related to their past experience with the firm's and competitors' products (Rust and Oliver 2000). It is also affected by the nature of the product and behavioral characteristics such as the consumer's self esteem (Schneider and Bowen 1999). Since the behavioral foundations and managerial importance of delight are just being explored, future research is needed to guide managers on how to assess their ability to profitably delight customers, and design appropriate referral strategies.

Managers also need to understand the nature of the conversion of a referral into an actual buyer. As we have seen, a higher conversion rate α is related to the ability of consumers to influence other consumers. Past research provides some indication on the factors that affect reliance on WOM. For example, for new products, high level of risk or high price can be related to the level of reliance on recommendations (Rogers 1995). The intangibility of services can drive WOM seeking (Murray 1991). Cultural norms can also play a significant role in the influence of recommendations (Buttle 1998). Consumers' susceptibility to interpersonal influence may also be a trait that varies across consumers (Bearden, Netemeyer, and Teel 1989). Managers can start to assess the importance of referrals by investigating the reliance of their current customers on WOM, and based on that make more informed decisions on the applicability of referral strategies.

Limitations and future research

Considering first assumption 3 that captures the referral mechanism, a referral is assumed to be a function of the total perceived value from the transaction, which includes both the value from the product and the reward. This approach follows the many findings that tie WOM level 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, however, may lead to recommendations even when the value from the product is very low. As mentioned before, this behavior is inconsistent with equilibrium.

One could also assume heterogeneity across consumers in the threshold requirement for customer delight. In this case, a seller may still find it profitable to use referral rewards if the majority of consumers have threshold levels that are not too high and not too low. To increase the efficiency ~~or~~ of the referral program, a seller could try to target these customers for referral rewards, for example through a questionnaire.

Considering assumption 4 regarding the conversion rate α, 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 if the average conversion rate is not too small. We have shown that the main result of the paper does not change when the conversion rate is endogenous.

Considering assumption 6, that a buyer may refer only one consumer, referral rewards are likely to be even more profitable if a delighted consumer refers several consumers. In that case, the referral reward region in Figure 1 will become larger.

We did not examine the advertising expenditure needed for customer acquisition, and 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 costs is low enough compared to the net profits from referrals. A more general marketing issue relates to the use of large-scale promotion 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 effect the use of referrals, namely the values of D and α. Comparing the two alternatives is an important topic for future research.

In our model, a reward is given for direct referrals only —no rewards are given to a customer for buyers referred by the original customer's referral. A system that rewards consumers for indirect referrals is similar to that found in network marketing organizations (Coughlan and Grayson, 1998). Studying this system would be another interesting topic for future research.

Is there a bright future to referral management? Recent technological advancement, especially on the Internet, make it much easier and cheaper 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 can be seen in 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 percent 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.

[Take a look, too, at sixdegrees.com, which is based on having all of your friends and your family signed up to this free chat/ web database, which is in itself enhanced through special offers by resellers, etc.. This might even have been the original referral internet site.]

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