

## **The Current and Future Sales Impact of a Retail Frequency Reward Program**

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### **ABSTRACT**

This research presents an empirical study of the impact of a retail frequency reward program on store sales. We examine both the “points-pressure,” or short-term impact, and the “rewarded behavior,” or long-term impact. The points-pressure impact is due to forward-looking customers increasing their purchase levels in order to earn the reward. The rewarded behavior impact is evidenced as purchases above baseline levels after an individual has received a reward and could result from either behavioral learning reinforcement or positive affect resulting from the reward. We investigate a turkey reward program that awarded free turkeys to shoppers who accumulated the required sales levels during an 8-week period. We find both a points pressure and rewarded behavior impact. These effects are statistically significant and managerially relevant in that the program is apparently profitable. The points pressure impact is especially strong among customers who do not place value on frequent shopper programs that in general deliver immediate price discounts. The key implications are that frequency reward programs of the form, “buy x, then receive xx” can be profitable, are segmentation strategies, and can complement a store’s overall frequent shopper program.

# **The Current and Future Sales Impact of a Retail Frequency Reward Program**

## INTRODUCTION

Frequency reward programs have become significant marketing activities for many companies. Airlines reward travelers with free flights after they have accumulated a required level of travel miles. Hotels reward their customers with free rooms after they've stayed at the hotel a certain number of nights. Bookstores award free merchandise to customers who have purchased a requisite number of books. The common thread is that frequency reward programs provide a tangible benefit to customers for repeatedly purchasing the company's product(s).

The benefits and costs of reward programs are debated in the literature. On the plus side, reward programs are seen as powerful mechanisms for increasing sales or brand loyalty (Kopalle and Neslin 2003). On the negative side, reward programs can be costly, complex, and precipitate significant competitive response (Dowling and Uncles 1997; Kopalle and Neslin 2003).

Fundamental to sorting through these trade-offs is the question, "What is the sales impact of frequency reward programs?" While there is a rich theoretical literature on the economics of these programs (driven by the sales impact) (Kim, Shi, and Srinivasan 2001; Beggs and Klemperer 1992; Kopalle and Neslin 2003), there is less empirical study of the sales impact itself (Lewis 2004; Bolton, Kannan, and Bramlett 2000; Bell and Lal 2002; Drèze and Hoch 1998).

What makes the sales impact question particularly intriguing is that reward programs can increase sales through two mechanisms: "points pressure" and "rewarded behavior." The points pressure mechanism is the short-term impact, whereby customers increase their purchase rate in an effort to earn a reward. The rewarded behavior mechanism is the long-term impact, whereby customers increase their purchase rate after they've received the reward. If reward programs

have a points pressure impact but no reward behavior impact, they function essentially as multi-period, but still episodic, promotions (Kopalle and Neslin 2003). If however, there also is a rewarded behavior effect, frequency reward programs can be a strategic tool for building the brand. It is therefore important to understand the relative contributions of these mechanisms to the overall sales impact of a particular reward program.

The purpose of this paper is to measure the short-term (points pressure) and long-term (rewarded behavior) effects of a frequency reward program. The setting is a “Turkey Reward Program” implemented by a supermarket chain. We investigate two executions of the program over a two-year period. Indeed, we find evidence for both points pressure and rewarded behavior impacts, and evidence that these impacts are related to customer characteristics.

The rest of the paper proceeds as follows. First we elaborate on our framework and discuss previous research. Second we describe our method, including the research setting, the design of the turkey reward program, and data collection. Third we describe our analysis and results. We conclude with a discussion of implications for both researchers and practitioners.

## FRAMEWORK

Figure 1 depicts the points pressure and rewarded behavior impacts. Period A is the customer’s baseline purchase rate. In Period B, the customer might increase his or her purchase rate in order to meet the requirements for a reward. The customer then might receive a reward at the end of Period B depending on his or her purchase level during that period. The potential long term impact of the reward is evidenced in Period C. This purchase level could be equal to the baseline, which would mean no rewarded behavior effect, or anywhere above that rate.

[Figure 1 Goes About Here]

The situation is similar to that depicted by Dekimpe and Hanssens (1999) in terms of “business as usual” and “hysteresis” (p. 399). If there is no rewarded behavior effect, we have business as usual, as purchase rates return to normal after the promotion. A rewarded behavior effect suggests possible hysteresis. Dekimpe and Hanssens portray hysteresis as a permanent change in behavior. While we cannot guarantee the effect is permanent, the main point is that the rewarded behavior effect operates for some time *after* the consumer receives a reward (in our case, we measure the effect for four weeks).

The simple effects portrayed in Figure 1 are idealizations. There is no guarantee they operate linearly. Indeed, the dynamic rational models discussed in the next section include non-linear discounting of future utility. For this reason, we do not analyze the data on a week-to-week basis, but in terms of average purchase rates measured in periods A, B, and C.

#### The Points Pressure Effect

A points pressure effect could be produced by a combination of customer switching costs and future orientation. The customer does not want to patronize a different retailer and lose the opportunity to build his or her points total. This produces a switching cost in the form of a foregone opportunity to build up sales levels (points) toward earning the reward. In order for the customer to care about this opportunity cost, he or she must be future oriented, i.e., care about the future reward to be gained by accumulating points. In this way, switching costs and future orientation impel the customer to increase spending during Period B in Figure 1.

These factors have been formalized in dynamic rational models, where reward programs “try to change the customer’s choice process from operating in a spot market to operating in a multi-period, contractual relationship market” (Dowling and Uncles 1997 pp. 78-79). Kim, Shi,

and Srinivasan (2001), Lewis (2004), and Kopalle and Neslin (2003) have formulated dynamic structural models of reward programs. In these models the customer makes a purchase decision in period  $t$  to maximize his or her utility in period  $t$ , *plus* the utility to be expected in future periods due to this decision. The customer realizes that future utility is enhanced by the reward, and that he or she needs to accumulate the required sales levels or “points” to earn it. This creates the points pressure: to increase purchases until the reward is earned.

Drèze and Hoch (1998) examined a category destination program that awarded a gift certificate after a required number of purchases. They found that category sales of baby-related products increased during the program. Lewis (2004) estimated a dynamic structural model for an online retailer who awarded frequent flyer miles to customers who achieved various purchase thresholds. Lewis found that this program increased purchase rates as customers built up their sales totals in anticipation of the reward. Interestingly, he found evidence for market segmentation, in that some customers had the future orientation to drive the points pressure effect, while others did not. In a working paper, Bell and Lal (2002) investigated a series of frequency reward programs in a retail supermarket. They found that sales during the reward program period (Period B in Figure 2) increased. Interestingly, infrequent users at the store generated the profits while the program had little impact on frequent users.

### The Rewarded Behavior Effect

The rewarded behavior effect can be produced either by behaviorist or cognitivist processes. Behavioral learning posits that rewarded behavior is more likely to persist (see Blattberg and Neslin 1990, Chapter 2, and Rothschild and Gaidis 1981 for discussion of the theory in a promotions context). To the extent that store patronage is rewarded (i.e., by a reward

program), re-patronage is likely to persist. The time sequence of behavioral learning fits reward programs quite well. The organism must first perform the behavior, then receive the reward, and then repeat the behavior. Behavioral learning assumes no inner mental processing by the organism. Behavioral learning is not due to active reasoning (e.g., “It was nice to receive this reward; therefore, I’ll use this product again.”). Instead, the organism becomes conditioned to repeat the behavior simply because of the coupling of the action with the reward.

From a cognitivist perspective, a reward can increase subsequent purchase behavior if the rewarded customer develops positive feelings toward the store that translate into higher patronage. In terms of the classic attitudinal framework (Engel, Blackwell and Minard 1995, p. 365), rewards produce affect, which increases purchase intentions, which translate into behavior. The ability of rewards or gifts to generate affect has been demonstrated in the social psychology literature (e.g., Ashby, Isen, and Turken 1999; Isen and Daubman, 1984; Isen and Patrick 1983; Isen, Shalcker, Clark, and Karp 1978). There are two paths by which this could translate into higher subsequent patronage. First, Tietje (2002) found that a reward provided by a product-related source could make positive information regarding that product more accessible in memory. This suggests that the rewarded customer would find it easier to remember positive aspects of the shopping experience (see also Kahn and Isen 1993; Isen et. al 1978; Teasdale and Fogarty 1979). Second, positive feelings toward a service experience can lead to higher *satisfaction* and in turn, higher purchase intentions. These steps have been demonstrated by Price, Arnould, and Tierney (1995, Affect => Satisfaction) and Oliver, Rust, and Varki (1997, Affect => Satisfaction => Intention).

Little is known empirically about the effects of reward programs on subsequent consumer behavior. Bell and Lal (2002), in exploring for stockpiling behavior, found evidence for a sales

increase during the redemption period, suggesting a rewarded behavior effect. Bolton, Kannan, and Bramlett (2000) used a customer survey to investigate the reward program of a European credit card company. The reward program enabled the customers to accumulate points by using the card and these points could be redeemed for free gifts. Bolton et al. found that membership in this program was associated with greater customer patience with respect to negative service encounters (possibly because of the positive affect induced by the gifts they received). However, they did not find a direct link to re-patronage levels.

### Individual Differences

In view of potential differences operating at the individual level, we believe it is important to explore potential individual differences in response to the reward program. This is supported by Lewis (2004), who suggests the existence of consumer segments that vary in their response to reward programs, and by Bell and Lal (2002), who found reward programs to be more effective among infrequent users. We will examine individual differences in the magnitude of the points pressure effect, and individual differences in which customers self-select into receiving a reward.

It is difficult to hypothesize *a priori* which individual factors will be important, and what the direction of their impact may be. For example, higher income customers might care less about switching costs and hence might have less of a points pressure effect. On the other hand, high income customers may be more future oriented because they are used to making long-term investments. This would make them more subject to points pressure. We therefore do not advance specific hypotheses and view our investigation of individual differences to be exploratory. We consider the following customer characteristics:

- Price consciousness
- Information seeking behavior
- Importance of card savings/reward programs
- Planning orientation
- Store loyalty
- Shopping enjoyment
- Income

### Contribution of the Paper

The above discussion shows that researchers are beginning to find evidence for a points pressure impact of reward programs and some indication of a rewarded behavior effect. The goal of our paper is to conduct an integral analysis to measure these effects simultaneously and explore the role of several customer characteristics in response to reward programs.

## METHOD

### Study Environment

The study was conducted in a midsize U.S. city. Eight small to medium chains dominated the environment. The test site was one of the larger chains in the area (containing over 25 stores<sup>1</sup>). This chain offered a card program to their customers entitling them to additional saving in the store as well as the opportunity to participate in other store promotions. The chain gathered all transaction data via individually coded identification cards. All ID cards within a household were linked to provide combined household purchase information.

### Description of the Reward Program Promotion

The test chain offered a promotion to participants in their card program in which consumers were given the opportunity to obtain a free turkey or turkey product based upon purchases during an eight-week promotion period. The size of the turkey varied based upon

reaching differing purchase levels. The promotion period ran from the beginning of September to the end of October. The promotion was conducted annually and data were gathered for two different years in which the promotion was offered.

### Data Collection

We collected two types of data, behavioral and self-report. The first phase of the study involved the administration of a mail survey that determined consumers' general feelings about grocery shopping and the amount of shopping conducted in the test chain as well as at other stores in the area. Demographic data were also gathered. The survey was mailed to a random sample of 5500 households who shopped at the test chain. A cover letter to the survey asked that the individual who was responsible for the majority of the grocery shopping in the household complete the survey. Surveys were numbered and coded so that each returned survey could be matched with the address to which it was sent<sup>2</sup>. One thousand seventy seven surveys (20% response rate) were returned of which 1050 were useable.

The second phase of data collection required determining actual customer purchase behavior. Basket item data for one hundred and three weeks following survey administration were gathered for the households who completed the survey. These data included a description of all items in the grocery basket, the corresponding UPC codes, date, time, and store where the transactions took place.

Using household address, the survey responses were merged with the purchase behavior data for survey responders. In order to be included in the final sample, subjects were required to have made at least one purchase during the post promotion period following the second turkey

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<sup>1</sup> Chain/store specifics are intentionally withheld to ensure confidentiality.

promotion. This ensured the elimination of any households who may have left the study during the two years that the purchase data were being gathered. The final sample contained survey responses and purchases for 776 households.

## Measurement

Six-item scales were used to measure both shopping enjoyment and price consciousness (see Appendix 1). We used summations of these measures. An alternative would be to use factor scores. However, one advantage of summated measures is that they are easy to replicate (Hair et al., 1995, pp. 390-391; see also Lehmann et al., 1998, p. 613).<sup>3</sup> In order to determine the subject's propensity to plan and to seek information, subjects were asked to indicate the degree to which they agreed with the following statements; "I generally make a list before going to the grocery store," and "I like to have a great deal of information before I buy." (7-point scale).

The following eight factors: variety, freshness, location, customer service, deals or specials, regular prices, cleanliness, and card savings/reward programs, were listed in the survey. Subjects were asked to rank order the five factors they felt were most important when considering where to buy their groceries. We created a "loyalty card importance" variable equal to 1 if the respondent specified the card savings/reward programs factor, and 0 if not.<sup>4</sup>

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<sup>2</sup> To ensure privacy protection, the test establishment did not supply the names of individual shoppers. Surveys were addressed to "Primary Grocery Shopper."

<sup>3</sup> We also conducted a sensitivity analysis by factor analyzing the 12 items. They factor analyzed cleanly into factors interpretable as "shopping enjoyment" and "price consciousness". The factor scores correlated .97 and .98 with their summated counterparts. We also measured the points pressure and rewarded behavior effects (as described subsequently) and found the results were very similar whether we used the summated or factor scores.

<sup>4</sup> We had measurement problems with this variable because several respondents simply checked boxes rather than rank ordered. We therefore used the simple 0-1 measure, with a one corresponding to whether the respondent had indicated, either through rank order or box check, that loyalty card programs were important.

In order to ascertain the degree of loyalty to the test establishment, subjects were asked to indicate whether they did all of their shopping, most of their shopping, half of their shopping, occasionally shopped at, rarely shopped at or never shopped at the investigated chain.

The final self-report measure included in the analysis was income. Subjects checked one of several boxes ranging from “under \$20,000” to “over \$150,000” to indicate their combined annual household income before taxes.

## RESULTS

### Descriptive Statistics

Table 1 displays descriptive statistics. The two sales figures are for the weeks preceding the first and second-year implementations of the reward program (Period A in Figure 1). They show the average sales level for our sample is \$39.91 per week in Year 1 and \$41.02 in Year 2. Average weekly grocery expenses in the U.S. between 1998 and 2002 were \$87.40 (Food Marketing Institute 2002). That the average weekly sales of our sample are lower than total U.S. weekly expenditures is not surprising. Note that a “2” on the store loyalty scale signifies “I do most of my shopping” at this chain and a “3” signifies “I do half of my shopping” at this chain. Since the average store loyalty is 2.57 (Table 1), average weekly supermarket expenditures and average weekly expenditures at our store correspond well to the U.S. average.

Among customer characteristics, note from the “card importance” variable that 23% of customers evoked the store card savings / reward program as one of five out of nine factors they consider when deciding where to shop. Also, an income of 5.45 corresponds to household income between \$50k-\$59k (Income = 5) and \$60k-\$75k (Income = 6).

[Table 1 Goes About Here]

The two pre-program sales figures are highly correlated. Store loyalty is positively

correlated with sales levels, as is income.<sup>5</sup> There is not much correlation between the customer characteristics themselves. Price consciousness is positively correlated with shopping enjoyment, information search, and card importance, and negatively correlated with store loyalty and income. Planning is negatively correlated with card importance, and shopping enjoyment is negatively correlated with income.

### Points Pressure Effect

We measure the points pressure effect for each year by comparing the average sales levels per customer in the pre-program period (Period A) to the sales levels during the program-period (Period B). To do this, we estimate a random effects regression. We use the random effects approach because we are measuring each customer twice and need to account for the fact that these are not independent observations. We also must control for different sales levels across households. We control for observed differences by including main effects for customer characteristic variables. We control for unobserved differences by including the heterogeneous random effect for each household. We also want to determine if shoppers with different customer characteristics reacted differently to the program, and include interactions between program availability and customer characteristics to answer that question. The model specification is as follows<sup>6</sup>:

$$\text{Sales}_{ij} = \beta_0 + \beta_1 \text{Prog}_j + \sum_{k=1}^7 \delta_k X_{ik} + \sum_{k=1}^7 \theta_k \text{Prog}_j * X_{ik} + \varepsilon_i + \varepsilon_{ij} \quad (1)$$

where

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<sup>5</sup> Recall from Table 1 that store loyalty is coded so that a smaller number means higher loyalty.

<sup>6</sup> Please note there is no adjustment for seasonality because preliminary analysis indicated there was no seasonality. Specifically, we obtained data on monthly supermarket sales in the region where our retailer was located. We then calculated monthly seasonals. We found very little seasonality. The highest monthly seasonal was 1.00249 (for April) and the lowest was .994148 (for June).

- $i$  = 1, . . . , 776 households.
- $j$  = 1, 2 (1 => pre-reward program period; 2 => reward program period).
- $k$  = 1, . . . , 7 labeling the 7 customer characteristic variables.
- $Sales_{ij}$  = Average weekly sales for household  $i$  in period  $j$ .<sup>7</sup>
- $Prog_j$  = 1 if  $j = 2$  (reward program period); 0 if  $j = 1$  (pre-reward program period).
- $X_{ik}$  = Value of customer characteristic  $k$  for household  $i$ . These variables are mean-centered.
- $\varepsilon_i$  = Random effect for household  $i$ .
- $\varepsilon_{ij}$  = Random error for household  $i$  in period  $j$ .

The  $\beta_1$  parameter represents the “main” points pressure effect and the  $\theta_k$ ’s represent interactions with customer characteristics, i.e., whether the points pressure effect differs by customer characteristic. Since the customer characteristics are mean-centered,  $\beta_1$  represents the points pressure effect for the average household, and the  $\theta_k$ ’s represent departures from this average. The  $\delta_k$  parameters represent controls for average sales levels due to observed customer characteristic variables, i.e., higher income households may systematically spend more than lower income households. The  $\varepsilon_i$  random effect controls for unobserved differences in household sales levels.

Equation (1) was estimated using the “Proc Mixed” procedure in SAS. The variance of the household random effect was highly significant ( $p < .0001$ ) indicating that indeed there were differences in normal household spending levels in addition to those captured by the customer characteristic variables.

Table 2 shows the estimated coefficients for Years 1 and 2. We show two models: a

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<sup>7</sup> For  $j = 2$ , the reward program period, the average sales level is over 8 weeks, the length of the reward program period. For  $j = 1$ , the pre-program period, average sales were over three weeks for the first year (because this brought us back to the beginning of the data) and seven weeks for the second year (because we then had a longer baseline period available).

“fully specified” model that includes all variables, and a “reduced” model that includes only the variables that achieved a t-statistic greater than 1 in the fully specified model.<sup>8</sup> In this case, the coefficients, as well as their significance levels, are similar between the fully specified and reduced models.

[Table 2 Goes About Here]

The first and most important result in Table 2 is a significant points pressure effect of \$2.44 for year 1 and \$2.61 for year 2. With baseline sales levels of \$39.91 per customer in year 1 and \$41.02 in year 2 (see Table 1), this amounts to a 6.1% weekly sales gain for year 1 and a 6.4% sales gain for year 2. That is, the reward program increased sales per household during the 8-week reward program period by an average of 6.1% in year 1 and 6.4% in year 2.

The interactions are not strongly significant. However, quite interesting is the negative interaction involving card importance. Although the result is not highly significant, it appears consistently in both years.<sup>9</sup> The negative sign means that households that ascribed high importance to reward program savings were subject to a lower points pressure effect. At first this appears counter-intuitive because one would think households who value reward program savings would be highly responsive, not unresponsive, to the turkey reward program. However, the result could be due to the short-term manner in which frequent shopper cards are currently implemented, that is, to deliver immediate discounts. Our results suggest that households that value the short-term savings provided by frequent shopper cards may not be motivated by future oriented promotions such as the turkey reward program.

Note that the main effects of many of the customer characteristic variables, representing observed heterogeneity in purchase levels, are significant. Sales are higher for households that

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<sup>8</sup> For an OLS regression model, adding an independent variable to a model will decrease the standard error of the estimate only if its t-statistic in the new model is greater than one (Plane and Oppermann 1981, p. 380).

are not price conscious but have higher incomes and are loyal to the supermarket in question. Planning is significantly positively associated with sales in Year 2, and marginally significant in Year 1 ( $p=.147$ ). The main effects for the other psychographic variables are not significantly related to sales levels. These results are consistent with the correlations shown in Table 1.

### Rewarded Behavior Effect

The rewarded behavior effect proposes that households who redeem rewards will generate higher sales post-redemption than they would have had they not redeemed the reward. Our strategy to measure this is a “before-after with one control group” analysis (Lehmann et al., 1998, p. 156). We first calculate the difference between rewarded customers’ weekly sales rates after they received a reward and their baseline sales rates before the turkey promotion. We then calculate the same difference for non-rewarded customers. Finally we subtract the non-rewarded customer difference from the rewarded customer difference as an estimate of the rewarded behavior effect.

To generate the “control group” sample of non-rewarded customers, we first divided rewarded customers into seven groups depending on the week in which they redeemed their reward (see Appendix 2 for details). Next, we selected non-rewarded customers who had average baseline sales within \$9 of the baseline for at least one of the rewarded customer groups.<sup>10</sup> We assigned each non-rewarded customer to the rewarded customer group whose baseline was closest to their baseline. The procedure netted 66 non-rewarded customers in Year 1 compared to 150 rewarded customers, and 121 non-rewarded customers in Year 2 compared to

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<sup>9</sup> Note also that the weak statistical significance could be due to the measurement problems described in Footnote 4.

<sup>10</sup> The \$9 was chosen to reach a reasonable compromise between the desire to find enough non-rewarded customers to serve as a control and the desire to make them as close as possible to the rewarded customers in terms of baseline sales.

153 rewarded customers. The average weekly baseline sales levels were \$86 (rewarded) versus \$81 (non-rewarded) for Year 1 and \$89 (rewarded) versus \$73 (non-rewarded) for Year 2. The non-rewarded customers have lower baseline sales levels than the rewarded customers, but far closer than if we had randomly selected non-rewarded customers.

We must also control for the fact that customers self-select into rewarded versus non-rewarded groups. Selection biases occur whenever individuals decide first whether to participate in a program and the analyst is interested in their behavior once they are participating. If the behavioral model leaves out factors that are correlated with the decision to participate, the inferences from the behavioral model can be biased. In our case, customers self-select into rewarded versus not rewarded groups. We wish to examine the impact of this decision on sales of both groups. We use a switching regression analysis to control for potential selectivity bias (Maddala 1983, pp. 223-227; 260-264). The model consists of a Probit model to predict whether a customer will be rewarded or not rewarded, and a baseline regression model to predict sales relative to the customer's baseline after this decision. The analysis is as follows:

*Probit Redemption Model:*

$$D_i^* = \delta_0 + \sum_{j=1}^J \delta_j X_{ij} + \eta_i \quad (2)$$

Customer  $i$  rewarded if  $D_i^* > 0$

Customer  $i$  not rewarded if  $D_i^* \leq 0$

Where:

$D_i^*$  = Household  $i$ 's unobserved latent utility for being rewarded.

$X_{ij}$  = Value of customer characteristic variable  $j$  for customer  $i$ . Each variable was mean-centered.

$\eta_i$  = error term for customer  $i$  in modeling latent utility for being rewarded.

$\delta_0, \delta_j =$  Probit parameters to be estimated.

We can then define:

$D_i = 1$  if customer  $i$  is observed to be rewarded (i.e., if  $D_i^* > 0$ )  
 $= 0$  if customer  $i$  is observed to be not rewarded (i.e., if  $D_i^* \leq 0$ )

This means that the probability customer  $i$  is rewarded is  $P(D_i = 1) = P(D_i^* > 0)$ .

*Baseline Regression Model:*

$$Sales_{ip1} = \beta_0 + \beta_1 Baseline_i + \varepsilon_{1i} \quad (\text{if customer } i \text{ rewarded}) \quad (3a)$$

$$Sales_{ip0} = \beta'_0 + \beta'_1 Baseline_i + \varepsilon_{2i} \quad (\text{if customer } i \text{ is not rewarded}) \quad (3b)$$

Where:

$Sales_{ip1} =$  Sales per week for rewarded customer  $i$  in the 4 weeks after redeeming the customer's reward for a free turkey.

$Sales_{ip0} =$  Sales per week for non-rewarded customer  $i$  in the 4 weeks after the rewarded customers with whom this customer is matched redeemed their reward.

$Baseline_i =$  Average weekly sales level for customer  $i$  during the period before the reward program (Period A in Figure 1).

$\beta_0, \beta_1, \beta'_0, \beta'_1$  Parameters to be estimated

$\varepsilon_{1i}, \varepsilon_{2i} =$  Error terms influencing sales levels of rewarded and non-rewarded customers.

We assume the error terms follow a multivariate normal distribution as follows:

$$\left. \varepsilon_{1i}, \varepsilon_{2i} \right\} \sim MVN \text{ with covariancematrix } \begin{Bmatrix} 1 & \rho_{12} & \rho_{21} \\ \rho_{12} & \sigma_1^2 & \rho_{12}\sigma_1\sigma_2 \\ \rho_{21} & \rho_{12}\sigma_1\sigma_2 & \sigma_2^2 \end{Bmatrix}$$

The model is estimated using maximum likelihood (Greene 1998). After estimation, post-redemption sales can be predicted using the following equations:

$$Sales_{ip1} = \hat{\beta}_0 + \hat{\beta}_1 Baseline_i + \hat{\rho}_1 \hat{\sigma}_1 (\phi / \Phi) \quad (\text{rewarded customers}) \quad (4a)$$

$$Sales_{ip0} = \hat{\beta}'_0 + \hat{\beta}'_1 Baseline_i + \hat{\rho}_2 \hat{\sigma}_2 (-\phi / (1 - \Phi)) \quad (\text{non-rewarded customers}) \quad (4b)$$

where the hats signify estimated coefficients, and

$\phi$  = The standard normal distribution evaluated at  $\hat{D}_i^*$  ( $\hat{D}_i^*$  calculated from the estimated Probit equation).

$\Phi$  = The cumulative standard normal distribution evaluated at  $\hat{D}_i^*$  ( $\hat{D}_i^*$  is calculated from the estimated Probit equation).

Note that there are three relevant sales levels in this analysis (see Figure 1). Baseline is the customer sales level before the reward program begins. We use this as the “before” in the before-after analysis. Sales during the reward program ( $Sales_{ij}$  in equation (1)) are used to determine if the customer is eligible for a reward. Sales after the reward is the variable we study to determine the rewarded behavior effect ( $Sales_{ip1}$  for rewarded customers and  $Sales_{ip0}$  for our matched sample of non-rewarded customers). Note also that all customers with frequent shopper cards were automatically enrolled in the program. In order to obtain a reward, the customer needed to decide whether to obtain a frequent shopper card, whether to spend enough to earn a free turkey, and given that he or she earned the turkey, whether to “cash in” and receive the turkey. Our analysis summarizes the impact of progressing through all of these decisions, up to and including receiving the turkey, on subsequent sales levels.

Table 3 displays the estimation results. We first examine the Probit model, which reveals the type of customer attracted by the reward. In Year 1, the reward attracts price conscious but not store-loyal customers. In Year 2, the reward attracted a less well-defined group. The only variable marginally significant in the Year 2 Probit is “Search,” indicating that the reward attracted customers who like to accumulate a lot of information before making a decision. One

interpretation of these results is that in Year 1, the reward served as a cue and attracted price conscious but low need-for-cognition customers (Inman, McAlister, and Hoyer 1990; note the Search variable is negatively signed), whereas in the second year, it only attracted customers who were convinced it was a good “deal” (the “high NFC’s” in Inman et al.’s characterization).

Our estimate of the rewarded behavior effect was calculated using the bootstrap method (Efron 1979). There were two reasons for bootstrapping: First, it provides standard errors for the switching regression predictions, where the usual OLS standard error of the estimate cannot be applied. Second, it is not appropriate to substitute mean values into the calculation, because the switching regressions are nonlinear due to the selectivity bias terms, and the mean of a nonlinear function does not equal that function evaluated at its means.

Our point estimate of the rewarded behavior effect is the average of  $\hat{Sales}_{ip1} - Baseline_i$  for rewarded customers minus the average of  $\hat{Sales}_{ip0} - Baseline_i$  for non-rewarded customers. We calculate this quantity for 1000 random draws of the baseline regression and probit parameters, drawn from the estimated distribution of these parameters provided by the MLE estimation. This provided bootstrapped estimates of the mean change and its standard error. The results were as follows:

	Rewarded Customers		Non-Rewarded Customers		Net Incremental Impact	
	Mean Change	Standard Error	Mean Change	Standard Error	Mean Difference	Standard Error
Year 1	\$16.07	\$3.98	\$-0.88	\$9.58	\$16.95	\$10.49
Year 2	\$10.41	\$3.20	\$-0.94	\$3.25	\$11.36	\$4.76

The results show that rewarded customers exhibited an average increase in weekly sales over their baseline of \$16.07 in Year 1 and \$10.41 in Year 2. The change in sales levels for non-rewarded customers was not significantly different from zero in both years. These results have

high face validity—the rewarded customers experienced an increase in sales and the non-rewarded customers did not. The net incremental rewarded behavior impact is \$16.95 for Year 1 and \$11.36 for Year 2. The Year 1 impact is significant at the  $p=.106$  level ( $t=1.618$ ); the Year 2 impact is significant at the  $p=.017$  level ( $t=2.387$ ).

For additional diagnostics, we plotted predicted post-redemption sales rates for the rewarded customers versus their baseline sales rates. We did this for the average customer for illustration and the results are shown in Figure 2. The key parameters that drive this plot are the slopes and intercepts of the switching regressions in Table 3. Judging from the lift versus baseline, the results suggest that the reward increased sales among customers with lower baselines more than those with higher baselines. This makes sense in that the customers with lower baselines would presumably have more room to grow their sales rates. Bell and Lal (2002) find a similar result.

[Figure 2 Goes About Here]

The average impact of the reward program is approximately \$14 per week ( $(\$16.95 + \$11.36)/2$ ). Since the average baseline sales across groups is approximately \$80 per week, this represents a 17.5% increase in sales rates relative to baseline levels. This may at first seem large. However, only approximately 20% of our sample redeemed a reward each year (150 in Year 1 and 153 in Year 2, out of 776 customers). A 17.5% increase in sales among 20% of customers amounts to a 3.5% increase overall. In addition, the effect is for four-week periods staggered over a 7-week time horizon corresponding to the seven time periods during which the redemptions took place. Therefore in any week we would see on average a little more than half of the 3.5% increase, or about 1.8%. So overall, we find a 6% increase in weekly store sales

over an 8-week period due to points pressure, and a 1.8% increase over a 7-week period due to rewarded behavior. These results have face validity.<sup>11</sup>

### Robustness Checks

We conducted several analyses to investigate the robustness of the rewarded behavior findings. These are as follows.

Figure 3 illustrates the findings graphically. This shows average weekly sales for rewarded versus non-rewarded customers in the pre-program, during program, and post-redemption periods. The figure shows that although rewarded and non-rewarded customers start out roughly matched on sales levels (as noted earlier), rewarded customers purchase more during the program-period (due to points pressure), and then maintain that difference in the post-redemption period. If there were no rewarded behavior effect, the difference in sales between the two groups would have returned to the pre-program period level. Instead, the difference was maintained. The rewarded customers maintained their high purchase rate although there was no longer any points-pressure motivation to do so. This is consistent with a rewarded behavior effect.

[Figure 3 Goes About Here]

We next investigated whether the independent variables included in the Probit equation affected the results. The motivation to do this was that several of the independent variables in that equation were not statistically significant (Table 3). We therefore undertook a two-stage process where in the first stage we estimated a Probit model that included all the psychographic variables plus the Baseline variable. We re-estimated the switching model using for the Probit

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<sup>11</sup> Our results are similar in magnitude to Bell and Lal (2002). These researchers find a post-reward effect equal to a 9% gain among “best” customers, 11% among “better” customers, and 17% among “other” customers.

only those variables that were statistically significant, and then calculated new mean changes and net incremental impact. The results were all within one standard error of our original results.

Lastly, we investigated various other methodological approaches for computing the rewarded behavior effect. We used the following techniques:

- Covariate Adjustment (CA): We adjusted the  $\phi/\Phi$  and  $-\phi/(1-\Phi)$  factors in equations 4a and 4b relative to the population average. The motivation was to adjust these predictions if customers were exceptionally different on these factors relative to the sample as a whole.
- Two-stage least squares (2SLS): This estimates  $Sales_{ip} = \beta_0 + \beta_1 Baseline_i + \beta_2 D_i + \varepsilon_i$  using two-stage least squares (Greene 1998, p. 717). The endogenous variable is  $D_i$ . The instruments are the psychographic variables.
- OLS: We estimated  $Sales_{ip} = \beta_0 + \beta_1 Baseline_i + \beta_2 D_i + \varepsilon_i$  using ordinary least squares.
- Average Treatment Effect (ATE): This measure is used in the economic evaluation of social programs (see Winship and Morgan 1999; Heckman et al. 2003).
- Treatment Effect on the Treated (TT): This measure is also used in the economic evaluation of social programs (Winship and Morgan 1999; Heckman et al. 2003).
- Expected difference between rewarded and non-rewarded customers (EC): This measure is described in the Stata reference manual (2003, p. 280).

CA, OLS, ATE, and EC produced results that were relatively close to those obtained with our analysis, although a bit higher. These results ranged from \$17.77 to \$24.81 for Year 1 (vs. \$16.95 for our analysis) and from \$12.03 to \$27.49 for Year 2 (vs. \$11.36 for our analysis). 2SLS produced poor results (-\$22.05 for Year 1 and \$40.45 for Year 2) although with very high standard errors (\$31.14 and \$27.49). 2SLS is known to produce higher standard errors so this result was not very surprising (Pindyck and Rubinfeld 1981, p. 339). TT produced much larger estimates (\$53.31 for Year 1 and \$98.82 for Year 2). These estimates lack face validity. For example, it seems implausible that the reward could have increased purchasing by \$98.82 per week when base sales are approximately \$80 per week and post-reward sales averaged approximately \$90 per week! The standard error for Year 1 was \$40.01, so that estimate is not

significantly different than ours. However, the standard error for Year 2 was \$11.75, so the \$98.82 is statistically higher than our estimate. It is difficult to diagnose the exact reason for this discrepancy. We note that TT assumes one can predict the sales rate for a rewarded customer had that individual customer not received that reward by adjusting the error term in equation 3b.

Overall, all the robustness tests support the existence of a positive rewarded behavior effect. Out of six methods investigated, four produced very similar results to our method, one (2SLS) produced different results that could be easily explained, and one method (TT) produced different results that had little face validity.

## DISCUSSION

### Summary

We have examined the impact of a turkey reward program offered in two successive years for a supermarket using actual field data. The results for both years show a current period “points pressure” impact and a post-program “rewarded behavior” effect. Store-wide, weekly sales increased on average by 6.1% in year 1 and 6.4% in year 2 during the 8 week program-period, as shoppers increased their purchase levels in order to receive a reward. This points pressure effect was particularly strong among shoppers who ordinarily do not consider frequent shopper programs to be an important benefit.

We also found that the shoppers who were rewarded with a free turkey experienced a rewarded behavior effect. That is, the redeemers’ purchase rate did not immediately return to pre-program levels after they redeemed the free turkey. The magnitude of the effect is an increase in store sales of 1.8% per week over a 7-week period.

It is interesting that the points-pressure effect is larger in aggregate than the rewarded

behavior effect. This is consistent with work in the sales promotion field that finds repeat purchase effects to be smaller than current period effects (Keane 1997; Gedenk and Neslin 1999). However, the rewarded behavior effect is isolated to a minority of customers who redeem a reward, and can be quite substantial among these customers.

One question is the extent to which these findings generalize to other venues. While a free-turkey reward program seems specialized, it is not dissimilar in form than the “Buy x-times, get a free xx” structure of many reward programs common in the supermarket industry, the retail industry, and in other consumer products industries. However, further research is needed to examine how our results differ according to the values of “x” and “xx.”

### Managerial Implications

The first implication of our findings is that reward programs can contribute to profit. Just taking into account points pressure, an increase of 6% per customer translates to \$2.40 per customer per week (on a base of \$40, see Table 1) over the 8 weeks of the program, or \$19.20 per customer. Using a gross margin of 28.4%, this implies a contribution of \$5.45 per customer. The cost of the program *per customer* is as follows. Among the 776 customers in our database, 150 received a free turkey. Assume the cost of the turkey was approximately \$5. The cost of the turkey per customer was therefore  $(\$5 \times 150) / 776$ , or \$0.97 per customer. Administrative costs include keeping track of each customer’s purchase levels and notifying winners. The tracking costs were minimal since they were done through the chain’s existing computer system. Notification costs would be the costs of printing and sending notices. This would be approximately \$0.30 per winner, or  $(\$0.30 \times 150) / 776 = \$0.06$  per customer. Total costs of the turkey promotion are therefore  $\$0.97 + \$0.06 = \$1.03$  per customer. From that investment, the

company gains \$5.45 profit contribution. That is an ROI of  $(\$5.45-\$1.03)/\$1.03 \approx 400\%$ . One could make the calculation more precise by including the rewarded behavior effect and more detail on administrative costs, but the calculation illustrates that the reward program can generate substantial profits. This corresponds nicely with Bell and Lal (2002) who also find a turkey reward program profitable based on its points pressure contribution.

A second implication of our findings is the difference between short-term discounts delivered via frequent shopper cards, and the long-term reward delivered through a buy-x-receive-xx reward program. Both are loyalty programs in the sense that both intend to increase store loyalty. The reward program we studied is linked more explicitly to store loyalty. However, a fascinating future study would be to compare the impact (both short term and long term) of a buy-x-receive-xx reward program to the short-term discounts offered to all shoppers who possess a frequent shopper card.

A third implication is that our results suggest that the frequency reward program is a *targeted* promotion. For example, we found it to be effective among those who place less value on the store's current frequent shopper program. Segmentation is the hallmark of many successful promotions (Farris and Quelch 1987). Our results suggest that a frequency reward program could target one set of shoppers while the everyday frequent shopper program (immediately-available discounts) could target a different set, suggesting there is room for both types of activities in the store's promotion mix.

A final implication is that frequency reward programs need to be evaluated both in the short and long term. The points pressure effect could by itself make the reward program profitable. However, the rewarded behavior effect can be significant, albeit by definition only among those who receive the reward.

## Limitations and Future Research

This paper measures the short-term (points pressure) and long-term (rewarded behavior) impact of a loyalty reward program. While we theorized the behavioral mechanisms that might produce these effects, we have not investigated which particular process is at work. For example, we have not shown whether the rewarded behavior effect is the product of behavioral learning or of cognitive changes in customer affect or intentions. The importance of the measured effects we find suggest it would be worthy for laboratory experiments to tease out the exact mechanism.

Related to the question of which mechanisms govern our results is the role of perceived effort. Kivetz and Simonson (2003) provide evidence that customers are more likely to join loyalty programs when they perceive the effort required of them is low compared to others. The authors refer to this as “idiosyncratic fit.” An interesting area for future research would be to investigate how idiosyncratic fit relates to the rewarded behavior effect. Based on Dodson, Tybout, and Sternthal (1978), one might conjecture that higher idiosyncratic fit would correlate with a lower rewarded behavior effect, since these authors find lower effort in buying on promotion is associated with lower repeat rates. This is somewhat supported by our result that the rewarded behavior effect was weakest for customers with high baselines, who presumably would have higher idiosyncratic fit (Figure 2). In any case, this merits further investigation.

A second limitation is that while our robustness checks for the rewarded behavior effect generally converged well with our results, the convergence was not perfect. One method (treatment effect on the treated) produced very different results that in fact lacked face validity. This illustrates the challenge in estimating the effectiveness of programs with non-random

assignment. Future research is needed both to replicate our results and investigate various ways for accounting for selectivity bias in calculating the rewarded behavior effect.

In addition to comparing immediately-delivered frequent shopper price discounts to reward programs, and measuring the impact of different program design parameters, another area would be competitive effects (Kopalle and Neslin 2003). What happens if all stores adopt turkey reward programs? Will consumers become inured to the same reward program implemented each year? We did not uncover evidence of that, since the measured impact is roughly the same each year, but that could change if more stores adopt similar programs (see Thompson and Noordeweir (1992) for a study of repeated rebate programs in the automobile industry).

Our analysis is a cross-sectional/time series econometric approach. Another line of future research would be to demonstrate the points pressure and rewarded behavior effects using a different research design, such as a consumer survey or a field experiment. The reason is that with our approach, one can never be positive about causation and the role of omitted factors such as competitive activity.

The findings in this paper suggest that factors such as attitudes toward reward programs, store loyalty, price consciousness, and the desire to accumulate information before buying, play a role in both points pressure and rewarded behavior responses. Further research is needed to develop a broad consumer behavior theory that would explain these roles, and more research is needed to replicate and extend our empirical results on individual differences.

Another avenue for future research would be to explore the dynamics of points pressure and rewarded behavior effects in more detail. This would involve a weekly or purchase-by-purchase analysis at the individual level. Dynamic rational models would be useful here (Lewis 2004). Another approach would be to employ structural break modeling (Grewal et al. 2001) to

determine exactly when customer buying behavior changes due to reward programs. This would be highly useful because it would verify the extent to which the linear effects idealized in Figure 1 apply to the real world, and would have implications for optimal reward levels and time requirements.

In summary, there is much more to be learned about the impact of reward programs. However, we are encouraged by the results in this study demonstrating both a short and long-term impact captured by points pressure and rewarded behavior effects.

## REFERENCES

1. Ashby, F Gregory, Alice M. Isen and And U. Turken (1999), "A Neuropsychological Theory of Positive Affect and Its Influence on Cognition," *Psychology Review*, 106 (July), 529-550.
2. Beggs, Alan, and Paul Klemperer (1992), "Multi-Period Competition with Switching Costs," *Econometrica*, 60 (May), 651-666.
3. Bell, David and Rajiv Lal (2002), "The Impact of Frequent Shopper Programs in Grocery Retailing," *Quantitative Marketing and Economics* 1 (June), 179-202.
4. Blattberg, Robert C., and Scott A. Neslin (1990), *Sales Promotion: Concepts, Methods, and Strategies*, Englewood Cliffs, New Jersey: Prentice-Hall.
5. Bolton, Ruth, P. K. Kannan, and Matthew D. Bramlett (2000), "Implications of Loyalty Program Membership and Service Experiences for Customer Retention and Value," *Journal of the Academy of Marketing Science*, 28 (Winter), 95-108.
6. Dekimpe, Marnik G., and Dominique M. Hanssens (1999), "Sustained Spending and Persistent Responses: A New Look at Long-Term Marketing Profitability," *Journal of Marketing Research*, 36 (November), 397-412.
7. Dodson, Joe A., Alice M. Tybout, and Brian Sternthal (1978), "Impact of Deals and Deal Retraction on Brand Switching," *Journal of Marketing Research*, 15 (February), 72-81.
8. Dowling, Grahame R., and Mark Uncles (1997), "Do Customer Loyalty Programs Really Work?" *Sloan Management Review*, 38 (Summer), 71-82.
9. Drèze, Xavier and Stephen J. Hoch (1998), "Exploiting the Installed Base Using Cross-Merchandising and Category Destination Programs," *International Journal of Research in Marketing*, 15 (December), 459-471.
10. Efron, B. (1979), "Bootstrap Methods: Another Look at the Jackknife," *The Annals of Statistics*, 7 (January), 1-26.
11. Farris, Paul W. and John A. Quelch (1987), "In Defense of Price Promotion," *Sloan Management Review*, 29 (Fall), 63-9.
12. Food Marketing Institute (2002), "Trends in the United States: Consumer Attitudes & the Supermarket." Washington, D.C.
13. Gedenk, Karen, and Scott A. Neslin (1999). "The Role of Retail Promotion in Determining Future Brand Loyalty: Its Effect on Purchase Event Feedback," *Journal of Retailing* 75 (Winter): 433-459.
14. Greene, William H. (1998), *LIMDEP Version 7.0*, Plainview, NY: Econometric Software, Inc.
15. Grewal, Rajdeep, Jeffrey A. Mills, Raj Mehta, and Sudesh Mujumbar (2001), "Using Cointegration Analysis for Modeling Marketing Interactions in Dynamic Environments: Methodological Issues and An Empirical Illustration," *Journal of Business Research* 51 (February), 127-144.
16. Hair, Joseph F., Jr., Rolph E. Anderson, Ronald L. Tatham, and William C. Black (1995), *Multivariate Data Analysis: With Readings*, 4<sup>th</sup> Edition, Englewood Cliffs, NJ: Prentice-Hall, Inc.
17. Heckman, James, Justin L. Tobias, and Edward Vytlačil (2003), "Simple Estimators for Treatment Parameters in a Latent-Variable Framework," *Review of Economics and Statistics*, 85 (August), 748-755.
18. Inman, J. Jeffrey, Leigh McAlister, and Wayne D. Hoyer (1990), "Promotion Signal: Proxy for a Price Cut?" *Journal of Consumer Research*, 17 (June), 74-81.
19. Isen, Alice M., Thomas E. Shalke, Margaret Clark and Lynn Karp (1978), "Affect, accessibility of material in memory, and behavior: A cognitive loop?" *Journal of Personality & Social Psychology*. 36 (January), 1-12.

20. Isen, Alice M. and Robert Patrick (1983), "The Effect of Positive Feelings on Risk Taking: When the Chips are Down," *Organizational Behavior & Human Decision Processes*. 31 (April), 194-202.
21. Isen, Alice M. and Kimberly A. Daubman (1984), "The Influence of Affect on Categorization," *Journal of Personality & Social Psychology*. 47 (December), 1206-1217.
22. Kahn, Barbara E; and Alice M. Isen (1993), "The Influence of Positive Affect on Variety Seeking among Safe, Enjoyable Products" *Journal of Consumer Research*. 20 (September), 257-270
23. Keane, Michael P. (1997), "Modeling Heterogeneity and State Dependence in Consumer Choice Behavior" *Journal of Business and Economic Statistics*, 15 (July), 310-327.
24. Kim, Byung-Do, Mengze Shi, and Kannan Srinivasan (2001), "Reward Programs and Tacit Collusion," *Marketing Science*, 20 (Spring), 99-120.
25. Kivetz, Ran, and Itamar Simonson (2003), "The Idiosyncratic Fit Heuristic: Effort Advantage as a Determinant of Consumer Response to Loyalty Programs." *Journal of Marketing Research*, 40 (November), 454-467.
26. Kopalle, Praveen, and Scott A. Neslin (2003), "The Economic Viability of Frequency Reward Programs in a Strategic Competitive Environment," *Review of Marketing Science (ROMS)*, 1, available at <http://www.bepress.com/romsjournal/vol1/iss1/>.
27. Lehmann, Donald R., Sunil Gupta, and Joel H. Steckel (1998), *Marketing Research*, Reading, MA: Addison-Wesley.
28. Lewis, Michael (2004), "The Influence of Loyalty Programs and Short-Term Promotions on Customer Retention," *Journal of Marketing Research*, 41 (August), 281-292.
29. Maddala, G. S. (1983), *Limited-Dependent and Qualitative Variables in Econometrics*. Cambridge, UK: Cambridge University Press.
30. Oliver, Rust, and Varki (1997), "Customer Delight: Foundations, Findings and Managerial Insight," *Journal of Retailing*, 73 (Fall), 311-336.
31. Pindyck, Robert S., and Daniel L. Rubinfeld (1981), *Econometric Models and Economic Forecasts*, 2<sup>nd</sup> Edition, New York, McGraw-Hill Book Company.
32. Plane, Donald R., and Edward B. Oppermann (1981), *Business and Economic Statistics*, Plano, TX: Business Publications, Inc.
33. Rothschild, Michael L., and William C. Gaidis (1981), "Behavioral Learning Theory: Its Relevance to Marketing and Promotions," *Journal of Marketing*, 45 (Spring), 70-78.
34. Rust, Roland T., and Richard L. Oliver (2000), "Should We Delight the Customer?" *Journal of the Academy of Marketing Science*, 28 (Winter), 86-94.
35. Stata (2003), *Base Reference Manual Volume 4, S-Z, Release 8*, College Station, Texas: Stata Corporation.
36. Sun, Baohong, Scott A. Neslin, and Kannan Srinivasan (2003), "Measuring the Impact of Promotions on Brand Switching When Consumers Are Forward Looking," *Journal of Marketing Research*, 40 (November), 389-405.
37. Thompson, Patrick A., and Thomas Noordewier (1992), "Estimating the Effects of Consumer Incentive Programs on Domestic Automobile Sales," *Journal of Business and Economic Statistics*, 10 (October), 409-17
38. Teasdale, John D. and Sarah Fogarty (1979), "Differential effects of induced mood on retrieval of pleasant and unpleasant events from episodic memory," *Journal of Abnormal Psychology*. 88 (Jun), 248-257.
39. Tietje, Brian C. (2002), "When Do Rewards Have Enhancement Effects? An Availability Valence Approach," *Journal of Consumer Psychology*, 12 (Issue 4), 363-373.

40. Winship, Christopher, and Stephen L. Morgan (1999), "The Estimation of Causal Effects from Observational Data," *Annual Review of Sociology*, 25, 659-706.

## APPENDIX 1

### Multi-Item Measures

All items were measured on a 7-point scale.

(strongly disagree–strongly agree)

Shopping Enjoyment (*Cronbach's alpha: 0.86*)

I enjoy grocery shopping.

Grocery shopping takes too much time. (R)

I wish I could get someone else to do my grocery shopping. (R)

I look forward to my trips to the grocery store.

I do not mind spending a lot of time shopping for groceries.

Grocery shopping is a necessary evil. (R)

Price Consciousness (*Cronbach's alpha: 0.79*)

I shop a lot for “specials.”

Most of the time, I check the prices of items I buy at the grocery store.

I usually watch the advertisements for announcements of sales.

I believe a person can save a lot of money by shopping around for bargains.

I usually look at in-store sale circulars when I'm shopping.

I often plan what I'm going to buy based upon what is on sale.

## APPENDIX 2

### Description of Matched Sample

	Rewarded Customers			Non-Rewarded Customers		
Year	Group	Average Baseline	Sample Size	Group	Average Baseline	Sample Size
1	1	\$82.69	37	1	\$80.53	10
1	2	\$92.43	40	2	\$93.67	2
1	3	\$98.32	6	3	\$99.97	14
1	4	\$88.39	9	4	\$87.74	3
1	5	\$73.76	15	5	\$70.40	30
1	6	\$84.98	31	6	\$85.12	3
1	7	\$89.07	12	7	\$89.91	4
1	Total	\$86.36	150	Total	\$81.55	66
2	1	\$91.10	41	1	\$91.59	10
2	2	\$83.11	47	2	\$80.35	23
2	3	\$133.30	3	3	\$136.56	4
2	4	\$58.85	4	4	\$55.82	37
2	5	\$66.46	18	5	\$67.29	38
2	6	\$108.52	27	6	\$112.15	6
2	7	\$100.82	13	7	\$97.70	3
2	Total	\$89.63	153	Total	\$73.54	121

**Table 1**  
**Descriptive Statistics**

<b>Variable</b>	<b>Mean</b>	<b>Std Dev</b>	<b>Interpretation</b>
Sales_Pre1	\$39.91	\$39.30	Avg weekly sales prior to program initiation Year1
Sales_Pre2	\$41.02	\$39.19	Avg weekly sales prior to program initiation Year2
Price Consciousness	4.74	1.24	1-7 scale. 7=> more price conscious
Planning	5.50	1.70	1-7 scale. 7=> more apt to plan shopping
Shopping Enjoyment	4.00	1.35	1-7 scale. 7=> enjoy shopping
Information Seeking	3.90	1.50	1-7 scale. 7=> seek more information
Store Loyal	2.57	1.36	1-6 scale. 1=> more store loyal
Card Importance	0.23	0.42	0-1 scale. 1=> card savings important
Income	5.45	2.18	1-9 scale. 9=> higher income

**Correlations**

	<b>Sales Pre1</b>	<b>Sales Pre2</b>	<b>Price Cons</b>	<b>Planning</b>	<b>Enjoy Shop</b>	<b>Info. Seeking</b>	<b>Store Loyal</b>	<b>Card Imp</b>	<b>Income</b>
<b>Sales Pre1</b>	1								
<b>Sales Pre2</b>	0.75	1							
<b>Price Cons</b>	-0.13	-0.16	1						
<b>Planning</b>	0.03	0.06	0.09	1					
<b>Enjoy Shop</b>	-0.03	-0.03	0.19	0.16	1				
<b>Info. Seeking</b>	0.01	-0.01	0.36	0.11	0.00	1			
<b>Store Loyal</b>	-0.40	-0.38	0.11	0.03	-0.02	0.00	1		
<b>Card Imp</b>	0.06	0.02	0.11	-0.13	0.07	0.09	-0.12	1	
<b>Income</b>	0.28	0.29	-0.15	-0.04	-0.14	-0.06	-0.09	-0.04	1

Note: n = 776. Given the same size, correlations greater than .07 in absolute value are statistically significant at p<.05.

**Table 2****Points Pressure Random Effects Regression Results****Year 1**

	<b>Full Model</b>		<b>Reduced Model</b>	
	<b>Coefficient</b>	<b>p-value</b>	<b>Coefficient</b>	<b>p-value</b>
<b>Intercept</b>	39.208	0.000	39.245	0.000
<b>Prog</b>	2.439	0.012	2.346	0.015
<b>Price Cons</b>	-0.413	0.022	-0.390	0.021
<b>Planning</b>	1.243	0.107	1.075	0.147
<b>Shop Enjoy</b>	0.018	0.908		
<b>Info. Seeking</b>	1.118	0.178	1.246	0.134
<b>Store Loyal</b>	-10.699	0.000	-10.744	0.000
<b>Card Imp.</b>	3.646	0.219	3.480	0.239
<b>Income</b>	4.197	0.000	4.196	0.000
<b>Prog*Price Cons</b>	0.027	0.823		
<b>Prog*Planning</b>	-0.341	0.444		
<b>Prog*Shop Enjoy</b>	0.051	0.618		
<b>Prog*Info. Seeking</b>	0.295	0.593		
<b>Prog*Store Loyal</b>	-0.068	0.905		
<b>Prog*Card Imp.</b>	-3.407	0.077	-2.994	0.113
<b>Prog*Income</b>	0.459	0.244	0.422	0.302

**Year 2**

	<b>Full Model</b>		<b>Reduced Model</b>	
	<b>Coefficient</b>	<b>p-value</b>	<b>Coefficient</b>	<b>p-value</b>
<b>Intercept</b>	40.832	0.000	40.800	0.000
<b>Prog</b>	2.611	0.001	2.634	0.001
<b>Price Cons</b>	-0.597	0.002	-0.609	0.001
<b>Planning</b>	2.054	0.007	1.995	0.009
<b>Shop Enjoy</b>	0.087	0.578		
<b>Info. Seeking</b>	0.929	0.284	0.956	0.279
<b>Store Loyal</b>	-9.899	0.000	-9.796	0.000
<b>Card Imp.</b>	1.264	0.699	1.400	0.671
<b>Income</b>	4.444	0.000	4.397	0.000
<b>Prog*Price Cons</b>	-0.072	0.423		
<b>Prog*Planning</b>	-0.129	0.745		
<b>Prog*Shop Enjoy</b>	0.026	0.766		
<b>Prog*Info. Seeking</b>	-0.618	0.178	-0.760	0.092
<b>Prog*Store Loyal</b>	0.258	0.574		
<b>Prog*Card Imp.</b>	-2.067	0.163	-2.151	0.136
<b>Prog*Income</b>	0.388	0.205	0.393	0.207

Table 3

Switching Regression Analysis of Rewarded Behavior Effect

		Year 1			Year 2		
		Coef.	t-Stat	p-value	Coef.	t-Stat	p-value
<b>Probit</b>	Constant	-0.060	0.11	0.91	-0.263	0.69	0.49
	Pricecon	0.028	2.01	0.05	-0.003	0.28	0.78
	Plang	-0.049	1.10	0.27	0.005	0.14	0.89
	Shopenj	-0.001	0.05	0.96	0.014	1.25	0.21
	Search	-0.064	1.06	0.29	0.065	1.61	0.11
	Storeloy	0.109	2.37	0.02	-0.017	0.62	0.54
	Cardimp	-0.233	1.27	0.20	0.045	0.32	0.75
	Income	-0.022	0.49	0.62	0.035	1.27	0.21
<b>Rewarded Customer Regression</b>	Constant	23.720	2.65	0.01	18.397	2.27	0.02
	Baseline	0.630	8.18	0.00	0.499	7.44	0.00
	$\rho$	0.899	13.60	0.00	0.940	29.99	0.00
	$\sigma$	53.217	12.78	0.00	56.537	12.29	0.00
<b>Non-Rewarded Customer Regression</b>	Constant	-34.0373	0.86	0.39	-3.066	0.28	0.78
	Baseline	1.095	3.09	0.00	0.421	3.18	0.00
	$\rho$	-0.492	0.85	0.40	-0.931	22.03	0.00
	$\sigma$	36.159	3.79	0.00	53.36	11.14	0.00

**Figure 1**

**Points Pressure and Rewarded Behavior Effects**

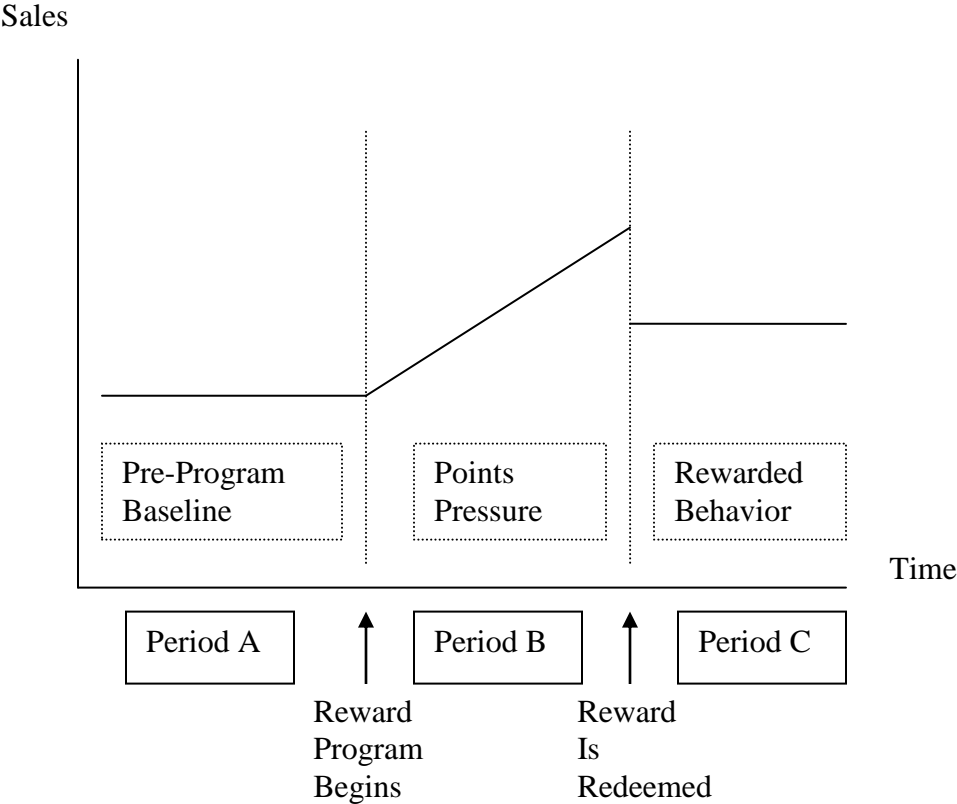
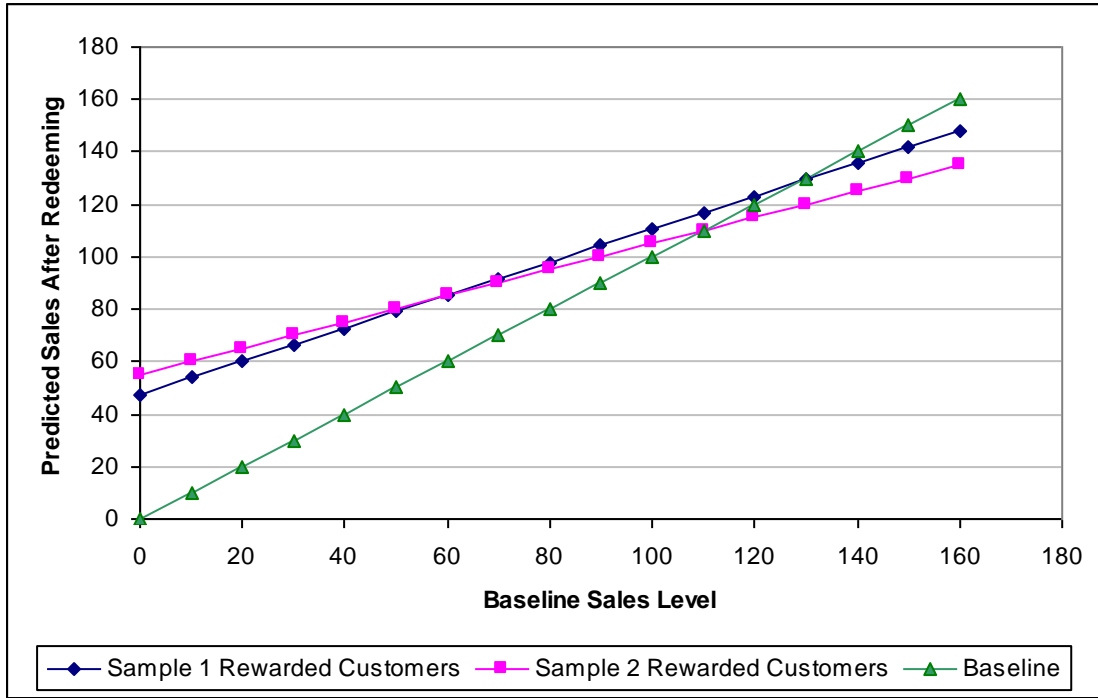


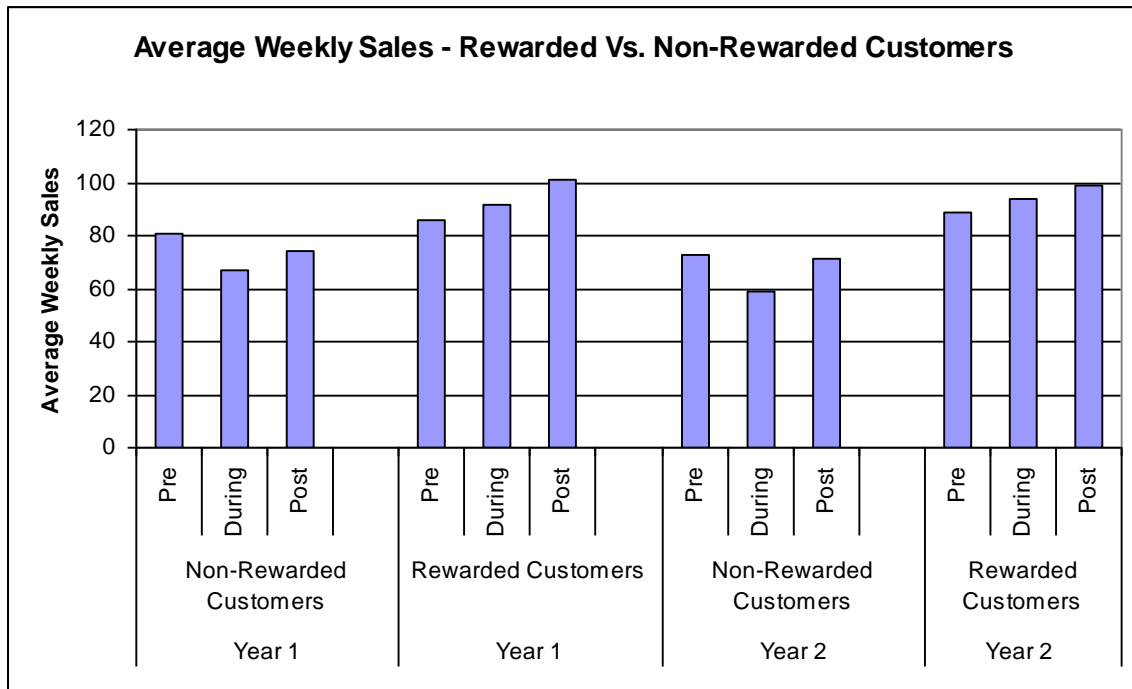
Figure 2

Differential Rewarded Behavior Effect Depending on Customer Baseline Sales



**Figure 3**

**Aggregate Sales Levels Pre, During, and Post-Reward Program:  
Rewarded vs. Non-Rewarded Customers**



Notes: n = 216 shoppers for Year 1; n = 274 for Year 2