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The Impact of Frequent Shopper Programs in Grocery Retailing

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The Impact of Frequent Shopper Programs in Grocery Retailing

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Abstract

Frequent Shopper programs are becoming ubiquitous in retailing. Retailers seem unsure however about whether these programs are leading to higher loyalty, or to higher profits. In this paper we analyze data from a US supermarket chain that has used a number of frequent shopper rewards to improve sales and profitability. We find that while these programs are profitable, this is only because substantial incremental sales to casual shoppers (cherry pickers) offset subsidies to already loyal customers. In this way our findings are inconsistent with existing theories about how frequent shopper programs are supposed to work. We construct our own Hotelling-like model that explicitly models cherry picking behavior and show that its predictions match the data quite closely. We further test the predictions of our model by characterizing the impact of such programs on trip frequency and basket size. We then use the model to examine more complex scenarios. For example, our analysis suggests that frequent shopper programs may be unprofitable if they eliminate all cherry picking. This may explain why some retailers seem dissatisfied with their programs. We end by proposing a solution that retains the benefits of the frequent shopper programs and yet continues to let supermarkets benefit from price discrimination.

1 Introduction

Ever since the acclaimed success of Frequent Flyer Programs in the airline industry, companies in many retail sectors such as hotels, financial services, and grocery, have rushed to introduce "frequent shopper programs." These programs offer various incentives and rewards to consumers on the basis of cumulative purchases from a given provider, be it a store, a service, or a manufacturer. The simplest frequent shopper program is perhaps a volume discount as in the case of the Discover card where one gets 2% of spending as cash back at the end of the year. More elaborate programs include tiered reward structures backed by a combination of a sort of volume discount (a free ticket for every 25,000 miles), a variety of services and a plethora of direct mail offers with varying degrees of customization.

These programs are expensive to launch and maintain. According to Nick Agarwal, a spokesperson for Asda, U.K., "it cost us 8 million [pounds] per year just to run the loyalty card trial and would have cost 60 million to roll out nationally (Curtis, Oct 7, 1999)." More recently, Starwood Hotels and Resorts Worldwide Inc. launched an aggressive frequent-guest program backed by a $50 million advertising campaign (The Wall Street Journal, February 2, 1999). One of the most sophisticated programs of this type is being used in the casino industry with Harrah's investing more than $100 million in computers and software to develop and implement a "frequent bettor program." The "Total Rewards" Program launched in 1997 was recently modified to include gold, platinum and diamond thresholds for frequent gamblers.

While it is difficult to document the economic value of these programs, The Wall Street Journal (May 5, 2000) reports that "the results are impressive enough that other casinos are copying some of Harrah's more discernible methods. Wall Street analysts are also beginning to see Harrah's - long a dowdy also-ran in the flashy casino business - as gaining an edge on its rivals. Harrah's stock price has risen quickly in recent weeks as investors have received news of the marketing results. And the company's earnings have more than doubled in the past year." According to Gary Loveman, Harrah's COO, "gamblers are promiscuous - we have customers who play around with everybody," and therefore the idea behind the reward program is to "grow the business by getting more from Harrah's existing casinos and customer

base" (The New York Times, December 27, 1999).

In the theoretical literature, success of these frequent shopper programs is argued to be due to reduced price competition through the creation of switching costs (Klemperer 1987). The argument is that as consumers continue to dedicate an increasing share of their wallet in the category to one brand or to one store, they incur a cost to switch to a different store or brand because of inertia effects. Since in many sectors consumers subscribe to several frequent shopper programs and regularly buy more than one brand, one may surmise that these inertia effects may not be significant enough to result in profitable loyalty programs. Fortunately, these results are shown to persist even with endogenous switching costs as in Caminal and Matutes (1990) and Kim, Shi and Srinivasan (2000) where consumers are awarded a cash discount for repeat purchases. In a model where firms compete over two periods and some consumers (heavy buyers) buy in both periods while others (light buyers) buy in only one period, it is shown that a cash coupon for purchasing in both periods reduces price competition in the second period leading to higher overall profitability. The cash coupon provides an incentive to the heavy buyers to remain loyal in the second period and therefore acts as a switching cost to the consumers. In contrast, the results in Kopalle, et al. (1999) suggest that "reward programs can be viewed as powerful, multi-period price promotions."

Success of loyalty programs can also be argued on the basis of the work by Heskett, Sasser and Schlesinger (1997) who document the value of focusing attention on the most loyal customer. They argue that as customer retention costs are generally lower than customer acquisition costs, companies are better off focusing attention on their more loyal customers especially since the top 20% of customers account for 80% of revenues and often more than 100% of profits. Brian Woolf (1996), based on his experience with loyalty/frequent shopper programs, makes two claims: (i) Retailers should not focus on getting new customers but on retaining and reaffirming the loyalty of the most profitable existing ones, and (ii) Retailers should use the information available through frequent shopper cards to determine their most profitable customers and charge them lower prices, through special offers or targeted coupons, while their less profitable customers should have to pay full price. This will, he argues, cause the more profitable customers to increase the amount of money they spend with the retailer, thus increasing

the retailer's profits. Similarly, Dowling and Uncles (1997) conclude that "... programs must enhance the overall value of the product and service and motivate loyal buyers to make their next purchase.

In summary, there are at least two competing reasons for the success of frequent shopper programs: (a) reduced price competition and therefore higher profits due to switching costs, and (b) reduced marketing expenses by focusing attention on retaining the loyal customers and capturing an increasing share of their wallet.

Few studies shed light on the effectiveness of frequent shopper programs. Dowling and Uncles (1997) conclude that "given the popularity of loyalty programs, they are surprisingly ineffective." Sharp and Sharp (1997) studied the impact of the Fly Buys, Australia's largest consumer loyalty program covering more than 20 percent of Australian retail spending and enrolling almost 25% of Australians. Consumers gathered points at participating retailers and redeemed them for flights and accommodation. Based on transaction data from a consumer panel, the authors conclude that only "two of the six loyalty program participants showed substantial excess loyalty deviation," but such deviations were also observed for non-members of the loyalty program. The authors conclude that they find no evidence to support an increased penetration or purchase frequency resulting from the incentive effects. A second study investigated the profitability of Tesco's loyalty program using data on market share and share of category requirements during 1994, 1996, and 1997, and concluded that "on the evidence available, there has been little impact on the share loyalty of individual customers so far" (East, Hogg and Lomax 1998). Hence the veracity of the theoretical arguments presented above is yet to be documented.

The only direct evidence in support of frequent shopper programs is available in Dreze and Hoch (1998) who experimented with a Baby Bucks program for a period of six months at all 70 locations of ABCO Markets in Phoenix and Tucson, AZ. The program, backed by radio and TV commercials, window banners, both in-aisle overhead banners and shelf talkers, offered consumers Baby Bucks that could be redeemed for a $10 store-wide gift certificate after spending $100 during an earn period in the "baby products" category. The program yielded a 25% increase in category sales, transaction size on baby

products also went up by 7.5% and the number of customers buying baby products rose by 25% while store traffic increased by only 5%.

In this paper we investigate the effectiveness of frequent shopper programs in grocery retailing. Grocery retailing is one of the least profitable sectors of the economy with net margins of 1-2% and the competition for shoppers is fierce. There aren't many ways to differentiate grocery stores. Weekly fliers in any given geographical area, based on the same vendor supported trade promotions, are also unable to create a point of difference in the eyes of the consumer. Not surprisingly, grocery shoppers have become well known for their promiscuity, with most shopping at more than one store regularly. Even more importantly, these shoppers are known to split their weekly grocery baskets across several competing formats. Given the success of frequent flyer programs in an environment where one airline is perceived to be no different than another, the grocery industry has moved to adopt the frequent shopper program as a panacea for its misfortunes.

Many frequent shopper programs deliver discounts at the check-out and allow shoppers to earn a rebate for buying a targeted amount of groceries within a well defined period. As the latest craze in the grocery industry, 61% of retailers had or planned to have a frequent shopper program, according to a Food Marketing Institute survey (The Commerial Appeal, May 17,1998). More recently, Retail Advertising and Marketing Association International reported that the average household participating in any frequent shopper program has 3.2 cards (Shepherdson, Feb 2000). Sixty-six percent of U.S. households belong to at least one grocery frequent shopper program and 57% belong to two. However, the success of these loyalty programs in the grocery industry is unclear (Kramer, Sept 15, 2000). Kramer contends that even though Grocery Manufacturers of America's most recent report on the subject argues that "leveraging consumer data is critically important to the future of the grocery industry, on the basis of Kraft's and Procter & Gamble's experience at Wegmans, Wegmans is the exception rather than the rule. Most frequent shopper programs are really frequency programs that use discounts to sway consumer loyalty. This short term approach eventually becomes just a sophisticated form of matchable price competition. Most card programs are offered to shoppers indiscriminately and deliver incentives across the board, regardless of shopper value." In this paper we provide the

first empirical study of the impact of different implementations of frequent shopper programs on household shopping behavior in grocery retailing.

The rest of the paper is organized as follows. In the next section we analyze frequent shopper data that have been made available to us by a grocery chain. We find that while the program achieved its objective of increasing spending by its best customers, more surprisingly, we find that the increase in spending by customers in lower spending deciles is even greater than that by its best customers. In contrast, the redemption of the rewards is the highest among the higher spending deciles. The chain makes incremental profits from the frequent shopper programs despite the programs' lack of profitability with the best customers.

In section 3 we construct a model whose predictions match our empirical findings. Our Hotelling-like one-period model explicitly allows for consumers to cherry-pick between competing stores. It predicts that frequent shopper programs improve profitability when one of the competing stores offers a program. Our model shows that the increase in profits stems from the reduction in shopping costs motivated by the rewards of the frequent shopper program. These system wide savings are reflected in higher profits to the stores and better prices to consumers who increasingly shop for the basket at a single store. We use data on trip frquency and basket size to provide empirical support for our theoretical model.

In section 4, we extend our model of frequent shopper programs in two ways. First, we demonstrate that frequent shopper programs continue to be profitable even when the competing store offers a frequent shopper program. Second, we consider situations where stores sell to consumers with varying shopping costs. We show that frequent shopper programs can reduce profitability by denying stores the opportunity to price discriminate between customers. In this more realistic setting we discover how and why frequent shopper programs can be a money sink for competing stores.

We conclude with a discussion of our results and directions for future research.

2 Frequent Shopper Program Data

We have been provided frequent shopper program data by a supermarket chain in the mid-west U.S.A. that prefers to be anonymous. The chain has a dominant share of its market. The clientele of this chain tends to be more upscale, older, more educated, with higher income and a smaller family. The only major source of competition is from Albertsons which did not have a loyalty card. The chain has had a card program since late 1995 and has used it to provide a variety of benefits to its card customers in the form of clipless coupons, item discounts, video rentals, rewards for loyalty, surprise rewards and automatic contest entries. By 1998, the chain had about 200,000 households in the program with about the top 20% of customers accounting for 80% of sales. Almost 90% of sales and 70% of transactions were reported to be swiped through the card.

During 1998 and 1999 the chain implemented a series of reward programs to increase sales to its best customers. In 1998 the chain introduced three different kinds of frequent shopper programs. The first, around Easter, was a ham promotion where consumers who spent $475 or more in the store during a six-week earn period received a certificate for a whole ham to be redeemed during a five-week period around Easter. Those spending between $325 - $474 received a certificate for a half ham. A second frequent shopper reward program was run during another six-week period during April-May with the redemption period set for the month of June. In this program, consumers had to spend $600 or more to get a certificate for a 15% discount coupon for a single purchase, a 10% discount coupon was awarded to those spending between $450 - $599 and a 5% discount coupon was mailed to those spending between $150 - $449. The final frequent shopper program of the year was implemented for a period of eight weeks starting soon after Labor Day and ending before Thanksgiving. Customers spending more than $815 got a certificate for a Butterball turkey plus a 15% discount coupon to be redeemed over the following four-week period. Customers spending between $625 - $815 received a certificate for a Butterball turkey, and consumers spending between $485 - $624 received a certificate for a Little Butterball turkey.

In 1999, the supermarket chain did not run a ham promotion but improved the terms of the 5/10/15% discount to 10/15/20%. This frequent shopper

program was also implemented during a six-week period during April-May, 1999, with the redemption period set for the month of June. In this program, consumers had to spend $600 or more to get a certificate for a 20% discount coupon for a single purchase, a 15% discount coupon was awarded to those spending between $400 - $599 and a 10% discount to those spending between $200 - $399. The chain also ran an improved turkey promotion in 1999 by decreasing the required spending levels to qualify for a discount coupon. Customers spending more than $750 over a six-week period earned a certificate for a Butterball turkey plus a 15% discount coupon to be redeemed over a three-week period. Customers spending between $500 - $749 received a certificate for a Butterball turkey, and consumers spending between $250 - $499 received a certificate for a Little Butterball turkey.

2.1 Analysis of the Ham Program

As indicated earlier, the objective of the ham program was to increase sales to the best customers (as articulated by Woolf 1996) and consequently the profitability of the stores. To analyze the impact of the ham program and estimate the differential impact on the best customers (high spenders) and the worst customers (low spenders), household spending data are available to us for the following time periods: a pre-ham promotion period, denoted as P1, lasting from Jan 1 - Feb 7, 1998; the ham promotion period, denoted as P2, during Feb 8 - March 21, 1998; and the redemption period, denoted as P3, of March 22 - April 18, 1998. We also have data for the corresponding three periods in 1999 when **no** such ham program was offered. The available data can be summarized as shown in Table 1 with the six different periods identified as P1-P6. Moreover, we know that all those who qualified to receive a reward by spending more than $325 during the earn period were mailed a reward to be redeemed during P3. All households who redeemed the award are also identified in our data set.

In order to estimate the impact of the Ham program on the best and worst customers, our approach is to look at a pool of best customers (defined later) and estimate the change in spending levels during the ham promotion period as compared to a control condition. The control condition provides an estimate of the spending level that could be expected of them in the **absence** of

the ham program. We can then compare these changes across consumers who redeemed the reward versus those who did not redeem the reward to identify the impact of the program. This analysis is based on the presumption that consumers who are not interested in the program or do not pay attention to the program, do not change their shopping behavior and therefore do not redeem the reward even if they qualify. In contrast, consumers who pay attention to the program are also likely to redeem the reward. Hence, a comparison of the changes in spending levels during the ham promotion period across these two groups of consumers provides an estimate of the impact of the ham program. Similar estimates for the low spenders provide us the variance in the impact of the program across the consumer population. We recognize that there may be some customers who paid attention to the frequent shopper program but could not redeem the reward for other extraneous reasons or some who had not heard of the program until they received a coupon in the mail. Such possibilities are likely to result in our estimates of the impact of the program to be conservative.[1]

[1]More precisely, we hypothesize that if a consumer is involved in the program, the impact of the program as measured by the spending level in the promotion period is

$$S^j_{\text{involved}} = S^j_{\text{control}} + \text{Effect of the Program} + \text{error, and}$$

$$S^k_{\text{uninvolved}} = S^k_{\text{control}} + \text{error,}$$

where S^j are all the households that are involved in the frequent shopper program and therefore pay attention and respond to it; S^k are all the households that are not involved in the program, pay no attention to it and therefore are not affected by it. However, we have no indication of a household's level of involvement in our data set. We only observe if the household redeemed the reward that was mailed to them upon qualifying for one. Therefore,

$$S^l_{\text{redeemed}} = S^l_{\text{control}} + \text{Effect of the Program} * \beta + \text{error, and}$$

$$S^m_{\text{did not redeem}} = S^m_{\text{control}} + \text{Effect of the Program} * \alpha + \text{error,}$$

where β captures the impact of consumers who redeemed the award but did not hear about it and α captures the fact that some consumers might have been affected by the program but did not redeem the reward for some extraneous reasons. Thus the difference between those who redeemed the reward and those who did not redeem the reward provides a conservative estimate of the impact of the frequent shopper program.

The impact of the frequent shopper program during Feb 8 - March 21, 1998 can be assessed by comparing the household purchases during ham promotion period with those in a control condition, the pre-ham-promotion period, Jan 1- Feb 7, 1998.

To classify customers as best customers versus worst customers, we use the cut-offs in the ham promotion program to form natural categories. The ham program rewarded all those spending $475 or more during the promotion period with a coupon for a full ham, those spending between $325 and less than $475 with a coupon for half ham and, those spending less than $325 were not rewarded. We therefore categorized all those who were expected to spend $475 or more as the **best customers**, all those who were expected to spend between $325 and less than $475 as **better customers** and the rest were classified as **worst**. We used spending levels (S1) in the pre-ham promotion period in 1998 (P1) to estimate the expected spending levels during the ham promotion period and classified consumers as best, better and worst.

We can now estimate the impact of the Ham promotion program by regressing the dependent variable, spending level during the ham promotion period (P2) minus the spending level in the pre-ham promotion period (P1)(normalized for the same number of days), S2-S1, on the following 6 independent variables with no constant term in the regression equation. The independent variables in the regression equation are indicator variables for the following categories:

(a) Best customers who redeemed the reward
(b) Best customers who did not redeem/get the reward
(c) Better customers who redeemed the reward
(d) Better customers who did not redeem/get the reward
(e) Worst customers who redeemed the reward
(f) Worst customers who did not redeem/get the reward

Null-Hypothesis: If the Ham Program does not have an impact on shopping behavior of those who redeemed the reward, there should be no difference in the dependent variable between consumers who redeemed the reward and those who did not redeem/get the reward, for any of the three groups of customers (best, better and worst).

The results of this regression analysis are presented in Table 2. These results indicate that while difference in spending between customers who redeemed the reward and those who did not redeem the reward among the best customers was $98.02, the corresponding difference among the better and worst customers was much higher, $140.98 and $150.55, respectively. We therefore reject the null hypothesis and conclude that the frequent shopper program had an impact on shopping behavior. Moreover, we observe that the impact of the program is not the highest among the best customers. It is the better customers and worst customers who seem to respond more to the Ham promotion as compared to the best customers. These differences across the best, better and worst customers are even more salient when one takes into account the fact that the expected average spending of the best customers was $641 while the expected average spending for the better customers was only $387. With average expected spending for all others to be $172, we can conclude that the Ham promotion had the biggest impact in percentage terms on the worst customers and the least impact on the best customers: contradicting the dictates of Woolf (1996).

We also observe that 5941 of the "best" customers redeemed the reward, yielding a redemption rate of 69.7 %. Redemption rates among the "better" and "worst" customers were significantly lower at 42.0% and 12.4%, respectively. Clearly, the "worst" customer group consists of consumers who were not expected to qualify for the reward and therefore the low redemption rates are not surprising. However, as also reported in Table 2, these differences in redemption rates continue to hold even when we reduce the sample to only those consumers who qualified to receive the reward due to their spending in period 2. Thus we notice that while the impact of the Ham promotion program is the least among the best customers, the redemption rate is the highest among this group.

We are informed by the grocery chain that the average cost of goods sold is about 75% and that the retail value of full ham and half ham was $25 and $15, respectively. The data show that 5941 consumers increased their spending by $98.02, 2454 consumers increased their spending by $140.98 and 2170 consumers by $150.55. Moreover, while 4461 consumers redeemed half a ham, 6104 consumers redeemed a full ham. Therefore we can calculate the profitability of the program to be 5941*$98.02*0.25 + 2454*$140.98*0.25 +

2170*$150.55*0.25 - 4461*0.75*$15 - 6104*0.75*$25 = $149,111.90 from the 31,789 consumers, before overhead costs.

To summarize, our analysis allows us to conclude that:

(i) The ham program had the least impact on the shopping behavior of the best customers.
(ii) The percentage of customers redeeming the reward is the highest among the best customers.
(iii) The program was profitable not because of the impact on the shopping behavior of the best customers but instead most of the profitability was due to the impact on the behavior of all but the best customers.

Before accepting these results at their face value we recognize that there may be some concerns about our estimates. First we need to consider the possibility of a stockpiling effect. It is well known that promotions often lead consumers to buy more in the promotion period, only to purchase less in future periods thereby creating the well known post-promotion dip. We need to look at sales in the redemption period and check if they were adversely affected by the purchasing behavior during the ham promotion period. To investigate this issue, we use (S3- S6), sales in redemption period in 1998 (P3) minus the sales in the corresponding period in 1999 (P6) (when no ham promotion was offered). (S3-S6) should be negative in the presence of a stockpiling effect. Therefore, the difference between the estimate of (S3-S6) for those who redeemed the coupon and those who did not redeem the coupon should also be negative in presence of the stockpiling effect. The results of the regression analysis with (S3-S6) as the dependent variable and the six indicator variables used before as the independent variables are presented in Table 3. Consumers were classified as best, better and worst on the basis of their spending levels (S1)in the pre-ham-promotion period (P1). The regression results show that the difference between those who redeemed the coupon and those who did not redeem the coupon continues to remain positive and significant. This implies that the ham promotion actually had a carry-over effect rather than suffering from a stockpiling effect. We also ran a similar regression with (S2+S3) - (S5+S6) as the dependent variable. (S2+S3) are the purchases during and after the ham promotion period in 1998 and (S5+S6) are purchases in the corresponding periods in 1999. If a

stockpiling effect was present, we would expect the difference between those who redeemed the coupon and those who did not redeem the coupon to disappear. However, our results indicate that the difference for the three groups remain significant and again are the lowest for the best customers as a percent of average expected spending.

A second concern relates to possible seasonality in the data, sales closer to Easter are generally higher than those at the beginning of the year, for example. We therefore re-analyze the data controlling for seasonality. We use data in Feb 8 - March 21, 1999 as the control condition because the ham program was not offered in 1999. While the comparison between purchases during Feb 8 - March 21, 1998 (Ham Promotion) and Feb 8 - March 21, 1999 (No Ham Promotion) controls for seasonality, these differences may be affected by year-to-year trends due to inflation or natural changes in family consumption patterns. To control for possible year-to-year trends, we use the difference in sales in Periods 1 (Jan 1-Feb 7, 1998) and 4 (Jan 1-Feb 7, 1999) identified in Table 1. Therefore the impact of the Ham Program can be measured as (S2-S5) - (S1-S4). We use spending levels in the pre-ham promotion period in 1998 (P1) to estimate the expected spending levels and classify consumers as best, better and worst. Using the same independent variables as used before, the regression analysis yielded the results presented in Table 4. The results of this regression show that among consumers who were expected to spend $475 or more (best customers), the difference in consumer spending between those who redeemed the coupon and those who did not was $94.46, during the ham promotion period. Similarly, among consumers who were expected to spend between $325 and less than $475 (better customers), the corresponding difference was $138.59; and finally for those expected to spend less than $325 (worst), the difference was $144.03. Thus the basic findings reported earlier remain unaffected by potential seasonality and trends in the data.

A third concern relates to the possibility of mis-classification of a consumer given our use of spending levels in the pre-ham promotion period in 1998. In other words, a consumer spending slightly more than $475 is classified as being among the best customers but could actually have been among the better consumers. The spending level used for classification is equal to a true value plus an error term. Some consumers who are classified as the

best consumers may actually be among the better consumers, and some consumers who are classified as better consumers may actually be among the best consumers. A similar possibility exists among the better and the worst consumers. The question arises if this error in classification creates biases that do not allow us to conclude that the impact of the program is the least for the best customers and the most for the worst customers. To address this concern, we conducted a sensitivity analysis on the cut-off values used to classify consumers to be among the best, better and worst. For example, when we used a cut-off of $500 and $350 in lieu of $475 and $325 to assign consumers into the three groups: best, better and worst, the difference in the spending levels between consumers who redeemed the coupon and those who did not, remain unchanged. Table 5a presents the results of this sensitivity analysis using different cut-off values with the dependent variable as S2-S1.

We also addressed this issue by taking an extreme step of using only those consumers who actually spent more than $325 during the ham promotion period and therefore qualified to receive a coupon for half or full ham. With S2-S1 as the dependent variable, we find that among those who were expected to spend more than $475 during the promotion period (best customers), the difference in spending between those who redeemed and did not redeem was $46.64. The corresponding difference among the better and worst customers was $59.85 and $71.20 respectively. Thus even among those who qualified and received the coupon, the program was the least effective among the best customers.

We addressed the issue of mis-classification in two other ways. First we investigated the impact of mis-classification on spending levels in 1999, when no ham promotion was offered. If our results are effetced by mis-classification, these results should persist even when no ham promotion is offered. Therefore we use a dependent variable, S5-S4, spending in 1999 during the period corresponding to the ham promotion period in 1998 minus spending in 1999 during the period corresponding to the pre-ham promotion period in 1998. The independent variables are the same as those in Table 2. To make a consistent comparison, we focused only on the qualifying households, i.e., those spending more than $325 in P5. Each of these households was categorized into one of the six groups based on their spending levels in the pre-ham-promotion period in 1999 (P4), and assigned randomly to have redeemed

the reward according to the probabilities observed in 1998. So, for exmaple, all households that were expected to spend $475 or more in P5 (based on their spending in P4) were randomly assigned to redeem the reward with a probability of 0.742, as reported in Table 2. Similarly, all households that were expected to spend more than $325 but less than $475 in P5 (based on their spending in P4) were randomly assigned to redeem the reward with a probability of 0.593, as reported in Table 2. in In effect, we have tried to repeat the statistical procedure that was used to analyze the 1998 data, on the 1999 data (when no ham promotion was offered). Table 5b presents the results of this regression and shows that, there is **no statistical difference between the spending levels of redeemers and non-redeemers for any of the three customer groups**. We therefore reject the hypothesis that our results in 1998 are due to classification biases induced by our statistical analysis. Second, we ran a regression on change in spending level due to the ham promotion period, as measured by S2-S5, on spending in P1, whether a household redeemed a reward and the interaction between the two aforementioned variables. The regression results as shown in Table 5c indicate significant affects for each of the three independent variables and in particular have a negative sign for the interaction variable; again confirming the finding that the impact of the program is higher at lower levels of spending.

In summary, after checking for potential stockpiling effects, seasonality and trends, and the possibility of mis-classification of customers, we conclude that
(i) the best consumers responded the least to the ham promotion
(ii) the best customers are most likely to redeem the reward
(iii) overall the ham program was profitable (before overheads).

2.2 Analysis of the Discount and Turkey Program

In analyzing the impact of the 5/10/15% discount program in 1998, and the 10/15/20% program in 1999, we again used the spending in the discount program period minus the spending in the previous period, in the same year, as the dependent variable. However, since there are more categories of spending levels than in the ham program, the dependent variable was regressed

on eight indicator variables as identified in Table 6a. Table 6a also presents the differences in spending levels of the redeemers and non-redeemers among the different categories for both 1998 and 1999. Table 6a also presents the redemption rates, defined by the number of redeemers divided by the number of households in the category. We see that the basic pattern in these results is exactly as observed in the ham program. The best customers are least responsive to the program, as a percentage of their spending levels, but have the highest redemption rates. Finally, using an analysis similar to that reported for the discount programs, the turkey promotion yielded results that are reported in Table 6b; again reconfirming the pattern of effects seen in the other programs.

A summary of the effects of these programs is available in Table 7. They show three systematic effects:

(a) These programs have the greatest impact on the behavior of the lower decile customers rather than the best customers.

(b) The percentage of customers redeeming the reward is highest among those consumers whose behavior is changing the least.

(c) The chain loses money on the best customers because a higher fraction redeem the reward without changing their buying behavior significantly. However, a lower redemption rate among the worst consumers along with a much higher increase in spending leads to higher profitability for the chain. These frequent shopper programs are profitable in the aggregate.

3 An Explanation

Our empirical research suggests that supermarket frequent shopper programs, as currently implemented, are an attempt to get customers to spend more at a store in exchange for a discount - be it a ham, turkey or a discount. In this section we seek to offer an explanation for the impact of such programs; where it is profitable to offer a frequent shopper program if only one of the competing firms offers the program and that such programs influence

the behavior of the worst customers (defined by their spending level at the store) more than that of the best customers. Our modeling effort builds on the work of Lal and Matutes (1994) and Lal and Rao (1997) that models competition between two stores where consumers shop for a basket of goods. Our analysis assumes that two supermarkets, A and B, located at the end of a line of unit length, carry the same assortment of products as reflected in a typical basket of goods purchased by shoppers, but perhaps at different prices. For the sake of expositional simplicity, the marginal costs of the goods to the stores are assumed to be zero.

Consumers are located uniformly along the line connecting the two stores and incur a shopping cost c, to and fro, per unit distance. This parameter is often interpreted as the travel cost to a store but more generally as the parameter that captures the degree of differentiation between stores. The latter interpretation involves c as the cost associated with the distance between the consumer's ideal point and the location of the store in a perceptual space, where the line connecting the two stores is a vector along dimensions differentiating the two stores. Each consumer is assumed to buy the same assortment of goods on a regular basis and the store choice decision is determined by the prices of the products and the relative convenience of the two stores. Consumers have a reservation price v for each good, and choose not to buy if the item is not available at a price below the reservation price. All prices are known to consumers before making the store choice decision.

As mentioned above, stores carry the same assortment of goods but may price individual items differently. As a practical matter it is difficult to implement a pricing strategy in which there are no cherry picking opportunities for the dedicated shopper. With thousands of items in the grocery store there will *always* be some items that are attractive to cherry pickers. The set of all items in each store can be divided into two baskets: one that consists of items that are relatively cheaper in the store and the other of those items that are relatively cheaper in the other store. The price of the basket that is cheaper in store A is assumed to be $P_a - d$ and the price of the basket of goods that is more expensive in store A is assumed to be P_a; similarly, the prices at store B are $P_b - d$ and P_b for these two baskets respectively. We further assume that the discount d on the cheaper items in the store is exogenously determined by factors beyond the control of the store and therefore, stores set

prices of the items in the grocery basket so as to communicate a price image captured by the decision variables P_a and P_b respectively. Since, all prices are known to the consumers, the cherry picker therefore can pay $2P_a - d$ by shopping for all items at store A or pay $P_a + P_b - 2d$ by cherry picking. Our model therefore has two key parameters that capture the trade off faced by the cherry picker: c, the opportunity cost of shopping around, and d, the savings potential.

3.1 Analysis of The Pure Price Game

For benchmark purposes, we begin by ignoring discounts and setting $d = 0$. In this case there is no incentive for any customer to cherry pick and every consumer shops either at store A, or store B, but not both. The marginal customer is located at a distance x from store A where

$$2P_a + 2cx = 2P_b + 2c(1 - x)$$

$$\text{that is} \quad x = \frac{c + P_b - P_a}{2c}.$$

Assuming that the reservation price is sufficiently high to cover the price of the goods and the shopping costs, store A's profits are

$$2P_a x = P_a \left\{ \frac{c + P_b - P_a}{2c} \right\},$$

and are maximized when $P_a = 0.5(c+P_b)$. By optimizing $2P_b(1-x)$ or simply by recognizing the symmetry between A and B we deduce that $P_a^* = P_b^* = c$. Total profits to store A are $2xP_a = c$. Note that the profits to the stores are related to travel costs rather than the value added of the items.

These results are well established but serve as a benchmark for our later analyses.

3.2 The Case of Promotional Pricing

If $d > 0$, consumers that are located closer to store A are likely to purchase the basket at store A and this fraction is

$$x_a = \left\{ \frac{2c + P_b - d - P_a}{2c} \right\}.$$

Similarly all consumers located at a distance greater than x_b from store A, where $x_b = \left\{ \frac{P_b - P_a + d}{2c} \right\}$ buy the complete assortment from store B. All consumers located between x_a and x_b cherry pick and buy the lower priced good at each store. Such cherry pickers exist only if $x_b > x_a$, i.e., $d > c$, that is the discounts have to be large enough (compared to the shopping costs) to make cherry picking worthwhile. If the discounts are too large, everyone cherry picks; i.e., $x_a < 0$ and $x_b > 1$. In equilibrium this happens if $d = 2c$, and discounts are large enough to cover the total costs of shopping around for all consumers.
We conclude that promotions d induce
(i) no cherry picking if $d \leq c$,
(ii) some cherry picking if $2c \geq d \geq c$.

We know that store profitability is equal to c in case (i). What about the other case ? In case (ii), store A will wish to maximize

$$(2P_a - d)x_a + (P_a - d)(x_b - x_a) = (2P_a - d)\frac{2c + P_b - d - P_a}{2c} + (P_a - d)\{d/c - 1\}.$$

Differentiating with respect to P_a yields

$$2 + \frac{1}{c}\{P_b - P_a - d - P_a + 0.5d + d\} - 1 = 1 + \frac{P_b}{c} - \frac{2P_a}{c} + \frac{d}{2c}.$$

Knowing that a symmetric equilibrium dictates $P_a^* = P_b^*$ we see that the optimal solution is given by

$$1 + P_a^*/c - 2P_a^*/c + d/2c = 0; \quad \text{i.e.} \quad P_a^* = P_b^* = c + 0.5d.$$

The equilibrium profits therefore are $c - 0.5d(d/c - 1)$ which is less than c for all $d > c$, and are zero when $d = 2c$.

3.3 Introducing Loyalty Programs

As the results in Section 2 are for a mid-west supermarket chain that is the only competitor in its trading area to offer a frequent shopper program, we begin by assuming that only one store, store A, offers a loyalty program. This store offers a discount of L to all consumers who buy both goods at store A, otherwise, the regular price at store A is P_a and the discounted price is $P_a - d$. The profits to store A, if some consumers continue to cherry pick, which requires $c + 0.5L < d < 2c$, are:

$$\Pi_a = (2P_a - d - L)\left\{\frac{P_b - P_a - d + L + 2c}{2c}\right\} + (P_a - d)\left\{\frac{2d - 2c - L}{2c}\right\}.$$

Differentiating with respect to L and P_a respectively, we get

$$\frac{\partial \Pi_a}{\partial L} = \frac{2P_a - 2L - 2c - P_b + d}{2c},$$

$$\text{and} \quad \frac{\partial \Pi_a}{\partial P_a} = \frac{-4P_a + 2L + 2c + 2P_b + d}{2c}.$$

Setting the first order conditions to zero and solving, we get

$$P_a = d + 0.5P_b, \quad \text{and} \quad L = 1.5d - c.$$

At the optimal value of L there is no cherry picking because $2d - 2c - L < 0$ when $L = 1.5d - c$, and $d < 2c$. The profits to the stores are c, and are higher than in the case where no store offers a frequent shopper program.[2] These results are consistent with the empirical results presented in Section 2 where frequent shopper programs are observed to have increased profitability. Our model suggests that the increase in profitability results from the reduction in the welfare loss incurred due to cherry picking. This welfare loss is recovered through the frequent shopper program and part of it goes to the store in the form of increased profitability. Moreover, since the fraction of consumers shopping for a single item is reduced from $\frac{2d-2c}{2c}$ to $\frac{2d-2c-L}{2c}$, it is easily seen

[2]In case of no cherry picking, the market share of store A is x where x is such that $2P_a - d - L + 2cx = 2P_b - d + 2c(1-x)$. The profits to store A therefore are $(2P_a - d - L) * x$ and those to store B are $(2P_b - d)(1-x)$. Let $2P_a - d - L = Y_a$ and $2P_b - d = Y_b$. The profits to store A can rewritten as $Y_a * x$ and those to store B as $Y_b * (1-x)$ and $x = \frac{2c - Y_a + Y_b}{4c}$. Now it easily seen that in equilibrium $Y_a = Y_b$ and the profits to the two stores are c.

that cherry pickers are spending more at store A by buying the complete basket at the store. This contrasts with the behavior of loyal customers which remains unaffected.

To summarize, we conclude from our model that:

(a) the frequent shopper programs are profitable even when only one retailer offers such a program;

(b) they are profitable because they help reduce cherry picking and the reduction in systemwide shopping costs show up in the form of higher profits, and

(c) the frequent shopper programs impact the behavior of the cherry pickers more than that of the loyal customers.

3.4 Empirical Validity of our Model

Assuming that frequent shopper programs do not affect the total number of trips made by a households to grocery stores, we are able to empirically test the conclusions of our model by estimating the difference in the number of trips for the redeemers and non-redeemers across the three customer groups. Given our contention that frequent shopper programs impact the behavior of cherry pickers more than that of the loyal customers by inducing them to shop more at the store, we expect to observe the impact of the program to be the highest for the worst customers. Table 8a presents the results of a regression analysis where the dependent variable, T2-T1, is the difference in the number of trips during the ham promotion period and the pre-ham promotion period. As expected, the difference between the redeemers and non-redeemers is the highest among the worst customers; during the ham promotion period, among the worst customers, the redeemers made 1.7 trips more than the non-redeemers (compared to an average of 5.8 trips for the worst customers during the ham promotion period). Similarly, among the best customers, the redeemers made 1.2 trips more than the non-redeemers but the average number of trips for the best customers was approximately 10 trips during this period. The average number of trips for the better cus-

tomers was 7.8.

Another test of our model could be with respect to the basket size measured as the spending per trip. Our model predicts that the introduction of the frequent shopper program would lead to more consumers buying the basket rather than the single item. We should therefore expect the difference in basket size for the redeemers and non-redeemers to be higher for the worst customers. Table 8b presents the results of such an analysis and shows that while the difference between the redeemers and non-redeemers in the average basket size for the best customers was $5.67, the corresponding difference for the better and worst customers was $7.56 and $9.33, respectively. Hence the model predictions are again supported by our data. These results find further support in the analysis of the discount program, see Table 8c, where the impact of the program on trip frequency and basket size for the worst customers is again more than it is for the best customers.

While our theoretical model therefore provides an explanation for the empirical results presented in Section 2, our experience from talking to retailers that have implemented frequent shopper programs suggests that few think they have enhanced profitability: some customers may indeed be more loyal in the sense of buying a greater percentage of their food items at a single store; but the fruits of this loyalty have yet to find their way to the bottom line. Retailers we have talked to that have so far resisted the introduction of loyalty programs, express satisfaction at this mixed bag performance, since it relieves them of the burden - and potential distraction - of introducing their own loyalty/frequent shopper program.

As we contrast our empirical findings that paint a positive picture on the success of frequent shopper programs with the anecdotal evidence suggesting the lack of enthusiasm for these programs among leading retailers, we note two differences between the circumstances for our mid-western chain and these leading retailers. First, as mentioned earlier, the mid-western chain, unlike many supermarket chains, does not face competing loyalty programs. Second, while our model assumes homogeneity (every customer has the same travel costs), supermarkets attract consumers with different shopping costs. In the next section we therefore extend our analysis to investigate the impact of these factors on our theoretical results. These extensions will allow us to

formulate hypotheses that could be tested in future.

4 Extending the Model

4.1 Competing Loyalty Programs

We now extend our analysis to the case where both stores offer a frequent shopper program. Suppose stores A and B offer loyalty payments of L_a and L_b to customers who buy both baskets at their store. Cherry pickers don't receive this payment of course. All consumers located to the left of y_a buy the complete assortment from store A where y_a is such that

$$2P_a - d - L_a + 2cy_a = P_a - d + P_b - d + 2c, \text{ or } y_a = \left\{ \frac{2c + P_b - d - P_a + L_a}{2c} \right\}.$$

Similarly, all consumers located to the right of y_b buy the complete assortment at store B where y_b is such that

$$2P_b - d - L_b + 2c(1 - y_b) = P_a - d + P_b - d + 2c, \text{ or } y_b = \left\{ \frac{P_b + d - P_a - L_b}{2c} \right\}.$$

Assuming that some consumers continue to cherry pick, store A would maximize $(2P_a - d - L_a)y_a + (P_a - d)(y_b - y_a)$. Optimizing with respect to P_a and L_a yields $P_a^* = 2c/3 + d$ and $L_a^* = d - 2c/3$ and similarly for P_b^* and L_b^*. These values lead to $y_a^* = 2/3$ and $y_b^* = 1/3$. Since $y_a^* > y_b^*$, we conclude that offering these loyalty programs eliminates all cherry picking. Any solution with the property $P_a^* - L_a^* = c + d/2$ and $L_a^* \geq d$ is therefore optimal. With the elimination of cherry picking, store $A's$ profits are as before. The solution $P_a^* = c + d, L_a^* = d$ means that the two baskets are priced at $c + d$ and c respectively with a loyalty payment of d, for a total payment of $2c$ and profits of c. Thus we find that if loyalty programs are offered by both stores they do not enhance the profitability of the stores compared to the case when only one store offers a loyalty program.

4.2 The Case of Two Customer Segments

We will now repeat the analysis of Section 4 assuming that there are two kinds of customers, with shopping costs c_1 and c_2 respectively where $c_2 < c_1$.

For the sake of expositional simplicity, we assume that there are equal numbers of each type, each distributed uniformly between the stores. To keep the profitability figures comparable with our earlier results, we assume that the total number of customers is unchanged. As in the previous section, we have a number of cases to consider to determine the equilibrium prices and profitability to the stores.

First consider the case $d < c_2$. In this case no cherry picking takes place and there are two breakeven distances to calculate, x_1 and x_2 where, for example, $2P_a + 2c_1x_1 = 2P_b + 2c_1(1 - x_1)$, and store A will pick P_a to maximize $2P_a(x_1 + x_2)/2$, the divisor reflecting the density of customers. The optimal solution is

$$P_a^* = 2c_1c_2/(c_1 + c_2)$$

with a profit of $2c_1c_2/(c_1 + c_2)$.

Next consider the case $c_2 < d < 2c_2 < c_1$. If d is in this range, some of the c_2 customers cherry pick but none of the c_1 customers do. We find that the equilibrium prices are

$$P_a^* = P_b^* = 2c_1c_2/(c_1 + c_2) + d/2$$

with store profits of $2c_1c_2/(c_1 + c_2) - d(d/c_2 - 1)/4$.

If $2c_2 < d < c_1$, all of the c_2 customers cherry pick, but none of the c_1 customers do so. The profits to store A are $(2P_a - d)(c_1 + P_b - P_a)/2c_1 + (P_a - d)$ and the equilibrium prices are $P_a^* = P_b^* = 2c_1 + d/2$ with store profits of $2c_1 - d/4$.

Finally, when $c_1 < d < 2c_1$, even some of the c_1 customers cherry pick. The optimal price remains $P_a^* = P_b^* = 2c_1 + d/2$ but store profits are $2c_1 - d^2/4c_1$. Figure 1 shows a graph of store profits as a function of d. The highest store profits occur when $d = 2c_2$. In other words, store profits are maximized when one segment of consumers cherry picks between the two stores.

The intuition for this graph is as follows. So long as $d < c_2$, no customer cherry picks therefore profits are constant for all $d \leq c_2$. When d exceeds c_2, some customers with lower shopping cost begin to cherry pick resulting

in lower profits for the stores. This continues until $d = 2c_2$ at which point all customers with lower shopping costs are cherry picking. When $d > 2c_2$, profits increase substantially but then decline for the same reason as before (losses from cherry picking). The key question that remains to be answered is why profits increase so substantially when $d > 2c_2$. The answer is that with $d \leq 2c_2$, some cherry pickers remain in play as potential full basket shoppers and hence influence full basket prices. However, when $d > 2c_2$, all consumers with shopping costs equal to c_2 will never buy both baskets at either store; as a result the full basket prices are influenced only by the price sensitivity of the remaining high shopping cost customers.

We now consider the impact of competing loyalty programs on the shopping behavior of the two segments of customers in our model. As before, we can show that optimal loyalty programs eliminate cherry picking by setting the reward for buying both baskets at the same store to be at or above d. When $2c_2 > d > c_2$, these optimal loyalty programs increase profits to the stores because eliminating cherry picking restores profits to the same level as when $d = 0$ (see Figure 1). However, when $d > 2c_2$, these loyalty programs **decrease** profits because profits when $d = 0$ are lower. Thus we see that introducing competing loyalty programs do not always result in higher profits.

The latest evidence to support the lack of performance comes from the UK with the scrapping of the pilot program by Asda in August 1999 and that by Safeway in May 2000. The experience at Safeway is summarized by its communications director, "Loyalty is not synonymous with having a loyalty card. Since we scrapped our ABC card we have gone on gaining customers-one million more have come to us the past year. You can give them a point for every penny spent, but it doesn't buy you loyalty." Similarly, the Asda spokesman said that given the high costs of implementing these programs, "we decided we didn't have to invest in points and plastic to make our customers loyal." Our results are also consistent with the sentiments expressed by Kramer (2000), where he concludes that " ... most frequent shopper programs are really frequency programs that use discounts to sway consumer loyalty. This short term approach eventually becomes just a sophisticated form of matchable price competition...."

5 Summary and Discussion

The current thinking on frequent shopper programs is that they should be designed to dig deeper into the pockets of the best customers. Our data from a supermarket chain tells a different story. The frequent shopper programs implemented by the supermarket chain we studied affected the behavior of lower spending customers more than that of its best customers. Moreover, these programs were profitable despite the fact that the best customers were more likely to redeem the reward without significant change in their behavior.

These empirical results are not surprising considering that cherry picking is, on the face of it, a bad thing. Customers travel more than is strictly necessary; stores sell only low margin items to these customers. It would seem that a loyalty program that encourages shoppers to buy all of their goods at a single store can be beneficial to all.

We construct a model of competition among stores that highlights the role of the cherry picker. We capture the essence of their behavior through two parameters: shopping costs (c) and the potential savings from cherry picking (d). The analysis of our model makes predictions that are consistent with our empirical findings. Furthermore, we provide empirical support for our model by developing and testing two new hypotheses with respect to trip frequency and basket size. Extending the model to allow for the existence of customers with varying shopping costs shows that frequent shopper programs reduce cherry picking may actually reduce profitability. This is because price promotions add value by providing a way for supermarkets to price segment the market - low prices to the price sensitive, high (not so low) prices to the price insensitive. The problem with discount-based frequent shopper programs is that they are fairly costly and offer the same deals to all, thus removing the hidden benefit of price segmentation. This may explain why grocery retailers seem largely dissatisfied with frequent shopper programs.

How can frequent shopper programs be successful in the grocery industry? First of all a frequent shopper program cannot be offered indiscriminately. It makes little sense to provide the person who lives next to the supermarket with a discount for loyalty. Yet it would be a pity to lose any of one's 100 best customers for the sake of a few dollars - companies often give discounts

to their best customers. Our analysis, throughout, assumed undifferentiated stores. The secret seems to be to continue to offer promotions for the price sensitive cherry picker and value added services for the full basket, less price sensitive shopper. Retailers can also draw a lesson from the success of loyalty programs in the airline industry. Airlines reward their best customers through improved perks and services rather than better prices and discounts even when the cost of offering a free trip is very low.

Supermarkets need to find ways to reward desirable customers with non-price benefits. The loyalty card data should be used to identify the best customers, learn what they like and dislike so that the store can do more of what they want. An enthusiastic store manager may merchandise the store in response to remarks and desires of the average customer or worse - the cherry picker with time on his/her hands to converse with the store manager. Albert Lee of Lees Supermarket reports being shocked when his loyalty data revealed who were his 10 best customers. "I could have named only three of them," he said.

A final word needs to be added about the ability of such programs to modify consumer behavior. These awards should be targeted towards consumers who have the potential to modify their behavior in a way that is desirable to the franchise. In different industries, different type of customers may have the flexibility to change their behavior in response to frequent shopper programs. For example, in the airline industry, it is the frequent traveller, business customer, who might have the possibility to increase its patronage of one airline over the other. The infrequent traveller who often takes only two family vacations a year may not have much flexibility in choice of airlines and may take a long time to accumulate the miles for free trips. Hence, it is easier to induce behavior modification among the more frequent traveller than the infrequent traveller. Frequent reward programs should therefore be directed towards the business customers and rewards have to be designed so as to encourage such customers to modify their behavior such that they are beneficial to the airline. In contrast, in the grocery industry, the best customer may already be patronizing the store to a degree that it is difficult to increase the store's share of wallet. It may therefore be difficult to significantly change his/her behavior through a frequent shopper program. Hence rewards to frequent shoppers have to be either lucrative enough to change the behavior of such customers or need to be targeted at a different customer

segment.

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Available Data for Ham Program

	Jan 1 - Feb 7	Feb 8 - March 21	March 22 - April 18
1998	P1-control	P2-Ham Promotion	P3-redemption
1999	P4-control	P5-control	P6-control

Table 1

The Ham Program in 1998

Dependent Variable: S2-S1

Variable	Coefficient	St. Error	t Stat	R-NR	Redemption	Redemption (among qualified)
475 R	-35.9	1.78	-20.2	$98	69.7%	74.2%
475 NR	-133.9	2.7	-49.7			
325 R	75.9	2.77	27.4	$141	42.0%	59.3%
325 NR	-65.1	2.36	-27.6			
Other R	172.6	2.94	58.7	$150.5	12.4%	49.4%
Other NR	22.1	1.11	19.9			

Table 2

Checking for Stockpiling

Dependent Variable: S3-S6

Variable	Coefficient	St. Error	t Stat	R-NR
475 R	49.9	1.9	26.3	$57.70
475 NR	-7.8	2.9	-2.7	
325 R	31.6	2.9	10.7	$42
325 NR	-10.4	2.5	-4.1	
Other R	18.4	3.1	5.9	$29.90
Other NR	-11.5	1.2	-9.7	

Table 3

Checking for Seasonality and Trends

Dependent Variable: (S2-S5) - (S1-S4)

Variable	Coefficient	St. Error	t Stat	R-NR
475 R	-24.76	2.63	-9.42	$94.46
475 NR	-119.22	3.99	-29.9	
325 R	75.02	4.09	18.33	$138.59
325 NR	-63.57	3.49	-18.2	
Other R	156.64	4.35	36	$144.03
Other NR	12.61	1.64	7.69	

Table 4

Checking for Misclassification

Dependent Variable: S2-S1

Difference in Spending Levels of Redeemers and Non-Redeemers

	Cut-off 500 and 350	Cut-off 475 and 325	Cut-off 450 and 300	Cut-off 425 and 275	Actually Spent 325 or more
Best	$96.34	$98.02	$98.49	$98.35	$46.64
Better	$139.85	$140.98	$144.01	$148.27	$59.85
Worst	$145.50	$150.55	$155.54	$157.51	$71.20

Table 5a

Checking for Misclassification

Dependent Variable: S5-S4

Variable	Coefficient	St. Error	t Stat	R-NR
475 R	-42.32	2.19	-19.3	$3.0
475 NR	-39.32	3.5	-11.2	
325 R	83.12	3.65	22.8	-$1.94
325 NR	85.06	4.26	20	
Other R	208.4	4.33	48.1	-$5.03
Other NR	213.43	4.32	49.4	

Table 5b

Checking for Misclassification

Dependent Variable: S2-S5

Variable	Coefficient	St. Error	t Stat
intercept	-37.11	2.07	-17.9
Redeem indicator	83.03	4.59	18.08
Spend in P_1	0.037	0.007	5.25
Interaction	-0.06	0.01	-5.78

Table 5c

Results from Discount Programs

1998 Discounts	R-NR	Redemption	**1999** Discounts	R-NR	Redemption
600 R	\$57.19	68.66%	600 R	\$93.11	72.92%
600 NR			600 NR		
450 R	\$80.66	57.47%	400 R	\$124.67	58.66%
450 NR			400 NR		
150 R	\$72.19	37.42%	200 R	\$138.68	39.52%
150 NR			200 NR		
Other R	\$101.42	13.69%	Other R	\$182.76	16.96%
Other NR			Other NR		

Table 6a

Results from Turkey Programs

1999 Turkey	R-NR	Redemption
750 R	$143.81	82.72%
750 NR		
500 R	$145.74	61.59%
500 NR		
250 R	$121.10	34.24%
250 NR		
Other R	$107.69	13.47%
Other NR		

Table 6b

Summary of Our Results

Ham Program	**R-NR**	**Redemption**	**1998 Discounts**	**R-NR**	**Redemption**
475	$98	69.70%	600	$57.19	68.66%
325	$141	42.00%	450	$80.66	57.47%
Other	$151	12.40%	150	$72.19	37.43%
			Other	$101.42	13.69%
1999 Turkey	**R-NR**	**Redemption**	**1999 Discounts**	**R-NR**	**Redemption**
750	$143.81	82.72%	600	$93.11	72.92%
500	$145.74	61.59%	400	$124.67	58.66%
250	$121.10	34.24%	200	$138.68	39.52%
Other	$107.69	13.47%	Other	$182.76	16.96%

Table 7

Results from Ham Programs

Differences in Trips between Redeemers and Non-Redeemers

Variable	Coefficient	t Stat	R-NR
475 R	-0.1	-3.7	1.2
475 NR	-1.3	-21.3	
325 R	0.9	14.3	1.6
325 NR	-0.7	-14.5	
Other R	2.2	34.8	1.7
Other NR	0.5	21.7	

Table 8a

Results from Ham Programs

Differences in Basket Size between Redeemers and Non-Redeemers

Variable	Coefficient	t Stat	R-NR
475 R	-3.21	-11.4	$5.67
475 NR	-8.88	-20.7	
325 R	1.67	3.8	$7.56
325 NR	-5.89	-15.7	
Other R	9.66	20.7	$9.33
Other NR	0.33	1.87	

Table 8b

Results from Discount Programs

Differences in Trips and Basket Size between Redeemers and Non-Redeemers

1998 Discounts	R-NR		**1999** Discounts	R-NR	
	Trips	Basket Size		Trips	Basket Size
600	0.88	$0.66	600	1.08	$5.14
450	0.95	$3.15	400	1.51	$8.42
150	1.22	$3.71	200	1.84	$7.45
Other	1.4	$9.21	Other	2.18	$15.56

Table 8c