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Modeling Coupon Values for
Ready-To-Eat Breakfast Cereals

by Gregory K. Price
and John M. Connor

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University of Connecticut
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Preface

This paper is a synopsis of the lead author's Ph.D. dissertation. This study evolved from the authors' mutual interest in the effects of industry concentration and market power on retail food marketing.

1. Introduction

Researchers in the field of marketing consider coupons to be promotional devices that aim to increase brand market share, strengthen brand loyalty, and expand a product=s market by attracting consumers with low reservation prices. Economists provide a complementary perspective by modeling coupons as tools to exploit unilateral market power through price discrimination. While both research traditions demonstrate interest in the functions of coupons and their performance implications, the determinants of coupon values have been largely unexplored. Reasons for this deficiency in the literature include a lack of sufficiently detailed transaction data and the proprietary nature of coupon information.

The objective of this study is to develop and test a model that explains the determinants of coupon values at the brand level. The theoretical framework is derived from price discrimination theory and the principles of demand. In order to test the hypotheses of the model, the framework is operationalized with a simultaneous, two-equation, fixed-effects, panel-data model and fitted with data on household purchases of ready-to-eat (RTE) breakfast cereals. The RTE cereal industry was chosen because of its intensive use of couponing.

There are several reasons why it is important to know the determinants of coupon values. First, published theoretical and empirical research is not rigorous in identifying the factors that influence discount levels. While a handful of studies have explicitly analyzed subsets of the explanatory variables (Gerstner, Hess, and Holthausen; Nevo and Wolfram; Shaffer and Zhang), most works have only hinted at what the determinants may be. As a result, previous research does not provide insights for brand managers who are interested in understanding the factors that influence the face values of coupons.[1] Second, there is concern that the discounts in some industries are at non-optimal levels (i.e., values that do not maximize firm profitability or diminish welfare). Knowledge about the significant determinants of coupon values can assist in the evaluation of financial or market performance. Third, product prices and coupon values are determined simultaneously. If the face values of coupons are to be set correctly, then the factors that affect both brand prices and discount levels must be identified and quantified with the appropriate data.

2. Functions of Coupons

Coupons can increase brand sales because they are price-discounting mechanisms, and the discounts expand demand by attracting price-sensitive consumers (Schindler, Ward and Davis). Unlike general price reductions, which can be taken advantage of by all consumers, couponing enables firms to target certain demand segments, in particular consumers with relatively low reservation prices. As a result, the issuers of coupons price discriminate and maximize profit (Houston and Howe, Narasimhan). Companies cannot prevent consumers with a high willingness to pay from using coupons, so discount levels are set such that leakage is minimized (Larson).

Manufacturers also issue coupons to encourage consumers to try new or unfamiliar products. The discounts compensate individuals for assuming risk and may reward firms with loyal purchasers (Levedahl). Coupons increase the probability of purchase through their advertising effect. Specifically, the discounts remind consumers of product availability and their desire to try particular goods (Capps, Seo, and Nichols; Leone and Srinivasan). Furthermore, manufacturers obtain market research data from the coupons that are redeemed. Specifically, firms code their coupons by media type and geographic region. Most companies contract with third parties to process the discounts and provide data on redemption patterns.[2] This information allows the firms to gauge consumer preferences. As a result, companies can alter their marketing strategies to more effectively promote their products.

Firms issue coupons to increase their brands= market shares (Neslin; Raju, Dahr, and Morrison). According to Shaffer and Zhang, couponing can be an offensive or defensive strategy. Aggressive companies offer discounts on their own products to steal consumers away from rival manufacturers. Targeted firms, on the other hand, issue coupons as a defensive measure to prevent the erosion of their own sales. Coupons can also serve as a strategic tool within the distribution channel (Gerstner and Hess). Discounts resulting from manufacturers= trade deals (promotions offered to distributors that are designed to encourage product stocking) are not always passed on to consumers. Couponing circumvents the problem of

[1] Brand managers are interested in other aspects of couponing including ad size (e.g., half-page or full-page), distribution method (free-standing inserts in newspapers, on-pack discounts, or shelf displays), circulation (regional versus national), the products to which a coupon applies, the number of purchased products required for discount eligibility, issue date, and validity length.

[2] Some large companies such as Proctor & Gamble and General Mills operate their own clearinghouses. Due to the large number of coupons issued, it is more cost effective for the companies to process the coupons themselves than to pay a third party to perform the job.

distributor compliance by placing the savings directly in the hands of consumers.[3]

3. Background on the RTE Cereal Industry

In the early 1990s, RTE breakfast cereals were among the five most concentrated classes of food products (Connor 1999). More recently, there has been further consolidation in the breakfast cereal industry. Philip Morris= Post bought RJR Nabisco=s cereal assets in January 1993, and General Mills acquired Ralcorp Holdings= branded cereal line (marketed under the Ralston name) in December 1996 (Wall Street Journal, Gibson 1996, Miller 1996b). Today, four firms dominate the industry: Kellogg, General Mills, Post, and Quaker.

Private-label cereals, also know as store brands, are not heavily promoted or advertised. Therefore, they are sold at prices that are significantly less than those of branded cereals. According to Connor (1999), branded cereal prices exceed those of private-label cereals by 43 to 47 percent. The total market share of private-label cereals is small but has grown over the past several decades. In 1999, the market share held by private-label cereals was over 10 percent of total industry volume, up from less than 3 percent in 1980 (Information Resources, Inc.; Connor, Rogers, Marion, and Mueller). Most private-label cereals are manufactured by Ralcorp (60 percent market share) and two smaller companies, Gilster Mary Lee and Malt-O-Meal (Cotterill 1997).

The RTE cereal industry may be characterized as a tight structural oligopoly. It is generally believed that leading cereal makers avoid competing on the basis of price in order to prevent destructive discounting practices that would erode profitability (Scherer), but that long-standing practice was broken in April 1996. Per capita consumption of branded cereals stagnated in the early 1990s because of the rising differential between branded and private-label cereal prices. Consumers were also switching to more portable foods such as bagels and breakfast bars (Canedy and Ableson). Post slashed its cereals= prices by 20 percent so that it could reduce the company=s dependence on inefficient promotional activities, namely couponing (Gibson and Ono). The other major producers including Kellogg and General Mills followed suit two months later by cutting a portion of their brands= prices (Balu 1998a, Miller 1996a). A simultaneous reduction in the number and face values of coupons lowered the net price effects to levels below those claimed by the firms.

Although RTE cereal manufacturers rarely compete on price, rivalry does arise through a variety of non-price strategies. In the early 1990s, couponing was the predominant vehicle for product promotion. More than 44 billion coupons were issued for breakfast cereals in 1993, which cost manufacturers approximately 17 to 20 percent of industry sales.[4] The goal of couponing is to encourage price-sensitive consumers to purchase brands that they would not normally buy without a discount and to entice the purchasers of rival cereals to switch brands. Cereal coupons= 3.8 percent redemption rate is 70 percent higher than grocery products= 2.2 percent redemption rate, and nearly 38 percent of the volume of RTE cereal is purchased with coupons (Connor 1997, Gibson 1993).

Furthermore, the major cereal makers spend 10 to 15 percent of the value of their sales on mass-media advertising to differentiate brands, reduce product substitutability, and create demand segments in the market (Connor 1999). This strategy limits the market penetration of potential entrants and private-label cereal makers. Intense advertising raises the minimum level of promotional activity that is required for new entrants to have successful product introductions. Entry into the market is also deterred by the large cereal markers= use of product proliferation (Schmalensee). The firms relentlessly introduce new brands to fill every possible niche in the market, thus making it difficult for small companies to gain significant shares of the market. In addition, the large cereal manufacturers use their dominant positions to negotiate space plans and shelf positions with retailers (Scherer). Since product placement is usually determined by past sales volume, large companies obtain the majority of shelf space as well as the most desirable locations.

Because of high market concentration, barriers to entry, and non-price rivalry, the RTE cereal industry enjoyed extraordinarily high profitability up until the mid-1990s.[5] Furthermore, the margin between cereal prices and

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[3] Other methods of addressing this principal-agent problem include the use of on-pack coupons and on-shelf dispensers.

[4] Couponing in the RTE cereal industry is expensive because the firms incur costs beyond the total dollar value of the redeemed price discounts. While the total redemption value (redemption rate multiplied by the face value of outstanding coupons) of breakfast cereal coupons in 1993 was $915 million, manufacturers spent an additional $300-$400 million on printing, distributing, and handling the discounts (both redeemed and unused coupons).

[5] According to Cotterill (1999), industry profits averaged 17 percent of sales in the 1980s and the first half of the 1990s. The RTE cereal industry=s performance was so phenomenal that the Federal Trade Commission filed an antitrust lawsuit against several firms in 1972. General Mills, Kellogg, General Foods (later known as Post), and Quaker (eventually dropped from the suit in 1978) were charged with monopolizing the market

manufacturing costs increased dramatically in the 1970s, 1980s, and the first half of the 1990s. The difference, known as the price-cost margin (PCM), is approximated with data from the cereal breakfast foods industry (which includes RTE cereal manufacturers as well as the producers of infant and hot cereals). In 1995, the cereal industry=s PCM was 0.75, up from 0.46 in 1973. Appendix Figure 1 (data used to generate the graph are provided in Appendix Table 1) illustrates the nearly monotonic increase in the cereal industry=s PCM over the twenty-three years.[6]

According to Connor *et al.* (1985), consumers in the 1970s and 1980s paid prices for RTE cereals that were 18 to 38 percent above competitive levels. For over 10 years, cereal prices advanced faster than food-at-home prices. Specifically, cereal prices rose 91 percent between 1983 and 1994 while all food prices increased only 45 percent during the same period (Cotterill 1999). Recently, high prices for branded cereals and consumers= increasing preference for portable breakfast foods have made it difficult for RTE cereal firms to maintain their previous success. Most dramatically, Kellogg=s market share slid to 31 percent in 1999 (in terms of volume), down from 47 percent in 1970. While the dominant cereals makers initiated price and discount cuts in 1996 to stimulate waning consumer demand and increase firm profitability, the results were disappointing (Balu 1998b).

4. Theoretical Model

Assume that there is a market for a particular good with two sellers and two distinct submarkets. Figure 1 provides a graphical depiction of the brands that are produced by the firms. The manufacturers compete directly and indirectly with each other through product formulation and demand positioning. As a result, all of the brands are substitutes to some degree. Brands in a given submarket are relatively strong substitutes because of product similarity. For example, brands A-II-A and A-II-B are similar to each other and to the brands produced by Firm B in Segment II. The most intense rivalry arises when firms imitate product formulations and create similar images for a pair of brands. In Figure 1, Firm A directly competes with Firm B by making brand A-I-A with attributes that are nearly identical to those of brand B-I-A and advertising it to the same subset of customers. Direct competition is denoted by bold arrows in Figure 1. Product design differences within a particular segment ensure less intense rivalry between brands (for example, brand A-II-B with brands B-II-A and A-II-A). The thin lines between products indicate moderate substitutability. Brands in different submarkets are competitively the most insulated from one another (i.e., weak substitutes).

It is assumed that consumers repeatedly purchase their favorite brands. Product differentiation creates varying degrees of brand loyalty in consumers. Depending on an individual=s preferences, a person either greatly or weakly prefers one brand over the others in his/her favorite category. Those individuals who greatly prefer their products are assumed to be brand loyal and have a high reservation price for their goods. Loyal consumers are relatively price insensitive; they require more compensation to switch brands than less loyal consumers. Nonloyal consumers display the opposite characteristics.

All brands are assumed to be purchased by loyal and nonloyal consumers. The market may be thought of as monopolistically competitive where each brand is horizontally differentiated. Therefore, the consumers= demand curves for their favorite brands are downward-sloping and fairly elastic. The demand curve of a single loyal consumer for brand i is denoted as D^L_i in Figure 2. In addition, a representative nonloyal consumer=s demand curve is labeled as D^N_i in the same figure. The retail price of brand i is P^R_i, and the vertical intercepts indicate the two consumers= reservation prices. The representative loyal consumer has a reservation price for good i equal to P^L_i, whereas the nonloyal individual is not willing to pay more than P^N_i for that brand. Each person=s demand function for his/her preferred brand is assumed to be specified by either

$$Q^L_i = \begin{cases} f(P^R_i,\ BL^L_i,\ P^R_{-i},\ C_{-i}) \text{ if } 0 \le P^R_i \le P^L_i \text{ or} \\ 0 \text{ if } P^R_i > P^L_i \end{cases} \qquad [1]$$

or

$$Q^N_i = \begin{cases} g(P^R_i,\ BL^N_i,\ P^R_{-i},\ C_{-i}) \text{ if } 0 \le P^R_i \le P^N_i \text{ or} \\ 0 \text{ if } P^R_i > P^N_i, \end{cases} \qquad [2]$$

depending on the degree of the individual=s loyalty. In [1] and [2], Q^L_i and Q^N_i indicate the quantities demanded of brand i by a single loyal and nonloyal consumer, respectively. The term BL_i denotes brand loyalty to brand

through highly effective tacit collusion and not competing on the basis of price. After nearly 10 years of lobbying and litigation, the companies were exonerated by an administrative law judge.

[6] The dominant RTE cereal producers have relatively low food ingredient costs (9 percent of sales in 1992, down from 23 percent in 1954). Expenses for packaging (plastic or foil bags and boxes) exceed those for food ingredients (Connor 1999). The cereal industry=s PCM was significantly less in 1996. The sudden drop was due primarily to the industry-wide price cuts which occurred that year.

i. The prices of rival brands (relative to brand i) are represented by P^R_{-i}, and C_{-i} stands for the size of the discounts for competing goods.

The manufacturers are assumed to price discriminate against their own loyal and nonloyal customers in each submarket. A given company maximizes the profit from brand i=s loyal consumers by charging them the product=s full retail price, P^R_i (for simplicity, it is assumed that no retailers or wholesalers are involved in the distribution and marketing chain). The firm also offers coupons for brand i with a value of C_i . The coupons lower the item=s shelf price for the price-sensitive consumers, and the reduced price, P^R_i - C_i, maximizes the profit from the nonloyal consumer segment (i.e., those individuals who weakly prefer brand i). While P^R_i may be such that $P^R_i > P^N_i$ (so long as P^R_i # P^L_i) or 0#P^R_i#P^N_i , it is assumed in this scenario that $P^N_i < P^R_i < P^L_i$) and the coupons make brand i affordable for the nonloyal consumers who prefer that product.

There are costs associated with using coupons. Consumers must find, clip, sort, save, and redeem the discounts in order to accrue the savings denoted by the face values. Each consumer is assumed to have transactions costs, and the costs are randomly distributed among both types of individuals.[7] That is, consumer j has transactions costs equal to t_j , and the value of t varies across consumers. Since coupon usage depends on the level of a particular individual=s transactions costs, the manufacturers cannot prevent the loyal consumers from redeeming the discounts. All loyal consumers purchase their favorite brand because P^R_i # P^L_i , and a given loyal individual uses his/her preferred brand=s discount if t_j # C_i (a net savings is realized). A nonloyal individual buys his/her favorite brand if

$$P_i^R - C_i + t_j \leq P_i^N \qquad [3]$$

is true. In other words, the discount must be large enough to offset the nonloyal consumer=s transactions costs and still have enough left over to reduce the price paid to or below the individual=s reservation price. Some nonloyal consumers remain out of the market when [3] does not hold.

At this point, it is important to discuss one limitation of the model. While the role of retailers is disregarded in the theoretical framework, in reality, retailers hold an important position in the food marketing and distribution chain. From the consumers= perspective, retailers are the gateway to food products. With respect to couponing, retailers deduct the discounts from the couponed products= shelf prices. Grocers also collect the coupons and send them on to clearinghouses for processing. Furthermore, retailers may offer incentives, such as the doubling or tripling of face values (usually discounts of 50 cents or less), to encourage consumers to shop at their stores. While brand managers set the face values of coupons, the true savings realized by consumers may be much greater if retailer doubling or tripling occurs. With additional discounts from retailers, more nonloyal consumers find that their preferred brands are affordable, and greater leakage occurs in the loyal consumer segment. The doubling or tripling of manufacturer-issued discounts is not considered in this study.

The first step in understanding the factors that influence the face values of coupons is to analyze the relationship between P^R_i and C_i using [3]. Rearranging to obtain C_i by itself, the inequality becomes $C_i \exists P^R_i - P^N_i + t_j$. It is argued that to just induce the nonloyal consumers with transactions costs t_j to purchase preferred brand i, the previous expression holds with equality. That is,

$$C_i = P_i^R - P_i^N + t_j. \qquad [4]$$

The partial derivative MC_i / MP^R_i reveals that there is a direct relationship between P^R_i and C_i . Considering the inequality, the change in the discount level must be greater than or equal to any given price increase if the nonloyal consumers are to continue purchasing their favorite brands.

Brand loyalty, the prices of competing brands, and rival discounts also affect the value of brand i=s coupons. These impacts occur because changes in the variables shift the nonloyal consumers= demand curves and alter their reservation prices.[8]
Specifically,

$$P_i^N = z(BL_i^N, P_{-I}^R, C_{-I}). \qquad [5]$$

Using [4] and [5], the effect of a change in brand loyalty on the preferred product=s discount, MC_i / MBL^N_i , is equal to (MC_i / MP^N_i) X (MP^N_i / MBL^N_i). The expression in the second set of parentheses is positive since an increase in brand loyalty causes the nonloyal consumers= demand curves to shift to the right as shown in Figure 3. The sign of the first expression is negative assuming that the nonloyal consumers= new reservation price, P^N_iN is such that $P^N_i N < P^R_i$. The inverse relationship between P^N_i and C_i exits because a smaller discount is needed (after the

[7] It is assumed that the degree of an individual=s loyalty to his/her preferred brand does not to imply anything about his/her transactions costs.

[8] Because loyal consumers have strong brand preferences, it is assumed that changes in rival brands= prices and discounts do not alter those individuals= demand curves.

shift in demand) to induce purchasing among those nonloyal consumers with transactions costs equal to t_j . The net effect of an increase in the nonloyal consumers= brand loyalty on brand coupon values is negative. Lower prices and larger discounts on rival brands make those products more attractive. As a result, the nonloyal consumers= demand curves shift to the left (Figure 4). Using [4] and [5] again, $MC_i / MP^R_{-i} = (MC_i / MP^N_i) X (MP^N_i / MP^R_{-i})$ and $MC_i / MC_{-i} = (MC_i / MP^N_i) \bullet (MP^N_i / MC_{-i})$. The expressions MC_i / MP^N_i and MP^N_i / MC_{-i} are negative while MP^N_i / MP^R_{-i} is positive. Therefore, MC_i / MP^R_{-i} is negative, indicating that targeted firms increase the discounts on their goods as rival products become cheaper. The expression MC_i / MC_{-i} is positive, thus showing that firms raise the price concessions on their own brands when rival manufacturers try to lure their customers away with competing discounts (Shaffer and Zhang). Both reactions are intended to protect the targeted firms= sales.

Brand market share (MS_i) is also thought to influence discount levels. Manufacturers are assumed to use coupons as share-maintenance tools. Therefore, a positive relationship between brand market share and discount levels is expected. Furthermore, hedonic pricing studies (e.g., Stanley and Tschirhart) have shown that brand-specific characteristics (BSC_i) influence product prices. Since discount levels and brand prices are intimately related, product attributes are expected to affect discount levels (either positively or negatively). To summarize, the following expression depicts the determinants of brand coupon values:

$$C_i = v(P_i^R, BL_i^N, P_{-i}^R\ C_{-i}, MS_i, BSC_i). \qquad [6]$$

Economic theory indicates that brand prices and discount levels influence each other. In order to account for the bi-directional causality between C_i and P^R_i , the determinants of P^R_i must be identified. Besides C_i , P^R_i is influenced by the prices of competing brands, costs of production, advertising expenditures, inventory levels, and brand-specific effects. That is,

$$P_i^R = w(C_i, P_{-i}^R, MAT_i, LAB_i, E_i, AD_i, INV_i, BSC_i). \qquad [7]$$

The variables MAT_i , LAB_i , and E_i are the material, labor, and energy costs associated with producing brand i, respectively; AD_i is brand-level advertising expenditures; and INV_i is the inventory level of brand i. Increasing costs of production (MAT_i, LAB_i, and E_i) and advertising expenditures (Wills and Mueller) have a positive influence on P^R_i because a higher brand price is needed to cover rising costs. Higher inventory levels, on the other hand, have a negative effect on P^R_i because the manufacturer must lower brand i=s price to reduce unexpected build-up of stocks. Together, [6] and [7] comprise the behavioral model used in this study. The expected hypotheses of the theoretical model are summarized in Appendix Table 2.

5. Application to the RTE Cereal Industry

The theoretical model is employed to analyze the determinants of coupon discounts for RTE breakfast cereals. The prepared cereal market is assumed to comprise four demand segments: regular/adult cereals, presweetened brands, fruit and nut cereals, and granolas. Some of the demand segments chosen by Nevo and Wolfram were similar to those in this study; they specified the cereal categories to be all family/basic, kids, simple health/nutrition, and wholesome/taste enhanced. The categories used in this study are thought to be reasonable. Researchers and industry analysts generally agree that RTE cereals may be divided into regular and presweetened brands. Granolas may be considered a separate submarket since they have a natural or healthy image. Furthermore, their heft and firm texture distinguish them from other cereals. Brands that contain fruit and nuts may also comprise an independent group because the other cereal types do not offer these ingredients and fruit/nut brands may provide a more nutritious and complete meal. The correlation of RTE cereal prices within and across submarkets support the reasonableness of the product categories (see Appendix Table 3). Cereal prices are highly correlated within a given submarket but not across cereal types.

RTE cereals have brand-specific characteristics that influence their prices and coupon values. Evidence suggests that presweetened brands as a group are discounted less than the other kinds of cereal. With most presweetened cereals being consumed by children, parents are likely to indulge their children and be relatively unconcerned about whether presweetened brands are discounted with coupons (Connor 1997). When adults purchase regular cereals for their own consumption, they may be more price- and coupon-sensitive. It is believed that average brand loyalty to fruit/nut and granola cereals is high, thus the coupon values for these brands may be larger than the discounts for regular and presweetened cereals. Product prices and coupon values are also assumed to be influenced by other brand-specific characteristics. These attributes include cereal texture (flaked, puffed, or shredded), grain type (corn, wheat, oats, barley, rice, or a mixture of grains), nutritional content (sodium, vitamin, and mineral levels), and the length of availability on store shelves (i.e., whether a particular brand is established or relatively new).

6. Empirical Model and Data

Equations [6] and [7] were operationalized with the following two-equation, fixed-effects, panel-data model:

$$\begin{aligned}\mathrm{COUPON}_i = \alpha_i + \beta_1\mathrm{PRICE}_i + \beta_2\mathrm{LOYALTY}_i + \beta_3\mathrm{RIVREDEMP}_i + \\ \beta_4\mathrm{MKTSHARE}_i + \beta_5\mathrm{POST96} + \beta_6\mathrm{GM96} + \\ \beta_7\mathrm{KELLOGG96} + \beta_8\mathrm{NEWEXP96} + \varepsilon_1\end{aligned} \quad [8]$$

and

$$\begin{aligned}\mathrm{PRICE}_i = \delta_i + \omega_1\mathrm{COUPON}_i + \omega_2\mathrm{RIVPRICE}_i + \omega_3\mathrm{MATERIAL}_i + \\ \omega_4\mathrm{COMPENSATE} + \omega_5\mathrm{AD}_i + \omega_6\mathrm{INVENTORY} + \omega_7\mathrm{POST96} + \\ \omega_8\mathrm{GM96} + \omega_9\mathrm{KELLOGG96} + \omega_{10}\mathrm{NEWEXP96} + \varepsilon_2\,,\end{aligned} \quad [9]$$

where PRICE_i and COUPON_i are the price of and redeemed discount for cereal i in dollars per pound, respectively. Redeemed manufacturer-issued discounts (not including additional discounts from retailer doubling or tripling) were preferred to those that are offered because coupons must be used in order for the manufacturers to realize their price discriminatory and competitive goals. Since coupons are designed to encourage purchasing among price-sensitive consumers, those discounts that are issued but never redeemed by nonloyal individuals are wasteful from the firms= perspective.

The variable $\mathrm{LOYALTY}_i$ is an index of consumer loyalty to cereal i (computed by Information Resources, Inc.).[9] The term $\mathrm{RIVREDEMP}_i$ is the weighted average discount that is redeemed for cereals that compete with brand i (i.e., those cereals that are in the same demand segment as brand i) in dollars per pound. The weight used to calculate $\mathrm{RIVREDEMP}_i$ was brand market share relative to the appropriate submarket. Brand market share, $\mathrm{MKTSHARE}_i$, is the percentage market share held by brand i in the entire RTE cereal market. The firm-year dummy variables, POST96, GM96, and KELLOGG96, indicate the brands that were produced by Post, General Mills, and Kellogg in 1996, respectively. These variables were included in the model to account for the major firms= slashing of cereal prices and discount levels that year. The term NEWEXP96 denotes the brands that were available for purchase in 1996 but were either introduced or discontinued during the study period (1992 to 1997). Similar to $\mathrm{RIVREDEMP}_i$, $\mathrm{RIVPRICE}_i$ is the weighed average price of rival cereals (given in dollars per pound) in the same submarket as brand i. The definitions of the variables above are summarized in Appendix Tables 4 and 6. The prices of rival brands were excluded as an explanatory variable in [8] because of the near price equality among similar RTE cereals (see Appendix Table 3 for the correlation between the prices of cereals in the same submarket). The data used to quantify the above variables were obtained from the *Marketing Fact Book* (Information Resources, Inc.). The report provided annual, aggregate information on household purchases of 81 RTE cereals from 1992 to 1997.[10,11] Summary statistics for theses variables are provided in Appendix Tables 5 and 7. The RTE cereal manufacturers included in the study are Kellogg, General Mills, Post, Quaker, Nabisco, Malt-O-Meal, Ralston, Health Valley, Kashi, and private-label makers.

[9] Loyalty to a given brand was measured from individual household purchases. Information Resources, Inc., (IRI) estimated household brand loyalty to breakfast cereals by analyzing purchased amounts as well as the number and frequency of sales. According to the company, the non-negative index is a good indicator of brand loyalty because the number and volume of cereal purchases are large enough to allow a loyalty pattern to emerge. Although the theoretical model specifies the inclusion of the nonloyal consumers= brand loyalty, such data were unavailable and IRI=s index was used as a proxy.

[10] The household purchase data were collected from 27 metropolitan markets within the continental United States. These markets were thought to be representative of national buyer behavior and overall consumer purchasing dynamics. A random sample of 1,500 to 3,500 families was tracked in each of the 27 markets. Grocery stores recorded household purchases by scanning an identification card and the UPC codes printed on the items that were bought. Store features and displays were recorded weekly by IRI employees and computers kept track of retail prices and price reductions. All coupons were tracked by IRI staff. In order to guarantee that the panel sample was representative of the population, IRI adjusted the data with respect to income, household size, and age of household head using U.S. Census Bureau information and major metro versus other area projections from each of the four Census regions (Northeast, West, South, and North Central). The data source has some limitations in that it did not include sales at non-grocery outlets (eg., convenience stores and gas stations), products without UPC codes, and non-scannable items. However, these limitations are unlikely to apply to RTE cereals.

[11] Two of the 81 cereals were in aggregate: all private-label brands and those that were available for purchase in 1996 but were either introduced or discontinued during the six-year period (i.e., new or expiring brands).

Data for the remainder of the variables were gathered from a number of sources (definitions and summary statistics are provided in Appendix Tables 6 and 7, respectively). The terms COMPENSATE and INVENTORY are the annual compensation (wages, salaries, and benefits) paid to employees and the total dollar value of inventories (including materials, work in progress, and finished goods) in the cereal breakfast foods industry, respectively.[12] These data were obtained from the *Census of Manufactures* and the *Annual Survey of Manufactures* (Bureau of the Census). Both variables are measured in millions of dollars.

Brand-level, mass-media advertising expenditures (AD_i) in thousands of dollars were taken from Leading National Advertisers= *Ad $ Summary*. In any given year, most cereals had one entry for total advertising expenditures. However, some cereals= expenditures were reported by media type. For those brands with multiple entries, total advertising expenditures were calculated by adding the specific outlays together. Furthermore, some firms jointly advertised their brands. For example, General Mills promoted Cheerios, Honey Nut Cheerios, and Apple Cinnamon Cheerios together as well as individually. Companies also marketed all of their cereals with general product line advertisements. It was assumed that each brand received an equal portion of the joint and general advertising expenditures. Total brand advertising expenditures were found by adding the applicable portions of the joint and general expenditures to the individual brand expenditures. For example, if General Mills spent $25 million on promoting regular Cheerios alone, $9 million on regular, Honey Nut, and Apple Cinnamon Cheerios together, and $1 million on all of the firm=s cereals (assuming 50 brands total), then General Mills= total advertising expenditures on regular Cheerios would be $28.02 million ($3 million from joint advertising, $20,000 from general promotions, and $25 million from individual marketing). Similarly, there were a few cases were cereals were co-advertised with other food products and firms such as coffee and the Walt Disney Company. A brand=s share of the co-advertising expenditures was found using the same approach as the one used in the case of joint cereal promotions. Advertising expenditures for brands that were not listed by LNA (including private-label and generic cereals) were assumed to be zero.

Post=s general product line advertising expenditures were extended to Nabisco=s cereals in 1996 and 1997. This action was taken because the Post-Nabisco merger became effective in 1995 and Information Resources, Inc., grouped the two companies together in its 1996 and 1997 data sets. General Mills= general advertising expenditures covered Ralston=s cereals in 1997 for the same reason.

The material costs index, $MATERIAL_i$, represents the cost of food ingredients and packaging materials used in the production of cereal i. Materials were separated into grains (wheat, rice, corn, oats, and barley), sugar, oil, nuts, dried fruit, and boxes and/or bags (a list of primary inputs was provided in the *Census of Manufactures*). The amounts of the various food ingredients (in percentage terms) were chosen based on cereal type.

By law since 1994, cereal manufacturers are required to list the food ingredients of their brands by weight on product packages. The ingredients that appeared in the list of primary food inputs (as noted by the Bureau of the Census) were recorded from the boxes of 124 brands of cereal. In order to measure the amount of each food ingredient used to make a particular cereal, the ingredients were assigned percentages according to their positions in the brand=s ingredient list. Appendix Table 8 lists the percentages that were chosen for each cereal=s food ingredients. (As a note, the brands listed in Appendix Table 8 are those cereals that were available for purchase between 1992 and 1997. Not all of the brands were produced in every year. Only 81 brands were continuously available over the six-year period.) Regular cereals were assumed to contain 10 percent sugar and 90 percent grain while presweetened brands had 40 percent sugar and 60 percent grain. Some presweetened cereals were assigned a 60-percent sugar content if sweeteners were the primary ingredients. If several grains were used to manufacture a brand, then the grains were assigned percentages in decreasing magnitude according to the relative volumes used. For example, if a presweetened brand with a 60-percent grain content had an ingredient list that noted corn, oats, and rice in that order, then the three grains would be assigned 30-, 20-, and 10-percent shares, respectively.

Cereals with either dried fruit or nuts were assumed to contain 10 percent of the given ingredient. If a brand contained both fruit and nuts, then each item was given a 5- percent share. Fruit- and nut-flavored cereals (eg., Apple Jacks and Honey Nut Cheerios) were not considered to have a significant amount of fruit or nuts even though they contained fruit juice, fruit puree, or ground nuts. Vitamins, preservatives, and other flavorings were also disregarded because the *Census of Manufactures* did not list them as primary ingredients. Oil was assumed to make up 1 percent of a brand=s ingredients if it was added in the

[12] The RTE cereal industry is most closely defined by the cereal breakfast foods industry (Standard Industry Classification code 2043), which includes RTE cereal manufacturers as well as the producers of hot and infant cereals. Use of this industry is acceptable because its specialization and coverage ratios indicate that the industry is well-defined by the SIC code.

production process. If oil was present in a cereal, then the percentage share of the most prominent grain (by weight) was reduced by 1 percentage point. The ingredients of some cereals could not be obtained because the brands were not available at local grocery stores or were discontinued. The ingredients and their respective shares were determined using similar brands for which ingredient information was available. If this was not possible, a reasonable hypothetical ingredient-share model was used. For private-label and generic cereals, the ingredients and shares were chosen such that they represented the average of the four types of cereal (regular/adult, presweetened, fruit/nut, and granolas).

Annual producer price indexes for these commodities were gathered from the Bureau of Labor Statistics= (BLS) website. Non-seasonally adjusted data were used because seasonally adjusted information was not consistently available. Grain prices were gathered from BLS= Farm Products group. Price indexes for the rest of the food ingredients were collected from the Processed Food and Feed group. Packaging costs came from the Pulp, Paper, and Allied Products group. The material costs index for a given brand was found by adding together the food ingredient costs (obtained by multiplying the food ingredients= percentages by the respective producer price indexes) and the indexes for boxes and bags. Malt-O-Meal=s entire product line and some of Quaker=s cereals were bagged only. For those brands, the price index for folding paperboard boxes was excluded from the material costs index (i.e., only the cost of plastic/foil bags was considered). Appendix Table 8 indicates if a given cereal was boxed as well as bagged. The material costs index is based in 1982 dollars.[13]

7. Results

Equations [8] and [9] were estimated with two-stage least squares in order to account for the endogeneity of brand price and discount levels (first-stage results are given in Appendix Table 9). It was suspected that some of the explanatory variables may be determined within the system. The Durbin-Wu-Hausman test was employed to check if $MKTSHARE_i$, $RIVREDEMP_i$, AD_i , and $RIVPRICE_i$ are exogenous. The term $RIVREDEMP_i$ was found to be endogenous. Since having endogenous explanatory variables results in biased and inconsistent coefficient estimates, the problem was alleviated by replacing the variable with an appropriate instrument (the fixed effects were included in the list of exogenous variables). The presence of heteroskedasticity and autocorrelation was not detected. The coefficients and t-statistics associated with the time-variant regressors are presented in Tables 1 and 2.

The fit of the model is excellent with 89 and 96 percent of RTE cereal discounts and prices, respectively, being explained by the independent variables. It can be seen in Tables 1 and 2 that both the time-variant regressors and brand-specific effects capture significant portions of the variation in the dependent variables. Nevo and Wolfram regressed cereal prices on coupon values and achieved a similar level of fit when the discounts were accompanied with dummy variables and detailed interaction terms. The fit of Gerstner, Hess, and Holthausen=s model, which regresses cereal discounts on brand price, the percentage markup, and a new product indicator, was significantly lower than that of the coupon value equation. While different explanatory variables were employed, the fits of the two equations are similar if the brand-specific effects are not included in this study=s coupon value equation.

Many of the variables are statistically significant, thus supporting a number of hypotheses proposed in this study. Both $PRICE_i$ in Table 1 and $COUPON_i$ in Table 2 are significant at the 99 percent confidence level. This finding shows that the causality between cereal prices and discount levels is bi-directional. The result also confirms that cereal manufacturers adjust discount levels when brand prices are changed so that they may continue to price discriminate between consumers who vary in their willingness to pay for their preferred brands. In contrast, Nevo and Wolfram found that shelf prices are negatively correlated with the size of cereal discounts. The authors concluded that RTE cereal makers do not use coupons primarily as price-discriminatory tools. Instead, other factors, such as the strategic interaction between firms, influence the relationship between cereal prices and discount levels.

Since the early 1990s, cereal manufacturers have expressed concern about the rising cost of couponing and the degree to which it cuts into profitability. While the industry=s worries about its performance are justifiable, couponing alone should not be singled out as the cause of the problem. By considering the companies= pricing and couponing practices together, the findings provide a better understanding of why the RTE cereal industry experienced financial decline during the last decade.

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[13] Energy costs were not included as an explanatory variable in [9] since they comprise a negligible portion of total production costs in the cereal breakfast foods industry. For example, in 1995, fuel and electricity costs were 3.4 percent of material costs and 0.7 percent of the total value of industry shipments (calculated with data taken from the 1995 *Annual Survey of Manufactures*).

The results in Table 2 support the contention that cereal makers offset additional discounts with higher brand prices in the early and mid-1990s, thus agreeing with the findings of Narasimhan and Gerstner, Hess, and Holthausen. In general, this marketing strategy leaves price-sensitive consumers no better off because the net prices paid remain the same. Moreover, some loyal consumers leave the market and the leakage segment increases (as noted by Larson). Another strategy of cereal makers is to raise brand prices without offering comparable increases in coupon savings. According to the coefficient of $PRICE_i$ in Table 1, redeemed discounts increase 9.2 cents per pound for every $1 per pound hike in cereal prices. In addition to higher leakage, some individuals (both loyal and nonloyal) find that their preferred brands are no longer affordable and, thus, stop purchasing them. With both strategies, the RTE cereal manufacturers= revenues decline. Therefore, cereal makers should consider re-evaluating their pricing and discounting behavior so that they may improve their performance.

While the negative values of the brand-specific effects (Appendix Tables 10 and 11) do not make economic sense (i.e., negative brand prices and discounts), they may be signaling the excessiveness of the RTE cereal industry=s couponing campaigns in the early and mid-1990s. Many of the fixed effects (accounting for cereal type and individual characteristics) are positive and significant in the brand price equation, thus reaffirm Stanley and Tschirhart=s conclusion that brand-specific effects influence cereal prices.

Consistent with Shaffer and Zhang, brand loyalty is another important variable that cereal makers take into account when setting the face values of coupons. Cereal makers reduce discounts an average of 1.4 cents per pound for every one-point increase in the brand loyalty index. The outcome of $MKTSHARE_i$ supports the hypothesis that RTE cereal producers use couponing as a share-maintenance strategy. In the mid-1990s, a one percentage-point difference in brand market share caused discount levels to vary by 6.9 cents per pound.

The variable $RIVREDEMP_i$ is strongly significant and reinforces the belief that cereal manufacturers rely on non-price strategies when competing with each other. When cereal makers offer large discounts to entice the purchasers of rival cereals to switch brands, the targeted firms retaliate with greater price concessions. This measure helps to prevent the erosion of the targeted firms= sales. According to Table 1, firms raise the discounts for their own brands by 83.5 cents per pound when the weighted average discount redeemed for rival cereals increases by $1 per pound. The outcome of $RIVREDEMP_i$ provides empirical support for Shaffer and Zhang=s hypothesis that firms can use couponing to steal consumers away from its rivals. The importance of firm rivalry was also stressed by Nevo and Wolfram; the authors found that coupons are more likely to be present (along with shelf price concessions) when rivals coupon their own products.

In Table 2, $RIVPRICE_i$ is significant at the 99 percent confidence level. The coefficient of this variable is interpreted as the average change in breakfast cereals= prices when the weighted average price of rival brands rises by $1 per pound. Between 1992 and 1997, cereal prices rose 73.9 cents per pound for every $1 per pound increase in the prices of competing brands. Although near price equality may indicate either a competitive market environment or imperfect collusion, company executives= statements seem to support the latter (Scherer).

Food ingredient and packaging costs are important factors that influence RTE cereal prices. In the early and mid-1990s, brand prices increased an average of 2.4 cents per pound for every 10-unit increase in the material costs index. Cereal makers are also concerned about inventory levels. Although breakfast cereals are not highly perishable like fresh meat or milk, they tend to become stale if not consumed within several months after production. As anticipated, manufacturers lower brand prices to reduce unexpected build-up of stocks. Surprisingly, mass-media advertising expenditures (AD_i) have a negligible effect on cereal prices. A strong, positive relationship was anticipated since higher prices would be needed to cover more expensive advertising campaigns. Previously, Wills and Mueller found that advertising has a significant and positive impact on brand-level food prices across 133 product categories. Employee compensation (COMPENSATE) was not significant either, but the aggregate data used to quantify the variable may have affected the magnitude of the coefficient.

Post=s price cuts and discount reductions in 1996 were statistically significant, thus supporting published news articles that the company dropped its cereals= prices in order to reduce the company=s reliance on inefficient promotional activities such as couponing (Gibson and Ono). The coefficients of POST96 in the two equations underestimate the actual reductions because the company=s 1996 prices and discount levels were compared with those in all other years in the study period - not just those in late 1995/early 1996. Only General Mills= price cuts were significant that year. The coefficient of GM96 in Table 2 overestimates the actual price reductions because it incorporates the firm=s price cuts from May 1994 (Holusha). The prices and coupon values for Kellogg=s cereals in 1996 were not different from those in other years even though the firm announced that it would slash half of its cereals= prices by 19 percent.

New and expiring brands= prices and discounts were not significantly lower in 1996. This result was expected since these cereals are somewhat insulated from competition. Consumers are relatively unfamiliar with new brands and do not always see the similarities among like cereals. Therefore, new products are not necessarily competitive with similar, established cereals. In other words, discounts for new cereals are likely to be high regardless of the coupon values for establish brands because the makers of new brands want to generate interest among potential first-time purchasers. Expiring brands, on the other hand, have waning demand because they have fallen out of favor with consumers. Companies tend concentrate on promoting more profitable brands and treat the unpopular cereals as “cash cows.” [14]

8. Summary and Implications

While the functions of coupons have been analyzed in depth, there have been few quantitative studies of the factors that influence the face values of coupons. The objective of this study was to highlight the determinants of coupon values at the brand level. The general model was developed from price discrimination theory and the principles of demand, and the framework was applied to the RTE breakfast cereal industry. In order to test the hypotheses of the model, a two-equation, fixed-effects, panel-data model was specified and fitted with household purchase data. The empirical model was chosen because it accounted for the bi-directional causality between brand prices and discount levels. The fit of the model is excellent with RTE cereal discounts being determined by product prices, brand loyalty, brand market share, and the degree of rival couponing. Cereal prices are influenced by discount levels, material costs, inventory levels, and the prices of similar brands. The model also accounts for the major cereal makers= price cuts and discount reductions which occurred in 1996.

While brand managers are interested in a number of aspects of couponing including ad size (e.g., half-page or full-page), distribution method (free-standing inserts in newspapers, on-pack discounts, or shelf displays), circulation (regional versus national), the products to which a coupon applies, the number of purchased products required for discount eligibility, issue date, and validity length, discount size and the number of coupons issued have recently become highly sensitive issues. Since the mid-1990s, RTE cereal manufacturers have complained that couponing is too costly and reduces profitability. As a result, they have slashed their spending on promotional programs, reducing face values and the number of discounts offered to consumers. While the companies blame coupons for their poor performance, it appears that the firms= combined pricing and discounting strategies that have caused their predicament. Although there are many facets of couponing that may influence firm profitability, marketing directors may be able to alleviate some of the pressures on industry performance by quantifying the significant variables in this study and calculating more appropriate discount levels. For example, if brand loyalty to a certain cereal is found to be high, then, all else being equal, marketing managers should reduce the discounts for that product because many consumers will continue to buy the cereal with a smaller (or even zero) savings.

Managers in the RTE cereal industry should be aware that the presence of price discrimination and near-symmetry of prices can be detected empirically. While these pricing tactics have undesirable welfare consequences, conscious parallelism in pricing is by and large legal so long as it is not the result of overt agreements. However, if such pricing practices are combined with evidence of intent to enhance market power, the conduct could be actionable under United States antitrust laws.

Before any action is taken against the RTE cereal industry, regulators should take into account one other finding of this study. Although cereal manufacturers price discriminate and do not appear to price independently, they are rivalrous with respect to couponing. Firms encourage brand switching and protect market shares with large discounts. Any proposed antitrust remedy must consider this historical behavior of the leading RTE cereal companies. Furthermore, policy restraints that focus exclusively on the problems of noncompetitive pricing and price discrimination are likely to have unintended consequences for couponing behavior. Also, suppressing couponing is probably politically infeasible because some consumers benefit from coupon redemptions and even larger numbers perceive they benefit from them.

References

Balu, R. 1998a. Kellogg Increases Prices on Majority of Cereal Brands. *Wall Street Journal* (December 15): B23.

[14] A Acash cow@ is a declining brand that has reduced marketing support. Manufacturers sometimes choose this promotional strategy because the increase in short-run profits outweighs the cost of extending a product=s life a few years through additional promotional expenditures.

_____. 1998b. Quaker Raises Cereal Prices and Cites Product Improvements, Ingredient Costs. *Wall Street Journal* (May 26): B12.

Canedy, D. and R. Abelson. 1999. Under Pressure, Kellogg Speeds a Shift at the Top. *New York Times* (January 6): C1.

Capps, O., Jr., S. Seo, and J. P. Nichols. 1997. On the Estimation of Advertising Effects for Branded Products: An Application to Spaghetti Sauces. *Journal of Agricultural and Applied Economics* 29:291-302.

Connor, J. M. 1999. Breakfast Cereals: The Extreme Food Industry. *Agribusiness* 15: 247-259.

_____. Couponing as a Horizontal and Vertical Strategy: Theory and Effects. Working paper No. 97-06. St. Paul, MN: Retail Food Industry Center, University of Minnesota (1997).

Connor, J. M., R. T. Rogers, B. W. Marion, and W. F. Mueller. 1985. *The Food Manufacturing Industries: Structure, Strategies, Performance, and Policies*. Lexington, MA: Lexington Books.

Cotterill, R. W. 1999. High Cereal Prices and the Prospects for Relief by Expansion of Private Label and Antitrust Enforcement. *Agribusiness*: 15:229-246.

_____. 1997. Policy Brief on the RTE Breakfast Cereal Industry. Issue Paper No. 14. Storrs, CT: Food Policy Marketing Center, University of Connecticut, Storrs, CT.

Gerstner, E. and J. D. Hess. 1991. A Theory of Channel Price Promotions. *American Economic Review* 81: 872-886.

Gerstner, E., J. D. Hess, and D. M. Holthausen. 1994. Price Discrimination Through a Distribution Channel: Theory and Evidence. *American Economic Review* 84:1437-1445.

Gibson, R. 1996. General Mills to Buy Ralcorp=s Chex, Other Branded Cereals for $570 Million. *Wall Street Journal* (August 15):B8.

_____. 1993. Post=s Breakfast Cereals are Waking Up. *Wall Street Journal* (November 2): B10.

Gibson, R. and Y. Ono. 1996. Cereal Prices are Cut by Philip Morris=s Post. *Wall Street Journal* (April 16): A2.

Holusha, J. 1994. General Mills to Cut Prices on Cereals. *New York Times* (April 5): D5.

Houston, D. A. and J. S. Howe. 1985. An Economic Rationale for Couponing. *Quarterly Journal of Business and Economics* 24:37-50.

Information Resources, Inc. 1997 and previous years. *Marketing Fact Book*. Chicago, IL: Information Resources, Inc.

Larson, R. B. 1997. Using Price Discrimination Theory to Plan Promotions. *Agribusiness* 13:401-408.

Leading National Advertisers, Inc. 1997 and previous years. *Ad $ Summary*. New York, NY: Competitive Media Reporting.

Leone, R. P. and S. S. Srinivasan. 1996. Coupon Face Value: Its Impact on Coupon Redemption, Brand Sales, and Brand Profitability. *Journal of Retailing* 72:273-289.

Levedahl, J. W. 1986. Profit Maximizing Pricing of Cents Off Coupons: Promotion or Price Discrimination. *Quarterly Journal of Business and Economics* 25:56-70.

Miller, J. P. 1996a. Cereal Makers Fight Bagels With Price Cuts. *Wall Street Journal* (June 20): B1.

_____. 1996b. General Mills Gets Clearance to buy Chex. *Wall Street Journal* (December 27): A3.

Narasimhan, C. 1984. A Price Discrimination Theory of Coupons. *Marketing Science* 3:128-147.

Neslin, S. A. 1990. A Market Response Model for Coupon Promotions. *Marketing Science* 9:125-145.

Nevo, A. and C. Wolfram. 1999. Prices and Coupons for Breakfast Cereals. Working Paper No. 6932. Cambridge, MA: National Bureau of Economic Research.

Raju, J. S., S. K. Dhar, and D. G. Morrison. 1994. The Effect of Package Coupons on Brand Choice. *Marketing Science* 13:145-164.

Scherer, F. M. 1982. The Breakfast Cereal Industry. In *The Structure of American Industry*. 6th ed. W. Adams, ed. New York, NY: MacMillan.

Schindler, R. 1984. How Cents-Off Coupons Motivate the Consumer. In *Research on Sales Promotion: Collected Papers*. K. E. Jocz, ed. Cambridge, MA: Marketing Science Institute.

Schmalensee, R. 1978. Entry Deterrence in the Ready-To-Eat Breakfast Cereal Industry. *Bell Journal of Economics* 9:305-327.

Selling Area Markets, Inc. 1983. *Special: An Exclusive SAMI Analysis of Generic and Private Labels*. New York, NY: Selling Area Markets, Inc.

Shaffer, G. and Z. J. Zhang. 1995. Competitive Coupon Targeting. *Marketing Science* 14: 395-416.

Stanley, L. R. and J. Tschirhart. 1991. Hedonic Prices for a Nondurable Good: The Case of Breakfast Cereals. *Review of Economics and Statistics* 73:537-541.

United States Bureau of the Census. 1996. *Annual Survey of Manufactures: Statistics for Industry Groups and Industries (Including Supplemental Labor, Fuel, and Electric Energy Costs): ASM*. Washington, DC: U.S. Department of Commerce (and previous years).

_____. 1995. *1992 Census of Manufactures. Industry Series. Grain Mill Products, Industries 2041, 2043, 2044, 2045, 2046, 2047, and 2048*. Washington, DC: U.S. Department of Commerce.

United States Bureau of Labor Statistics. World Wide Web address: http://www.bls.gov.

Wall Street Journal. 1995. Philip Morris=s Kraft Prevails in U.S. Suit over Antitrust Issue. *Wall Street Journal* (February 23): A15.

Ward, R. W. and J. E. Davis. 1978. A Pooled Cross-Section Time Series Model of Coupon Promotions. *American Journal of Agricultural Economics* 60(August): 393-401.

Wills, R. L. and W. F. Mueller. 1989. Brand Pricing and Advertising. *Southern Economic Journal* 56:383-395.

Table 1. Regression Results Explaining RTE Cereal Coupon Discounts from 1992-1997

Variable	Coefficient	t-statistic
$PRICE_i$	0.0919*	3.797
$LOYALTY_i$	-0.0141*	-2.982
$MKTSHARE_i$	0.0685*	4.832
$RIVREDEMP_i$	0.8351*	15.012
POST96	-0.0239$	-1.810
GM96	-0.0014	-0.128
KELLOGG96	0.0085	0.691
NEWEXP96	-0.0162	-1.256
n = 492	$F_{(89,402)} = 36.72^{\#}$	$R^2 = 0.8905$
Regressors		R^2
Brand-Specific Effects Only		0.6496
Time-Variant Variables Only		0.4474

* Significant at the 99 percent confidence level using a one-tailed t-test. Critical value is 2.326.
$ Significant at the 95 percent confidence level using a one-tailed t-test. Critical value is 1.645.
\# Significant at the 99 percent confidence level.

Table 2. Regression Results Explaining RTE Cereal Prices from 1992-1997

Variable	Coefficient	t-statistic
$COUPON_i$	0.9862*	2.837
$RIVPRICE_i$	0.7393*	11.721
AD_i	-1.1×10^{-6}	-0.461
$MATERIAL_i$	0.00236*	3.888
COMPENSATE	-0.00067	-1.275
INVENTORY	-0.00034+	-2.004
POST96	-0.2193*	-4.508
GM96	-0.1770*	-4.178
KELLOGG96	0.0024	0.055
NEWEXP96	-0.1251	-0.708
n = 492	$F_{(91,400)} = 106.00^{\#}$	$R^2 = 0.9602$
Regressors		R^2
Brand-Specific Effects Only		0.9179
Time-Variant Variables Only		0.3706

* Significant at the 99 percent confidence level using a one-tailed t-test. Critical value is 2.326.
\+ Significant at the 95 percent confidence level using a one-tailed t-test. Critical value is 1.645.
\# Significant at the 99 percent confidence level.

Figure 1. Competing Brands Offered by Two Firms in Different Demand Segments.

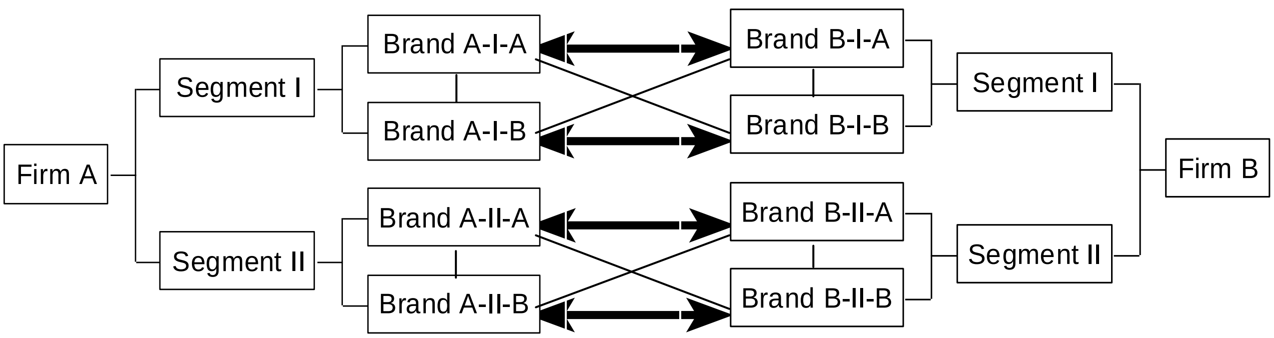


Figure 2. Demand Curves of a Single Loyal and Nonloyal Consumer for Brand i.

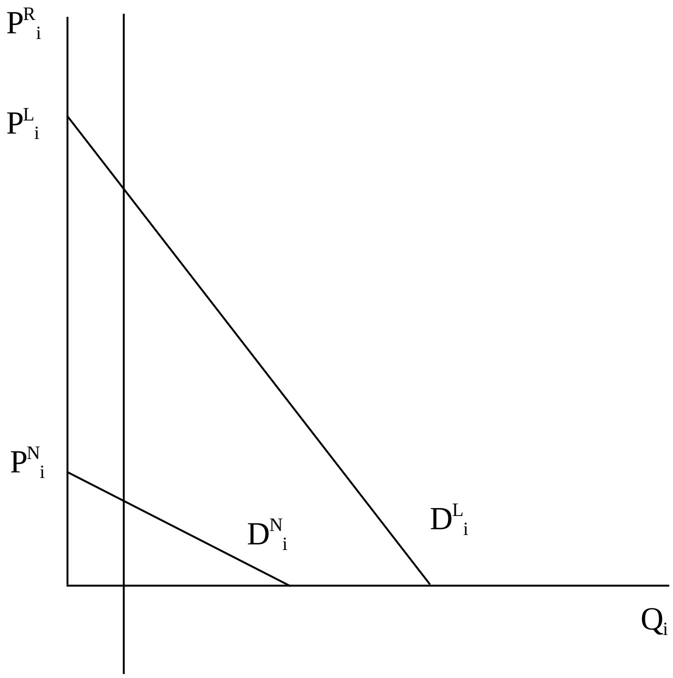


Figure 3. Demand Curves of a Single Nonloyal Consumer with Different Levels of Loyalty to Brand i.

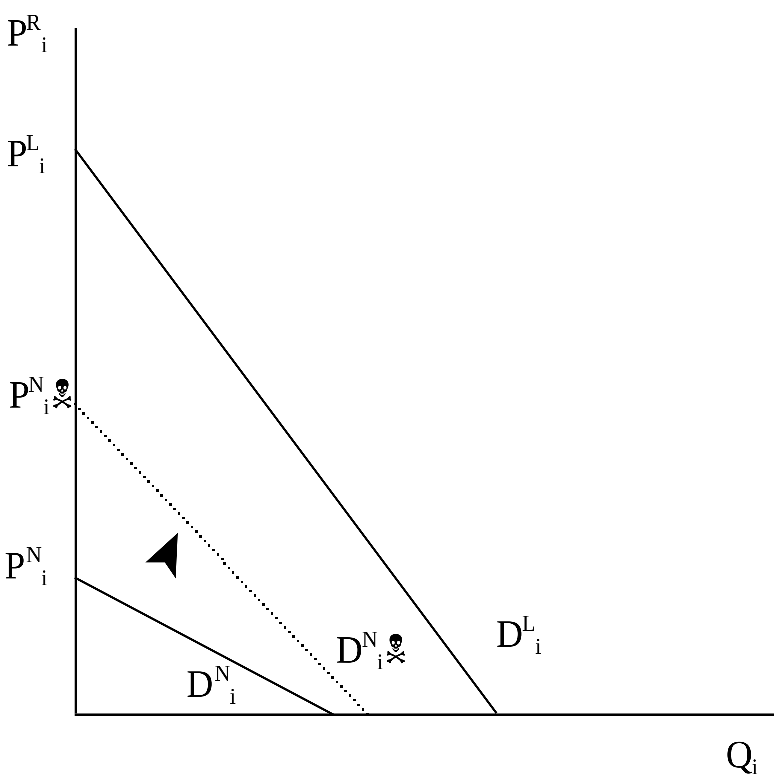
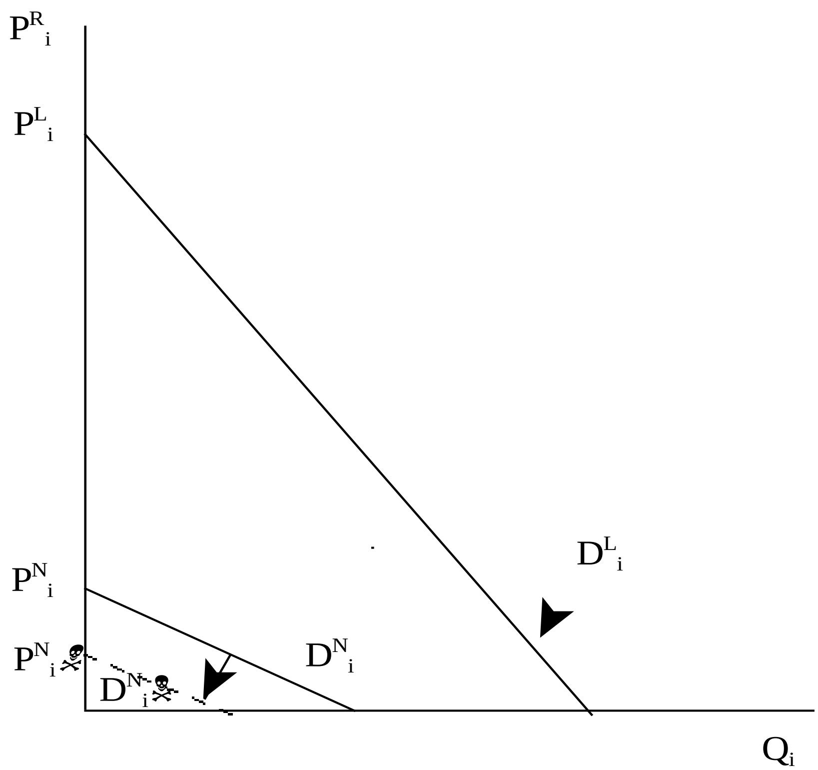
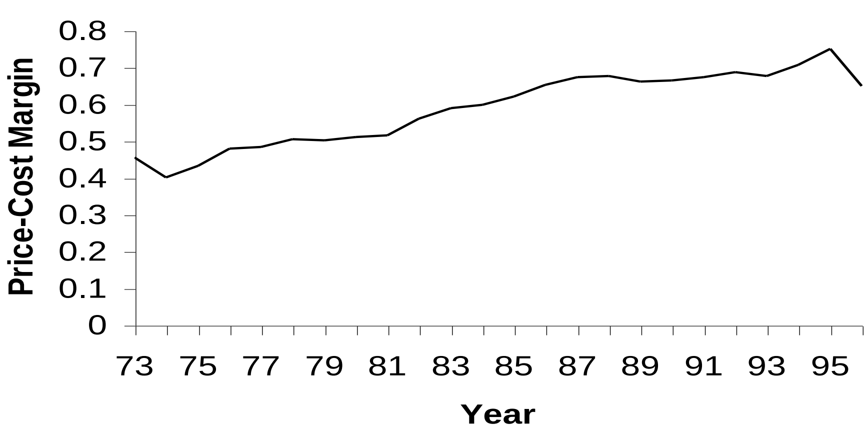


Figure 4. Effect of Lowering Competing Products= Prices or Increasing Rival Brands= Discounts on a Nonloyal Consumer=s Demand Curve.



Appendix Figure 1. Price-Cost Margin of the Cereal Breakfast Foods Industry: 1973 –1996.



Source: Appendix Table 1.

Appendix Table 1. Annual Price-Cost Margin of the Cereal Breakfast Foods Industry: 1973-1996

Year	PCM	Year	PCM
1973	0.455	1985	0.621
1974	0.401	1986	0.652
1975	0.433	1987	0.673
1976	0.479	1988	0.677
1977	0.483	1989	0.661
1978	0.505	1990	0.665
1979	0.502	1991	0.673
1980	0.510	1992	0.687
1981	0.515	1993	0.676
1982	0.561	1994	0.706
1983	0.589	1995	0.751
1984	0.598	1996	0.649

Source: Bureau of the Census= *Annual Survey of Manufactures* (1996 and previous years) and the *1992 Census of Manufactures* (1995).

Appendix Table 2. Summary of Hypotheses and Expected Influences on Brand Prices and Discount Levels

Variable Symbol	Definition	Expected Sign	Hypothesis
C_i	Coupon value for brand i	Positive	Brand price rise as the coupon value increases. The positive relationship prevents larger discount from reducing firm revenues and profit.
$P^R{}_i$	Retail price of brand i	Positive	Larger discount is required when brand price increases so that nonloyal consumers remain in the market
$BL^N{}_i$	Loyalty of nonloyal consumer to brand i	Negative	A firm does not need to discount a brand as much when consumers become more loyal to that product
$P^R{}_{-i}$	Prices of rival brands in the same demand segment as brand i	Positive	Lower prices of competing brands cause the nonloyal consumers= demand curves to shift to the left, thus increasing the discount needed to keep them from switching brands
C_{-i}	Discounts for rival brands in the same demand segment as brand i	Positive	Larger coupon values for competing brands cause the nonloyal consumers= demand curves to shift to the left, thus increasing the discount needed to keep them in the market
MS_i	Market share held by brand i	Positive	Couponing is a share-maintenance tool designed to preserve the market positions of leading brands. A greater market share associated with a larger discount.
BSC_i	Brand-specific characteristics of good i	Positive or Negative	Product-specific attributes have unique influences on brand price and the size of the discount
MAT_i	Material costs associated producing brand i	Positive	Higher brand price is required to cover higher material costs
LAB_i	Labor costs associated with producing brand i	Positive	Higher brand price is required to cover higher labor costs
E_i	Energy costs associated with producing brand i	Positive	Higher brand price is required to cover higher energy costs
AD_i	Advertising expenditures for brand i	Positive	Higher brand price is required to cover greater advertising expenditures
INV_i	Inventory held of brand i	Negative	Lower brand price is needed to reduce unexpected build-up of stocks

Appendix Table 3. Correlation Between RTE Cereal Prices Within and Across Demand Segments.

Single Brand in a Given Demand Segment	Average Price Per Pound by Demand Segment			
	Regular	Presweetened	Fruit and Nut	Granola
Regular	0.967*	-0.069	-0.045	-0.016
Presweetened	-0.069	0.980*	-0.047	-0.017
Fruit and Nut	-0.046	-0.047	0.990*	-0.011
Granola	-0.017	-0.017	-0.011	0.974*

* Correlation coefficients are statistically significant at the 99 percent confidence level.

Appendix Table 4. Description of Variables in the Coupon Value Equation.

Variable	Definition	Unit of Measurement
$PRICE_i$	Average retail price of brand i	Dollars per pound
$COUPON_i$	Average redeemed coupon value for brand i	Dollars per pound
$LOYALTY_i$	Consumer loyalty to brand i determined from the amount (absolute and relative) of RTE cereal bought by households as well as the frequency of purchase	Index calculated by Information Resources, Inc.
$RIVREDEMP_i$	Weighted average discount redeemed for brand i=s rival cereals in the same demand segment (regular/adult, presweetened, fruit/nut, or granola). The weight is brand market share in the respective submarket.	Dollars per pound
$MKTSHARE_i$	Market share of brand i in the entire RTE cereal industry	Percentage
POST96	Indicator of brands produced by Post in 1996	0/1 dummy variable
GM96	Indicator of brands produced by General Mills in 1996	0/1 dummy variable
KELLOGG96	Indicator of brands produced by Kellogg in 1996	0/1 dummy variable
NEWEXP96	Indicator of new brands (introduced between 1992 and 1996) and expiring cereals (discontinued in 1997) that were produced by the firms in sample	0/1 dummy variable

Appendix Table 5. Summary Statistics for Variables in the Coupon Value Equation.

Variable	Average	Standard Deviation	Minimum	Maximum
$COUPON_i$	0.301	0.146	0.000	0.873
$PRICE_i$	3.301	0.728	1.451	5.822
$LOYALTY_i$	6.269	2.286	2.000	18.230
$RIVREDEMP_i$	0.287	0.076	0.064	0.485
$MKTSHARE_i$	1.013	1.210	0.000	9.240
POST96	0.030	0.172	0.000	1.000
GM96	0.045	0.207	0.000	1.000
KELLOGG96	0.047	0.211	0.000	1.000
NEWEXP96	0.002	0.045	0.000	1.000

Appendix Table 6. Description of Selected Variables in the Brand Price Equation.

Variable	Definition	Unit of Measurement
$RIVPRICE_i$	Weighted average retail price of brand i=s rival cereals in the same demand segment (regular/adult, presweetened, fruit/nut, or granola). The weight is brand market share in the respective submarket.	Dollars per pound
INVENTORY	Annual total value of inventories (materials, work in progress, and finished goods) in the cereal breakfast foods industry, SIC Code 2043. (Note: data are at the industry level; the same value is used for each brand in a given year.)	Millions of dollars
COMPENSATE	Annual total employee compensation (wages, salaries, and benefits) in the cereal breakfast foods industry, SIC Code 2043. (Note: data are at the industry level; the same value is used for each brand in a given year.)	Millions of dollars
AD_i	Annual mass-media advertising expenditures for brand i	Thousands of dollars
$MATERIAL_i$	Total cost of food ingredients and packaging (boxes and bags) for brand i	Index in 1982 dollars

Appendix Table 7. Summary Statistics for Selected Variables in the Brand Price Equation.

Variable	Average	Standard Deviation	Minimum	Maximum
INVENTORY	370.960	79.805	286.920	541.050
COMPENSATE	979.000	32.348	940.100	1019.200
AD_i	7924.500	8867.100	0.000	51471.000
$MATERIAL_i$	397.990	36.559	230.840	459.610
$RIVPRICE_i$	2.986	0.174	2.436	3.380
POST96	0.030	0.170	0.000	1.000
GM96	0.045	0.207	0.000	1.000
KELLOGG96	0.047	0.211	0.000	1.000
NEWEXP96	0.002	0.045	0.000	1.000

Appendix Table 8. Food Ingredient Percentages and Use of Packaging Materials by Brand of RTE Cereal

Cereal	Sugar	Corn	Wheat	Rice	Oats	Barley	Other Grains	Nuts	Fruit	Oil	Box	Bag
100% Bran	10		50			40					X	X
100% Natural	10		30		49			10		1	X	X
40% Bran	10		90								X	X
Addams Family	40	30	20		10						X	X
All Bran	10		90								X	X
All Bran Extra Fiber	10	40	50								X	X
Almond Delight	10		39	10	20	10		10		1	X	X
Alpha Bits	40	20			40						X	X
Apple Cinnamon Cheerios	40				59					1	X	X
Apple Jacks	40	30	20		10						X	X
Apple Zaps	40	39			20					1		X
Banana Nut Crunch	10		39	10	20	10		5	5	1	X	X
Basic 4	10	40	20	5	5	10		5	5		X	X
Batman	40	30	20		10						X	X
Berry Berry Kix	40	59								1	X	X
Blueberry Morning	10	39	10	20	10			5	5	1	X	X
Boo Berry	40	59								1	X	X
Brannola	10		90								X	X
Cap N Crunch	40	39			20					1	X	X
Cap N Crunch Crunch Berries	40	39			20					1	X	X
Cap N Crunch Deep Sea Crunch	40	39			20					1	X	X
Cap N Crunch Home Run	40	39			20					1	X	X
Cap N Crunch X-Mas	40	39			20					1	X	X
Cheerios	10				90						X	X
Cinnamon Grahams	40	39	20							1	X	X
Cinnamon Mini Buns	40	30	20		10						X	X
Cinnamon Streudel	40	40	20								X	X
Cinnamon Toast Crunch	40		39	20						1	X	X
Clusters	10		50	30				10			X	X
Cocoa Frosted Flakes	40	60									X	X
Cocoa Krispies	40			60							X	X
Cocoa Pebbles	40			59						1	X	X
Cocoa Puffs	60	39								1	X	X
Cocoa Roos	60	39								1		X
Collossal Crunch	40	39	20							1		X
Common Sense Oatbran	10				90						X	X

(continues)

Appendix Table 8 (continued).

Cereal	Sugar	Corn	Wheat	Rice	Oats	Barley	Other Grains	Nuts	Fruit	Oil	Box	Bag
Cookie Crisp	40	59								1	X	X
Corn Bursts	40	60										X
Corn Chex	10	90									X	X
Corn Pops	40	59								1	X	X
Corn Quakes	40	39			20					1		X
Count Chocula	40	59								1	X	X
Country Corn Flakes	40	60									X	X
Cracklin' Oat Bran	10		30		59					1	X	X
Cranberry Almond Crunch	10	5	39	20	10	5		5	5	1	X	X
Crispix	10	50		40							X	X
Crispy Wheats and Raisins	10		80						10		X	X
Crunchy Corn Bran	10	49			40					1	X	X
Dino Pebbles	40			59						1	X	X
Double Chex	10	45		45							X	X
Double Dip Crunch	40	30	20		10						X	X
Dutch Apple	40	40	20								X	X
Fibre One		40	60								X	X
Fingos	40	30	20		10						X	X
Franken Berry	40	59								1	X	X
French Toast Crunch	40	59								1	X	X
Froot Loops	40	29	20		10					1	X	X
Frosted Bran	40		60								X	X
Frosted Cheerios	40	20			40						X	X
Frosted Flakes	40	60									X	X
Frosted Krispies	40			60							X	X
Frosted Mini Wheats	40		60								X	X
Frosted Shredded Wheat	40		60								X	X
Fruit Wheats			90						10		X	X
Fruitful Bran	10		80						10		X	X
Fruitty Pebbles	40			59						1	X	X
Fruity Marshmallow Krispies	40			60							X	X
Fuitangy Oh's	40	39			20					1		X
Generic	25	20	20	20		10		2.5	2.5		X	X
Golden Grahams	40	39	20							1	X	X
Golden Raisin Crisp	60		29						10	1	X	X
Graham Chex	40	39	20							1	X	X
Grape Nuts	10		49			40				1	X	X
Great Grains	10		39	10	20	10		10		1	X	X
Halloween Rice Krispies	40			60							X	X
Health Valley	10	5	10	5	20	39		5	5	1	X	X

(continues)

Appendix Table 8 (continued).

Cereal	Sugar	Corn	Wheat	Rice	Oats	Barley	Other Grains	Nuts	Fruit	Oil	Box	Bag
Healthy Choice	10	40		50							X	X
Hidden Treasure	40	30	20		10						X	X
Holiday Lucky Charms	40				60						X	X
Holiday Rice Krispies	40			60							X	X
Honey Almond Delight	40		29	5	10	5		10		1	X	X
Honey and Nut Shredded Wheat	40		60								X	X
Honey Bunches of Oats	40	30	10	5	10	5					X	X
Honey Crunch Corn Flakes	40	60									X	X
Honey Frosted Wheaties	40	40	20								X	X
Honey Maid	40		60								X	X
Honey Nut Cheerios	40				60						X	X
Honey Nut Toasty O=s	40				60							X
Honeycombs	40	40			20						X	X
Jurrasic Park	40	30	20		10						X	X
Just Right	10	20	40	10	10			5	5		X	X
Kashi			10	20	30	10	30				X	X
Kellogg Corn Flakes	10	90									X	X
Kellogg Meuslix	10	5	10	5	20	39		5	5	1	X	X
Kellogg Raisin Bran	10		80						10		X	X
Kenmei	10	40		50							X	X
King Vitamin	40	39			20					1	X	X
Kix	10	90									X	X
Life	40	20	5	5	30						X	X
Low Fat Granola	10		20	10	49			10		1	X	X
Lucky Charms	40				60						X	X
Maizoro	10	90									X	X
Marshmallow Fruit Loops	40	29	20		10					1	X	X
Marshmallow Mateys	40				60							X
Marshmallow Safari	40				59					1		X
Mini Frosted Rice Chex	40			60							X	X
Multi Grain Cheerios	10	40	5	5	30	10					X	X
Multi Grain Chex	10	40	30	20							X	X
Nature Valley	10		20	10	49			10		1	X	X
Nut & Honey Crunch	40	60									X	X
Nut and Honey Oh's	40				60						X	X

(continues)

Appendix Table 8 (continued).

Cereal	Sugar	Corn	Wheat	Rice	Oats	Barley	Other Grains	Nuts	Fruit	Oil	Box	Bag
Nutri Grain	10	40		50							X	X
Nutri Grain Raisin Bran	10		80						10		X	X
Oat Bran	10	20	30		40						X	X
Oat Squares	10		40		50						X	X
Oatbake	10				90						X	X
Oatmeal Crisp	10		25	10	55						X	X
Oatmeal Crisp Almonds	10		20	10	50			10			X	X
Oatmeal Crisp Raisins	10		20	10	50				10		X	X
Oh's	40	29	5	5	20					1	X	X
Organic Milling	10	5	10	5	20	39		5	5	1	X	X
Pop Tart Crunch	40	30	20		10						X	X
Post Bran Flakes	10		50			40					X	X
Post Raisin Bran	10		50			30			10		X	X
Private Label	25	20	20	20		10		2.5	2.5		X	X
Product 19	10	40	10	10	30						X	X
Puffed Rice		100									X	X
Puffed Wheat			100								X	X
Raisin Nut Bran	10		79					5	5	1	X	X
Raisin Squares	10		80						10		X	X
Ralston Meuslix	10	5	10	5	20	39		5	5	1	X	X
Razzle Dazzle Rice Krispies	40			60							X	X
Reeses	40	50						10			X	X
Rice Chex	10			90							X	X
Rice Krispies	40			60							X	X
Rice Krispies Treats	40			59						1	X	X
Ripple Crisp	40	30	20		10						X	X
Shredded Wheat			100								X	X
Smacks	60		39							1	X	X
Special K	10			90							X	X
Spiderman	40	30	20		10						X	X
Spooky Froot Loops	40	29	20		10					1	X	X
Spoon Size Shredded Wheat			100								X	X
Sprinkle Sprangle	40	30	20		10						X	X
Strawberry Squares	10		79						10	1	X	X
Sugar Puffs	60		39							1		X
Sun Crunchers	40	60									X	X
Super Golden Crisp	60		39							1	X	X
Teenage Mutant Ninja Turtles	40	30	20		10						X	X
Temptations	10		39	10	20	10		5	5	1	X	X
Toasted Oatmeal	10		30	20	39					1	X	X
Toasties	10	90									X	X
Toasty Oh's	10				90							X

(continues)

Appendix Table 8 (continued).

Cereal	Sugar	Corn	Wheat	Rice	Oats	Barley	Other Grains	Nuts	Fruit	Oil	Box	Bag
Tootie Fuities	40	29	20		10					1		X
Total	10		50	40							X	X
Total Corn Flakes	10	90									X	X
Total Raisin Bran	10		80						10		X	X
Triples	10	40	30		20						X	X
Trix	40	59								1	X	X
Tropical Forest Froot Loops	40	29	20		10					1	X	X
Urkel Oh's	40	29	20		10					1	X	X
Waffle Crisp	40	20	10		29					1	X	X
Weetabix	10		90								X	X
Wheat and Bran			100								X	X
Wheat Chex	10		89							1	X	X
Wheat Dunk a Bites	40	40	20								X	X
Wheaties	10		89							1	X	X

Appendix Table 9. First-Stage Estimation Results.

Equation	R^2	F-statistic*
Coupon Value	0.876	30.26
Brand Price	0.954	85.95

* F-statistics have 93 and 398 degrees of freedom. Both test statistics are significant at the 99 percent confidence level.

Appendix Table 10. Regression Results for the Brand-Specific Effects in the Coupon Value Equation After Accounting for the Endogeneity of $RIVREDEMP_i$.

Manufacturer	Brand	Coefficient	Standard Error	t-statistic
General Mills	Apple Cinnamon Cheerios	-0.10320	0.08384	-1.23095
General Mills	Basic 4	-0.13001	0.09432	-1.37829
General Mills	Cheerios	-0.34292[#]	0.09378	-3.65683
General Mills	Cinnamon Toast Crunch	-0.18096[$]	0.09471	-1.91071
General Mills	Clusters	-0.14853[$]	0.08550	-1.73732
General Mills	Cocoa Puffs	-0.18037[$]	0.09558	-1.88706
General Mills	Count Chocula	-0.07126	0.11360	-0.62726
General Mills	Crispy Wheat and Raisins	-0.13795[$]	0.07492	-1.84132
General Mills	Fiber One	-0.22796[&]	0.09297	-2.45187
General Mills	Golden Grahams	-0.14653	0.09215	-1.59014
General Mills	Honey Nut Cheerios	-0.23431[#]	0.08893	-2.63463
General Mills	Honey Wheaties	-0.04647	0.07801	-0.59575
General Mills	Kix	-0.25816[#]	0.09968	-2.58982
General Mills	Lucky Charms	-0.21348[&]	0.09423	-2.26551
General Mills	Oatmeal Crisp	-0.10720	0.08431	-1.27144
General Mills	Oatmeal Raisin Crisp	-0.12866	0.08437	-1.52495
General Mills	Raisin Nut Bran	-0.13029	0.08540	-1.52567
General Mills	Total	-0.12462	0.10400	-1.19821
General Mills	Total Corn Flakes	-0.01974	0.12158	-0.16235
General Mills	Total Raisin Bran	-0.14408[$]	0.08698	-1.65638
General Mills	Trix	-0.13065	0.09796	-1.33363
General Mills	Wheaties	-0.16053[&]	0.07554	-2.12492
Health Valley	Health Valley	-0.54967[#]	0.10211	-5.38315
Kashi	Puffed Kashi	-0.56236[#]	0.09974	-5.63827
Kellogg	All Bran	-0.21562[#]	0.08230	-2.61983

(continues)

Appendix Table 10 (continued).

Manufacturer	Brand	Coefficient	Standard Error	t-statistic
Kellogg	All Bran Extra Fiber	-0.29449#	0.09643	-3.05380
Kellogg	Apple Jacks	-0.21701&	0.09044	-2.39937
Kellogg	Cocoa Krispies	-0.20020&	0.08595	-2.32937
Kellogg	Complete Bran Flakes	-0.18199&	0.07959	-2.28651
Kellogg	Corn Flakes	-0.38178#	0.07509	-5.08460
Kellogg	Corn Pops	-0.25957#	0.08902	-2.91584
Kellogg	Cracklin= Oat Bran	-0.24035&	0.09612	-2.50052
Kellogg	Crispix	-0.24606#	0.09302	-2.64530
Kellogg	Froot Loops	-0.25924#	0.08684	-2.98506
Kellogg	Frosted Flakes	-0.36291#	0.08523	-4.25802
Kellogg	Frosted Mini Wheats	-0.30252#	0.08310	-3.64029
Kellogg	Just Right	-0.18268&	0.08175	-2.23460
Kellogg	Low Fat Granola	-0.16484&	0.08127	-2.02844
Kellogg	Meuslix	-0.16310$	0.09594	-1.70008
Kellogg	Nutri Grain	-0.26541#	0.09049	-2.93288
Kellogg	Product 19	-0.26924#	0.10449	-2.57661
Kellogg	Raisin Bran	-0.36612#	0.07656	-4.78228
Kellogg	Raisin Squares	-0.24653#	0.08735	-2.82228
Kellogg	Rice Krispies	-0.33392#	0.08750	-3.81600
Kellogg	Smacks	-0.20490#	0.07487	-2.73686
Kellogg	Special K	-0.25403&	0.10027	-2.53346
Kellogg	Strawberry Squares	-0.26478#	0.08352	-3.17011
Malt-O-Meal	Honey & Nut Toasty O=s	-0.31170#	0.06267	-4.97391
Malt-O-Meal	Toasty O=s	-0.32984#	0.06047	-5.45464
Malt-O-Meal	Tootie Fruitie	-0.31126#	0.06071	-5.12658
Post	Alpha Bits	-0.11492	0.08790	-1.30745
Post	Bran Flakes	-0.10947	0.07941	-1.37847

(continues)

Appendix Table 10 (continued).

Manufacturer	Brand	Coefficient	Standard Error	t-statistic
Post	Cocoa Pebbles	-0.19840[&]	0.08947	-2.21754
Post	Fruit and Fibre	-0.09468	0.08605	-1.10024
Post	Fruity Pebbles	-0.24262[#]	0.09009	-2.69314
Post	Grape Nuts	-0.24708[#]	0.07359	-3.35775
Post	Great Grains	-0.11287	0.08546	-1.32078
Post	Honey Bunches of Oats	-0.17175[&]	0.08352	-2.05626
Post	Honeycomb	-0.22646[#]	0.08764	-2.58413
Post	Raisin Bran	-0.22065[#]	0.07016	-3.14482
Post	Super Golden Crisp	-0.14903[&]	0.07306	-2.03968
Post	Toasties	-0.16688[#]	0.05166	-3.23055
Private Label	Aggregate Brand	-0.73148[#]	0.10289	-7.10956
Quaker	100% Natural	-0.14179[$]	0.07858	-1.80400
Quaker	Cap N Crunch	-0.19080[&]	0.07778	-2.45301
Quaker	Cap N Crunch - Crunch Berries	-0.18838[&]	0.07625	-2.47061
Quaker	Cap N Crunch - Christmas Crunch	-0.28137[#]	0.06996	-4.02164
Quaker	Life	-0.13519[$]	0.07110	-1.90156
Quaker	Oat Squares	-0.14400[$]	0.08190	-1.75820
Quaker	Oh=s	-0.41207[#]	0.07561	-5.45012
Quaker	Puffed Rice	-0.28229[&]	0.11450	-2.46547
Quaker	Puffed Wheat	-0.27559[&]	0.13149	-2.09598
Quaker	Vitamin King	-0.40495[#]	0.06804	-5.95167
Ralston[*]	Cookie Crisp	-0.13928	0.10848	-1.28391
Ralston[*]	Corn Chex	-0.31971[#]	0.08835	-3.61855
Ralston[*]	Multi Bran Chex	-0.11675	0.07580	-1.54019
Ralston[*]	Rice Chex	-0.26119[#]	0.08866	-2.94597
Ralston[*]	Wheat Chex	-0.17428[&]	0.06958	-2.50493

(continues)

Appendix Table 10 (continued).

Manufacturer	Brand	Coefficient	Standard Error	t-statistic
Nabisco**	100% Bran	-0.14694$	0.08071	-1.82065
Nabisco**	Shredded Wheat	-0.18053&	0.08491	-2.12617
Nabisco**	Spoon Size Shredded Wheat	-0.20982&	0.08338	-2.51637
All Firms	Average of new, expiring, and generic brands	-0.16278&	0.08143	-1.99916

* Ralston was purchased by General Mills in 1996. This study considers the acquisition effective as of January 1, 1997.
** Nabisco was purchased by Post in 1993. However, due to litigation, the merger was not completed until 1995. This study considers the acquisition effective as of January 1, 1996.
\# Two-tailed t-test significant at the 99 percent confidence level. Critical value approximately 2.576.
& Two-tailed t-test significant at the 95 percent confidence level. Critical value approximately 1.960.
$ Two-tailed t-test significant at the 90 percent confidence level. Critical value approximately 1.645.

Appendix Table 11 Regressions Results for the Brand-Specific Effects in the Brand Price Equation After Accounting for Endogeneity of $RIVREDEMP_i$.

Manufacturer	Brand	Coefficient	Standard Error	t-statistic
General Mills	Apple Cinnamon Cheerios	0.60300	0.44230	1.36334
General Mills	Basic 4	1.09359[&]	0.43693	2.50290
General Mills	Cheerios	0.51272	0.44913	1.14157
General Mills	Cinnamon Toast Crunch	1.05325[&]	0.44516	2.36602
General Mills	Clusters	0.74135[$]	0.44323	1.67260
General Mills	Cocoa Puffs	1.19257[#]	0.44662	2.67023
General Mills	Count Chocula	1.86653[#]	0.42518	4.38995
General Mills	Crispy Wheat and Raisins	0.27115	0.45224	0.59956
General Mills	Fiber One	0.67938	0.47392	1.43354
General Mills	Golden Grahams	0.96604[&]	0.44235	2.18387
General Mills	Honey Nut Cheerios	0.61925	0.44984	1.37661
General Mills	Honey Wheaties	0.36553	0.43970	0.83132
General Mills	Kix	1.30943[#]	0.44226	2.96080
General Mills	Lucky Charms	1.03696[&]	0.44718	2.31888
General Mills	Oatmeal Crisp	0.52980	0.43997	1.20418
General Mills	Oatmeal Raisin Crisp	0.63083	0.44644	1.41302
General Mills	Raisin Nut Bran	0.59615	0.44653	1.33508
General Mills	Total	1.23694[#]	0.43035	2.87425
General Mills	Total Corn Flakes	2.02935[#]	0.41411	4.90051
General Mills	Total Raisin Bran	0.73311	0.44615	1.64319
General Mills	Trix	1.23324[#]	0.43432	2.83949
General Mills	Wheaties	0.04799	0.45191	0.10618
Health Valley	Health Valley	1.80538[#]	0.51336	3.51677
Kashi	Puffed Kashi	1.73557[#]	0.50852	3.41296
Kellogg	All Bran	0.21886	0.47584	0.45994

(continues)

Appendix Table 11 (continued).

Manufacturer	Brand	Coefficient	Standard Error	t-statistic
Kellogg	All Bran Extra Fiber	1.18314&	0.47000	2.51733
Kellogg	Apple Jacks	0.99378&	0.45212	2.19806
Kellogg	Cocoa Krispies	0.85804$	0.45642	1.87992
Kellogg	Complete Bran Flakes	0.12886	0.46341	0.27808
Kellogg	Corn Flakes	-0.82274$	0.47480	-1.73283
Kellogg	Corn Pops	0.91217&	0.45877	1.98830
Kellogg	Cracklin= Oat Bran	1.15179&	0.45396	2.53720
Kellogg	Crispix	1.00566&	0.44645	2.25257
Kellogg	Froot Loops	0.71832	0.45631	1.57419
Kellogg	Frosted Flakes	0.02239	0.47391	0.04725
Kellogg	Frosted Mini Wheats	0.17344	0.46896	0.36984
Kellogg	Just Right	0.57363	0.45531	1.25985
Kellogg	Low Fat Granola	0.74310	0.45502	1.63312
Kellogg	Meuslix	1.14767#	0.44368	2.58668
Kellogg	Nutri Grain	0.91075$	0.46473	1.95974
Kellogg	Product 19	1.56574#	0.45441	3.44565
Kellogg	Raisin Bran	-0.32839	0.46995	-0.69877
Kellogg	Raisin Squares	0.87440$	0.46581	1.87715
Kellogg	Rice Krispies	0.39776	0.45044	0.88307
Kellogg	Smacks	0.39199	0.46587	0.84142
Kellogg	Special K	1.21327#	0.44573	2.72196
Kellogg	Strawberry Squares	0.80027$	0.46856	1.70792
Malt-O-Meal	Honey & Nut Toasty O=s	0.26854	0.50712	0.52953
Malt-O-Meal	Toasty O=s	-0.06000	0.50838	-0.11802
Malt-O-Meal	Tootie Fruitie	0.15549	0.50677	0.30683
Post	Alpha Bits	0.82865$	0.44073	1.88018
Post	Bran Flakes	0.12815	0.45380	0.28239

(continues)

Appendix Table 11 (continued).

Manufacturer	Brand	Coefficient	Standard Error	t-statistic
Post	Cocoa Pebbles	0.96138[&]	0.45355	2.11968
Post	Fruit and Fibre	0.70311	0.43740	1.60748
Post	Fruity Pebbles	1.00113[&]	0.45838	2.18405
Post	Grape Nuts	-0.40964	0.46964	-0.87224
Post	Great Grains	0.71281	0.44019	1.61932
Post	Honey Bunches of Oats	0.54435	0.45424	1.19837
Post	Honeycomb	0.89496[&]	0.45584	1.96330
Post	Raisin Bran	-0.23280	0.45844	-0.50781
Post	Super Golden Crisp	0.19018	0.45918	0.41417
Post	Toasties	-1.06562[&]	0.48045	-2.21794
Private Label	Aggregate Brand	-0.67333	0.51760	-1.30085
Quaker	100% Natural	-0.08207	0.46534	-0.17637
Quaker	Cap N Crunch	0.23414	0.45587	0.51361
Quaker	Cap N Crunch - Crunch Berries	0.32073	0.45945	0.69807
Quaker	Cap N Crunch - Christmas Crunch	0.35119	0.48216	0.72837
Quaker	Life	-0.07831	0.46513	-0.16835
Quaker	Oat Squares	0.32012	0.45319	0.70638
Quaker	Oh=s	0.64218	0.51092	1.25690
Quaker	Puffed Rice	2.04902[#]	0.44610	4.59316
Quaker	Puffed Wheat	2.69599[#]	0.43562	6.18880
Quaker	Vitamin King	0.35503	0.51446	0.69010
Ralston[*]	Cookie Crisp	1.71209[#]	0.43386	3.94614
Ralston[*]	Corn Chex	0.95245[&]	0.46453	2.05034
Ralston[*]	Multi Bran Chex	0.18271	0.44801	0.40783
Ralston[*]	Rice Chex	0.90750[&]	0.45279	2.00425
Ralston[*]	Wheat Chex	-0.07882	0.45929	-0.17161
Nabisco[**]	100% Bran	0.19661	0.46220	0.42537

(continues)

Appendix Table 11 (continued).

Manufacturer	Brand	Coefficient	Standard Error	t-statistic
Nabisco**	Shredded Wheat	0.57861	0.45142	1.28177
Nabisco**	Spoon Size Shredded Wheat	0.38615	0.45778	0.84352
All Firms	Average of new, expiring, and generic brands	0.63966	0.45794	1.39683

[*] Ralston was purchased by General Mills in 1996. This study considers the acquisition effective as of January 1, 1997.
[**] Nabisco was purchased by Post in 1993. However, due to litigation, the merger was not completed until 1995. This study considers the acquisition effective as of January 1, 1996.
[#] Two-tailed t-test significant at the 99 percent confidence level. Critical value approximately 2.576.
[&] Two-tailed t-test significant at the 95 percent confidence level. Critical value approximately 1.960.
[$] Two-tailed t-test significant at the 90 percent confidence level. Critical value approximately 1.645.