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AUTHORS	Eugene Jones
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Eugene Jones (USA)

An empirical estimation of price sensitivity differences among inner-city and suburban consumers: a look at breakfast cereals

Abstract

Breakfast cereals are a common purchase for many Americans, being consumed in 93% of all U.S. households. When brands, flavors and product sizes are aggregated, over 360 options are available to consumers and this study posits that inner-city and suburban shoppers make significantly different selections from these choices. These choices are reflected in a 104-week scanner data set for four supermarkets, covering calendar years of 2006 and 2007. Two of these four supermarkets are located in inner-city areas and these areas are populated with a high proportion of lower-income residents. The other two supermarkets are located in suburban areas, where income levels are much higher. A large number of empirical findings are revealed, but a few of the contrasting ones show inner-city shoppers to be: (1) more price sensitive toward the purchase of national and private label brands; (2) more careful in their purchase selections, in that they find ways to pay lower prices for similar products; (3) more inclined to purchase larger quantities of private label cereals; and (4) more inclined to incorporate several factors into their purchase decisions, especially price, brand and product attributes.

Keywords: breakfast cereals, own-price elasticity, cross-price elasticity, price sensitivity, inner-city shopper, suburban shopper, national brands, private-label brands.

Introduction

An extended period of slow growth in the U.S. economy has prompted many food manufacturers to adopt creative methods for marketing their products. Manufacturers, recognizing that consumers are becoming more and more cost-conscious, are offering supermarkets relatively stable prices through smaller or revised package sizes (Hirsch, 2008; Stock, 2011). Such marketing efforts at the retail level are communicated to consumers only through in-store inspection of products before purchase. Utility is therefore best maximized for a given purchase by exploring several products within a given product category. For example, purchasers of ready-to-eat (RTE) breakfast cereals are likely to find it advantageous to consider many brands of cereal as potential substitutes or complements to a specific brand. In essence, the relevant choice set of breakfast cereals for a shopper within a supermarket is the entire breakfast cereal category. Hence, this study examines the purchase behavior of shoppers for every brand of RTE breakfast cereals sold in four supermarkets.

Recent breakfast cereal studies have focused on the impacts of industry characteristics on product pricing and industry profitability (Price, 2000; Nevo, 2001). Factors such as high concentration, large price-cost margins, large advertising-to-sales ratios, rapid infusion of coupons and expanded product proliferation have been identified as key determinants of sales for RTE breakfast cereals (Price, 2000; Nevo, 2001). More recent studies have focused on the roles brand loyalty and supermarket characteristics play in the pricing and marketing of RTE breakfast cereals (Chidmi and Lopez, 2007; Allender and Richards, 2009; Empen, Loy and Weiss, 2011). A key finding of Chidmi and Lopez's (2007) study is that consumers are highly price sensitive, but they display considerable brand and store loyalty. Allender and Richards (2009) examine the relationships between brand loyalty and the frequency and depth of price promotions and they find the correlation to be negative for brand loyalty and frequency of promotions as well as for brand loyalty and the depth of promotions. Empen, Loy and Weiss (2011) use scanner data for German supermarkets and reach conclusions supportive of Allender and Richards' (2009) findings. That is, their results show stronger brands to be promoted less frequently than weaker brands and these stronger brands also have lower levels of discount.

This study focuses primarily on consumer characteristics, with most of the structural characteristics highlighted in the aforementioned studies held constant by store selection from a single supermarket chain that uses zone pricing across its stores. Aspects of brand loyalty are included in this study in that consumer price sensitivity measures are derived for many brands of cereal. Yet, the research focus of this study rises above the market structure and performance issues of recent studies. Rather than addressing the question of how brand manufacturers and supermarkets use their market power to influence cereal prices, this study addresses the question of how consumers, with different levels of income, respond to cereal prices within selected stores. Stated differently, the question is: how do consumers with different levels of income make product selections when faced with identical prices?

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The supermarket chain providing the data for this study offers a total of 360 brands and/or product sizes of cereals. As previously stated, a key objective of this study is to determine if inner-city shoppers, mainly lower-income shoppers, make purchase decisions that are significantly different from those of suburban shoppers, mainly higher-income shoppers.

1. Industry characteristics, consumer demographics and hypotheses

Ready-to-eat breakfast cereals are relevant for this study because they are consumed by almost all U.S. households (93%) and they have a retail value of more than $10.8 billion (Gallagher, 2009). Consumption of RTE cereals grew from 8.2 pounds per capita in 1970 to 14.8 pounds in 1994 (Price, 2000). Following this 1994 per capita consumption peak, consumption declined for a period, but has since rebounded for an annual growth rate of 0.3 percent during 2003-2008 (Euromonitor, 2009). Some of this growth has been sparked by private label cereals, brands that grew 12.8% during 2007-2009 and now represent 12.3% of RTE sales (Gallagher, 2009).

A recent study suggests that close to half of American consumers are fairly loyal to their favorite brand, while other consumers are willing to trade down to lower-priced national brands and private labels (Gallagher, 2009). As consumers trade down, it seems reasonable to hypothesize that they will attempt to select products with attributes that closely resemble those in their most preferred choice set. For this study, attributes and preferences are assumed to be highly correlated with product sales. That is, as preferred attributes among a product group increase, product sales for that group increase. Indeed product sales are assumed to represent revealed consumer preferences.

For model estimation, this study groups brands of cereals into classes based on sales. Specifically, sales data are used to identify the top 24 national brands as well as the top 24 private label brands (national brands are listed in order of market share; private-labels are not listed to avoid revealing the identity of the retailer)[1]. National brands are identified from AC Nielsen data and private label brands are identified from a set of data provided to this researcher by the supermarket chain. These private-label data sales cover more than 140 stores over a three-state area: Ohio, Michigan and West Virginia. For estimation purposes, these 24 brands are then grouped as follows: top 6, second 6, third 6 and fourth 6 national brands; top 6, second 6, third 6 and fourth 6 private-label brands. Additional classes consist of all other cereals made by well-known manufacturers: General Mills; Kelloggs; Quaker Oats; Post; other national/regional brands; and other private-label brands. In summary, empirical estimates are derived for 14 classes of cereals. To provide further clarity, the top 24 national brands are grouped as follows:

- Top 6: Cheerios, Honey Bunches, Special K, Raisin Brans, Oat Life, Frosted Mini Wheats.
- Second 6: Cinnamon Toast Crunch, Frosted Flakes, Lucky Charms, Capn Crunch, Rice Crispies, Fruity Pebbles.
- Third 6: Fruit Loops, Fiber One, Apple Jacks, Corn Flakes, Shredded Wheat, Trix.
- Fourth 6: Cocoa Puffs, Kix, Cookie Crisp, Golden Crisp, Cocoa Pebbles, Grape Nut Flakes.

Five hypotheses are specified and tested in this study. These hypotheses are motivated by studies in the marketing literature that have attempted to explain the behavior of inner-city, or lower-income residents and suburban or higher-income residents. Included among these studies are: Allenby and Rossi, 1991; Bijmolt, Van Heerde and Pieters, 2005; Blattberg et al. 1978; Hoch, Kim, Montgomery, and Rossi, 1995; and Mulhern, Williams and Leone, 1998. Approaches used by these authors allow for testing many hypotheses, but only expenditure and own-price elasticities are tested in this study because cross-price elasticities are too numerous for definitive tests. Specified hypotheses are:

H_1: Suburban consumers, as compared to inner-city ones, are hypothesized to show lower levels of price sensitivity for all classes of cereals.

H_2: Inner-city consumers are hypothesized to show higher levels of price sensitivity for national brands than for private-label brands.

H_3: Inner-city consumers are hypothesized to exhibit careful shopping behavior and therefore pay lower per unit prices for all classes of cereal.

H_4: Inner-city consumers are hypothesized to show higher expenditure elasticities for all classes of cereal.

H_5: Inner-city consumers are hypothesized to show a stronger preference for lower-priced product classes.

2. Data and model specification

A 104-week data set covering calendar years of 2006-2007 is used to empirically estimate price-sensitivity measures for inner-city and suburban consumers. These consumers patronize four supermarkets in the Columbus, Ohio, metropolitan area: two inner-city and two suburban stores. All of these stores are part of a single supermarket chain and

[1] Cheerios, Honey Bunches, Special K, Raisin Brans, Oat Life, Frosted Mini Wheats, Cinnamon Toast Crunch, Frosted Flakes, Lucky Charms, Capn Crunch, Rice Crispies, Fruity Pebbles, Fruit Loops, Fiber One, Apple Jacks, Corn Flakes, Shredded Wheat, Trix, Cocoa Puffs, Kix, Cookie Crisp, Golden Crisp, Cocoa Pebbles, Grape Nut Flakes.

geographically, they are within a single pricing zone – meaning identical prices for cereals across all stores. As a general rule, residents surrounding the two inner-city stores have lower incomes and lower levels of education than those surrounding the two suburban stores. As previously mentioned, 360 brands and/or product sizes of cereals are sold in these supermarkets. Hence, to make the data manageable, cereals are grouped into the previously identified classes.

Descriptive statistics are developed for each class of cereal and these statistics are shown in Table 1 (see Appendix). A few of these are: (1) suburban shoppers purchase larger shares of national brands from the top 6 and second 6 classes than inner-city shoppers (33.1% and 13.2% respectively vs. 30.7% and 12.7%); (2) inner-city shoppers purchase larger shares of private-label brands from all four classes: top 6, second 6, third 6 and fourth 6; (3) for inner-city shoppers, shares range from 6.7% for the top 6 to 2.0% for the fourth 6; (4) for suburban shoppers, these shares range from 4.4% to 1.8%; and (5) inner-city shoppers pay lower prices than suburban shoppers for all but two classes of cereals: class 4 national brands and all other national/regional brands. These outcomes could reflect differences in opportunity cost of time as well as differences in product preferences among classes.

3. Model development

A double-log seemingly unrelated regression model is often used to estimate demand elasticities for food products involving supermarket scanner data (Capps, 1989). For this study, this approach would provide a unique set of own-price and cross-price elasticities for each store, making comparisons across four stores somewhat difficult. To minimize problems of comparison, this study uses a time series cross-section model (TSCS). Pindyck and Rubinfeld (1998) have shown that this approach is most appropriate for data involving time and space. Several model specifications are possible, but the error components model has been shown to be the most robust (Fuller and Battese, 1974). The general form of this model is:

$$Y_{qr} = \sum_{s=1}^{v} X_{qrs}\beta_s + \mu_{qr} \quad q = 1,2,...,N,$$

$$r = 1, 2,...,T, \qquad (1)$$

where N is the number of cross-sections, and T is the length of a time-series for each cross-section.

Four cross-sections and 104 observations per cross-section are included in the specified model for this study. Fourteen equations are specified and estimated using the time series cross-section regression (TSCSREG) procedure in SAS. The equations and included variables are specified as follows:

$$Q_{ikt} = f(p_{ikt}, p_{jkt}s, p_{mkt}, SDUM_{kt}, TEXP_{kt}, TEXP_{kt}s, PROM_{ikt}), \quad (2)$$

where Q_{ikt} is the total ounces of class i for store k in week t; i = 1, …, 14; k = 1, …, 4; t = 1, …, 104; p_{ikt} is the weighted-average price of class i for store k in week t; $p_{jkt}s$ represents weighted-average prices for competing classes for store k in week t; p_{mkt} is identical to pikt for inner-city stores 3 and 4, but 0 for all other stores (it is intended to capture price elasticity differences for inner-city and suburban shoppers); $SDUM_{kt}$ are zero-one dummy variables intended to capture store differences; $TEXP_{kt}$ represents total expenditures on cereals for store k in week t (intended as a proxy for consumer income); $TEXP_{kt}s$ is identical to $TEXP_{kt}$ for inner-city stores 3 and 4, but 0 for all other stores (it is intended to capture differences in expenditure elasticities for suburban and inner-city shoppers); and $PROM_{ikt}$ is the number of products in class i within store k that are temporarily reduced in price by 10% or more during week t. Descriptive statistics for dependent and independent variables are provided in Table 2 (see Appendix).

Prices are determined by expressing each cereal product as a ratio of all cereals within a given class. Specifically, weighted prices for class i in each time period are:

$$P_i = \Sigma_j W_{ij} P_{ij}, \text{ where } W_{ij} = \frac{P_{ij}Q_{ij}}{\Sigma_j P_{ij}Q_{ij}},$$

and j denotes the cereal products in the same class. Because each class of cereals is a potential substitute for, or complement with, other classes of cereals, all classes are included in each equation.

Own-price, cross-price and expenditure elasticities are the primary coefficients of interest in this study. These factors are emphasized because they have the potential for revealing many insights into consumer behavior. Own-price elasticities measure consumers' price sensitivity toward changes in product prices and these measures are critically important to retailers in the pricing and marketing of their products. For breakfast cereals, inner-city shoppers are hypothesized to show higher levels of price sensitivity for all brands of cereals. This hypothesis stems from the characteristics of inner-city shoppers (lower incomes, lower opportunity cost of time, etc.) and the relative weights they are likely to place on price relative to other factors such as brand and product attributes. Cross-price elasticities, estimated for price increases, are hypothesized to be smaller for inner-city shoppers than for suburban shoppers; this hypothesis stems from the differential impacts that price increases have on real incomes for the two

groups. For the econometric model used in this study, differences in cross-price elasticities for inner-city and suburban shoppers cannot be captured, but what can be captured are differences in the magnitude of cross-price elasiticites over product space. Specifically, it is hypothesized that cereal products that are closest in product space will have the largest cross-price elasticities (Berry et al., 1995). For example, the cross-price elasticity between class 1 and class 2 national brands is hypothesized to be larger than the cross-price elasticity between class 1 and class 4 national brands.

Inner-city shoppers are hypothesized to have expenditure elasticities that are larger than those of suburban shoppers because income (expenditure) elasticities for food have been shown to decline with income (Tomek and Robinson, 2003). Temporary price reductions are expected to have positive impacts on sales and this effect is captured with a promotion variable that is hypothesized to be positive and statistically significant. A lagged dependent variable is included to capture habit persistence and this variable is expected to be positive and to range between 0 and 1. Finally, the four stores have average weekly sales ranging from $402,000 to $751,000 and these variations in sales are hypothesized to result in store differences. These differences are captured with zero-one dummy variables, with store 1 serving as the base store.

4. Empirical results

4.1. Overall model results. Table 3 and 4 provide empirical results for the 14 classes of cereals listed in Tables 1 and 2. This discussion will focus mainly on estimated own- and cross-price elasticities, as shown in Table 4; the rest of this section provides a limited discussion of results shown in Table 3. As shown in Table 3, all elasticities are derived from equations with fairly high R^2's. One equation, all other national/regional brands, represents a small share (less than 1%) of all cereals and its R^2 is quite low (0.45). Indeed this is the only equation for which the own-price elasticity is statistically insignificant for both inner-city and suburban shoppers. Other R^2 values range from 0.57 to 0.98, suggesting a high level of explanatory power for the explanatory variables. Sales at the four stores reflect store size as well as shoppers' purchasing behavior and shopping frequency. Dummy variables are included in the model to capture these store effects and most coefficients are statistically insignificant. Store 1 is the base store and most coefficients that are statistically significant have mathematical signs that are consistent with differences in purchases for inner-city and suburban shoppers.

4.2. Own-price elasticities: top 24 national brands. As shown in Table 4 (see Appendix), the top four classes of national brand cereals have fairly large own-price elasticities, confirming high degrees of price sensitivity. Further, inner-city shoppers, as compared to suburban shoppers, are shown to express even higher levels of price sensitivity for these cereals and these values offer support for hypotheses H_1 and H_2. These differences are smallest for the top 6 brands and largest for the fourth 6. Both suburban and inner-city shoppers show the highest level of price sensitivity for national brands that are designated as the third 6 (-1.78 and -2.36 respectively). Inner-city shoppers show roughly the same level of price sensitivity for the top 6 and fourth 6 classes of national brands (-1.44 vs. -1.46). By contrast, suburban shoppers show much higher price sensitivity for the top 6 than for the fourth 6 (-1.22 vs. -.83). Among these national brands, both inner-city and suburban shoppers express the second highest level of price sensitivity for the second 6. In short, estimated own-price elasticities suggest that price reductions to stimulate sales are likely to be most effective for the second 6 and third 6, and less effective for the top 6 and fourth 6. Such results present options for manufacturers and retailers. For example, if brands produced by General Mills and Kelloggs are prominent in the first-named group, then retailers, in conjunction with manufacturers, could feature a combination of these brands for a particular promotion. Likewise, if brands produced by Post and Quaker are prominent in the second-named group, then these brands could be featured in a different promotion. And given the price sensitivity differences between the groups, retailers could use larger price reductions for the latter group to try and achieve similar sales results.

4.3. Own-price elasticities: top 24 private-label brands. Private-label cereals, on average, are shown to have lower levels of price sensitivity than those estimated for national brands. For suburban shoppers, all of the estimated own-price elasticities for private label are inelastic, suggesting limited opportunities for retailers to use price reductions to stimulate sales. For inner-city shoppers, two of the four own-price elasticities for private labels are essentially unitary, while those for the second 6 and fourth 6 are elastic; these values are consistent with hypothesis H_1. Further, these levels of elasticities are smaller than those which inner-city shoppers express for national brands, offering support for hypothesis H_2. Interestingly, relative differences in own-price elasticities for private label cereals follow a similar pattern as that for national brands. That is, differences in own-price elasticities for inner-city and subur-

ban shoppers are largest for the fourth 6 brands; for national brands, the smallest difference in own-price elasticities exists for the top 6 brands, but for private label brands, the smallest difference exists for the second 6 brands. These estimates support the view that highly preferred attributes, as associated with sales, tend to diminish the impact of price for all consumers.

4.4. Own-price elasticities: other national brands. Cereals not grouped in the top four national or private-label classes represent the third set of empirical results in Table 4 (see Appendix). All classes of cereals produced by the major manufacturers (General Mills, Quaker, Kelloggs, and Post) are shown to have high levels of price sensitivity, with estimated own-price elasticities comparable in magnitude to those shown for the top four classes of national brands. These brands are not among the top sellers, but each class offers consumers a wider array of choices than the top four classes of national brands. As such, a high level of price sensitivity is reasonable for a larger number of choices. Inner-city shoppers, relative to suburban shoppers, show much higher levels of price sensitivity for these four classes of cereals and these results are consistent with hypothesis H_1. For Quaker Oats cereals, inner-city shoppers express a level of price sensitivity that is more than twice that of suburban shoppers. An inelastic demand, as revealed for suburban shoppers, suggests the presence of some product attributes among this class of Quaker cereals that are highly preferred by these shoppers. By contrast, suburban shoppers express fairly elastic demands for cereals produced by the other three manufacturers. Higher elasticities for inner-city shoppers show the relative importance of price to product attributes for lower-income shoppers.

4.5. Own-price elasticities: other private-label and national/regional brands. The final cereal classes are all other national/regional brands that are not produced by the top four cereal manufacturers and all other private label brands that are not included in the top four classes. As Table 1 shows, very few cereals fall into the national/regional class. Indeed the statistically insignificant own-price elasticity for this class of cereal is possibly due to insufficient price variation across a small number of products. By contrast, a large number of cereals fall into the catchall, private label class. Predictably, this class of private labels shows high price sensitivity for all consumers, but slightly higher price sensitivity for inner-city shoppers, offering support for hypothesis H_1. Despite this high price sensitivity for both groups of shoppers, Table 2 shows that inner-city shoppers pay a lower price per pound for this class of cereals and this result supports hypothesis H_3. With private-labels being a supermarket brand, this high level of price sensitivity suggests that the supermarket could easily move products in this class with promotional efforts such as coupons, merchandising and temporary price reductions. Indeed temporary price reductions, as shown in Table 3, are quite effective in stimulating sales for this product class.

4.6. Expenditure elasticities. Income is known to be a key determinant of demand and its proxy, total expenditures on cereals, is shown to be positive and statistically significant for all 14 classes of cereals. A dummy variable was included in the model to capture differences in expenditure elasticities for inner-city and suburban shoppers, but this variable proved to be statistically insignificant for most classes of cereal. This insignificant variable is specific to hypothesis H_4 and this is the only hypothesis that is not supported by the empirical results. Because this variable is statistically insignificant, it is not shown in Table 3. Inner-city shoppers are shown to have higher expenditure elasticities for the second 6 and fourth 6 classes of private label cereals, but lower expenditure elasticities for other national brands of cereals produced by General Mills, Quaker Oats and Post. These estimates suggest that breakfast cereals, as a single food category, command a share of consumers' total income that is too small to reveal significant expenditure differences for inner-city and suburban shoppers.

4.7. Cross-price elasticities. As expected, most cross-price elasticities show substitute relationships among cereal classes. Estimated elasticities for the leading classes of national and private label cereals tend to support the hypothesis that cereals closest in product space will have the largest cross-price elasticities. The second 6 class of national brands is a stronger substitute (.5413) for the top 6 class of national brands than the third 6 class (.5137) is for the top 6. Similarly, the top 6 class of private label cereals is a stronger substitute (.6381) for the top 6 national brands than they are for the second 6 class (.2246) of national brands. Other cross-price elasticities show that a particular Product A can be a substitute for another Product B without Product B being a substitute for Product A. Similarly, the elasticities show that a particular Product A is often a strong substitute for another Product B, while Product B is a weak substitute for Product A. As examples, the third 6 class of private label cereals is a substitute for the top 6 class of national brands, but the top 6 class of national brands is not a substitute for the third 6 class of private labels. Additionally, the third 6 class of national brands is shown to be a strong substitute for the top 6 national brands, but the top 6

national brands is a weak substitute for the third 6 national brands. These results reflect differences in product prices and attributes.

Cross-price hypotheses were not advanced for several cereal classes because their product space relationships could not be determined. For example, is the all other class of Post cereals closer in product space to all other General Mills cereals or all other Quaker Oats cereals? One observation from the estimated cross-price elasticities is that the leading classes of national brands and private label cereals are more likely to serve as substitutes for other classes produced by major manufacturers. Several examples are provided: third 6 national brands is a substitute for other Quaker Oats cereals, but other Quaker Oats is not a substitute for third 6 national brands; top 6 private label brands is a substitute for other Kelloggs cereals, but other Kelloggs cereals is not a substitute for top 6 private label brands; top 6 private label brands is a substitute for other Post cereals, but other Post cereals is not a substitute for top 6 private label brands; and the second 6 private label cereals is a substitute for other Kelloggs cereals, but other Kelloggs cereals is not a substitute for the second 6 private label cereals.

4.8. Relevancy of findings. Extending the discussion of the empirical estimates, it is clear that 12 of 14 estimated own-price elasticities show inner-city shoppers to have higher levels of price sensitivity, results that are consistent with hypothesis H_1. Since these estimates are derived from data within a common pricing zone, it seems reasonable to posit that inner-city shoppers can serve to moderate price increases for breakfast cereals. That is, retailers perhaps recognize that across-the-board price increases for cereals would lead to larger reductions in sales in inner-city stores, as compared to suburban stores. Similarly, it seems reasonable to expect a temporary price reduction to give sales a larger boost in inner-city stores. For this study, temporary price reductions are limited to those that are 10% or larger and the impact of these reductions is captured by the number of products promoted during a given week. Results in Table 3 show that a one-unit increase in the number of products promoted leads to an average increase of 0.016 ounces sold across the top four classes of national brands, with the largest effect (0.045) realized for the fourth 6. For the top four classes of private label cereals, promotion is statistically insignificant for the first two classes, but, for the last two classes, a promotion effect comparable to that for national brands is realized. Specifically, a one-unit increase in the number of products promoted leads to an average increase of 0.014 ounces sold. A much larger promotion effect is realized for other national brands, with a unit increase in the number of products promoted leading to an average increase of 0.065 ounces sold across the four classes. By far, the largest (0.185) impact is realized for Quaker Oats cereals.

Lower estimated own-price elasticities for private label cereals seem reasonable, given that private-label cereals are priced lower than national brands. As an illustration, it is plausible that a 10% price increase for private-label cereals will still leave these products in a favorable price position as compared to national brands. Despite lower prices for private-label cereals, inner-city shoppers were hypothesized to show higher price sensitivity than suburban shoppers for these brands and this hypothesis (H_1) is confirmed for all four classes. Further support for the higher price sensitivity of inner-city shoppers is revealed by descriptive statistics that show inner-city shoppers paying lower prices per pound for private-label cereals (Table 2). Indeed inner-city shoppers are shown to pay lower per unit prices for 12 of 14 product classes, offering strong support for hypothesis, H_3. These lower prices could reflect purchases of larger package sizes, a more optimal combination of flavors, more timely shopping, or a combination of these and other factors. Regardless of the factors involved, the descriptive statistics in Table 2 support the empirical estimates that show inner-city shoppers to be more price sensitive toward the purchase of private label cereals. As shown, inner-city shoppers, relative to suburban shoppers, purchase smaller shares of the higher-priced national brands, but larger shares of the lower-priced private-label brands, results that are consistent with hypothesis H_5.

The estimated own-price elasticites for these cereals have implications for manufacturers and retailers. Instead of temporary price reductions to lower prices for all consumers, manufacturers could possibly increase their revenue by lowering prices in inner-city areas through indirect promotional efforts, such as coupons. Retailers, in response to incentives from manufacturers to move product, could alter the mix of merchandising, advertising and temporary price reductions across inner-city and suburban stores to achieve both higher sales and higher profits. Such a change in strategy does not mean that the retailer has to abandon its common pricing zone. A change as simple as allowing in-store merchandising within inner-city stores to differ from that within suburban stores may be sufficient to increase sales and profits.

Conclusions and managerial implications

Empirical results for this study show distinct differences in the purchasing behavior of inner-city and suburban shoppers. These differences are not cost driven, as all shoppers face identical prices across the four stores. Income differences among the areas

surrounding the stores appear to be a major factor, as inner-city store locations are populated with a larger proportion of lower-income shoppers. In addition to lower incomes, the purchasing behavior of inner-city shoppers is likely influenced by lower opportunity cost of time and differential weights placed on factors such as price, brand and product attributes.

While price is shown to be an important determinant of consumers' purchase behavior, it should be noted that the top and fourth classes of national brands have relatively higher prices, but these classes do not have the highest level of price sensitivity. Indeed the highest level of price sensitivity is shown for the third class of national brands. These results suggest that consumers identify a set of desired characteristics within a product class and these desired characteristics can serve to diminish the role of price. In essence, price is just one factor among a set of product characteristics that ultimately determine a purchase decision. Manufacturers and retailers can use this information to offer various combinations of in-store merchandising, advertising and price reductions to achieve desired sales and profit.

As expressed in hypotheses H_1 and H_2, inner-city shoppers, relative to suburban shoppers, were expected to show higher price sensitivity for all cereal classes and they were expected to show the highest level of price sensitivity for national brands. These outcomes are observed in the empirical results and they have implications for brand and store managers. Instead of implementing zone pricing, the results suggest that brand and retail managers could enhance their profitability by utilizing micro-marketing strategies to charge different prices across stores or retail market areas. Indeed the results suggest that price promotions aimed at brand switching would be less effective in inner-city stores than in suburban stores. Further, the stronger preference for private-label cereals in inner-city stores suggests a different product mix for the two groups of stores. In essence, brand and store managers can increase profitability by varying their promotion and product-mix strategies by store type and location.

Future research and study limitations

To measure the impacts that household incomes have on consumer purchase behavior, this study isolated consumer shopping areas by geographic locations: inner-city and suburbia. This method was used because this researcher did not have access to detailed data for individual shoppers. As such, the empirical results for this study capture the store-level behavior that is expressed by the majority of shoppers. A better measure of shoppers' behavior could have been obtained with detailed observations on individual consumers. In essence, there is less than a 100 percent correlation between observed behavior and income because some higher-income shoppers patronized inner-city stores and some lower-income shoppers patronized suburban stores. Yet, if household-level data could have been used for this study, as opposed to store-level data, the empirical findings likely would have been stronger, not weaker. Nevertheless, as the supermarket chain providing this data develops secure measures for collecting and sharing more detailed data, this researcher will be the first to utilize these data to try and develop more refined measures of consumer behavior.

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Appendix

Table 1. Shares of purchased cereals for suburban and inner-city shoppers

Product class	Suburban stores					
	Store 1		Store 2		Average	
	Sales share	Quantity share	Sales share	Quantity share	Sales share	Quantity share
National brands 1	32.97	30.23	33.21	30.54	33.09	30.39
National brands 2	13.20	13.32	13.28	13.41	13.24	13.36
National brands 3	6.84	6.67	6.41	6.29	6.63	6.48
National brands 4	4.50	4.10	4.26	3.88	4.38	3.99
Private label 1	4.53	7.22	4.35	6.92	4.44	7.07
Private label 2	1.98	2.83	1.86	2.66	1.92	Z74
Private label 3	2.29	3.21	2.26	3.16	2.27	3.18
Private label 4	1.78	2.66	1.74	2.60	1.76	2.63
Other GM	9.10	6.80	9.75	7.36	9.43	7.08
Other Quaker	2.09	2.12	2.39	2.45	2.24	2.29
Other Kelloggs	9.41	7.37	9.54	7.50	9.48	7.43
Other Post	6.27	6.74	5.94	6.55	6.10	6.64
Other N/R brands	0.65	0.63	0.66	0.60	0.65	0.62
Other private labels	4.39	6.10	4.34	6.08	4.36	6.09
Total	100.00	100.00	100.00	100.00	100.00	100.00
Product class	Inner-city stores					
	Store 3		Store 4		Average	
	Sales share	Quantity share	Sales share	Quantity share	Sales share	Quantity share
National brands 1	32.07	27.30	29.26	25.18	30.67	26.24
National brands 2	11.06	11.01	14.36	14.86	12.71	1Z93
National brands 3	5.94	5.76	9.39	9.03	7.67	7.39
National brands 4	3.50	Z71	5.08	4.05	4.29	3.38
Private label 1	8.17	12.15	5.63	8.83	6.90	10.49
Private label 2	3.46	4.81	3.66	5.29	3.56	5.05
Private label 3	3.82	5.01	2.46	3.44	3.14	4.22
Private label 4	2.52	3.55	1.91	2.77	2.21	3.16
Other GM	6.72	4.69	7.49	5.34	7.10	5.01
Other Quaker	1.91	1.85	1.48	1.45	1.69	1.65
Other Kelloggs	6.77	5.08	7.65	6.11	7.21	5.59
Other Post	5.36	5.52	6.18	6.65	5.77	6.08
Other N/R brands	1.26	1.04	0.61	0.59	0.94	0.81
Other private labels	7.45	9.55	4.84	6.44	6.14	7.99
Total	100.00	100.00	100.00	100.00	100.00	100.00

Table 2. Weekly mean values for classes of breakfast cereals

Class	Quantity (ounces)					
	Suburban stores			Inner-city stores		
	Store 1	Store 2	Average	Store 3	Store 4	Average
National brands 1	11918	18165	15042	6337	13465	9901
National brands 2	5250	7972	6611	2555	7946	5250
National brands 3	2628	3738	3183	1336	4828	3082
National brands 4	1618	2306	1962	628	2166	1397
Private label 1	2848	4118	3483	2820	4722	3771
Private label 2	1115	1582	1349	1117	2829	1973
Private label 3	1267	1877	1572	1162	1838	1500
Private label 4	1048	1547	1297	823	1481	1152
Other GM	2682	4377	3530	1088	2856	1972
Other Quaker	837	1460	1148	429	777	603
Other Kelloggs	2904	4460	3682	1178	3266	2222
Other Post	2656	3895	3276	1281	3554	2418
Other N/R brands	250	357	303	241	313	277
Other private labels	2405	3618	3011	2217	3442	2829
Class	Prices paid (per 16 oz box)					
	Suburban stores			Inner-city stores		
National brands 1	3.39	3.40	3.39	3.31	3.39	3.35
National brands 2	3.03	3.04	3.03	2.80	2.77	2.79
National brands 3	3.11	3.12	3.12	2.88	2.96	2.92
National brands 4	3.44	3.45	3.45	3.71	3.72	3.72
Private label 1	1.83	1.84	1.83	1.80	1.76	1.78
Private label 2	2.02	2.05	2.04	1.92	1.90	1.91
Private label 3	2.12	2.12	2.12	2.06	1.99	2.03
Private label 4	1.97	1.98	1.98	1.91	1.97	1.94
Other GM	3.90	3.87	3.88	3.82	3.86	3.84
Other Quaker	2.96	2.85	2.90	2.79	2.87	2.83
Other Kelloggs	4.08	4.05	4.07	3.92	3.91	3.91
Other Post	2.82	2.77	2.80	2.70	2.67	2.68
Other N/R brands	3.03	3.13	3.08	2.99	3.22	3.11
Other private labels	2.08	2.08	2.08	2.06	2.04	2.05
Class	Sales (dollars)					
	Suburban stores			Inner-city stores		
National brands 1	2269	3472	2871	1186	2571	1878
National brands 2	908	1389	1148	409	1262	835
National brands 3	471	670	571	220	825	522
National brands 4	310	446	378	129	446	288
Private label 1	312	455	383	302	494	398
Private label 2	136	195	166	128	322	225
Private label 3	158	236	197	141	216	179
Private label 4	122	182	152	93	168	130
Other GM	626	1019	823	248	658	453
Other Quaker	144	250	197	70	130	100
Other Kelloggs	648	998	823	250	673	461
Other Post	431	621	526	198	543	371
Other N/R brands	45	69	57	47	53	50
Other private labels	302	454	378	275	425	350
Class	Promotion (number)					
	Suburban stores			Inner-city stores		
	Store 1	Store 2	Average	Store 3	Store 4	Average
National brands 1	4.30	4.16	4.23	4.00	4.19	4.10
National brands 2	2.06	2.10	2.08	1.73	2.07	1.90
National brands 3	1.54	1.38	1.46	1.35	1.62	1.48
National brands 4	0.92	0.88	0.90	0.84	0.92	0.88

Table 2 (cont.). Weekly mean values for classes of breakfast cereals

Class	Promotion (number)					
	Suburban stores			Inner-city stores		
	Store 1	Store 2	Average	Store 3	Store 4	Average
Private label 1	1.49	1.47	1.48	1.30	1.82	1.56
Private label 2	0.99	1.01	1.00	1.07	1.07	1.07
Private label 3	0.83	0.72	0.77	0.77	0.88	0.83
Private label 4	0.66	0.68	0.67	0.59	0.70	0.64
Other GM	1.61	1.62	1.61	1.49	1.73	1.61
Other Quaker	0.34	0.25	0.29	0.26	0.27	0.26
Other Kelloggs	2.48	2.63	2.56	2.07	2.57	2.32
Other Post	1.59	1.64	1.62	1.42	1.64	1.53
Other N/R brands	0.37	0.37	0.37	0.33	0.42	0.38
Other private labels	2.25	2.53	2.39	1.93	2.32	2.13
Variable	Dollars					
Store sales	579224	750780	665002	402192	581680	491936

Table 3. Empirical results (excluding all own-price and cross-price elasticities)

Variable	Dependent variables[a]							
	National brands 1		National brands 2		National brands 3		National brands 4	
Constant	-1.5386	0.0012	-4.1311	0.0015	-0.5988	0.5495	-5.1707	<.0001
Promotion	0.0049	0.0038	-0.0004	0.9369	0.0120	0.0759	0.0368	0.0012
Expenditures	1.0737	0.0001	1.0430	0.0001	0.7527	0.0001	1.2211	0.0001
Store 2	-0.0250	0.1965	-0.0303	0.9827	0.0426	0.9321	-0.1546	0.7397
Store 3	0.1194	0.7564	-1.5669	0.3211	-2.4947	0.0106	-0.5014	0.6587
Store 4	0.0138	0.9721	-1.4678	0.3550	-1.9370	0.0496	-0.2990	0.7964
R^2	0.9845		0.7131		0.7041		0.5932	
Variable	Dependent variables[a]							
	Private label 1		Private label 2		Private label 3		Private label 4	
Constant	0.8310	0.3431	2.7011	0.0214	-0.2983	0.7594	-0.1178	0.9176
Promotion	-0.0021	0.6044	0.0082	0.2087	0.0116	0.0843	0.0162	0.0715
Expenditures	0.8573	0.0001	0.6072	0.0001	0.8092	0.0001	0.6436	0.0001
Store 2	0.0169	0.9740	0.0932	0.0666	0.0640	0.1314	0.1114	0.0270
Store 3	0.7070	0.4593	-4.9920	<.0001	0.8120	0.4211	-2.8458	0.0153
Store 4	0.4692	0.6274	-5.1021	<.0001	0.5888	0.5687	-2.9384	0.0140
R^2	0.5871		0.8767		0.7855		0.7988	
Variable	Dependent variables[a]							
	Other GM		Other Quaker		Other Kelloggs		Other post	
Constant	-1.6082	0.1560	-5.1044	0.0022	-4.3369	<.0001	-4.6190	<.0001
Promotion	0.0149	0.0022	0.1860	<.0001	0.0192	<.0001	0.0345	5.1500
Expenditures	1.0329	0.0001	1.3473	0.0001	1.0909	0.0001	1.1887	0.0001
Store 2	0.0605	0.9482	-0.0151	0.9259	-0.0384	0.3550	-0.1482	0.0009
Store 3	0.7015	0.5769	5.0410	0.0009	-1.0931	0.1936	1.7372	0.0484
Store 4	0.4562	0.7138	5.1325	0.0009	-1.0512	0.2228	1.9981	0.0268
R^2	0.6379		0.5958		0.9561		0.9402	
Variable	Dependent variables[a]							
	Other N/R brands		Other private labels					
Constant	3.9986	0.4234	-0.6377	0.4829				
Promotion	0.2042	<.0001	-0.0019	0.3357				
Expenditures	0.8108	0.0686	0.7356	0.0001				
Store 2	-0.1216	0.7148	0.0968	0.8733				
Store 3	2.3213	0.5885	-0.2267	0.8364				
Store 4	2.0458	0.6417	-0.4864	0.6620				
R^2	0.4573		0.5704					

Note: [a] The first column for each variable contains estimated coefficients; the second column presents p-values.

Table 4. Own-price and cross-price elasticities for time series cross-section regression model (dependent variables[a])

	Dependent variables[a]									
	National brands 1		National brands 2		National brands 3		National brands 4		Private label 1	
National brands 1[b]	-1.224	0.0001	-0.015	0.7981	0.2089	0.0007	-0.0406	0.4353	0.167	0.1571
National brands 1[c]	-0.2221	0.0476								
National brands 2[b]	0.5413	0.0007	-1.5549	0.0001	-0.0032	0.9762	-0.0249	0.7898	0.0674	0.7528
National brands 2[c]			-0.4088	0.0125						
National brands 3[b]	0.5137	0.0032	0.1554	0.2075	-1.7768	0.0001	-0.0486	0.6441	0.2843	0.2595
National brands 3[C]					-0.5848	0.0001				
National brands 4[b]	-0.3423	0.1242	0.1701	0.2898	-0.0174	0.9102	-0.8327	0.0001	0.3101	0.3225
National brands 4[c]							-0.6232	0.0023		
Private label 1[b]	0.6381	0.0001	-0.08	0.4289	0.2246	0.0242	0.0086	0.9207	-0.8055	0.0008
Private label 1[c]									-0.3456	0.0163
Private label 2[b]	0.2873	0.1518	0.0413	0.7768	0.2134	0.1233	0.2338	0.0661	-0.2518	0.4313
Private label 2[c]										
Private label 3[b]	0.4492	0.0066	0.0159	0.8949	0.0284	0.8028	0.0549	0.6002	-0.3446	0.1953
Private label 3[C]										
Private label 4[b]	-0.0853	0.6771	0.1128	0.4456	-0.0005	0.9969	0.0741	0.5604	-0.4551	0.1514
Private label 4[c]										
Other GM[b]	0.4528	0.0074	0.3357	0.0049	-0.0727	0.537	-0.0074	0.9423	-0.0276	0.9092
Other GM[c]										
Other Quaker[b]	1.0058	0.0016	-0.0021	0.9927	0.2646	0.2276	-0.0412	0.8289	0.0388	0.933
Other Quaker[c]										
Other Kelloggs[b]	-0.3673	0.0452	0.3639	0.0049	-0.283	0.0253	-0.0455	0.6812	0.2382	0.3647
Other Kelloggs[c]										
Other Post[b]	0.0046	0.9828	0.3694	0.0103	-0.3968	0.0065	0.2684	0.0297	-0.0723	0.7956
Other Post[c]										
Other N/R brands[b]	-1.1138	0.226	-0.578	0.3689	1.2821	0.0435	0.1766	0.7489	0.8364	0.5097
Other N/R brands[c]										
Other private labels	0.3034	0.0302	0.0631	0.5378	0.0698	0.4703	0.0129	0.8891	-0.1751	0.4461
Other private labels[c]										
	Dependent variables[a]									
	Private label 2		Private label 3		Private label 4		Other GM		Other Quaker	
National brands 1[b]	0.0128	0.8865	0.0823	0.2391	-0.0109	0.8733	0.1224	0.0954	0.0551	0.1865
National brands 1[c]										
National brands 2[b]	-0.0882	0.5892	0.1778	0.155	-0.1833	0.1301	0.0393	0.7641	-0.221	0.0037
National brands 2[c]										
National brands 3[b]	-0.2458	0.1873	0.0361	0.8051	-0.0569	0.6941	0.1374	0.3266	0.1569	0.0689
National brands 3[c]										
National brands 4[b]	-0.1346	0.5682	0.1068	0.559	-0.106	0.5503	0.1754	0.3862	0.0772	0.4782
National brands 4[c]										
Private label 1[b]	-0.0791	0.6129	-0.2122	0.0777	-0.0566	0.6273	0.0632	0.5897	-0.146	0.0374
Private label 1[c]										
Private label 2[b]	-0.6987	0.0807	-0.5073	0.0064	0.3231	0.0772	0.3955	0.0146	-0.032	0.7602
Private label 2[c]	-0.3051	0.0235								
Private label 3[b]	0.0861	0.652	-0.6563	0.0168	-0.2563	0.0928	0.1669	0.2085	0.1352	0.1126
Private label 3[c]			-0.3431	0.0342						
Private label 4[b]	0.2534	0.2671	0.3548	0.0477	-0.6736	0.0053	0.1097	0.5061	-0.1	0.3328
Private label 4[c]					-0.6449	0.0167				
Other GM[b]	-0.3423	0.0572	0.2255	0.1108	-0.0368	0.7891	-1.3789	0.0001	-0.005	0.9493
Other GM[c]							-0.5192	0.0054		
Other Quaker[b]	-0.4099	0.227	0.8413	0.0016	0.3745	0.1501	0.6409	0.0124	-0.571	0.0074
Other Quaker[c]									-0.923	0.0001
Other Kelloggs[b]	0.221	0.2605	-0.0895	0.5611	0.0026	0.9858	0.3854	0.0105	-0.099	0.2731
Other Kelloggs[c]										

Table 4 (cont.). Own-price and cross-price elasticities for time series cross-section regression model (dependent variables[a])

	Dependent variables[a]									
	Private label 2		Private label 3		Private label 4		Other GM		Other Quaker	
Other Post[b]	0.192	0.3624	0.3193	0.0508	0.2761	0.0805	0.0906	0.6035	-0.178	0.0708
Other Post[c]										
Other N/R brands[b]	1.4868	0.1194	-0.9039	0.2235	-0.3951	0.5879	-0.1692	0.8225	0.4881	0.2727
Other N/R brands[c]										
Other private labels[b]	0.2498	0.1212	0.1589	0.2215	0.2218	0.0861	0.3829	0.0007	0.0261	0.7182
Other private labels[c]										
	Dependent variables[a]									
	Other Kelloggs		Other Post		Other N/R brands		Other private labels			
National brands 1[b]	0.0699	0.1365	0.0396	0.5033	-0.0283	0.1102	0.077	0.5146		
National brands 1[c]										
National brands 2[b]	0.036	0.6686	-0.0189	0.856	0.0426	0.1807	0.352	0.0984		
National brands 2[c]										
National brands 3[b]	-0.2278	0.014	0.1467	0.1896	0.0701	0.0571	-0.0594	0.8071		
National brands 3[c]										
National brands 4[b]	0.1152	0.342	-0.1809	0.2219	0.1589	0.0006	0.7061	0.0211		
National brands 4[c]										
Private label 1[b]	0.1392	0.0792	0.3383	0.0004	0.0257	0.3927	0.3155	0.1291		
Private label 1[c]										
Private label 2[b]	0.2023	0.086	-0.1398	0.2697	0.0184	0.684	-0.2597	0.4021		
Private label 2[c]										
Private label 3[b]	0.0541	0.5786	0.0161	0.8772	-0.0264	0.4809	0.2944	0.2461		
Private label 3[C]										
Private label 4[b]	0.1691	0.1508	0.1102	0.3999	-0.0169	0.7083	-0.2824	0.3519		
Private label 4[C]										
Other GM[b]	0.3196	0.0007	0.2905	0.0081	-0.0083	0.8154	0.2662	0.258		
Other GM[c]										
Other Quaker[b]	-0.0936	0.591	0.0445	0.8259	-0.0396	0.5722	-0.4501	0.3108		
Other Quaker[c]										
Other Kelloggs[b]	-1.1989	0.0001	0.0983	0.4082	-0.0827	0.0323	-0.0037	0.9883		
Other Kelloggs[c]	-0.3448	0.0364								
Other Post[b]	-0.0973	0.3767	-1.1324	0.0001	0.0871	0.0367	0.2602	0.3471		
Other Post[c]			-0.5982	0.0002						
Other N/R brands[b]	0.4388	0.3779	0.5101	0.402	-0.3914	0.2457	1.7331	0.1698		
Other N/R brands[c]					-0.1017	0.7663				
Other private labels[b]	0.0511	0.5366	0.1169	0.1855	-0.0052	0.8712	-2.0027	0.0001		
Other private labels[c]							-0.2037	0.4363		

Note: [a]The first column for each variable contains estimated elasticities; the second column presents p-values. [b]Indicates the price elasticity estimate for all consumers. [c]Indicates the price elasticity difference for suburban and inner-city consumers.