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An Empirical Assessment of Consumers' Preferences for Coffee

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Abstract

This study examines the purchasing behavior of inner-city and suburban shoppers for more than 265 brands and varieties of coffee. Weekly data for the 2011 calendar year are used for this study and these data represent purchases of shoppers in four stores in Columbus, Ohio. A national supermarket chain provided the data from a common price zone, meaning identical prices across all stores. The major premise of the research is that inner-city shoppers will show greater price-sensitivity toward the purchase of all brands of coffee.

Keywords: coffee, price sensitivity, own-price elasticity, cross-price elasticity, temporary price reductions

Introduction

Several studies have documented changes that consumers were motivated to make in their consumption and spending behavior in response to the 2007-2009 recession (Kaufman and Kumcu 2012; Wharton School of Business 2010). Consumers often react to a recession by purchasing lower-priced products within specific product categories[1], while attempting to maintain their previous consumption levels within these product categories. Coffee is a product category that offers a wide array of brands and varieties and these options provide opportunities for consumers to trade down. Most brands offer varieties across the spectrum of regular, premium, super premium and gourmet; some brands extend beyond this spectrum to include specialty products such as cappuccino and espresso. Consumers are expected to express a level of price-sensitivity toward brands and varieties of coffee that is dependent on their socioeconomic characteristics (Ailawadi and Rossi 1998; Aguiar and Hurst 2007; Nagle and Hogan 2006). Indeed shopping responses of consumers by socioeconomic characteristics are the primary focus of this research.

Economic theory suggests that an additional dollar of income provides a higher level of marginal utility to a lower-income person than it does to a higher-income one (Berry et al. 1995). Further, for a fixed market basket of goods, a price increase for a particular product within that basket, say coffee, is likely to have its greatest impact on lower-income individuals. In essence, lower- and higher-income individuals are likely to show different purchase responses to both price and income changes. Individual income data are not available to this researcher, but 2010 census tract data are available and these data are used to select four grocery stores within specific geographic locations from a single supermarket chain (Table 1).

Table 1. Socioeconomic Characteristics of Store Residents

		Median Household	**Median Family**	**% Population**	**% Population**	**% Population**
Suburban Stores	Population	Income	Income	over 65	in Poverty	College Grads
Store 1	51,047	93198	111540	7.33	4.22	57.79
Store 2	32,737	78086	94994	10.02	4.89	47.70
Average		86309	103929	8.38	4.58	52.75
Inner-City Stores						
Store 3	38,148	36538	51116	8.95	30.63	59.95
Store 4	18,569	35275	42381	12.81	23.78	17.61
Average		35918	47157	10.21	27.64	38.78

[a] Note that all variables are weighted by population values.
Census Tract Data for Ohio Counties, U.S. Bureau of Census, 2010.

[1] Buying lower-priced products in response to less disposable income is often described as "trading down." For example, within categories of frequently purchased food products, many consumers trade down from national brands to store or private label brands.

Although variations in socioeconomic characteristics are sure to exist among individuals within all geographic areas, this study adopts the premise that enough commonality in characteristics is likely to exist among individuals within specified geographic areas to extract meaningful patterns of behavior. To this end, two stores are selected within the inner-city of Columbus, Ohio, and these stores serve mainly residents with lower incomes; two additional stores are selected within suburban areas and they serve predominately residents with higher incomes. With respect to coffee purchases, it is hypothesized that shoppers within the two inner-city stores, relative to those in suburban stores, will show greater price-sensitivity for all brands of coffee (Ailawadi and Rossi 1998). Any noise in the data caused by higher-income (lower-income) residents shopping at lower-income (higher-income) stores is expected to lead to smaller (larger) own-price elasticities.

A recent survey by the National Coffee Association (NCA) revealed that 54% of Americans drink coffee daily and over 73% drink it several times per year (NCA 2013). In volume, the average American drinks 26 gallons of coffee per year (Osterweil 2011). At the retail level, dollar sales of coffee for 2012 are estimated at $9.6 billion, although it is not clear if this total includes Wal-Mart outlets (Jacobsen 2012). What is clear about coffee is that K-cups, a type of single serve, have been growing at an astronomical rate. Sales increased from $1 billion in 2011 to more than $1.8 billion in 2012, an increase in excess of 80% (Watson 2013). What is interesting about this surge in sales of K-cups coffee is that it is one of the most expensive types of coffee available and the 2007-2009 recession motivated consumers to trade down (Kaufman and Kumcu 2012; Wharton School of Business 2010). As evidence of consumers' attempt to economize during the recession, they increased their coupon redemption by 10% and 27% respectively in 2008 and 2009, as compared to increases in previous years of no more than 1 to 2 percent (Vanac 2013). With rapid increases in K-Cups sales and the effects of the recession still lingering, it seems reasonable to try and estimate demand elasticity relationships among various brands and varieties of coffee at the retail level. To accomplish this objective, store-level scanner data are used to try and identify product preferences and price-sensitivities among inner-city and suburban residents.

The rest of this paper is organized as follows. Section two provides a literature review of coffee studies, with the scope ranging from returns to Fair Trade coffee to price elasticities for specific brands. Section three presents the theoretical and empirical models, the study objectives, and provides a discussion of the econometric procedures used to estimate the empirical model. Section four provides a description of the coffee data and the process used to segment these data into meaningful characteristics for empirical estimation. Twelve categories of coffee are identified and considerable emphasis is placed on the brands and varieties comprising these categories. Section five provides a discussion of general socioeconomic characteristics for residents surrounding the selected grocery stores. Coupled with this discussion of socioeconomic characteristics is a discussion of differences among stores. Differences emphasized are focused on factors such as customer counts per store (customers who make a purchase), total store sales, and total coffee sales per store.[2] Additionally, a discussion of market shares for these 12 categories is provided. Section six provides a discussion of the empirical results. Finally, Section seven ends the paper with a summary and conclusions.

[2] A confidentiality agreement between this researcher and the supermarket chain forbids its name disclosure.

Literature Review

Many studies of coffee have focused on the distribution of retail prices between producing and consuming countries (Valkila et al. 2010; Bacon et al. 2008; Kilian et al. 2006; Mendoza and Bastiaensen 2003; Zehner 2002). Coffee certification schemes such as Fair Trade, Rainforest Alliance, and Organic have been implemented to help poor farmers in coffee-producing countries increase their prices and incomes. To try and measure the effectiveness of these schemes, researchers have used various methods. Fair Trade is one of the best known certification schemes and it is the only scheme that sets minimum prices in an attempt to raise prices for farmers in developing countries (Valkila et al. 2010). Researchers have concluded that roasters and retailers in consuming countries charge high margins for Fair Trade coffee and these margins provide large returns to marketers in developed countries (Valkila et al. 2010; Bacon et al. 2008; Kilian et al. 2006; Mendoza and Bastiaensen 2003; Zehner 2002). Valkila et al. (2008) concluded that, despite higher prices for Fair Trade coffee, producing countries receive a smaller share of the higher prices (35%) than they do for lower-priced conventional coffee (48%). Such results support the premise that retailers and roasters in developed countries have market power and this power limits returns to poor farmers from Fair Trade certification.

Several studies have extended analyses of coffee beyond Fair Trade to include other certification schemes and many other factors. Some prominent factors included in these studies are production (organic or non-organic), country of origin, roast type, bean type, product claim, supply constraints and droughts (Cranfield et al. 2010; Gabriele and Vanzetti 2008; Loureiro and Lotade 2005). Using a conjoint analysis approach, Cranfield et al. (2010) examined the significance of several factors for coffee purchases across two Canadian cities and found price to be most important. Other factors of significance, and listed in order of importance, include claim (whether the product was labeled as Fair Trade, certified as Fair Trade, or had no claim), region of origin (Colombian, Guatemalan, or blend of many beans), production (organic or nonorganic) roast (medium or dark), and bean (ground or whole). Separate analyses were conducted for Toronto and Vancouver and the results were almost identical to those for the combined sample. Importantly, several factors led to increased consumer utility: certified Fair Trade, labeled Fair Trade, Colombian origin, organic production, and medium roast. In short, the authors concluded that producers and consumers of coffee derive benefits from more than just certification schemes.

Although coffee certification schemes have served to raise prices for producers in developing countries, these schemes are not expected to protect farmers from wide swings in world prices. As such, some authors have proposed supply constraints as a way to raise world prices (Gilbert 1996; Deaton and Laroque 1992; Ponte 2002). This approach gained some momentum after the collapse of the International Coffee Organization (ICO) quota system in 1989. Gabriele and Vanzetti (2008) examined the likely impact of a 10% reduction in production and world exports for the top four producing countries: Brazil, Colombia, Indonesia and Vietnam. The authors concluded that this supply control mechanism would result in a 17% increase in world prices and a 6% increase in long-term coffee returns for these countries.

Other ways to increase coffee prices and producers' revenue have focused on price premiums that result from participating in the Cup of Excellence Auction programs (Wilson and Wilson

2013; Donnett et al. 2008; Teuber and Hermann 2012). Although these authors come to slightly different conclusions about the relative importance of various factors that influence price premiums, there is general consensus that high returns result from sensory quality, quality score, position placed within an auction, altitude of production and quantities supplied (Wilson and Wilson, 2013). Some noted differences among the aforementioned researchers are: (1) Teuber and Hermann (2012) find tree variety to be a significant determinant of price premiums, whereas the other researchers find this factor to be statistically insignificant; (2) Donnett et al. (2008) find the International Coffee Organization composite price to have a positive impact on price premium, whereas Wilson and Wilson (2013) find this effect to be significant and negative; and (3) Wilson and Wilson (2013) allow for diminishing returns to quality by including quality as both a linear and squared variable and find diminishing returns to it; the other researchers, by contrast, include quality only as a linear variable and find increasing returns to it.

This review concludes with a group of studies that have provided estimated elasticities for conventional, Fair Trade, and various brands of coffee. As a general rule, researchers have concluded that coffee, as a commodity, has low own-price elasticity (Larson 2003). Yet, price elasticities for brands of coffee have been found to be reasonably high, ranging in magnitude from -1.0 to -14.8 (Krishnamurthi and Raj 1991; Bell et al. 1999). Valkila et al. (2010) have argued that Fair Trade coffee, although not a brand, can be considered an "ethical luxury good" and treated much like a brand. To this end, Arnot et al. (2006) estimated price elasticities for Fair Trade coffee and two types of conventional coffee, Colombian and "all other". Colombian coffee was chosen because it has a high-quality image and the author wanted to examine consumer preferences for it relative to Fair Trade coffee. Using a coffee shop at a Canadian university, the authors were able to discount coffee prices (change relative prices) and measure consumer responses to the discounted and non-discounted coffee. These experiments revealed own-price elasticities respectively of -1.55 and -.42 for Colombian and Fair Trade coffee. For "all other coffee", own-price elasticity comparable in magnitude to that for Colombian coffee was found. Further, cross-price elasticities showed Fair Trade coffee to be a strong substitute for Colombian coffee (1.12), while Colombian coffee was shown to be a weak substitute for Fair Trade coffee (.13). These estimates led the authors to conclude that consumers have strong preferences for Fair Trade coffee and raising its price would lead to higher revenue for marketers and farmers in developing countries.

At a more refined level, Krishnamurthi and Raj (1991) estimated promotional elasticities, not own-price elasticities, for three brands of coffee: Folgers, Maxwell House, and Chock full o'Nuts. These brands represented 75% of total coffee sales, as each brand consisted of many UPCs of different sizes and grinds. The authors segmented consumers into loyal and non-loyal customers and found promotional elasticities that ranged from -2.7 to -3.0 for the loyal customers; from -6.6 to -14.8, for the non-loyal customers. Differences in magnitude for loyal and non-loyal customers were attributed to heavy brand switching by non-loyal customers. In essence, the magnitude of promotional elasticities that are estimated in the absence of customer segmentation will depend on the ratio of loyal to non-loyal customers. Indeed Bell et al. (1999) conducted a non-segmentation customer study for several brands of coffee and found consumers to have responses to promotional pricing that are fairly close in magnitude: brand switching (52.6%) and purchase acceleration (43.4%). In short, price promotions encouraged many non-loyal customers to switch brands, but they also encouraged loyal customers to purchase more of

their favorite brands. Promotional elasticities are relevant for this paper because they can be linked to own-price elasticities (Bolton 1989). For example, brands with large market shares and those with frequent displays in stores have been shown to have smaller own-price elasticities. Other market characteristics such as advertising, brand experience, budget share allocations, perceived differentiation, perishability, purchase frequency, and relative price position can also impact estimated own- and cross-price elasticities but these factors are not available to this researcher.

As a final reference, McManus (2007) estimated own-price elasticities for specialty coffee served at coffee shops on and near the University of Virginia campus. College students were the main customers for these establishments and they were found to have high price-sensitivity toward three types of coffee (drip, regular espresso, and sweet espresso), served in four cup sizes (8, 12, 16 and 20 ounces). Estimated elasticities ranged from -4.34 to -5.68. Although these are estimates for away-from-home specialty coffee, they provide a benchmark for comparing elasticities for brands of coffee purchased in supermarkets for at-home consumption.

Model Development, Estimation Procedures and Study Objectives

A double-log, seemingly unrelated regression model has been used in demand studies to estimate 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 extremely difficult. For example, it would be difficult to test the main hypothesis of this study that inner-city shoppers are more price-sensitive than suburban shoppers. 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. The time element for this study involves 52 weekly observations, while space pertains to four stores in different geographic areas. Several model specifications are possible, but the error components model has been shown to be the most robust (Fuller and Battese 1974). Twelve product categories are estimated in this study (Table 2, See Appendix). The general form of the model is:

$$(1)\ Y_{qr} = \sum_{s=1}^{v} X_{qrs}\beta_s + \mu_{qr} \qquad q = 1,2 \ldots, N; \qquad r = 1,2, \ldots T,$$

where N is the number of cross-sections, and T is the length of a time-series for each cross-section. For this study, q goes from 1 to 4; r, from 1 to 52.

Four cross-sections and 52 weekly observations per cross-section are included in the specified model for this study. Twelve equations are specified and estimated for each coffee category, using the time-series cross-section regression (TSCSREG) procedure in SAS. The equations and included variables are specified as follows:

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

where Q_{ikt} is total ounces of category i for store k in week t; i = 1, …, 12; k = 1, …, 4; t = 1, …, 52; p_{ikt} is a weighted-average price of category i for store k in week t (note from equation 3 that weights are a function of product prices and unit sales and change weekly); p_{jkt}^{s} represents weighted-average prices for competing categories for store k in week t; p_{mkt} is identical to p_{ikt} 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 coffee for store k in week t (intended as a proxy for consumer income); and TPR_{ikt} is the number of products at the UPC level in category i, within store k that are temporarily reduced in price (TPR) by 10% or more during week t. Categories with the most TPRs are: Folgers I; Starbucks I; and Private Label I.

It is important to emphasize the relationship between promotions and consumer response. Frequent promotions that increase price variability are likely to lead to lower consumer response (Bell et al. 1999). Such promotions have implications for estimated own-price elasticities because failure to capture these effects can influence own-price elasticities.

Prices are determined by expressing each coffee product as a ratio of all coffee products within a given category. Specifically, weighted prices for category i in each time period is:

$$(3)\ P_i = \sum_j W_{ij} P_{ij}, \quad where\ W_{ij} = (P_{ij} Q_{ij}) / (\sum_j P_{ij} Q_{ij})$$

and *j* denotes coffee products at the UPC level in the same category. Because each category of coffee is a potential substitute for, or complement to, other categories of coffee, all categories are included in each equation.

Own-price, cross-price and expenditure elasticities are the estimates of primary interest for this study. These factors are emphasized because they can reveal many insights into consumer behavior. Own-price-elasticities measure consumers' price sensitivity toward changes in a product's price, which are critical to retailers' pricing and marketing strategies. For coffee, inner-city shoppers are hypothesized to show higher levels of price-sensitivity for all brands of coffee. 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, as compared to other factors, such as brand and product attributes. Lower-income shoppers are likely to have less discretionary income than higher-income shoppers and this factor suggests a higher level of marginal utility of income for them. Because of this higher marginal utility of income and higher opportunity cost of time, these shoppers engage in more search and gain greater awareness of unit prices. Greater awareness of unity prices coupled with a tight budget constraint leads to increased price-sensitivity (Russo 1977; Berry et al. 1995).

Cross-price elasticity measures the change in quantity of one good with respect to a price change for another good. For this study, cross-price elasticities are estimated for price increases and they 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 directly, but what can be captured are differences in the magnitude of cross-price elasiticites over product space. Specifically, it is

hypothesized that coffee 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 Folgers II and Maxwell House II is hypothesized to be larger than the cross-price elasticity between Folgers II and Starbucks I.

Inner-city shoppers are hypothesized to have expenditure elasticities that are larger than those of suburban shoppers because income (expenditure) elasticities for food and beverages 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. Finally, the four stores have average weekly sales ranging from $429,000 to $919,000 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.

Data Description

This study consists of supermarket scanner data for four stores from a national supermarket chain. This chain has stores throughout the U.S. and more than 40 stores in the Columbus, Ohio, area. Weekly data are used in this study, covering all 52 weeks of the 2011 calendar year. These data are comprehensive, including UPCs at the product level, product description, unit price, flavor, size, unit sales, and unit quantities. The four stores are within a common price zone and the supermarket chain uses identical pricing across the zone. Brands and varieties of coffee offered, as well as brands and varieties selected by consumers, differ in the four stores and this allows consumers to pay different weighted prices for a given product category (Table 3)[3]. More than 265 brands and varieties of coffee are carried by the supermarket chain providing this data and, as previously discussed, the coffee products are segmented into 12 categories for empirical estimation. Folgers, Maxwell House and Starbucks respectively are the three leading brands of coffee in the U. S. and each brand is segmented into two categories for empirical estimation. Private label brands are numerous and diverse and these brands are segmented into three categories. Three other categories are also included: Nescafe Instant Brands, K-Cups Brands, and Other National Brands.

Folgers, the leading brand of coffee, is segmented into two categories: Folgers I and Folgers II. Included in the first category are all brands and flavors except decaf and instant coffee. More specifically, Folgers I include all brands of Regular, Premium, Colombian and Gourmet coffee. Folgers II includes all brands and flavors of Decaf and Instant coffee. Each of these varieties had sufficient weekly sales to allow for segmentation into separate categories but this approach is forgone in the interest of minimizing the size of the own-price, cross-price elasticity matrix. As a proportion of total coffee sales, Folgers I amounts to 19.39%; Folgers II, 5.38% (Table 4).

[3] This table provides average prices but deviations in these prices across stores show similar variability in weekly prices paid within each store.

Table 3. Weighted Prices Paid by Category and Store

Category	Store 1	Store 2	AVG1	Store 3	Store 4	AVG2	AVG1-AVG2
Folgers I	0.409	0.391	**0.400**	0.384	0.389	**0.386**	0.014
Folgers II	0.618	0.624	**0.621**	0.638	0.722	**0.680**	-0.059
Maxwell House I	0.419	0.329	**0.374**	0.330	0.321	**0.325**	0.049
Maxwell House II	0.659	0.801	**0.730**	0.866	0.785	**0.825**	-0.095
Starbucks I	1.144	0.873	**1.009**	1.615	1.366	**1.491**	-0.482
Starbucks II	0.375	0.388	**0.381**	0.257	0.332	**0.295**	0.087
Private Label I	0.391	0.402	**0.397**	0.377	0.374	**0.375**	0.021
Private Label II	0.422	0.368	**0.395**	0.419	0.411	**0.415**	-0.020
Private Label III	0.300	0.319	**0.310**	0.272	0.301	**0.286**	0.024
Other National Brands	0.525	0.532	**0.529**	0.648	0.529	**0.588**	-0.060
Nescafe Instant Brands	1.303	1.625	**1.464**	1.502	1.778	**1.640**	-0.176
K-Cups Brands	1.224	1.152	**1.188**	1.487	1.150	**1.318**	-0.130

Table 4. Market Shares by Category and Store

Category	Store 1	Store 2	AVG1	Store 3	Store 4	AVG2	AVG1&AVG2	AVG1-AVG2
Folgers I	19.58	20.11	**19.84**	16.82	16.82	**18.94**	19.39	0.91
Folgers II	5.78	4.94	**5.36**	2.90	2.90	**5.40**	5.38	-0.03
Maxwell House I	10.51	9.54	**10.02**	8.31	8.31	**10.72**	10.37	-0.70
Maxwell House II	2.18	3.15	**2.67**	1.80	1.80	**2.87**	2.77	-0.20
Starbucks I	12.71	12.97	**12.84**	12.50	12.50	**10.89**	11.86	1.95
Starbucks II	10.46	11.03	**10.75**	13.94	13.94	**9.59**	10.17	1.16
Private Label I	12.42	11.98	**12.20**	13.25	13.25	**13.71**	12.96	-1.51
Private Label II	4.09	5.32	**4.70**	6.52	6.52	**8.65**	6.68	-3.95
Private Label III	1.15	1.24	**1.20**	0.93	0.93	**0.87**	1.04	0.32
Other National Brands	12.92	13.72	**13.32**	14.43	14.43	**11.34**	12.33	1.98
Nescafe Instant Brands	1.67	1.78	**1.73**	5.64	5.64	**4.65**	3.19	-2.92
K-Cups Brands	6.53	4.22	**5.37**	2.96	2.96	**2.36**	3.87	3.01

Maxwell House coffee is the second largest brand and two categories of this coffee are defined the same way as specified for Folgers: Maxwell House I and Maxwell House II. Maxwell House I consists of all brands of Regular, Premium, Colombian and Gourmet coffee. This category

captures 10.72% of coffee sales. Maxwell House II consists of all remaining Maxwell House brands and this category represents 2.77% of coffee sales. For both categories of Folgers and Maxwell House, it should be noted that shoppers in inner-city Store 3 allocate a smaller share of their budget to purchases in these four categories than shoppers in the other three stores. Data in Table 1 suggest that these selection differences are likely due more to differences in educational attainment among shoppers than to differences in income. That is, an unusually large proportion (59.95%) of inner-city residents has college degrees.

Starbucks brands are also segmented into two categories: Starbucks I and Starbucks II. Starbucks I consists of all regular, blends and Colombian coffee, whereas Starbucks II consists of all specialty coffees: Frappuccino, Espresso and Double-Shot. Many of these specialty coffees are ready-to-drink products but they are all displayed with traditional coffee (non-refrigerated products). Across the four stores, Starbucks I constitutes 11.86% of all coffee sales; Starbucks II, 10.17% of sales. As compared to shoppers of other stores, shoppers of Store 3 are shown to purchase smaller shares of all four categories of Folgers and Maxwell House brands. Yet, as compared to shoppers of other stores, shoppers of Store 3 purchase the largest share of the best-known specialty coffee, Starbucks II. This budget allocation is undoubtedly influenced by the store's location around the Ohio State University campus and the educational attainment of these students, particularly those who patronize this store.

Private Label coffee is segmented into three categories: Private Label I, Private Label II, and Private Label III. The first category consists of Regular, Premium Blends, Colombian, and Gourmet coffee and it constitutes 12.96% of coffee sales (Table 4). Private Label II consists of Decaf and Instant varieties and this category represents 6.68% of total coffee sales. Finally, Private Label III consists of specialty coffee, Cappuccino and Espresso. This category is reasonably small, representing 1.04% of total coffee sales. It should be noted that this supermarket chain offers a wide variety of super-premium brands, just as offered by manufacturers of national brands. These brands are undoubtedly offered to compete for customers who are attracted to premium national brands.

An especially large category, Other National Brands, capture many well-known brands. Included among these are: 8 O'Clock, Caribou, Gevalia, Millstone, Peet, Seattle Best, and Yuban. These brands, representing category 10, are easily recognizable at the national level and many of them have sufficient sales to represent standalone categories. Yet, following the law of parsimony, these national brands are aggregated into one category and the market share for this category is 12.33%.

Nescafe Instant Brands represent a combination of Premium Clasico and Super Premium Taster's Choice. Both are instant coffee and therefore aggregation into one category (category 11) seems natural. This category is fairly large for inner-city shoppers but more meager for suburban shoppers. Overall, the category represents 3.19% of coffee sales. Finally, K-Cups, a surging variety of coffee, consist of all national brands of K-cups (retailer does not offer a Private Label K-cups brand). Although this retailer has yet to offer private label K-cups, it should be emphasized that many retailers have realized tremendous growth for their K-cups coffee since the 2012 expiration of the patent held by Green Mountain Coffee Roasters for the Keurig machine (Freeman 2013). As shown in Table 4, this category represents 3.87% of total coffee sales.

Socioeconomic Characteristics for Each Geographic Area

The primary objective of this section is to emphasize data (already shown in Table 1) that support the major premise of this study: Stores 1 and 2 are patronized largely by higher-income shoppers who are relatively price-insensitive; by contrast, Stores 3 and 4 are patronized mainly by lower-income shoppers who are relatively price-sensitive. This emphasis is provided because this researcher does not have access to panel data with socioeconomic characteristics for individual shoppers. To highlight differences among stores, descriptive statistics from the 2010 census are provided for residents surrounding each store. These statistics and/or socioeconomic factors include median household income, median family income, population over 65, poverty rate and educational attainment. These factors together with store location data offer support for segmenting shoppers into suburban (higher-income) and inner-city (lower-income) groups. These data are limited to a 3-mile radius around each store because research supports the notion that this area characterizes the food shopping behavior of most consumers (Drewnowski et al. 2012).

Although census tract data are used to isolate stores according to socioeconomic characteristics, it is recognized that no clear boundaries exist to separate inner-city shoppers from suburban shoppers. Further, even if such boundaries existed, there are no laws to keep residents from crossing them. If higher-income shoppers make purchases at lower-income stores, these purchases are expected to lead to smaller (less price-sensitive) own-price elasticities. Likewise, purchases in higher-income stores by lower-income shoppers are expected to lead to larger (more price-sensitive) own-price elasticities. A maintained hypothesis of this study is that such deviations from normal shopping patterns will be so small as to have no measureable effect on estimated price-elasticities.

As shown in Table 1, two of the selected stores are within the inner-city of Columbus and they serve the shopping needs of inner-city residents. Two others stores are outside the city limits and they serve the shopping needs of suburban residents. Socioeconomic data for these stores show residents within a 3-mile radius of the suburban stores to have median household income that is more than twice that of residents within this same radius of inner-city stores ($86,309 vs. $35,918). Further, comparable poverty rates are more than 5-times higher for inner-city residents than for suburban residents (27.6% vs. 4.6%). Significant differences also exist among other factors, such as educational attainment and age disparities. Simply stated, most shoppers of inner-city stores have socioeconomic characteristics that differ significantly from those of suburban shoppers and these characteristics are hypothesized to influence the magnitude of price-sensitivities for the two groups.

Data in Table 5, provided by the retail chain, are meant to strengthen the argument that differences exist for the two groups of stores. First, suburban stores are generally larger than inner-city stores. This is reflected in several factors but most clearly in weekly store sales and sales per customer. Average weekly sales for the two suburban stores total $812,532, but sales average just $531,679 for the two inner-city stores. Further, as support for the hypothesis that major income differences exist for the store groups, average purchases per customer amount to $44.17 for suburban shoppers, as compared to $29.35 for inner-city shoppers. As another indicator, weekly coffee sales averaged $4,111 for suburban stores, but just $3,094 for inner-city

stores. A z-test of mean differences for coffee sales is shown to be statistically different at the .001 level of significance (z = 4.22). Although weekly coffee sales for inner-city Store 4 are greater than those for suburban Store 2, coffee sales per customer are lower in Store 4. This observation is consistent with findings by Aguiar and Hurst (2007) that lower-income shoppers have lower opportunity cost of time. The larger customer count coupled with low purchases per visit suggests that shopper of this store make frequent trips to the supermarket. Indeed residents surrounding Store 4 have the lowest median family income ($42,381) but the largest customer count per week. In short, coffee sales per customer for Stores 3 and 4 support the view that shoppers of these two inner-city stores have lower-incomes than shoppers of Stores 1 and 2.

Table 5. Coffee Sales and Customer Observations by Store (Average weekly observations)

Store	Customer Count (CC)[a]	Store Sales (SS)[b]	SS/CC)[c]	Coffee Sales (CS)[d]	CS/CC)[e]	Total Coffee Sales[f]
1	20574	$919,596	$44.70	$4,981	$0.24	$258,993
2	16164	$705,468	$43.64	$3,241	$0.20	$168,556
3	13804	$429,391	$31.11	$2,011	$0.15	$104,553
4	22976	$633,968	$27.59	$4,177	$0.18	$217,221

Notes:
[a]Customer count is the number of customers making a purchase, not the number entering a store.
[b]The variable Store Sales is a proxy for store size and shoppers' income.
[c]Sales per customer (SS/CC) represents the weekly average purchase per customer.
[d]Coffee Sales (CS) is the average weekly sales of coffee per store.
[e]Coffee Sales per customer (CS/CC) is the average sales per customer, assuming all shoppers purchase coffee.
[f]Total Coffee Sales are store sales for the 52 weeks of this data period.

Empirical Results

Overview

Eleven of twelve own-price elasticities are negative and statistically significant and six of these eleven are greater than 1 in magnitude, suggesting a high level of consumer price-sensitivity (Table 6-A, see Appendix). The own-price elasticity for all shoppers is not statistically significant for K-cups coffee but it is statistically significant for inner-city shoppers. Temporary price reductions are effective in stimulating sales for eight of 12 categories and expenditure elasticities are positive and statistically significant for all categories, except Private Label III. Much of the variation in coffee weekly purchases is explained by the independent variables: price, promotion, coffee expenditures, and store differences. The percentage of explained variation (R^2) ranges from 56% to 91%. An unexpected result is that inner-city shoppers are shown to have the same level of price-sensitivity as suburban shoppers for nine of twelve product categories. The three exceptions are Private Label III, Other National Brands, and K-cups. All consumers are shown to have a high level of price-sensitivity for Other National Brands but inner-city shoppers are shown to have a lower level of price-sensitive than suburban shoppers. As the market share data in Table 4 shows, this relationship is undoubtedly due to a strong preference for these brands by inner-city shoppers of Store 3.

Own-Price Elasticities

As hypothesized, price is a major determinant of coffee purchases, as all but two elasticities are negative and statistically significant at the .001 level. Relative to the three leading brands of coffee—Folgers, Maxwell House and Starbucks—it is clear that consumers have the highest level of price-sensitivity for Maxwell House brands and the lowest level for Starbucks. Consumers are highly price-sensitive toward the purchase of both categories of Maxwell House coffee, but price-insensitive toward the purchase of both categories of Starbucks' coffee (Table 6-A). Folgers' brands fall in the middle of these price elasticities, with one category being mildly elastic (-1.14); the other, mildly inelastic (-.89). Unexpected for these six categories of coffee is the common elasticities for inner-city and suburban shoppers. These findings do not support the hypotheses of this study and these results are likely do to a combination of brand aggregation and data omissions.

Coffee is a storable product and many consumers do not make frequent purchases of their favorite brands. Hence, to deal with missing observations over several weeks, some aggregation was necessary. This aggregation process has undoubtedly averaged some of the substitution that occurs among brands and this process is likely to explain much of the similarity in own-price elasticities for all shoppers. Further, market characteristics that are missing from these data could be important determinants of price responses, particularly since researchers have demonstrated their explanatory power for promotional responses (Bell et al. 1999). These market characteristics include factors such as: brand experience, budget share, purchase frequency, perceived differentiation and relative price position. Related to the storability of coffee is the fact that consumers can time their purchases to take advantage of price promotions and these promotions can limit the effectiveness of everyday pricing to capture purchasing behavior. Finally, market share purchases for inner-city shoppers of Store 3 are so different from those of inner-city shoppers for Store 4 that these offsetting patterns may have constrained the capacity of the econometric model to capture price-sensitivity differences.

Private label coffee was aggregated into three categories: Private Label I, Private Label II, and Private Label III. Consumers show considerable price-sensitivity toward the purchase of Private Label I but far less price-sensitivity toward the purchase of Private Label II. For both categories, inner-city shoppers are shown to have the same level of price-sensitivity as suburban shoppers. These results could emanate from differences in market share purchases for Stores 3 and 4 (Table 4). That is, shoppers of Store 3 exemplify purchasing patterns for many product categories that are more consistent with suburban shoppers of Stores 1 and 2 than they are with shoppers of Store 4. However, it should be noted that Private Label II consists of instant coffee and this product has a low-quality image. That is, roasters make it from low-quality beans to keep the price attractive for lower-income consumers. Indeed inner-city shoppers are shown to have strong preferences for Private Label II products, showing market share differences between inner-city and suburban shoppers that is the largest among the twelve categories. For Private Label III, inner-city shoppers are shown to be more price-sensitive (-1.47) than suburban shoppers (-.87). This product category accounts for a small percent of total coffee sales but inner-city shoppers are quite sensitive to price changes for these products.

A category consisting of many well-known national brands, labeled Other National Brands, is shown to have own-price elasticities that are statistically different for the two consumer groups. An unexpected result, however, is that inner-city shoppers are shown to have a lower level of price-sensitivity for this product category. With more than twelve national brands included in this category, this estimated elasticity is possibly reflecting the fact that inner-city shoppers within the boundaries of Store 3 have a strong preference for many of these brands. Indeed inner-city shoppers surrounding Store 3 make larger purchases within this product category than those made by suburban shoppers surrounding Stores 1 and 2 (Table 4). Such preferences could reflect the fact that Store 3 includes the Ohio State University campus within its boundaries and all of its 55,000 students. These students, although part of a lower-income area, are likely to have product preferences that differ from those of more traditional populations. Further, these strong preferences of shoppers in Store 3 for this product category are possibly overwhelming preferences of shoppers in Store 4 for this same product category. If so, this could explain the lower price-sensitivity of lower-income shoppers. In short, a number of factors can explain inner-city shoppers' lower own-price elasticity of -1.32 for this product category versus the higher own-price elasticity of -2.78 for suburban shoppers.

Two brands of Nescafe are combined into one within the Nescafe Instant Brands category and both inner-city and suburban shoppers are shown to have an identical level of price sensitivity, an own-price elasticity of -1.29. Instant coffee is often viewed as a commodity that has special appeal to those attempting to save money. From this perspective, one would expect inner-city shoppers to purchase much larger market shares and also express a higher level of price-sensitivity. Larger market shares are realized (Table 4) but expected differences in price-sensitivity are not realized and this is possibly due to the fact that instant coffee has moved beyond its commodity image. Indeed Nescafe offers premium (Clasico) and super premium (Taster's Choice) brands of instant coffee and this latter brand is largely reflected in the market shares shown for suburban Stores 1 and 2.

The final category of coffee, K-Cups, is interesting in that it is the only category for which price is not a statistically significant determinant of purchases for all shoppers. It is one of the most expensive varieties of coffee; yet, it has shown the fastest growth over the past few years (Mintel 2012). Inner-city shoppers are shown to have a negative and statistically significant own-price elasticity (-1.24) for this product, confirming their high price-sensitive toward the purchase of K-cups coffee. Clearly the market share data of Table 4 shows that inner-city shoppers make much smaller purchases in this category than those made by suburban shoppers. Yet, it should be noted that inner-city shoppers within the Ohio State University area (Store 3) purchase larger shares than other inner-city shoppers (Store 4).

Cross-Price Elasticities

A price change for one good often generates a quantity change for another good and economists capture this effect with a cross-price elasticity. Twelve product categories are estimated in this study and this estimation results in 132 cross-price elasticities. All cross-price elasticities are hypothesized to show positive relationships because each brand meets a similar need and can therefore serve as a substitute for any other brand. Statistically insignificant cross-price elasticities relationships are found for most product categories but a total of 26 statistically

significant elasticities are revealed. Eighteen (69%) of these show substitute relationships and the other eight show complementary relationships (Table 6-B, see Appendix).

Folgers I is shown to be a substitute for both Maxwell House I and II coffees. Since Folgers and Maxwell House are the two leading brands of coffee, it seems reasonable that consumers would substitute Folgers, the leading brand, for brands of Maxwell House. Another category of Folgers, Folgers II, is a substitute for Maxwell House II and a complement to Folgers I. This latter effect suggests that a price increase for one category of Folgers' coffee leads to quantity reductions across both Folgers' categories (all Folgers' brands). That is, consumers associate a price increase for one brand as a price increase across the entire brand category and make purchases from other brands. In essence, they seek other brands of Maxwell House, as opposed to seeking similar products within Folgers' brands. With respect to estimated cross-price elasticities for this study, it seems appropriate to acknowledge that both the aggregation of brands into categories and the stockpiling effect that results from price promotions could be factors influencing these estimates.

Maxwell House I is shown to be a substitute for Folgers I and it is also a substitute for Other National Brands. This latter category consists of many national brands and this substitute relationship suggests that Maxwell House I coffee has product attributes that are similar to those found in Other National Brands. Maxwell House II, as estimated for Folgers I and Folgers II, is shown to be a complement to Maxwell House I. Again, aggregation of brands within categories and stockpiling incentives from price promotions could be factors in these estimated elasticities. Indeed weighted prices for these brands (Table 3) would suggest that Maxwell House I is a strong substitute for Maxwell House II. Yet, it is possible that a price increase for products within a product category is perceived as a price increase across all products within that category.

Products offered in the Starbucks I category are somewhat similar to those offered in Folgers I and Maxwell House I categories. Yet, Starbucks I is not a substitute for any Folgers or Maxwell House brands, but it is a substitute for Other National Brands. By contrast, Starbucks II is a substitute for Folgers I. These substitution patterns, especially for Starbucks I, suggest that consumers have unique perceptions of Starbucks' products. Specifically, price increases for the two leading brands, Folgers and Maxwell House, do not precipitate purchases of similar brands of Starbucks, Starbucks I. Yet, price increases for brands within Other National Brands make products within Starbucks I an attractive alternative. Further, price increases for Folgers I lead consumers to purchase specialty Starbucks products, Starbucks II. In essence, consumers are willing to switch from the leading brand, Folgers, to specialty products within the third-leading brand, Starbucks, but not from the leading brands (Folgers) to other similar products within the third-leading brand (Starbucks).

Private Label I coffee is a category with strong consumer preferences and it serves as a substitute for three other categories: Maxwell House I, Maxwell House II, and Folgers I. These three substitute relationships speak to the market strength of private label coffee in this Columbus, Ohio, market. Unexpectedly, this product category is also shown to be a complement to K-cups coffee. Because price is not a statistically significant determinant of K-cups coffee purchases, this effect could suggest that consumers decrease their purchases in other product categories as

they increase their purchases of K-cups coffee. Indeed cross-price relationships for this study suggest that they decrease their purchases of all private label coffee and Other National Brands.

Private Label II coffee is shown to be a substitute for Maxwell House II, Private Label III and Nescafe Instant Brands. These relationships are theoretically logical and it is of interest to note that neither Nescafe Instant Brands nor Maxwell House II is a substitute for Private Label II. In essence, private label is a substitute for national brands but national brands are not substitutes for private labels. This suggests that relative prices between private label decaf/instant and national brands of decaf/instant are such that price increases for Private Label II are below the threshold level that would precipitate a brand switch. Finally, as previously mentioned, this product category is a complement to K-cups coffee. Again, this relationship is possibly related to the statistical insignificance of the price-elasticity for K-cups.

Private Label III is shown to be a complement to K-cups coffee and a substitute for Folgers I. The complementary relationship is possibly related to the statistical insignificance of the own-price elasticity for K-cups and the substitute relationship suggests that price increases for the product category with the largest market share can lead consumers to experiment with products in other categories. Given the similarities in product attributes, it seems more reasonable to expect this product category to serve as a substitute for Starbucks II. Perhaps this relationship is not realized for two reasons: (1) major differences in market shares for the two categories; and (2) comparable prices across the two categories. In essence, those who purchase Starbuck coffee have strong preferences for these products and do not experiment with other brands; by contrast, those who purchase Folgers' products are willing to experiment with private label brands.

Other National Brands consist of many national brands and this broad aggregation complicates the interpretation of cross-price elasticities. The estimates show one substitute and two complementary relationships. Comparable to estimates for Private Label III, Other National Brands are also shown to be a substitute for Folgers I. With this category of Folgers being number one in coffee sales, it is logical for consumers to switch to some of the many brands within Other National Brands in response to price increases for Folgers I. By contrast, price increases for Private Label II and K-Cups coffee lead to decreased purchases of Other National Brands. These complementary relationships suggest that purchases in these three categories have moved together and these relationships suggest that some important market characteristics may be missing from these data.

Nescafe Instant Brands is a substitute for Maxwell House II, as theory would predict. Yet, it is not a substitute for Private Label II, but it is a substitute for Private Label I. These relationships are possibly influenced by the aggregation of decaf and instant coffee into a single category. Further, the aggregation of Nescafe regular and instant brands into a single category could have influenced these relationships. For example, many consumers who purchase Nescafe Taster's Choice may consider private label instant coffee to be an inferior product. Yet, those who purchase Nescafe Clasico brand might have a different view of private label instant coffee. In essence, consumers who trade down may set boundaries or limits on their willingness to "trade". Finally, K-Cups coffee is shown to be such a unique product that it has no substitutes or complements.

Temporary Price Reductions (TPRs) and Expenditure Elasticities

In cooperation with manufacturers, retailers often use temporary price reductions to try and stimulate sales. Most TPRs, as coded in this study, ranged between 10 and 21%, although a few were as high as 35%. These TPRs are instrumental in stimulating sales for eight of twelve product categories. For each TPR, changes in sales ranged from .01 ounces to .11 ounces, with an average of .07. As a general rule, slow-moving products received a smaller boost from TPRs than faster-moving products. From a shopping perspective, it seems that consumers are either unaware of great deals on less popular brands, or they have a set of fixed preferences that cause them to ignore some brands. It is of interest to note that three of the four categories for which TPRs are not effective involved some combination of instant coffee, Maxwell House II, Private Label II, and Nescafe Instant Brands. If indeed instant coffee is perceived to be a commodity purchase that appeals mainly to lower-income shoppers, then this factor could explain a limited response to price promotions. Further, the limited response to price promotions could be related to the aggregation of decaffeinated coffee into this category, as decaffeinated represents less than 10% of coffee sales for these stores.

Expenditures on coffee are used in this study as a proxy for income and the empirical results show positive and statistically significant responses in coffee quantities for 11 of 12 categories. Private Label III is the only category with a statistically insignificant elasticity and this effect could be related to its low market share of roughly one percent. Indeed expenditure elasticites show the largest percentage change in purchases for Maxwell House I and the smallest change for PL III. For most product categories, the percentage change in purchases is less than 1%, for each 1% change in coffee expenditures. As expected, a fairly large effect (.92%) is realized for K-cups coffee.

Store Effects

Considerable variations exist in total sales among the four stores and these differences were hypothesized to have statistically significant impacts on coffee purchases for the twelve product categories. Store 1 is used as the base store and, relative to this store, negative store differences are found for six product categories, positive store differences for four, both positive and negative differences for one, and no statistically significant effect for one (Table 6-C). Of particular interest are store differences for two categories of coffee: Starbucks II and K-Cups. Products in the Starbucks II category have strong appeal to those with high incomes; those in K-Cups have strong appeal to those with high levels of education. Shoppers of Stores 1 and 2 meet the conditions specified for Starbucks II products, while shoppers around Store 3 meet the conditions specified for K-Cups coffee. For these product categories, Stores 2 and 3 show no statistical difference in purchases from those of Store 1. Store 4, as expected, shows a negative difference with respect to Store 1 because shoppers surrounding Store 4 have lower education levels and lower incomes. For K-Cups coffee, the own-price elasticity is shown to be statistically insignificant for suburban shoppers of Stores 1 and 2, but statistically significant for inner-city shoppers of Stores 3 and 4. Thus, the negative store effects for Stores 3 and 4 and statistically insignificant effect for Store 2 are consistent with the estimates for own-price elasticities.

Summary and Conclusions

This research is rooted in the premise that inner-city shoppers have higher levels of price-sensitivity for all brands, varieties and categories of coffee. Economics serves as the foundation for this premise and this researcher has confirmed its validity for products such as breakfast cereals, cheese, milk and orange juice. Results from this study provide limited support for this premise, as nine of twelve own-price elasticities showed inner-city (lower-income) shoppers to have price-sensitivity levels statistically insignificant from those of suburban (higher-income) shoppers. Yet, purchased shares of coffee across the twelve categories show inner-city shoppers more inclined to purchase lower-priced, private labels and instant coffee.[4] For example, private label and instant coffee constituted respectively 23.2% and 4.6% of coffee purchases for inner-city shoppers, but 18.1% and 1.7% respectively for suburban shoppers and these differences are statistically significant at the .01 level. By contrast, suburban shoppers are more inclined to purchase higher-priced national brands and specialty coffee. For example, Starbucks and K-Cups coffee comprised 28.9% of purchases for suburban shoppers but just 22.8% of purchases for inner-city shoppers. These trends support the main premise of this paper, although this support is weaker than what would have been revealed with statistically significant differences in price-sensitivities. Three factors have likely influenced the own-price elasticities in this study: (1) store selections; (2) aggregation of brands into categories; and (3) unavailable market characteristics for brands, categories and consumers.

Store selections were guided by geographic locations and income levels surrounding these locations. Results from this study suggest that income and education may interact in ways to alter hypothesized relationships between income and purchasing patterns. This is evident by observations for Store 3; residents surrounding this store are shown to have the highest incidence of poverty but they purchase the largest share of the highest-quality specialty coffee, Starbucks II. A key difference between the two inner-city stores is revealed in the educational attainment of residents surrounding them. A total of 59.9% of residents surrounding Store 3 has college degrees, whereas just 17.6% of residents surrounding Store 4 have similar accomplishments. A normal profile of residents surrounding an inner-city store is one of high poverty and low levels of education. So, it seems reasonable to conclude that the results of this study have been influenced by deviations from this normal profile.

The aggregation of brands into categories is consistent with approaches used by other researchers; yet, it is likely that the twelve categories used in this study are too limiting to capture consumer responses to more than 265 brands, varieties and flavors of coffee. Bell et al. (1999) segmented 18 brands of coffee into a single category and Krishnamurthis and Raj (1991) segmented all brands of Folgers, Maxwell House and Chock full o'Nuts into three categories, representing 75% of total coffee sales. Despite these precedents from earlier studies, today's consumers have more product choices and less aggregation is likely to do a better job of capturing consumer responses to price changes for brands of coffee. Less aggregation seems especially relevant for estimating cross-price elasticities, as just 26 of 132 in this study are statistically significant. Since consumers are known to make substitutions among products that are close in product space, category aggregation has likely averaged meaningful substitution

[4] Instant coffee per ounce is not necessarily lower-priced than ground coffee. Many shoppers perceive it to be lower-priced because consuming it does not require the purchase of a coffee maker and filters.

patterns. Yet, it is of interest to note that more product categories serve as substitutes for the two leading brands, Folgers and Maxwell House, than these same brands serve as substitutes for other brands. In essence, price increases for these leading brands will cause consumers to switch to others brands more readily than price increases for other brands will cause them to switch to these leading brands. With budget share being an important determinant of purchase behavior, these substitution patterns could reflect the fact that these leading brands represent a larger share of consumers' budget.

Although stores were selected by geographic areas to account for major differences in consumers' socioeconomic characteristics, it is recognized that consumer panel data are much richer and are likely to yield better results than store-level data. Further, it is recognized that results from store-level data can be improved with the addition of market characteristics such as manufacturer advertising, coupon redemptions, display activities and retailer advertising. None of these enumerated factors were available to this researcher. Despite these data limitations, it should be noted that many of the results from this study are consistent with those from other studies. For all but K-Cups coffee, price is shown to be a significant determinant of quantity purchased. Further, both elastic and inelastic own-price estimates are shown for the twelve product categories and these estimates are consistent with studies that have found elastic measures for traditional varieties (Krishnamurthi and Raj 1991; Bell et al. 1999) and inelastic measures for specialty coffee, i.e., Fair Trade (Arnot et al. 2006). Additionally, as hypothesized, products close in product space are more likely to substitute for one another than products in more distant space. These results show Folgers I to be a stronger substitute for Maxwell House I than it is for Maxwell House II. Likewise, Private Label I is shown to be a stronger substitute for Folgers I and Maxwell House I than it is for Maxwell House II. In short, many results are consistent with the study hypotheses as well as with findings from other studies. If this study could be replicated with store-level data, it is likely that more significant differences in price-sensitivities would be revealed with less brand aggregation and more careful store selections.

Consistent with economic theory and other coffee research, findings from this study show that all consumers are sensitive to price but inner-city (lower-income) shoppers are more price-sensitive than suburban (higher-income) shoppers for many brands and varieties. While estimated own-price elasticities offer weak support for this conclusion, purchased shares offer strong support. Differences in purchase behavior for the two inner-city stores suggest that the selection of these stores may be a critical factor in explaining the realized results for own- and cross-price elasticities. Yet, the contributions of this paper are significant for coffee manufacturers, consumers and retailers. Temporary price reductions (TPRs) of significant magnitude are shown to be especially effective for brands with large market shares and this suggests opportunities for manufactures to influence the sale of these brands with increased incentives to retailers. Equally important, consumers can easily observe the frequency of TPRs and time their purchases to stock-up on favorite brands and possibly experiment with untried brands. Further, suburban (higher-income) shoppers are price-insensitive toward the purchase of K-cups and this provides opportunities for coffee manufactures and retailers to increase their sales and profit margins. Finally, inner-city (lower-income) consumers are more inclined to purchase private labels and this purchase behavior provides opportunities for retailers to stock and display more of these products in selected stores and ultimately increase coffee returns.

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Appendix

Table 2. Twelve Categories of Coffee and Some Selected Products in Each Category

Category	Selected Products within Each Category	
Folgers I -- Includes all brands of Folgers except Decaffeinated and Instant coffee		
FOLGER 100% COLMBN COFFEE	FOLGER GRMT COLOMBN K CUP	FOLGER BRKFST BLND COFFEE
FOLGER BRAZIL BLND COFFEE	FOLGER GRMT SPRME COFFEE	FOLGER GS CHOC TRFLE COFF
Folgers II -- Includes all Decaffeinated and Instant coffee		
FOLGER DCF CLSC RST COFF	FOLGER GS DECAF CLMBN COFF	FOLGER DECAF COFF SINGLES
FOLGER DCF INST JAR COFF	FOLGER INST PLST JAR COFF	FOLGER GS DECAF CLMBN COF
Maxwell House I -- Includes all brands of Maxwell House except Decaffeinated and Instant		
MXHS BREAKFST BLND COFFEE	MXHS GOURMET RST	MXHS FRENCH ROAST COFFEE
MXHS COLOMBN SPRM COFFEE	MXHS HOUSE BLEND COFF	MXHS ORIGINAL COFFEE
Maxwell House II -- Includes all Decaffeinated and Instant coffee		
MXHS DECAF INSTANT COFFEE	MXHS ORIG DECAF COFF	MXHS LITE COFFEE
MXHS INSTANT COFFEE	MXHS ORIG LITE COFF	MXHS DCF TRL PK COFF 10CT
Starbucks I -- Includes all regular, blends, Colombian and Gourmet coffee		
STARBUCKS VIA HOUSE BLEND	STRBCK C RCA TARRZ GR COF	STRBCK 50% CAF BRKFST COF
STBK GROUND VERANDA	STRBCK CFE VRNA DCF GR CF	STRBCK COLMBN WHL BN COFF
Starbucks II -- Includes all specialty coffee such as Frappuccino, Espresso and Double-Shot		
STRBCK DOUBLESHOT COFFEE	STRBCK FRAPP LT VANILLA	STRBCK DBLSHT ENRGY VANLA
STRBCK ESPRESSO GR COFFEE	STRBCK FRAPP MINT MOCHA	STRBCK FRAPPUCCINO COFFEE
Private Label I -- Includes all regular, blends, Colombian and Gourmet Coffee		
BKFST BLND GRD V COF	KONA BLND WHL BN COF	PREM DRK ROAST COFFEE
SUPREME VP COFFEE	KENYAN AA WHL BN COF	CINN HAZELNUT COFFEE
Private Label II -- Includes all Decaffeinated and Instant coffee		
FRENCH VAN INST COFF	VP DECAF COFFEE	HZLN CR DCF GR VL CF
CLMBN S MINI DCF COF	CLMBN DCF GRD VL COF	SF FF FRN VAN INS CF
Private Label III -- Includes all specialty coffee such as Cappuccino, Espresso and Mocha		
CAFFE FRAPPE COFFEE	MCHA LTTE GRD VL COF	VANILLA CAFFE FRAPPE
ESPRESSO GRND VL COF	ITLN ESPRESSO RST VP	MOCHA CAFFE FRAPPE
Other National Brands -- Includes all national brands except Folgers, Maxwell House and Starbucks coffee		
PEET HSE BLND WHL BN COFF	WHTCST COFFEE	SPTLT VAL GROUND COFFEE
PEET ITALIAN ROAST COFFEE	YUBN FACM COFFEE	SBST ANNIV ROAST COFFEE
Nescafe Instant Brands -- Includes all varieties of Clasico and Taster's Choices coffee		
NSCF CLASICO	NSCF GOLD BLEND DECAF	NSCF ORIGIINAL
NSCF CLASSIC REG	NSCF ORIGINAL DECAFF	NSCF ALTA RICA
K-Cups Brands -- Includes all national brands of K-Cups coffee		
STRBCK HOUSE BLEND KCUP	FOLGER GRMT BLK SILK KCUP	NWMN OWN SPCL BLEND KCUP
STRBCK SUMATRA KCUP	MLST HAZELNUT CREAM K CUP	GRMTN BREAKFAST BLND KCUP

Table 6-A. Selected Empirical Results for Time-Series Cross-Section Regression

Category	Own-Price Elasticity[a]	P Value	Own-Price Elasticity[b]	P Value	Own-Price Elasticity[c]	Expend Elasticity	P Value	TPR	P Value	R^2
Folgers I	-1.14	0.0001	-0.13	0.6412	-1.27	0.97	0.0001	0.045	0.0008	0.82
Folgers II	-0.89	0.0001	-0.07	0.8128	-0.97	0.99	0.0001	0.051	0.0901	0.86
Maxwell House I	-3.09	0.0001	-0.50	0.2546	-3.59	1.14	0.0001	0.097	0.0023	0.83
Maxwell House II	-1.87	0.0001	-0.53	0.8471	-2.40	1.02	0.0001	0.019	0.7128	0.83
Starbucks I	-0.15	0.0875	0.05	0.6939	-0.10	1.09	0.0001	0.046	0.0001	0.66
Starbucks II	-0.48	0.0011	-0.01	0.9408	-0.49	0.45	0.0006	0.027	0.0187	0.60
Private Label I	-1.48	0.0001	-0.23	0.3337	-1.71	0.56	0.0001	0.217	0.0756	0.73
Private Label II	-0.75	0.0001	-0.04	0.8817	-0.79	0.77	0.0001	0.022	0.4441	0.91
Private Label III	-0.87	0.0001	-0.60	0.0124	-1.47	0.17	0.6004	0.213	0.0886	0.56
Other National Brands	-2.79	0.0001	1.47	0.0047	-1.32	0.68	0.0001	0.015	0.2809	0.72
Nescafe Instant Brands	-1.29	0.0012	-0.53	0.3086	-1.82	0.84	0.0001	0.035	0.4336	0.69
K-Cups Brands	0.49	0.1425	-1.24	0.019	-0.75	0.92	0.0005	0.114	0.041	0.66

[a]Indicates price elasticity for all shoppers.

[b]Indicates price elasticity difference for inner-city shoppers.

[c]Sum of elasticities a and b is the price elasticity for inner-city shoppers.

Table 6-B. Own- and Cross-Price Elasticities for Time-Series Cross-Sectional Regression

							Price					
	Fol I	**Fol II**	**MH I**	**MH II**	**SB I**	**SB II**	**PL I**	**PL II**	**PL III**	**ONB**	**NIB**	**K-Cups**
Fol I	-1.14	-	0.32	0.21	-	-	-	-	-	-	-	-
Fol II	-0.44	-0.89	-	0.24	-	-	-	-	-		-	-
MH I	0.81	-	-3.09	-	-	-	-	-	-	0.84	-	-
MH II	-	-	-1.06	-1.87	-0.15	-	-	-	-		-	-
SB I	-	-	-	-	-0.15	-	-	-	-	0.71	-	-
SB II	0.73	-	-	-	-	-0.48	-	-	-	-	-	-
PL I	0.33	-	0.31	0.27	-	-	-1.48	-	-	-	-	-0.93
PL II	-	-	-	0.16	-	-	-	-0.75	0.09	-	0.35	-0.26
PL III	0.83	-	-	-	-	-	-	-	-0.87	-	-	-0.61
ONB	0.37	-	-	-	-	0.18	-	-0.18	-	-2.79	-	-
NIB	-	-	-	0.39	-	-	0.46	-	-	-	-1.29	-
K-Cups	-0.60	-	-	-	-	-	-	-	-	-	-	**0.49**

Quantity

Variable Definitions:

[a]Fol I is Folgers I; Fol II is Folgers II; MH I is Maxwell House I; MH II is Maxwell House II;

[b]SB I is Starbucks I; SB II is Starbucks II; PL I is Private Label I; PL II is Private Label II;

[c]PL III is Private Label III; ONB is Other National Brands; NIB is Nescafe Instant Brands;

[d]K-Cups is K-Cups Brands; (-) and boldfaced represent statistically insignificant own- and cross-price elasticities.

Table 6-C. Selected Empirical Results for Time-Series Cross-Sectional Regression

	Folgers I		**Folgers II**		**Maxwell House I**	
Store Variables	Coeff.	P-Value	Coeff.	P-Value	Coeff.	P-Value
Store 2	-0.1539	0.0540	-0.3110	0.0070	-0.1000	0.7422
Store 3	-0.3801	0.1707	-0.9700	0.0001	0.3543	0.5594
Store 4	-0.1358	0.5989	0.0855	0.5989	0.7757	0.1545
Constant	-0.9383	0.3102	-2.5860	0.0554	-4.2230	0.0205
	Maxwell House II		**Starbucks I**		**Starbucks II**	
Store Variables	Coeff.	P-Value	Coeff.	P-Value	Coeff.	P-Value
Store 2	0.9572	0.0001	1.2620	0.0001	-0.1130	0.3276
Store 3	-0.4634	0.1615	1.3600	0.0001	-0.0046	0.9885
Store 4	0.4969	0.0177	1.1150	0.0001	-0.6706	0.0128
Constant	-5.5520	0.0105	-3.5520	0.0242	3.6180	0.0016
	Private Label I		**Private Label II**		**Private Label III**	
Store Variables	Coeff.	P-Value	Coeff.	P-Value	Coeff.	P-Value
Store 2	-0.1569	0.0961	0.0047	0.9652	-0.2176	0.3231
Store 3	-0.0568	0.8469	0.2254	0.4204	-1.7910	0.0002
Store 4	0.3503	0.1558	0.8352	0.0007	-1.1280	0.0018
Constant	2.1970	0.0442	-0.8375	0.4640	4.3240	0.1096
	Other National Brands		**Nescafe Instant Brands**		**K-Cups Brands**	
Store Variables	Coeff.	P-Value	Coeff.	P-Value	Coeff.	P-Value
Store 2	-0.2856	0.0070	-0.0553	0.7280	-1.5730	0.3602
Store 3	0.7089	0.0361	1.4360	0.0001	-1.0870	0.0015
Store 4	0.1893	0.5956	1.2270	0.0001	-1.8040	0.0001
Constant	0.2911	0.7836	-2.8230	0.0928	-1.5140	0.4714