IMPACT OF PROMOTIONAL TACTICS ON CONSUMERS' DEMAND FOR FRUIT JUICES

By

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To my mother and father.

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The high level of beverage assortment in supermarkets has dramatically changed beverage consumption patterns and trends throughout the United States. With more firms contending for consumers' dollars, companies utilize price and non-price promotional strategies to increase market share of their brands. The primary objective of this study is to understand the interrelationship between brands of orange juice and brands of other juice beverages. To accomplish this goal it is imperative to understand how consumers allocate total beverage expenditures by empirically testing block-wise separability among orange juice, fruit juices, and fruit drinks. Secondly, this study analyzes the impact of retail promotions on the demand for beverages in the previously mentioned categories using AC Nielsen scanner data for major retail outlets earning more than $2 million in sales.

Results from the absolute price version of the Rotterdam indicate that consumers do not perceive orange juice, fruit juices, and fruit drinks as separable categories. Findings also suggest that displays combined with feature advertisement had the largest impact on demand. Display only and feature only were also significant and had a positive impact on marginal utility. The majority of the beverage brands included in this study were deal inelastic.

CHAPTER 1
INTRODUCTION

This chapter introduces the research problem for the United States beverage market. The background, the researchable problem, and study objectives are provided followed by the organization of the dissertation.

Background

The nonalcoholic beverage market is highly competitive, as evidence by numerous new products introduced on an annual basis. In 2004 the nonalcoholic beverage market was estimated to be worth $79 billion; however, this market has experienced minimal real growth in recent years. This stagnation is partly attributed to the segments of the markets such as carbonated soft drinks, fruit juices, and milk, which are mature markets (Nonalcoholic Beverages 2004). Within the beverage industry, orange juice is the most popular juice, but orange crop shortages in recent years have led to increased juice prices making substitutable products more attractive. With more brands competing for consumers' dollars, retailers and brand manufacturers implement various promotional strategies with the intention of increasing sales and altering consumption patterns.

As consumer encounter more variety in their beverage choices, retailers and juice manufacturers experience intense pressure from competitors. For example, ready to drink (RTD) fruit drinks, sports drinks, energy drinks, and teas are categories within the nonalcoholic beverage industry battling for a percentage of consumers' beverage expenditures (Figure 1-1). Thus, is important for brand managers, retailers, and other industry officials to understand demand interrelationships among the various beverages.

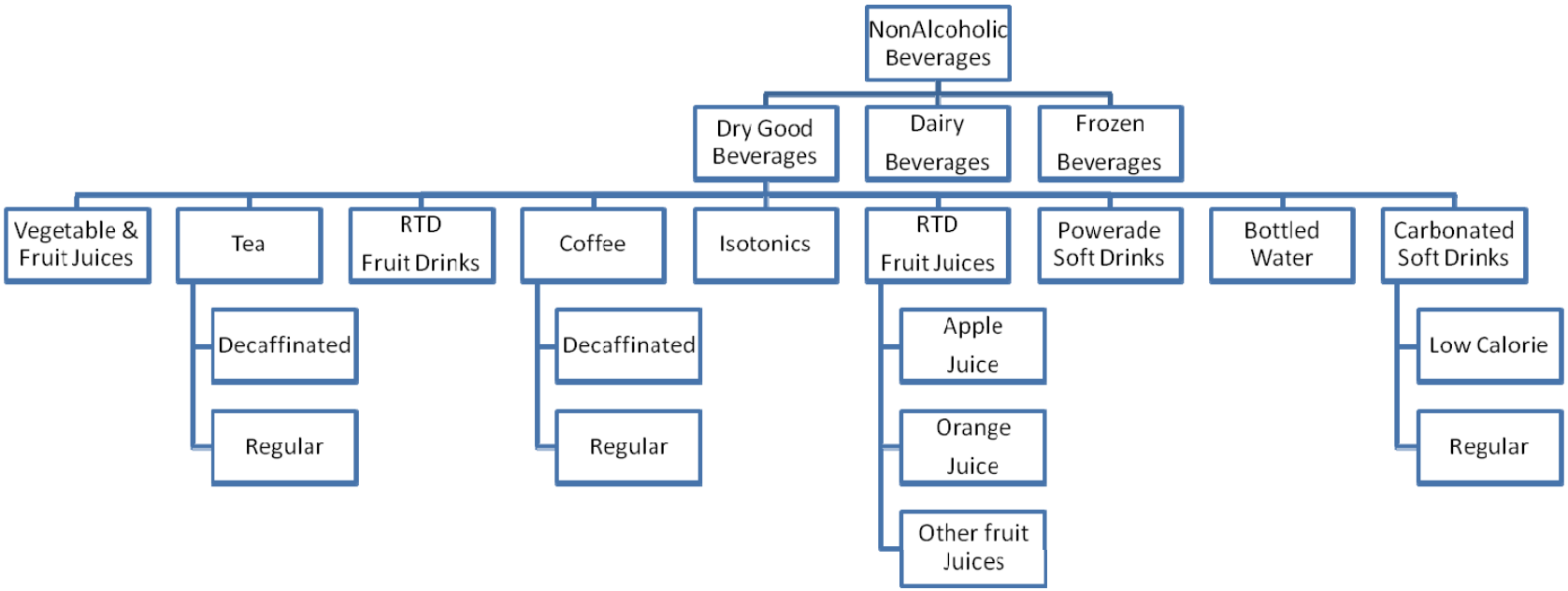


Figure 1-1. ACNielsen homescan data beverage categories Source: Capps, Clauson, Guthrie, Pittman, and Stockton 2005

The United States juice market is a part of the nonalcoholic beverage industry and consists of 100% fruit juice (from concentrate), 100% fruit juice (not from concentrate), nectar (30 to 99% juice), fruit drinks (0 to 29 % juice) and vegetable juice. This sector posted slow but steady growth rates throughout 2001-2007 with consumption increasing at constant annual growth rate of 1 % between 2001 through 2005. Revenue for the juice market grew by 1.8% in 2005 reaching a value of $19.4 billion (Figure 1-2). In 2005, 100% fruit juice (from concentrate) represented the largest segment in the juice market accounting for 26.3% of the market's overall volume. Sales of fruit drinks were a close second, accounting for 26% of the market's total volume (Datamonitor 2006). However by 2006, fruit drinks were the most lucrative segment in the juice market, generating 34.5% of the market's revenue (Datamonitor 2007). Meager growth in overall volume suggests that consumers are switching from one beverage to another igniting intense competition between brands.

Table 1-1. United State juice market value: $ billion, 2001-2005

Year	Market Value (in $ billions)	% Growth
2001	18.1	
2002	18.2	0.90
2003	18.7	2.70
2004	19.1	1.70
2005	19.4	1.80
Constant Average Growth Rate, 2001-2005 1.8%		

(Source: Datamonitor, 2006)

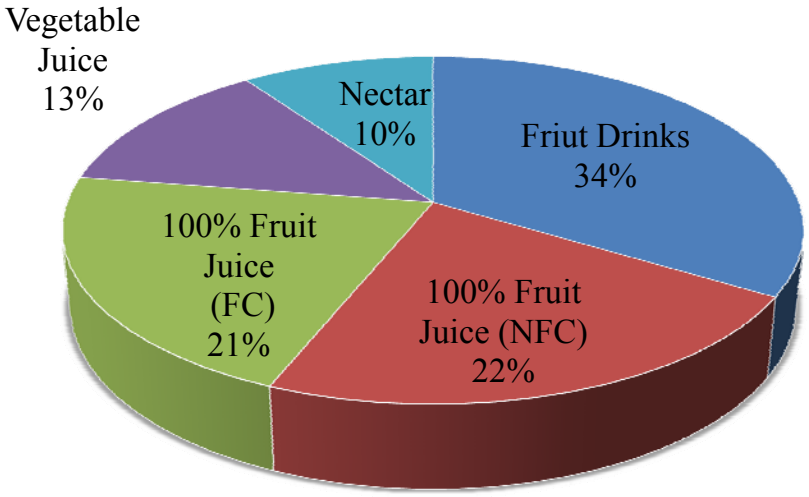


Figure 1-2. United States juice market segment by % share, by volume 2005
Source: Datamonitor, 2006

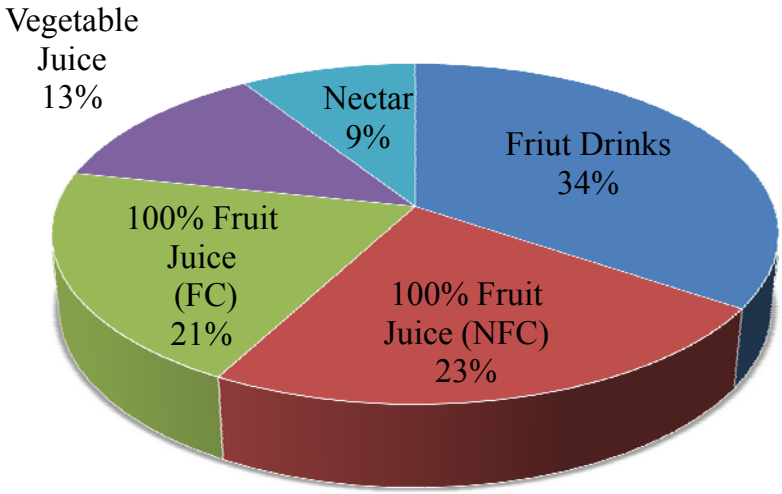


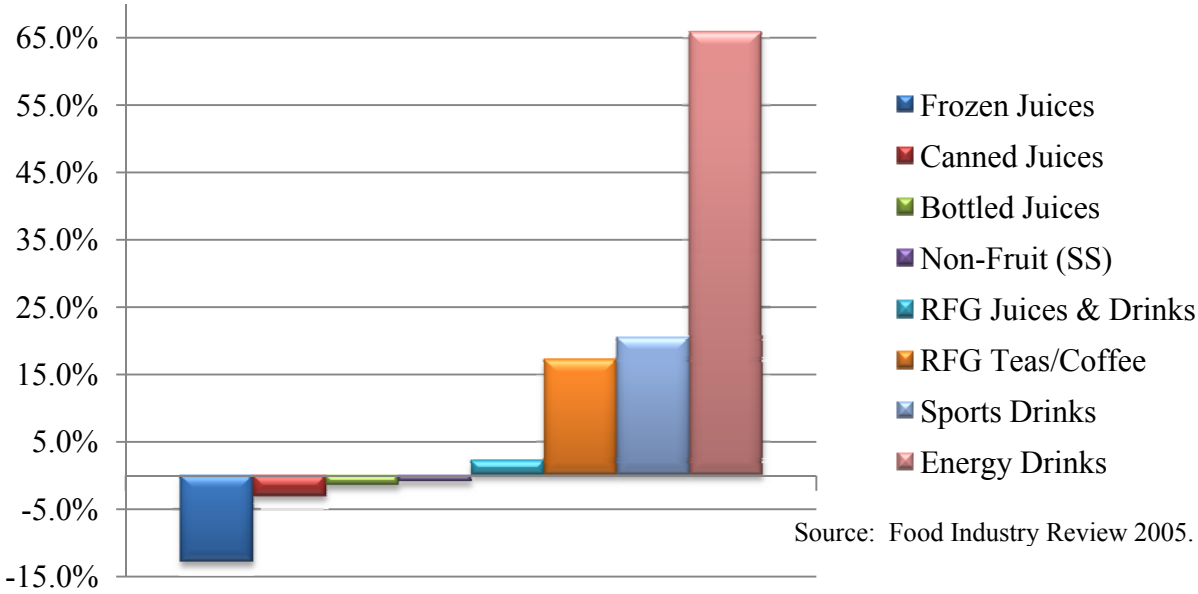
Figure 1-3. United States juices market segment by % share, by volume 2007
Source: Datamonitor, 2007

As the number of types of beverages in supermarkets increased, U.S beverage consumption patterns and trends have changed. While overall market growth has been minimal, some beverage segments within the market have experienced dramatic growth. According to the Beverage Marketing Corporation, consumption (in gallons) of carbonated soft drinks (CSDs) and fruit beverages declined during 2004 through 2006; whereas, consumptions of energy drinks, sport drinks, and RTD coffee and teas has substantially increased (Table 1-2). Similarly, changes in beverages sales from 2004 to 2005 (Figure 1-4) indicate energy and sport drinks experienced significant increases (65.9 % and 20.6 % respectively). Refrigerated juice sales increased a mere 2.2 %, shelved non-fruit drinks decreased 0.9 %, bottled juices and cocktails both decreased 1.5 % and frozen juice sales decreased by 12.8 % (Food Industry Review, 2006).

Table 1-2. United States liquid refreshment beverage market

Segments	Millions of Gallons			% Change	
	2004	2005	2006	04/05	05/06
CSDs	15,367.2	15,271.6	15,103.3	-0.6	-1.1
Bottled Water	6,806.7	75,37.1	8,253.1	10.7	9.5
Fruit Beverages	4,187.3	4,119.0	4,020.1	-1.6	-2.4
Sports Drinks	1,000.8	1,207.5	1,348.8	20.7	11.7
RTD Tea	509.9	555.9	701.5	9.0	26.2
Energy Drinks	84.5	152.5	227.4	80.5	49.1
RTD Coffee	31.7	38.9	43.0	23.0	10.4

Source: Beverage Marketing Corporation



Source: Food Industry Review 2005.

Figure 1-4. Changes in consumer's beverage expenditures from 2004 to 2005

In addition to changes in expenditure, per capita availability of orange juice and other selected fruit juice have changed over time (Table 1-3, Figure 1-5 and Figure 1-6). Consumption trends for citrus fruit juices and fruit drinks, ades and cocktails have been steadily declining. The decrease in consumption can be partly explained by the increased in popularity of low-carbohydrate diets such as the Atkins diet which encouraged dieters to reduce or completely eliminate their fruit juice intake (Cogrove 2005; Love 2005). The decline in orange juice consumption observed from 2004 to the present can also be explained by additional events. In 2004, the citrus industry experienced immense damage from one of the harshest hurricanes seasons in history when hurricanes Charley, Francis and Jeanne rampaged through the Florida peninsula, the primary provider of orange juice within the United States. In addition to the hurricanes, citrus canker, a disease that dramatically decreases the productivity of citrus trees, poses a major threat and damages to current and future orange crops (Zansler 2004). As a result of the smaller orange crops, brands such as PepsiCo's Tropicana increased wholesale orange prices 3 to 5 % (Beverage Industry 2004). The Florida Department of Citrus announced plans to

spend $3 million to promote orange juice in an effort to improve consumption which had declined 1.6 % annually since 2001.

Table 1-3. Top variety of bottled juices

Variety	Dollar Sales	% Change From Prior Year
Apple Juice	$ 542,221,100	-0.4
Cranberry Cocktail Juice/Drinks	$ 618,726,600	-2.5
Cranberry Juice/Juice Blends	$ 155,709,900	-8.2
Fruit Drinks	$ 722,495,400	1.7
Fruit Juice Blends	$ 235,680,200	0.6
Grape Juice	$ 225,680,200	-7.3
Grapefruit Juice	$ 52,241,200	12.4
Lemonade	$ 146,340,100	20.2
Orange Juice	$ 29,041,880	-31.5
Tomato/Vegetable Juice/Cocktails	$ 290,271,700	-1.3

Source: Cosgrove 2005

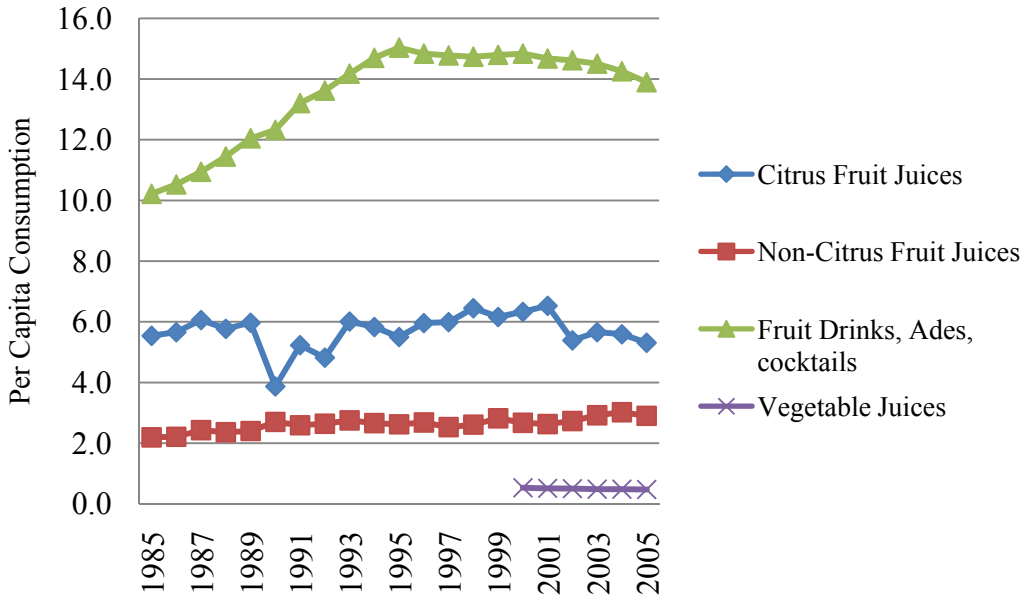


Figure 1-5. Per capita consumption for selected fruit juices

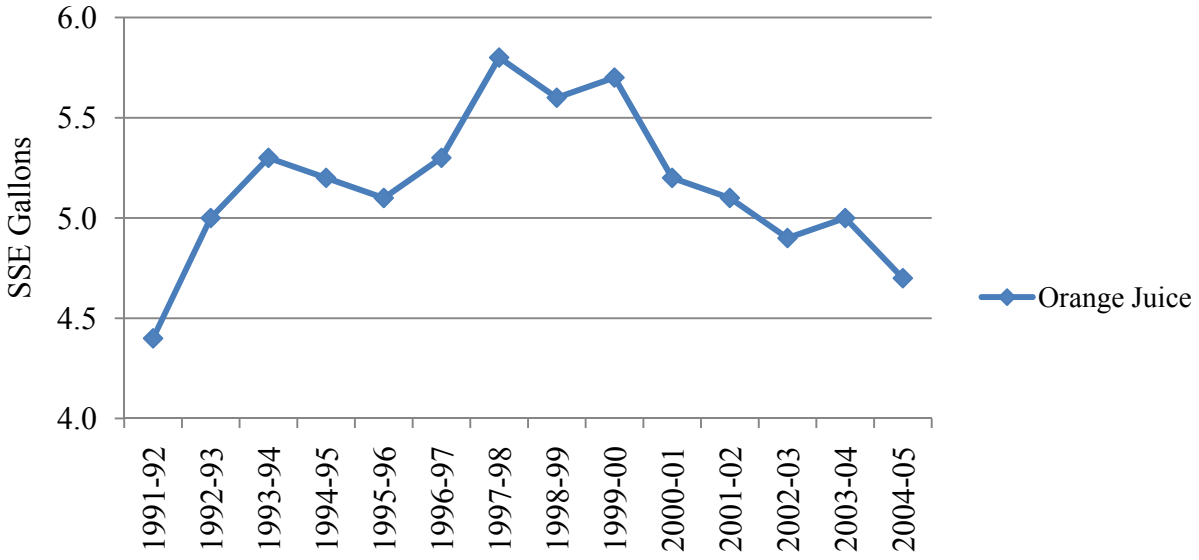


Figure 1-6. Orange juice per capita consumption

Generic and brand promotions are utilized develop or expand the market for many agricultural commodities and alter consumption patterns (Lee, Fairchild, and Behr 1988). The fundamental objective of each promotional program is the same, but the methods of implementation and funding of each program differs. Generic promotional programs are promoted by producers and the aim of these programs is to increase consumption of a specific commodity or food product. Generic advertising is designed to encourage consumers to experiment with a particular product category and remind consumers to become repeat purchasers. Marketing firms utilize brand advertising to expand sales or increase market share for a particular brand of commodity or food product. This form of promotion is used to persuade consumer to select a particular brand within a certain product category and to influence the consumers' preferences for certain commodity attributes. Brand advertising is also intended to redirect the consumers' attention to a particular brand with the purpose of making the consumer a repeat buyer. The precipitation and reminder mechanisms are more inclined to increase total

product or industry sales while persuasion and reinforcement are related to maintaining or increasing market shares of specific brand (Lee, Fairchild, and Behr 1988).

With more brands contending for consumers' dollars, retailers utilize price and non-price promotional strategies to stimulate short-term sales and revenue and to increase store traffic (Inman and Leigh 1993; Blattberg, Briesch and Fox 1995; Kumar and Leone 1988). Temporary price reductions (TPR), feature advertising, and displays are common tactics used is the grocery business to direct consumers' attention to a specific brand or product line. In this study, a temporary price reduction occurs when the product is sold from its normal shelf location at price discount greater than 5 % of regular price that cannot that last longer than six weeks. Feature advertising is regarded as any published print advertisement such as newspaper advertisements, neighborhood mailers, and in-store circular media. Grocery retailers believe that feature advertising is a cost effective method of informing consumers' of in-store specials offered in an effort to increase the store's profitability. Displays are secondary locations away from the normal shelf stocking location increasing the products visibility.

Over 14 billion gallons of beverages were purchased in U.S. grocery outlets in 2002. This amount decreased to approximately 9 billion in 2009 (Table 1-4). This downward trend was also observed for fruit drink, fruit juices, and orange juice. Consumers were inclined to purchase beverages when they perceived the products' price was on a deal (Table 1-5). For example, in 2004 nearly 57 % of all orange juice was purchased when the buyer felt that the purchase price was a deal, but this % declined to 45 % in 2006.

Table 1-4. Total gallons of beverages purchased in U.S. grocery outlets earning more than $2 million in sales (in thousands of gallons)

Segment	2002	2003	2004	2005	2006
Total Beverages	14,185,696	14,968,874	14,644,435	9,232,827	9,253,420
Fruit Drinks	1,108,705	1,178,166	1,191,552	754,520	749,151
Fruit Juices	430,939	452,406	442,385	283,074	722,661
Orange Juice	759,141	770,374	729,003	491,806	442,206
Isotonics	148,913	104,285	97,227	65,224	67,580
Sunny Delight	88,753	91,484	81,172	43,796	N/A

Source: Florida Department of Citrus 2007

Table 1-5. Percent of beverages purchased on a deal at grocery outlets earning more than $2 million in sales

Segment	2002	2003	2004	2005	2006
Total Beverages	47.4%	49.6%	47.2%	43.3%	38.4%
Fruit Drinks	51.6%	54.1%	53.1%	49.3%	42.2%
Fruit Juices	53.2%	55.1%	53.5%	49.3%	41.6%
Orange Juice	56.2%	58.6%	57.1%	50.7%	45.0%
Isotonics	53.9%	53.5%	53.5%	52.0%	45.8%

Source: Florida Department of Citrus 2007

Researchable Problem

Due to the changes in consumption the beverage industry has undergone many transformations. All other things being equal, consumer theory states that a shift in demand for one good will be compensated by shifts in the opposite direction in the demand for other good. Brand manufacturers and retailers must continue to monitor the ever-changing beverage retailing landscape to ensure profitability. Thus, in an effort to better understand how consumers make beverage purchase decisions, this study examines the competitiveness and structure of the beverage industry. To accomplish this goal separability tests are conducted among refrigerated orange juice, refrigerated fruit juices, and shelf stable fruit drinks. This study contributes to the existing body of literature by providing information on consumers' behavior regarding beverage purchases, the structure of the beverage industry and implications for the industry in the future.

Objectives

In an effort to better understand consumer behavior regarding juice purchase patterns, the primary objective of this research is to evaluate the impact of three retail promotion strategies (feature advertisements without displays, display advertisement without feature ads, and a combination of feature ads and displays) on consumers' demand for orange and grapefruit juice along with other fruit drinks. Specific objectives are:

- To develop econometric models for analyzing demand relationships between brands in the previously mentioned juice categories using store level scanner data.
- To examine the degree of separability between refrigerated and shelved juice/ drink products.
- To estimate own price, cross price and promotional elasticities for specified brands in each beverage category.
- To compare and contrast the impact of promotion across stores adopting different pricing philosophies.
- To discuss the marketing implications associated with the empirical results.

Outline

The dissertation is organized as follows: Chapter 2 consist of a literature review of the impact of promotions on demand and retail sales. The chapter contains a review literature where beverage demand and structure of the beverage industry is analyzed.

In chapter 3, consumer demand theory is developed and different versions of the Rotterdam model used to empirically test for separability and evaluate the impact of promotional tactics on demand are derived. Chapter 4 contains a discussion of the data sources and key descriptive statistics. Chapter 5 and 6 include the system of equations that are empirically applied to data and results from the empirical models. Finally, chapter 7 includes the conclusion and marketing implications.

CHAPTER 2
LITERATURE REVIEW

Manufacturers and retailers spend billions of dollars each year on promotion, but entity uses promotions for different reasons. When promoting brands, the objectives of manufacturers include the following: (1) increasing consumption by current users, (2) motivate brand substitution, and (3) motivate category substitution. The retailers' primary objective is to maximize store profits, which can be achieved by maximizing profits for each product category. It is imperative for both manufacturers and retailers to evaluate the effectiveness and financial impact of promotional tactics. Chain-brand models allow retailers to calculate the incremental sales from a given promotion allowing them to compute the profitability of the promotional program. Manufacturers desire these models because the information provided from running them enables the manufacturers to persuade the chain to promote their brand. This chapter reviews the existing body of literature that evaluates the impact of retail promotion on consumer demand and retailer and literature that explains the structure of the beverage industry.

Several studies in the marketing literature have evaluated the impact of retail promotions on retail sales and brand choice using household panel and scanner data (Prasad and Ring 1976; Cotton and Babb 1978; Guadangi and Little 1983; Walters 1991; Dekimpe, Hanssens, and Silva-Risso 1999; Bell, Chaing, and Padmanabhan 1999; Van Heerde, Leeflang, Wittink 2000; Kumar, Rajiv and Jeuland 2001; Pauwels, Hanssens, and Siddarth 2002). Price reductions, feature advertisements, and in-store displays are types of retail promotions that have the ability to increase current period sales, but also alter consumer purchasing habits by changing consumers' perceptions of the promoted good (Gao and Lee 1995). Scanner data has made it possible to analyze the impacts of retail promotions on consumer behavior. Studies suggest that price reductions and displays are more powerful in increasing short term sales when compared to

newspaper advertisements. Additionally, when prior purchases were made on display and feature promotions or when price reductions were paired with displays or features following purchases increased (Wilkinson, Mason, and Paksoy 1982; Papatla and Krishnanmurthi 1996).

Blattberg, Briesch and Fox (1995) surveyed the promtional literature to develop generalizations, which are based on consistent findings among mutliple studies. One significant conclusion is that high market share brands are less deal elastic (Bolton 1989; Vilcassim and Chintaguanta 1995). Moriarty (1985) and Woodside and Waddle (1975) found sales were very responsive to temprorary price reductions. However, these studies also suggest that it is difficult to isoloate the influence other promotional tactics have on sales. Gupta (1988) and van Heerde, Leeflang and Wittink (2004) decomposed the sales spike to find that the majority of sales increases were attributed to brand substitution within a store, purchase time acceleration, and the stockpiling effect was minor. These results conflict with Vilcassim and Chintaguanta (1995) whom suggests switching does not account for the majority of the volume. Similarly, Kumar and Leone (1988) found that increases in sales can be attributed to two factors, brand substitution within a store and cross-shopping caused by price promotions and feature and display advertisements. This study also develops two propositions. The first proposition states a store's price promotion, featuring, and display activities for a specific brand positively affect that store's sales of the brand and negatively affect sales of the brand's competitors within the store. The second proposition states that for a given product category, if two stores within a geographic area are competitors, one store's price promotion, featuring, and display activities for a specific brand negatively affect the sales of that brand and competing brands at the other store.

Literature also suggests that price cuts and feature ads encourage consumers to cross-shop amongst stores which positively impact sales, however, research has conflicted on the impact

promotions have on the % change in sales and the duration of the promotional effect. Moriarty (1985) suggests that promotions cause sales displacement and reductions in both current and future demand for competitor products (substitution effects). The study found sales of a promoted product will increase and future sales will decrease as a result of current promotional activity. Purchase acceleration is higher as the package size of the product becomes larger. Consumer are less likely to stockpile smaller size product because these products are viewed as convenience products. Additionally, purchase acceleration is more likely to happen for feature and display merchandising rather than price reductions (Abraham and Lodish 1993). Shoaf (1997) also found a decline in the repurchase rate at a promotion, suggesting stockpiling. Trotten and Block (1987) and McAlister (1986) report no evidence of stockpiling. A study conducted by Walters and MacKenzie (1988) found that store traffic, sales and profit did not exhibit significant increases in response to promotions. Dekimpe, Hanssens, and Ailva-Risso (1999) estimated the permanent effects of promotions and found that this effect did not exist. From these findings one can conclude that the impact of promotions on sales is usually confined to the period that the promotion occurs.

As the retailing environment becomes more competitive, retailers invest more resources in developing strategies to maximize store profits. Existing research provides micromarketing strategies that will assist retailers in developing optimal promotional strategies. Hoch et al (1995) suggest that stores isolated from competitors are less deal sensitive. Kumar, Rajiv, and Jeuland (2004) found that retailers prefer to offer promotions on products for which switching customers have stronger demand than loyal customers and/or for which the price sensitivity of demand is high for both switching and loyal customers. Simester (1995) found that in order to receive maximum economic rents, firms should offer deeper promotions on products which

enjoy complementary relationships with other products sold by the firm rather than on products for which the firm sells a substitute. Promotions are found to encourage store profits because customers are exposed to low margin promoted products and full margin nonpromoted products .

Researchers have analyzed the impact of retail purchase on the demand for beverages but the majority of exisiting reseach concerning juice beverages focuses on the impact of generic advertising on commodity demand while few studies investigate the impact of brand advertising on demand (Lee 1981; Gao and Lee 1995; Zheng and Henry 2004; Lee, Fairchild and Behr, 1988). The objectives of generic promotions differ drastically from the nature of brand promotions (Brester and Schroeder 1995). Generic promotions are designed to increase overall demand for a specific group of commodities and brand promotion are expected to increase the salse of a specfic brand. Lee, Fairchild and Behr (1988) found that brand advertising did not have a substantial impact on sales of orange juice and that brand advertsing is associated with maintaining or increasing marketshares, while declines in commodity advertising (generic) resulted in a reduction in orange juice consumption. Another study conducted by Brown and Lee (1997) found brand promotions changed only the brands perceived price. Brand promotional cross price elasticities were smaller than generic promotion elasticities. In fact, several brand elasticities were close to zero. Brown and Lee (2007) used a differential approach to estimate the impact of four promotional tactics on the demand for 12 beverages and found cross promotional effects tended to offset own promotional effects which were all postive. The intercepts for orange juice, grapefruit juice, apple juice, milk, and grape juice were negative, suggesting demand for these beverages has declined over time. Remaining juice, tea, and water possessed positive coefficients, signifying growth in demand. The study also suggests that if retailers

promoted only one brand at a time the demand for juice drinks would increase 23% and orange and grapefriut juice demands would increase 15.3 % and 25 %, respectively.

Nelson and Morgan (1995), Zhen and Kinnucan (2004), and Zhen, Kinnucan, and Kaiser (2007) evaluate the impact of generic advertising on demand curves for nonahcolic beverages. Results from theses studies indicate that advertising influences own price elasticities through a combinations of outward shifts and rotation. Advertising shifts and rotate demand curves by changing the price people are willing to pay for a product. The overall impact of promotions on goods belonging to different categories depends on the nature of the underlying preference structure.

Numerous studies have examined the orange juice industry to identify competitors, but studies have not tested for separability within the fruit juice market. Brown, Lee, and Seale (1994) tested for strong separability between fresh fruits, fruit juices, and tomato juices and failed to reject the hypothesis of strong separability. Suggesting that the marginal utility of fruit juices is not affected by an increase marginal expenditures of fresh fruit or tomato juice. Brown and Lee (2000, 2007), Brown, Lee and Seale (1992,1994), and Lee, Jong-Ying (1984) successfully identified juice beverage that are substitutes for orange juice, but the studies do not consider the impact of sport drinks on this demand. Several studies have tested for separability within the meat market (Nayga and Capps 1994; Eales and Unnevehr 1988; Hayes, Wahl and Williams 1990), however, a this type of disaggregate model has not been used to evaluate the manner in which consumers allocate their beverage expenditure. This study will contribute to the existing body of literature by providing information on consumers' behavior towards their beverage purchases and the structure of this beverage industry, which is the second largest component of the food and beverage manufacturing industry (ERS, 2005).

CHAPTER 3
THEORETICAL MODEL

Consumer Demand Theory

Consumer demand theory is used to investigate demand interrelationship between different beverage categories and brands of beverages. Consumption theory enables economists to analyze the market structure of the beverage industry; specifically the fruit juice and fruit drink markets, by using the concept of separability. This theory involves the analysis of the change in marginal utilities of one product due to a change in consumption of a closely related product. The changes in marginal utilities are related to the price substitution terms of demand functions.

Consumer Demand Analysis

Consumer behavior models are used to analyze decisions made by both individuals and households. Economists assume that given a budget and information pertaining to the prices of commodities, consumers exhibit optimizing behavior when making choices constrained by psychological factors (i.e. preferences). Consumers are expected to behave rationally, which is a result of having a well-defined preference set. Preference sets must fulfill the following axioms: reflexivity, completeness, transitivity, continuity, convexity and non-satiation. Reflexivity, completeness, and transitivity define preordering of the preference set. When numeric values are assigned to the bundles of goods and services, preference ordering can be represented by a utility function. Bundles given higher values or perceived to provide higher utility are preferred to those with lower values or lower utility. All of the previously mentioned axioms allow economists to transition from preferences to utility and address the constrained utility maximization problem.

The theoretical framework for utility maximization problem is well documented by Deaton and Muellbauer (1980), Theil (1980), and Phlips (1983). A utility function, $U(x_1, x_2,\ldots, x_n)$, is a mapping of the consumer's preferences regarding a bundle of goods or services at a particular point in time. It measures the overall satisfaction an individual receives from consuming a specific bundle. It is more convenient to discuss utility function rather than preferences sets; however, utility functions possess three primary shortcomings. Utility functions are inestimable, unobservable, and ordinal. Because of the ordinal nature, utility functions are only defined as monotonically increasing. Despite these disadvantages, a utility function is extremely useful when paired with a linear budget constraint, as it provides, enough information to evaluate the consumer allocation problem.

The constrained utility maximization problem assumes that given a fixed amount of income to spend, an individual will buy those quantities that exhaust total income. Promotional variables are incorporated directly into the utility function as an indicator of consumer prefernces (Theil 1980; Duffy 1987; Brown and Lee 2002,2007). Therefore the utility maximization problem is as follows:

(3.1) $$Max\, u = f(x_1,...,x_n,z_1,...,z_n)$$

$$s.t. \sum_{i=1}^{n} p_i x_i = m$$

where x_i denotes the quantity of the i^{th} good demanded, z represents the promotion variables, p_i denotes the price of the i^{th} good and m represents dollars allocated or total expenditure on n-goods. Four steps are necessary to solve the constrained utility maximization problem. First, the Lagrangian function is formulated:

(3.2) $$L = u(x_1,...,x_n,z_1,....,z_n) + \lambda(m - \sum_{i=1}^{n} p_i x_i)$$

where λ is the Lagrangian multiplier, the marginal utility of money. The value of the Lagrangian multiplier is positive and represents the amount the utility maximum would increase given a unit relaxation in the constraint (a unit increase in total expenditure).

The second step of solving the constraint utility maximization problem is to differentiate L with respect to x_i and λ and then set each equation equal to zero yielding:

(3.3 a) $$\frac{\partial u(x,z)}{\partial x_i} = \lambda p_i$$

(3.3 b) $$\sum_{i=1}^{n} p_i x_i = m .$$

These $n+1$ equations are known as the first order conditions and represent the necessary conditions for an interior maximum. The first order conditions require the marginal utility of the i^{th} good to equal the price of good i times the marginal utility of money. Thus at the margin, the amount of utility given up equals the amount of utility gained in exchange for money.

The next step is to solve the first order conditions of the utility maximization problem for the optimal Marshallian demand functions. The demand functions describe the quantity of a commodity a consumer is able and willing to purchase when constrained by a budget and prices of all commodities and a defined set of preferences. The optimal solutions are:

(3.4 a) $$x_i = g(p,z,m) \qquad i=1, 2,...,n \text{ and}$$

(3.4 b) $$\lambda = \lambda(p,z,m) .$$

The Marshallian, uncompensated, demand functions (x_i) describe the behavior of the consumer in the market. The solution to the system produces n equilibrium demand value, $x_i,\ldots,x_n$. These demand functions are unique to a specific set of prices, income and preferences; thus, changes in parameters or taste and preferences will cause the demand system to adjust, producing new optimal values.

Marshallian demand functions are also called uncompensated demand functions because income is fixed and utility changes between curves, not along curves. When prices change there is no income compensation to keep an individual at the same level of utility. A price decrease allows an individual or household to attain a higher utility level because real income has increased, but since the function are uncompensated the price and income effects are combined. The Marshallian demand functions are specified as:

(3.5) $$x_i = g_i(p_1,...,p_n,z_1,...z_k,m) \quad i = 1, 2,. . . , n.$$

where x_i represents the quantity of a good consumed. Quantity demanded is a function of all the independent variables including prices of the ith good, $p_1, . . . , p_n$, promotional variables, $z_i,\ldots,z_k$, and the consumer's or household's income or total expenditure on goods, m. In summary, demand functions relate the equilibrium quantities demanded to the market price of that commodity and the nominal prices of other commodities held constant. To verify that the Marshallian demand functions derived are indeed the optimal quantities, the final step is to derive the second order conditions which ensure optimality.

To analyze the effect of prices, income, and promotions variable on consumer demand, to the first order condition presented in (3.3) is differentiated and arranged in terms to obtain the fundamental matrix equations of consumer demand theory (Barten 1977; Brown and Lee 1997):

(3.6a) $$Udx - pd\lambda = \lambda dp - Vdz$$

(3.6b) $$pdx = dm - xdp$$

or

(3.6c) $$\begin{bmatrix} U & p \\ p' & 0 \end{bmatrix} \begin{bmatrix} dx \\ -d\lambda \end{bmatrix} = \begin{bmatrix} 0 & \lambda I & -V \\ 1 & -x' & 0 \end{bmatrix} \begin{bmatrix} dm \\ dp \\ dz \end{bmatrix}$$

where $U = \left(\frac{\partial u^2}{\partial q_i \partial q_j} \right)$ a *nxn* Hessian matrix; and $V = \left(\frac{\partial u^2}{\partial q_i \partial z_k} \right)$, a *nxn* matrix indicating the impact of promotional effects on marginal utilities; *x* and *p* are *n* vectors representing the quantity of goods demanded ; and *z* is a *k* vector of promotional tactics. Equation 3.6 must be solved for dx and $d\lambda$ to generate the effects of the exogenous variables quantity demanded. Barten (1977) shows the effect of promotions on demand can be written as

(3.7a) $$\frac{\partial x}{\partial z'} = -\left(\frac{\partial x}{\partial p'} + \frac{\partial x}{\partial m} x \right) \left(\frac{1}{\lambda} \right) V$$

or

(3.7b) $$\frac{\partial x}{\partial z'} = -S \left(\frac{1}{\lambda} \right) V$$

where $S = \left(\frac{\partial x}{\partial p'} + \frac{\partial x}{\partial m} x \right)$ is the Slutsky substitution matrix. This result implies that the effect of promotions is related to the substitution effect of price changes.

An alternative approach for solving the consumer allocation problem is to use the indirect utility function to obtain the Marshallian demand functions. The indirect utility function expresses utility as a function of prices, promotional variables, and income. Quantities that a consumer selects depend on the prices faced and income, which is identical to the utility maximization problem. The indirect utility function is defined as follows:

(3.8) $$U^* = v\left[(g_1(p_1,..., p_n, z, m),..., g_n(p_1,..., p_n, z, m) \right] = \psi^*(p_1,..., p_n, z, m).$$

This function is called indirect because it expresses the consumer's utility as a function of prices and income rather than quantity. The indirect utility function is computed from its original utility function by deriving the optimal utility maximizing quantities demanded and then substituting these quantities into the utility function which produces the highest level of utility attainable

given preferences, prices and income. Since the utility function assumes utility is maximized, Roy's identity is applied to find the optimal Marshallian demand functions. Roy's identity states:

$$g_i(p,m,z) = -\left[\frac{\left(\frac{\partial \psi(p,m,z)}{\partial p}\right)}{\left(\frac{\partial \psi(p,m,z)}{\partial m}\right)}\right]. \tag{3.9}$$

The concept of elasticity is useful to summarize information pertaining to the demand function. Elasticity measures the responsiveness of the quantity demanded (in percentage terms) to percentage changes in price or income. The most frequently used elasticities of demand are own-price, cross-price, and income elasticities. For a given demand function, $x_i = g_i(p,z,m)$, the following elasticities are defined as:

$$\varepsilon_{ii} = \left(\frac{\partial x_i}{\partial p_i}\right)\left(\frac{p_i}{x}\right) \quad \text{own-price elasticity} \tag{3.10}$$

$$\varepsilon_{ij} = \left(\frac{\partial x_i}{\partial p_j}\right)\left(\frac{p_j}{x_i}\right) \quad \text{cross-price elasticity} \tag{3.11}$$

$$\eta_i = \left(\frac{\partial x_i}{\partial m}\right)\left(\frac{m}{x_i}\right) \quad \text{income elasticity} \tag{3.12}$$

$$\rho_{ij} = \left(\frac{\partial x_i}{\partial z_j}\right)\left(\frac{z_j}{x_i}\right) \quad \text{promotional elasticity.} \tag{3.13}$$

Own-price elasticity measures the effect a change in the price of good *i*, p_i, has on the demand for the i^{th} good, x_i. Responsiveness of demand to price changes is described in three ways: elastic, where changes in price significantly affect quantity ($\varepsilon_{ii} < -1$); inelastic, where changes in price do not significantly impact demand ($\varepsilon_{ii} > -1$); and unit elasticity, where quantity

demand changes at the same percentage as the change in price (ε_{ii} = -1). For example, a value of ε_{ii} =-2 implies that a one % increase in prices causes quantity demanded to decrease by two %. Cross-price elasticity describes the relationship between the quantity of good *i* demanded given changes in the price of another good, *j*; making it possible to identify substitutes or complements. The i^{th} and j^{th} goods are gross substitutes if $\varepsilon_{ij} > 0$, which implies $\left(\frac{\partial x_i}{\partial p_j}\right)$ is positive. The converse is true for goods that are gross complements $\varepsilon_{ij} < 0$, which implies that $\left(\frac{\partial x_i}{\partial p_j}\right)$ is negative. Another important concept of elasticity measures the relationship between income changes and price changes. By definition, the quantity of a normal good demanded will increase as income increases; thus, $\eta_i >$, which implies that $\left(\frac{\partial x_i}{\partial m}\right) > 0$. Normal goods can be classified into two categories: necessities and luxury goods. Necessities are those by which $\eta_i < 1$ and luxury goods possess a value of $\eta_i > 1$. A good is considered inferior if the quantity demanded decreases as income increases, suggesting $\eta_i < 0$ and $\left(\frac{\partial x_i}{\partial m}\right) < 0$. Promotional elasticities play a critical role in determining the type of promotional activity a retailer implements. Promotional elasticities measure the change in quantity demanded relative to the change in promotional activity (East 1990; Brown and Lee 2007; Narasimhan, Nelsin, and Sen 1996). Goods that have exceptionally low price elasticity and a high price promotional elasticity will cause a firm to lose money when temporary price discounts are implemented. For *n* goods there, are n^2+n elasticities to be estimated; n^2 price elasticities, and *n* income elasticities. However, the actual number of

elasticities estimated is reduced by imposing restrictions from the optimization problem and the properties of the utility function.

Restrictions imposed on Marshallian demands are derived from properties associated with the utility maximization and a linear budget constraint. Economists assume that demand functions are continuous and differentiable and they must also satisfy the following properties:

Property 1: Homogeneity. All demand functions are homogeneous of degree zero in prices and income which implies that proportional changes in all prices and income leave the budget set unchanged; thus, demand and utility function are unaffected. This property is also known as "absence of money illusion". Consumer experience money illusion if increases in income cause an increase in purchases regardless of the prices of the goods. Since consumers do not suffer from money illusion, decisions are made on the basis of relative prices and income. Homogeneous of degree zero implies:

$$x_i = g_i(kp, km, z) = g_i(p, m, z) \tag{3.14}$$

where k is any positive scalar. One can also illustrate the homogeneity restriction on demand functions using the Euler theorem:

$$\sum_{j=1}^{n} \varepsilon_{ij} + \eta_i = 0. \tag{3.15}$$

Using Euler's theorem in (3.15), adding up suggests that changes in quantity demand induced by changes in prices must equal changes in the demand induced by income. As a result, quantities demanded are unaffected by equivalent changes in prices and income.

Property 2: Engel Aggregation. In order for consumers' to maximize utility, the budget constraint must be binding. Engel aggregation states that changes in income are allocated completely across all commodities. For example, a five percent increase in income requires total purchases to also increase by five percent.

This concept is illustrated by differentiating the budget constraint presented in (3.1) with respect to m:

$$\sum_{i=1}^{n} p_i \frac{\partial g_i(p,m,z)}{\partial m} = 1. \quad (3.16)$$

Budget exhaustion can also be expressed in income elasticity form:

$$\sum_{i=1}^{n} w_i \eta_i = 1 \quad (3.17)$$

where $w_i = \frac{p_i x_i}{m}$ which is known as the expenditure share on the i^{th} commodity. Equation (3.17) suggests the weighted sum of income elasticities for all goods must equal one. Thus, only $n-1$ of the income elasticities are independent. Promotional variables must also fulfill the adding up property; thus, an increase in demand for one good must be compensated by a decrease in demand for the other good, while total expenditure remains constant,

$$\sum_i p_i \left(\frac{\partial q_i}{\partial z_k} \right) = 0 \quad (3.18)$$

or in elasticity terms

$$\sum_i w_i \rho_{ij} = 0 \quad (3.19)$$

which states the weighted sum of advertising elasticities is zero (Brown and Lee 2002).

Property 3: Cournot Aggregation. The final property indicates that expenditure share on the j^{th} good influences the magnitude of elasticities for the i^{th} good. This property is derived by differentiating the linear budget constraint with respect to p_i, resulting in,

$$\sum_{i=1}^{n} w_i \varepsilon_{ij} = -w_j \; . \quad (3.20)$$

This equation is useful when elasticity information for a limited number of goods is available and one seeks to know elasticities of others that are unavailable.

Duality theory provides different techniques economists can use to derive optimizing values. Any constrained maximization problem is associated with the dual problem, constrained minimization, which focuses on the constraint in the primal problem. Duality theory has become popular and is used in many branches of economics. This theory is valuable because it provides the economist with a simple and alternative method of analysis.

As discussed previously, the primal involves solving the utility maximization problem and solving for the equilibrium Marshallian demand functions. The dual problem generates optimal quantities that minimize the expenditure needed to achieve the optimal utility level derived in the primal problem. The constrained expenditure minimization problem is written as:

$$(3.21) \qquad Min\ E = \sum_{i=1}^{n} p_i x_i$$

$$s.t. \quad U = f(x_1, ..., x_n, z).$$

In the dual problem, the quantity demanded is a function of utility, prices, and promotional strategies which are denoted as u, p, and z, respectively. These demand functions differ from the Marshallian demands derived in the primal problem which are a function of income, prices, and promotional strategies. These new cost-minimizing demand functions are derived by solving the first-order conditions of the Lagrangian or employing Shephard's Lemma. Shephard's Lemma enables economists to derive the optimal cost minimizing demand functions, Hicksian demand, from any known expenditure function by taking the partial derivative of the expenditure function with respect to price, $\left(\frac{\partial E(p,u,z)}{\partial p}\right)$. Hicksian demand functions are also called compensated demand functions because if price changes, the individual must receive more income or compensation in order to remain at the same utility level. Solutions to the utility-maximization

and cost-minimization problems produce the same optimizing quantities, thus the following equality holds:

(3.22) $$x_i = g_i(p_i, m, z) = g_i(p_i, E(p, u, z)) = h_i(u, p_i, z).$$

Marshallian and Hicksian solutions can be substituted back into their respective problems to give, first, maximum attainable utility and, second, minimum attainable expenditure. Hence,

(3.23) $$U = v(x) = v(g(p, m, z)) = \psi(p, m, z) \text{ and}$$

(3.24) $$m = \sum p_i x_i = \sum p_k h_k(u, p, z) = E(u, p, z).$$

Both the indirect utility function and expenditure function discussed in (3.23) provide alternative techniques to derive the of optimal demand functions.

Changes in endogenous variables, particularly price and income, typically impact the consumers' and expenditure decisions. However, the effect of price on quantities demanded is typically more complex to analyze than is the effect of a change in income. The effect of a change in price on quantity can be decomposed into a substitution effect and an income effect. The substitution effect accounts for the variation in quantity demanded influenced by the fact the relative price of one good changed; therefore, consumption decreases for the good whose relative price increases. The income effect explains the variation resulting in an adjustment in the consumers' purchasing power because price has changed. Mathematically, the own effect of a price change of a good is expressed as follows:

(3.25) $$\frac{\partial g_i(p, m, z)}{\partial p_i} = \frac{\partial h_i(p, z, \psi(p, m))}{\partial p_i} - \frac{\partial g_i(p, m, z)}{\partial m} x_i.$$

The Marshallian, uncompensated, demand functions, $\frac{\partial x_i(p,m,z)}{\partial p_i}$, decomposed into the substitution effect and income effect, respectively, are on the right hand side of the equation. This equation is known as Slutsky's Decomposition and can be rewritten as:

(3.26) $$\frac{\partial g_i(p,m,z)}{\partial p_i} = \frac{\partial h_i(p,u,z)}{\partial p_i} - \frac{\partial g_i(p,m,z)}{\partial m} x_i .$$

Slutsky's Decomposition is important because it enables one to isolate the general effect (income effect) and specific effect (substitution effect), (s_{ii}), caused by price changes of a commodity. From Slutsky's Decomposition it is apparent that Marshallian demands are more responsive to price changes than Hicksian demands, and the budget share of a commodity significantly impacts the difference between the Marshallian and Hicksian demands.

Hicksian, like the Marshallian, demand functions must satisfy the following properties which serve as the basic general principles of demand functions.

Property 1: Homogeneity. Hicksian demands are homogeneous of degree zero in prices and Marshallian demands in income (total expenditure) and price, for any positive scalar, $k > 0$:

(3.27) $$h_i(u,kp,z) = h_i(u,p,z) = g_i(kp,km,z) = g_i(p,m,z) .$$

Property 2: Adding up. The total expenditure in both Hicksian and Marshallian demands equal the budget constraint:

(3.28) $$\sum_{i=1}^{n} p_i h_i(p_1,...,p_n,u,z) = \sum_{i=1}^{n} p_i g_i(p_1,...,p_n,m,z) = m.$$

Property 3: Symmetry. The cross-price derivatives of the Hicksian demands are symmetric for all $i \neq j$,

(3.29) $$\frac{\partial h_i(p,u,z)}{\partial p_j} = \frac{\partial h_j(p,u,z)}{\partial p_i} .$$

It is important to emphasize that $\frac{\partial h_i(p,u,z)}{\partial p_j} = \frac{\partial E(p,u,z)}{\partial p_i \partial p_j}$. Young's theorem declares that second-order partial derivatives are identical as long as both functions are continuous. Symmetry is guaranteed because consumers' decisions are consistent.

Property 4: Negativity. The *nxn* matrix formed by price derivatives of the Hicksian demand functions are negative semi-definite. This matrix of price derivatives is referred to as the substitution matrix or Slutsky matrix of compensated price responses and elements of this matrix are denoted as $s_{ij} = \frac{\partial h_i(p,u)}{\partial p_j} = \frac{\partial g_i(p,m,z)}{\partial p_j} + \frac{\partial g_i(p,m,z)}{\partial m} x_j$. Negativity implies that the diagonal elements of substitution matrix are nonpositive, for all *i*,

(3.30) $$s_{ii} \leq 0.$$

Indicating that an increase in price holding utility constant causes demand for that commodity to fall or at least remain unchanged. Expression (3.28) is commonly referred to the law of demand.

Separability and Multi-Stage Budgeting

Separability is a concept commonly used in empirical studies to limit the number of estimable parameters by imposing restrictions on preferences. This approach conveys important information regarding the appropriate conditions partitioning commodities into groups or aggregates and details on how consumers allocate expenditures within in each group. The objective is to use conditions established by separability theory and partition goods into subsets that include commodities that are closer substitutes or complements to each other than to members of subsets. Separability of preferences is required to guarantee that the utility realized in terms of individual commodities is identical to the utility achieved when some commodities are aggregated. The theoretical basis for separability has been documented in Barten (1977) Deaton and Muellbauer (1980), Pudney (1981) and Phlips (1983).

The composite commodity theorem develops the first conditions under which groups of commodities can be treated as one. This theorem states that if a set of prices move in a parallel fashion, the corresponding group of commodities can be treated as a single good. The composite commodity theorem involves relative prices, which suggests prices move over time at proportionate rates. The theorem is not appropriate when modeling a reality where prices are constantly changing.

An alternative justification for commodity aggregation is based on the form of the utility function itself. The necessary and sufficient condition for separable preferences is that the marginal rate of substitution between any two commodities belonging to the same group are independent of the value of any good in any other group. If this condition holds, the utility function presented in (3.1) can be partitioned into *m* groups, and $n_r (r=1,\ldots,m)$ represents the commodities in each group ($n = \sum_{r=1}^{m} n_r$) (Phlips 1983). Separable functions are written as

$$U = f(x_1,...,x_n) = F(f_1(x_1,.....,x_g), f_r(x_h),..., f_m(x_n)). \tag{3.31}$$

These subutility functions are mutually exclusive and exhaustive subsets and at least one group must contain two or more commodities. Mathematically, a utility is weakly separable if and only if

$$\frac{\left(\partial f_r / \partial x_i\right)\left(\partial f_r / \partial x_j\right)}{\partial x_k} = 0 \quad \text{for} \quad i, j \in n_r \quad k \neq n_r . \tag{3.32}$$

Weak separability allows closely related commodities to be aggregated into groups without losing important properties. Weak separability of preferences also imposes restrictions on consumer behavior that limits the degree of substitution between goods in different groups. To test for weak separability, some studies (Brown, 1993; Lee et al., 1992; Nagaya and Capps,

1994) elect to utilize the technique proposed by Goldman and Uzawa (1964). Their study suggests that the necessary and sufficient condition for weak separability is that the off-diagonal terms of the Slutsky substitution matrix are proportional to the income derivatives of the two separable goods. As a consequence of separable preferences, cross-substitution terms become

$$s_{ij} = \phi_{GH}\left(\frac{\partial x_i}{\partial m}\right)\left(\frac{\partial x_j}{\partial m}\right) \qquad i \in G,\ j \in H,\ \text{and}\ G \neq H. \tag{3.33}$$

The parameter ϕ_{GH} is a factor of proportionality, summarizing the interrelationships between groups I and J. Multiplying both sides of (3.33) by $p_i p_j / m$ one obtains

$$\pi_{ij} = \left(\frac{p_i p_j}{m}\right) s_{ij} = \phi_{GH}\theta_i\theta_j . \tag{3.34}$$

Block-wise dependence is a special case of weak separability. Under conditions (3.31) the change of marginal utility of a dollar spent on the i^{th} good $\left(i \in S_G\right)$caused by an extra dollar spent on the j^{th} good which belongs to a different groups equals to a_{GH},

$$\frac{\partial u^2}{\partial(p_i q_i)\partial(p_k q_k)} = a_{GL} \quad i \in G, k \in L, G \neq L \ \text{(Theil 1976).} \tag{3.35}$$

This effect is independent of goods *i* and *k*, which implies the result is the same for all pairs of commodities in the selected groups. Thus if orange juice and fruit juice are weakly separable groups, an extra dollar spent on either Brand A or Brand B orange juice has the same effect on the marginal utility of a dollar spent on any brand in the fruit juice category. Therefore, utility interaction of two products in different groups is dependent of groups rather than individuals goods (Theil, 1979, 1980).

According to Strotz (1957) and Gorman (1959) the separability property yields appealing behavioral interpretation regarding the consumer allocation problem and simplifies the decision-

making process. Multistage budgeting is a common practice implies that consumers' can allocate expenditure in multiple stages; at the first stage, expenditures are allocated to broad groups of goods and the second and lower stages, require group expenditure to be allocated across individual commodities (de Janvry, Bieri and Nunez 1972; Richards, Van Ispelen, and Kagan 1997; Edgerton 1997;.

The simplest form of multistage budgeting contains two stages. Both of these allocations have to be perfect in the sense that the results of two-stage budgeting must be identical to what would occur if the allocation were made in one step with complete information. At the first stage, allocation requires knowledge of total expenditure and appropriately defined group prices, while at the second stage, individual expenditures must be functions of group expenditure and prices within the group only. The second stage corresponds to a utility maximization problem of its own because weak separability implies that decisions are independent of commodities outside of a specified group. Thus, the conditional, Marshallian sub-group, demand functions that are derived are written as:

(3.36) $$g_i = x_{fi}(m_f, p_1, p_2) \quad i = 1, 2.$$

Conditional demand functions are derived from a standard utility maximizing process and possess all the usual properties o

f demand functions.

Consumer demand theory assumes that an individual or household purchases a collection of commodities which maximizes utility subject to a budget constraint. Commodities are distinguishable by their nature, brand or quality; thus separability and two-stage maximization provide the conditions that make theoretical plausible to reduce the number of variables by

grouping together some of the commodities, representing the quantities and prices of the members of each group by a quantity-index and a price-index.

The Rotterdam Model

The differential demand model, developed by Barten (1964) and Theil (1965, 1975, 1980(a,b)) is based not on a particular utility function but, more generally, on a first-order approximation to the demand functions themselves. The Rotterdam model is derived from the maximization of a general utility function or total differentiation of a general demand function, using economic theory to describe the demand for goods given income and prices faced by the consumer. The Rotterdam model can be extended to include marketing variables such as promotions or any other elements of the marketing mix (Clements and Selvanathan 1988; Duffy 1987; Brown and Lee 1997, 2006, 2007; Gao and Lee 1995; Theil 1980 (a,b)). Using theoretical framework for the Rotterdam model is developed in equation (3.7) this can be written as

(3.38) $$w_i q_i d(\log q_i) = \theta_i d(\log Q) + \sum_j \pi_{ij} d\left(\log p_j\right) + \sum_j \sum_k \beta_{ij} d \log a_j^k$$

where $w_i = p_i\, q_i / m$ is the budget share for good i; $\theta_i = p_i\, \partial q_i / \partial p_i$ is the marginal propensity to consume; $d\left(\log Q\right) = \sum_i w_i d \log q_i$ is the Divisia volume index; $\pi_{ij} = \left(p_i\, p_j / m\right) s_{ij}$ is the Slutsky coefficient, with $s_{ij} = \partial q_i / \partial p_i + q_j \partial q_i / \partial m$ or the element in the i^{th} row and j^{th} column of the substitution matrix; $\beta_{ij} = w_i\left(\partial \log q_i \big/ \partial \log a_j^k\right)$ is a promotional tactic coefficient indicating the impact of the k^{th} tactic used in promoting product j on the demand for product i. The general restrictions on demand are

(3.39a) Adding up: $\sum_i \theta_i = 1; \quad \sum_i \pi_{ij} = 0 \sum_k \beta_{ij}^k = 0;$

(3.39b) Homogeneity: $\sum_i \pi_{ij} = 0;$

(3.39c) Symmetry: $\pi_{ij} = \pi_{ji}$.

Baten's findings from equation (3.7) are then used to define $\beta_{ij}^{k} = \pi_{ij}\gamma_{hj}^{k}$. Specifically, Barten suggests the effect of the promotion is as follows

(3.7b) $$\frac{\partial q_i}{\partial z_j^k} = -S\left(\frac{1}{\lambda}\right)V$$

where λ is the marginal utility of income; S is the *nxn* substitution or Slutsky matrix and $V = \left(\frac{\partial u^2}{\partial q_i \partial z_k}\right)$. Therefore,

(3.40a) $$\frac{\partial q_i}{\partial z_j^k} = -\left(\frac{1}{\lambda}\right)s_{ij}v_{jk}\text{, or}$$

(3.40b) $$\frac{p_i x_i}{m}\left(\frac{\partial q_i}{\partial a_k}\right)\left(\frac{a_k}{q_i}\right) = -\left(\lambda u^{ij} - \frac{\lambda}{\partial\lambda/\partial m}\frac{\partial q_i}{\partial m}\frac{\partial q_j}{\partial m}\right)\frac{1}{\lambda}\left(\frac{\partial^2 u}{\partial q_i \partial z_j^k}\right)\text{, or}$$

(3.40c) $$w_i\left(\frac{\partial d\log q_i}{\partial d\log a_j^k}\right) = -\sum_h \pi_{ih}\gamma_{hj}^{k}\ .$$

Assuming that promotional tactics only affect the marginal utility of the brand in question, the coefficient of the promotional variable is written as $\beta_{ij}^{k} = \pi_{ij}\gamma_{jj}^{k}$. Furthermore, Theil (1980) restricted the k^{th} promotional tactic to have the identical efect across all brands which suggests that $\gamma_{jj}^{k} = \gamma^{h}$. Hence, $\beta_{ij}^{k} = \pi_{ij}\gamma^{k}$, and the final model is written as

(3.41) $$w_i d(\log q_i) = \theta_i d(\log Q) + \sum_{j=1}^{N}\pi_{ij}\left(d\log p_j - \gamma^k da_j^k\right)\ i=1,\ldots,n$$

The demand elasticities can be calculated using the parameters of the Rotterdam model in equation (3.46) as:

(3.42a) compensated price: $\varepsilon_{ij} = \left(\pi_{ij}/w_i\right)$

(3.42b) income: $\eta_i = \left(\theta_i/w_i\right)$

(3.43c) promotional elasticity: $\dfrac{d\log q_i}{d\log a_j^k} = \left(\pi_{ij}\gamma^k a_{ik}\right)/\, w_i = \varepsilon_{ij}\gamma^k a_{ik\,/}$

Aggregation Issues

Data available for empirical analysis is usually aggregated over households or individuals, but consumer demand theory is formulated for individual households. The transition from the microeconomics of consumer behavior to the analysis of market demand is frequently referred to as the aggregation over individual problem. Aggregation prevents a straightforward application of the theory to the data; therefore, aggregation theory provides necessary conditions under which it is possible to treat aggregate consumer behavior as if it were the outcome of the decisions of a single maximizing consumer; this case we shall refer to as that of exact aggregation. Some economists possess the view that microeconomic theory has greater relevance for aggregate data, arguing that the variations households average out to negligible proportions in aggregate, leaving only the systemic effects of variations in prices and budgets (Hicks, 1956).

The Rotterdam model is selected for this analysis because it is consist with consumer demand theory and allows advertising variables to be incorporated directly into the utility functions. This model also lends itself to empirically test for separability within commodity groups without imposing additional a priori restrictions. Separability is used in empirical studies to limit the number of estimable parameters. This approach conveys important information regarding the condition for dividing commodities into groups or aggregates and relays information on how consumers allocate expenditures within in each group.

CHAPTER 4
DATA SOURCE AND DESCRIPTIVE STATISTICS

This chapter includes a discussion of the data set used to estimate demand interrelationships between brands of orange juices, fruit juices, and fruit drinks. This section will provide an overview of the data utilized this analysis as well as important descriptive statistics.

Data Sources

The availability of scanner data, data electronically collected at the stores or distribution locations containing price and volume information, has revolutionized the manner in which supermarkets operate and has provided substantial advances in food marketing (Capps 1989; Nayga 1992; Cotterill 1994, 2004; Baron and Lock 1995; Capps and Love 2002; Jensen 2002). Store/supermarket level scanner data, data collected from a national representative survey of stores, offers researchers new opportunities because the data contains measures of product flow through supermarkets and projects product movement in physical units, market share, prices, and merchandising activities within a trading area. Merchandising activity includes, but is not limited to, the percent of a product sold using in-store displays, the percent sold when product appeared in feature advertisements, and the percent of a product sold using price reductions. Using supermarket/store level data, researchers have conducted numerous market and consumer demand studies supplying members of the food industry with a wealth of information on firm behavior, consumer purchase patterns, and brand and product characteristics (Guadagni and Little 1983; Capps 1989; Capps and Nayga 1989; Abraham and Lodish 1993). Regardless of its richness, scanner data has several challenges and limitations (Capps 1989; Baron and Lock 1995): (a) the lack of household and consumer information, (b) the exclusion of foods consumed away from home, and (c) sheer volume of information. Despite these limitations, scanner data has provided food manufacturers, retailers, and policymakers with significant information,

enabling them to understand industry structure and the impact of price, promotion and other marketing variables on sales and share of various products.

Separability Model

ACNielsen weekly scanner data containing unit sales and sales dollars information for all brands of orange juice, fruit juices, and fruit drinks sold in 12 grocery accounts with stores earning $2 million or more in annual sales were analyzed to aid in the understanding of demand relationship among beverages. The period starting July 3, 2004 through the week ending in August 26, 2006 (104) was studied. Data were 52^{nd} differenced to account for seasonality (for the 52 weeks in the year). For simplification purposes, brands possessing less than five % of the market share within orange juice, fruit juice, and fruit drink categories were not included in the study. Thus, four brands of orange juice: Florida's Natural, Minute Maid, Private Label, and Tropicana; five brands of fruit juices: Minute Maid, Private Label, Sunny D, Tropicana, and Welch's; and six brands of fruit drinks: Capri Sun, Gatorade, Hi-C, POWERade, Sunny D, and Tropicana are utilized to empirically test for separability between orange juice, fruit juice, and fruit drinks.

In this study, 52 % of consumers' beverage expenditure was spent on orange juice brands represented by the shades of green in Figure 4-1. Nine percent of consumers' budget was allocated to fruit juices and expenditure share on fruit drinks was 29 % (shades of orange and purple, respectively). Tropicana orange juice was the dominant brand and Gatorade followed in second accounting for 21 % of the expenditure share. Average prices are derived by dividing total sales by total units. The average price for the beverage brands varied from $2.88 per gallon for Tropicana orange juice to $1.24 per gallon for private label fruit drinks. During the study period, the price of all orange juice brands increased while the majority of fruit juice brands and fruit drink brands had price decreases. The price of Welch's and Minute Maid fruit juices

increased by 6 % and 2 % during June 23, 2004 and December 23, 2006 and Capri Sun (fruit drink) increased 2.5 % during the study period (Table 4-1). Despite the average price increases in orange juice, all brands except Florida's Natural had increases in the quantity purchased.

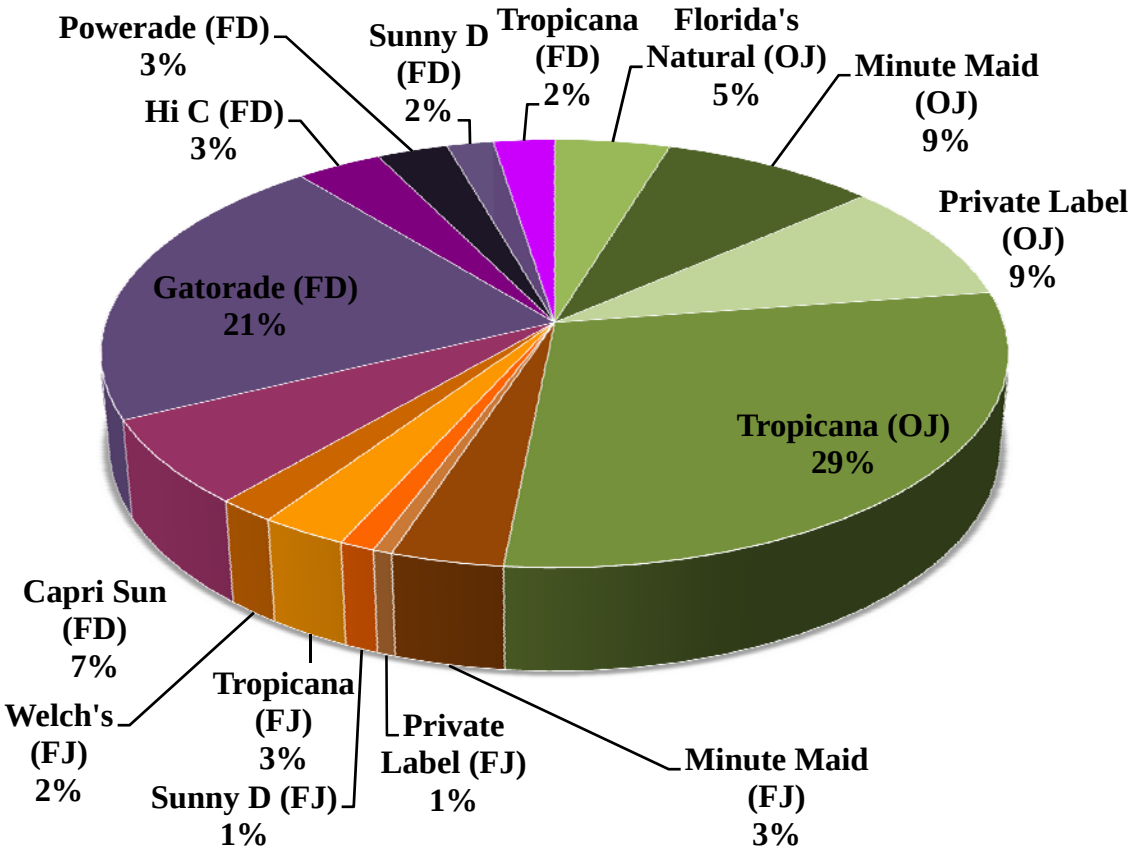


Figure 4-1. Separability model expenditure share, by brands

Table 4-1. Separability model descriptive statistics

Category	Product	Sales in Gallons	Sales in Dollars	Average Price	Change in Quantity		Change in Price	
					Mean	Std Dev	Mean	Std Dev
Refrigerated Orange Juice	Florida's Natural	532,110	$ 1,255,539	$ 2.43	-0.158	0.616	0.062	0.125
	Minute Maid	944,844	$ 2,322,781	$ 2.49	0.056	0.343	0.026	0.102
	Private Label	1,210,289	$ 2,398,541	$ 1.99	0.042	0.323	0.043	0.100
	Tropicana	2,650,117	$ 7,578,910	$ 2.88	0.049	0.192	0.004	0.096
Refrigerated Fruit Juices	Minute Maid	591,581	$ 939,263	$ 1.66	0.088	0.279	0.060	0.104
	Private Label	126,701	$ 153,486	$ 1.24	0.122	0.277	-0.084	0.154
	Sunny D	176,047	$ 300,978	$ 1.82	0.156	0.485	-0.056	0.221
	Tropicana	411,254	$ 715,546	$ 1.80	0.236	0.318	-0.047	0.125
	Welch's	209,479	$ 466,297	$ 2.24	0.205	0.213	0.017	0.057
Shelved Fruit Drinks	Capri Sun	844,834	$ 1,733,512	$ 2.07	0.055	0.369	0.025	0.112
	Gatorade	2,570,844	$ 5,686,573	$ 2.26	0.240	0.323	-0.004	0.175
	Hi C	488,639	$ 936,122	$ 1.93	0.092	0.297	-0.025	0.057
	POWERade	547,802	$ 779,184	$ 1.49	0.463	0.422	-0.129	0.116
	Sunny D	338,069	$ 512,474	$ 1.63	0.413	0.486	-0.084	0.204
	Tropicana	417,975	$ 671,974	$ 1.62	-0.081	0.300	-0.011	0.071

Promotional Model

Retailer X

The $400 billion grocery industry includes about 40,000 companies that operate 70,000 grocery stores. This industry is highly concentrated with the 50 largest companies controlling about 70 % of the market. Retailer X represents a major grocery retailer whose strategy is to provide consumers with quality products, superb customer service and an enriching shopping experience.

ACNielsen aggregated scanner data set for Retailer X consists of unit sales, prices, feature ads, displays, and temporary price reduction information in terms of %ACV for all brands of refrigerated and shelved orange and grapefruit juice and fruit drinks sold during the study period, July 7, 2004 through December 30, 2006 (122 weeks). The data was 52nd difference to account for seasonality. To simplify the data set, brands controlling less than 5% of market share were omitted from the study to eliminate aggregation bias. This study consists of three brands of orange juice: Private Label, Minute Maid, and Tropicana; five brands of fruit juices: Minute Maid, Private Label, Welch's, Sunny D, Tropicana; and six brands of fruit juices: Tropicana, Capri Sun, Gatorade, Minute Maid, POWERade, Kool-Aid, and Snapple. These brands are used to examine the impact of marketing variables on beverage demand.

According to expenditure share values, the majority of consumers' beverage expenditures were spent on orange juice beverages, and Gatorade was the leading product sold by Retailer X. Tropicana, Private Label, and Minute Maid orange juices are also major brand sold at Retailer X. Tropicana orange juice had the highest average unit price among all beverage brands included in the study, while POWERade had the lowest average price (Table 4-3). Significant price changes occurred during the study period, most noticeably, the price of Private Label orange juice increased by 10 % during the study period and the price of Gatorade and POWERade

declined 15 % and 11 % during this period. Given average price increases Gatorade and POWERade, the quantity purchased dramatically decreased 32 % and 18 %, respectively. A temporary price reduction (TRP) was the promotional tactic used most by Retailer X to stimulate short term consumption. Gatorade was heavily promoted using TPRs during the study period; its TRP level was also the highest among the four promotional tactics studied. Features and display ads were used least by Retailer X (Table 4-3).

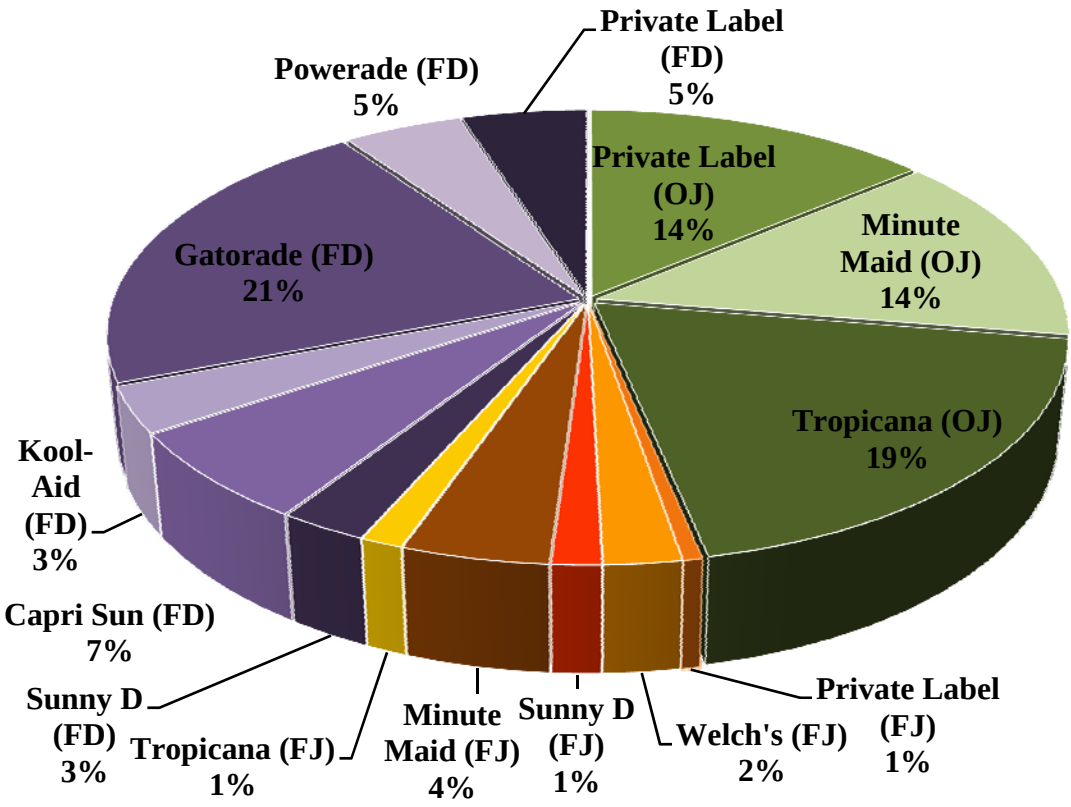


Figure 4-2. Retailer X expenditure share by brands

Table 4-2. Retailer X descriptive statistics

Category	Product	Sales in Gallons	Sales Dollars	Average Price	Change in Prices		Change in Quantity	
					Mean	Std Dev	Mean	Std Dev
Orange Juice	Private Label	31,591,456	$ 59,008,166	$ 1.90	0.101	0.127	-0.112	0.207
	Minute Maid	21,388,603	$ 58,935,820	$ 2.82	0.049	0.162	0.032	0.323
	Tropicana	26,672,125	$ 81,484,815	$ 3.15	0.061	0.144	- 0.022	0.277
Fruit Juices	Private Label	1,406,037	$ 2,389,645	$ 1.71	0.087	0.137	0.110	0.372
	Welch's	4,721,448	$ 9,766,917	$ 2.08	0.015	0.074	0.156	0.203
	Sunny Delight	3,791,333	$ 6,291,619	$ 2.02	0.117	0.351	-0.147	0.742
	Minute Maid	11,866,118	$ 18,755,525	$ 1.72	0.061	0.100	0.056	0.285
	Tropicana	2,021,010	$ 5,285,822	$ 2.68	0.174	0.143	-0.186	0.371
Fruit Drinks	Sunny D	8,230,703	$ 11,411,946	$ 1.75	0.055	0.307	0.018	0.800
	Capri Sun	14,679,702	$ 28,226,720	$ 1.95	-0.056	0.198	0.000	0.413
	Kool-Aid	11,126,289	$ 14,338,964	$ 1.30	-0.070	0.141	-0.022	0.212
	Gatorade	50,999,381	$ 93,499,073	$ 2.03	-0.107	0.347	0.323	0.538
	POWERade	16,310,503	$ 20,630,560	$ 1.35	-0.146	0.111	0.181	0.273
	Private Label	17,716,796	$ 21,588,916	$ 1.22	0.026	0.043	0.031	0.117

Table 4-3. Retailer X promotional activities sample statistics (in % ACV)

Category	Product	Feature	Display	F&D
Orange Juice	Private Label	47.07	11.19	6.97
	Minute Maid	31.07	8.59	8.7
	Tropicana	36.17	13.9	12.97
Fruit Juices	Private Label	0.97	1.46	0.01
	Welch's	7.67	0.79	0.44
	Sunny Delight	5.19	8.56	5.33
	Minute Maid	22.24	7.29	2.81
	Tropicana	0	3.53	0
Fruit Drinks	Sunny D	10.29	14.2	7.2
	Capri Sun	17.53	22.36	11.1
	Kool-Aid	16.3	10.54	5.71
	Gatorade	35.76	46.83	27.2
	POWERade	13.39	20.16	5.4
	Private Label	16.84	17.63	2.37

Retailer Z

Retailer Z represents a discount grocery retailer whose strategy is to provide consumers with low prices. ACNielsen aggregated scanner data set for Retailer Z contains unit sales, prices, feature ads, displays, and temporary price reduction information in terms of %ACV for all brands of refrigerated and shelved orange and grapefruit juice and fruit drinks sold during the study period, July 3, 2004 through June 26, 2006 (104 weeks). The data was 52nd difference to account for seasonality. To simplify the data set, brands controlling less than five % of market share were omitted from the study to eliminate aggregation bias. This study consists of three brands of orange juice: Florida's Natural, Minute Maid, and Tropicana; six brands of fruit juices: Minute Maid, Newman's Own, Turkey Hill, Vita J, Private Label, Welch's, Tropicana; and five brands of fruit juices: Capri Sun, Gatorade, Minute Maid, POWERade, and Snapple which are used to assess the influence of marketing variables on beverage demand.

According expenditure share values, the majority of consumers' beverage expenditures were spent on orange juice beverages, and Tropicana orange juice was the leading product sold by Retailer Z (Figure 4-4). Gatorade and Tropicana orange juice had the highest average unit prices among all beverage brands included in the study, while Vita J and POWERade were among the lowest priced brands. During the study period, Tropicana (fruit juice) prices were the most volatile decreasing by 19 % during June 23, 2004 and December 23, 2006. Minute Maid orange juice consumption increased considerably, 22 %, during the study period while Newman's Own experienced a significant decline in consumption. Temporary price reductions are the dominant promotional tactic used by Retailer Z. Tropicana orange juice and fruit juice were the most heavily promoted brand of beverage and temporary price reduction was the method of choice. Display and feature advertisements were the promotional schemes least used by Retailer Z.

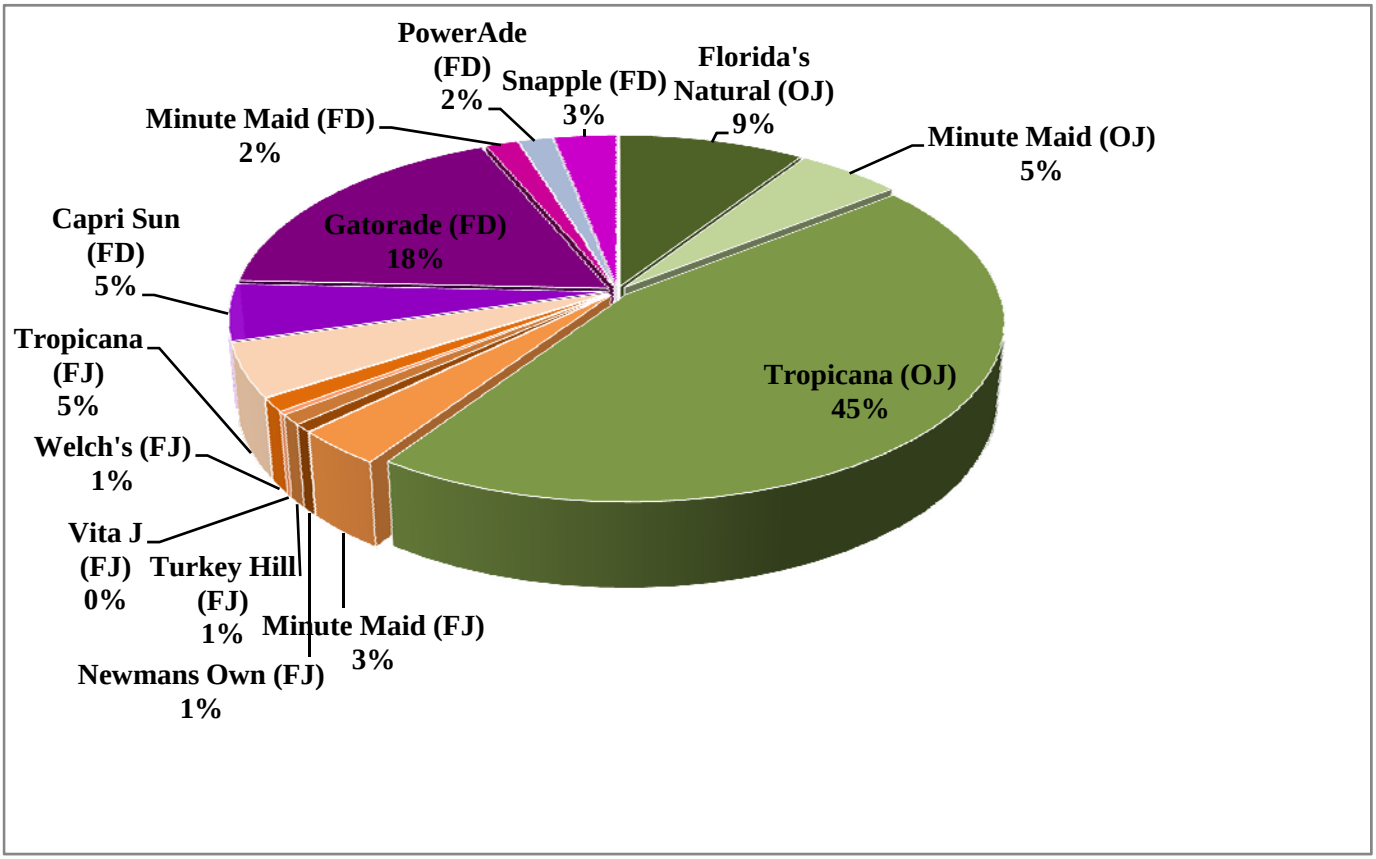


Figure 4-3. Retailer Z expenditure share by brands

Table 4-4. Retailer Z sample statistics

Category	Brand	Sales in Gallons	Sales in Dollars	Avg. Price	Change in Price		Change in Quantity	
					Mean	Std. Dev.	Mean	Std. Dev.
Orange Juice	Florida's Natural	1,070,066	$ 2,496,923	$ 2.96	0.084	0.372	-0.220	1.616
	Minute Maid	635,190	$ 1,420,408	$ 2.52	-0.084	0.255	0.331	1.074
	Tropicana	4,187,957	$ 12,178,598	$ 3.07	0.010	0.243	-0.062	0.534
Fruit Juices	Minute Maid	547,338	$ 910,800	$ 1.81	-0.052	0.203	0.168	0.555
	Newman’s Own	78,345	$ 181,291	$ 2.34	0.095	0.140	-0.359	1.063
	Turkey Hill	112,175	$ 242,078	$ 2.30	0.021	0.188	0.001	0.392
	Vita J	103,535	$ 69,811	$ 0.71	-0.114	0.227	0.051	0.359
	Welch's	137,696	$ 334,634	$ 2.65	0.021	0.211	-0.007	0.617
	Tropicana	792,111	$ 1,303,154	$ 1.91	-0.195	0.360	0.607	0.741
Fruit Drinks	Capri Sun	652,389	$ 1,399,403	$ 2.71	0.086	0.288	-0.252	0.796
	Gatorade	1,884,723	$ 4,948,745	$ 3.09	0.024	0.316	0.158	0.579
	Minute Maid	209,554	$ 420,766	$ 2.04	0.043	0.166	-0.333	0.340
	POWERade	390,998	$ 456,734	$ 1.54	-0.061	0.227	0.262	0.614
	Snapple	384,190	$ 839,048	$ 2.11	0.150	0.347	-0.181	0.317

Table 4-6. Retailer Z sample statistics for promotional activities (in % ACV)

Category	Brand	Feature	Display	F&D
Orange Juice	Florida's Natural	31.44	6.90	13.62
	Minute Maid	19.40	1.54	4.98
	Tropicana	68.81	14.98	26.77
Fruit Juices	Minute Maid	17.15	6.40	3.21
	Newman's Own	0.00	0.00	0.00
	Turkey Hill	1.85	3.60	0.08
	Vita J	8.94	1.13	1.13
	Welch's	5.75	1.08	0.83
	Tropicana	7.65	7.48	1.65
Fruit Drinks	Capri Sun	21.65	7.87	13.94
	Gatorade	29.08	24.54	14.44
	Minute Maid	3.25	1.04	0.00
	POWERade	10.31	4.50	1.46
	Snapple	31.02	6.13	10.77

The three data sets discussed in this chapter were collected by AC Nielsen. The data is used to estimate three Rotterdam model. The results from the models will be used to make inferences on the structure of the fruit juice/drink market, beverage demand relationships, and the influence of marketing variable on beverage demand. This study will have multiple marketing implications which can be utilized to better understand and position juice products.

CHAPTER 5
EMPIRICAL MODEL

Given the theoretical framework developed in Chapter 3, this chapter includes a discussion of the empirical models used to test for separability within the fruit juice/drink market, to estimate demand interrelationships between various brands of orange juices, fruit juices, and fruit drinks; and to estimate the impact of retail promotions on beverage demand . Two different empirical models are developed in order to accomplish the previously mentioned objectives. The first model tests for separability within the U.S. fruit juice market. The second model is developed to analyze the influence of promotional strategies on the demand for orange juice, fruit juice, and fruit drinks at two stores adopting different pricing philosophies. Time Series Processor Program (TSP 5.0) was utilized to estimate the empirical models presented in this sections.

Empirical Models

Separability Model

The absolute version of the Rotterdam model developed by Theil (1975) used to empirically test for separability among refrigerated orange juices, fruit juices, and fruit drinks is written as

(5.1) $$\overline{w}_{it} d\log q_{it} = \theta_i d\log Q + \sum_{j=1}^{N} \pi_{ij} d\log p_{jt}$$

where $\overline{w}_i = \left(w_{it} + w_{i,t-52}\right)/2$ represents the average expenditure share for brand *i* in time period *t*; $d\log q_{ti} = \frac{q_{it}}{q_{i,t-1}}$ represents the log change in the consumption level for brand *i*; $\theta_i = p_i \frac{\partial q_i}{\partial m}$ is the marginal propensity to consume; $d(\log Q) = \sum_{i=1}^{15} \overline{w}_i d\log q_{it}$ is the Divisia volume index;

$\pi_{ij} = \left(\frac{p_i p_j}{m} \right) s_{ij}$ is the compensated price effect and s_{ij} is the Slutsky coefficient, with

$s_{ij} = \frac{\partial q_i}{\partial p_j} + \frac{\partial q_i}{\partial m} q_j$, and $d \log p_{it} = \frac{p_{it}}{p_{i,t-1}}$ representing the log change in the price of brand *i*.

In econometric analyses, time series data usually violates the assumption of independence of errors. In this model (5.1), the Durbin-Watson statistic did indicate the presence of positive autocorrelation. Autocorrelation causes ordinary least squared estimates to no longer be efficient because the variance is not minimized, the R-squared values are overestimated, and the confidence intervals derived for hypothesis testing are wider, increasing the probability of a Type I error (Bence 1995; Greene 2003; Gujarati 2003). The Cochran-Orcutt iterative procedure was used to correct for first order autocorrelation. The first order autoregressive (AR(1)) model is the procedure most widely used to correct for autocorrelation and calculate the value of the coefficient of autocovariance, ρ, because higher order autocorrelation models are exceedingly complex and provide no gains in the efficiency of the estimates (Greene 2003).

Demand equations for fifteen brands were estimated and analyzed in this study. When empirically estimating demand systems, one equation must be omitted to prevent singularity of the variance-covariance matrix of the disturbance terms and the general restrictions of demand theory are directly applied to the parameters of the Rotterdam model in (5.3), specifically:

(5.2 a) Adding up: $\sum_{i=1}^{15} \theta_1 = 1$ and $\sum_{i=1}^{15} \pi_{ij} = 0$

(5.2 b) Homogeneity: $\sum_{j=1}^{15} \pi_{ij} = 0$

(5.2 c) Symmetry: $\pi_{ij} = \pi_{ji}$.

Given the restrictions, parameters for the omitted equations are easily recovered $\theta_{15} = 1 - \sum_{i=1}^{14} \theta_i$

and $\pi_{i15} = 1 - \sum_{j=1}^{14} \pi_{ij}$.

$$w_{it} d\log q_{it} = \rho w_{i,t-1} d\left(\log q_{i,t-1}\right) + \theta_i \left(d\log Q_t - \rho d\log Q_{t-1}\right) + \sum_j \pi_{ij}\left(d\log p_{jt} - \rho d\log p_{j,t-1}\right) + \varepsilon_{it} \quad (5.3)$$

The demand elasticities are calculated using the parameters of the Rotterdam model presented in equation (5.3) as:

(5.4) uncompensated price: $\sigma_{ij} = \left(\pi_{ij} / w_i\right) - w_i \eta_i$

(5.5) compensated price: $\varepsilon_{ij} = \left(\pi_{ij} / w_i\right)$

(5.6) income: $\eta_i = \left(\theta_i / w_i\right)$.

The method popularized Glodman and Uzawa is used to empirically test for block dependence between the selected fruit juice/drink categories. The necessary and sufficient condition for weak separability is that off-diagonal terms in the Slutsky substitution matrix are proportional to the income derivatives of the two separable goods, shown in (5.7)

$$s_{ij} = \phi_{GH}\left(\frac{\partial q_i}{\partial m}\right)\left(\frac{\partial q_j}{\partial m}\right) \quad (5.7)$$

where all $i \in G$ and all $k \in H$ where $s_{ij} = \frac{\partial h_i(p,u)}{\partial p_j} = \frac{\partial g_i(p,m,z)}{\partial p_j} + \frac{\partial g_i(p,m,z)}{\partial m} x_j$, elements of the Slutsky matrix. Therefore, if brands in the fruit drink category are separable from those brands in the orange juice category, then the factor of proportionality, ϕ_{GH}, is the same for all brand combinations within these two categories. Using the parameters estimated in model (5.3) the factor of proportionality is derived as

$$\phi_{GH} = \pi_{ij} / \theta_i \theta_j \quad (5.8)$$.

The model estimated in (5.3) evaluates demand interrelationships and intrarelationships for brands belonging to selected categories within the fruit juice/ drink market. Separability tests are conducted among brands of orange juice, fruit juices and fruit drinks. Brands included in this model and mode codes are shown in Table 5-1. Compensated price effects and income elasticities are also calculated to identify the degree of substitutability between brands. Several transformations that have occurred in the beverage industry and results from this model will provide information on the structure of the fruit juice market. It is expected that major competitors of orange juice are not limited to other breakfast juices, but also sports drinks and single serve juices.

Table 5-1. Separability model codes

Category	Brand	Quantity log changes	Price log changes	Budget Shares	Subscript
Orange Juice	Florida's Natural	$dlogq_1$	$dlogp_1$	w_1	1
	Minute Maid	$dlogq_2$	$dlogp_2$	w_2	2
	Private Label	$dlogq_3$	$dlogp_3$	w_3	3
	Tropicana	$dlogq_4$	$dlogp_4$	w_4	4
Fruit Juices	Minute Maid	$dlogq_5$	$dlogp_5$	w_5	5
	Private Label	$dlogq_6$	$dlogp_6$	w_6	6
	Sunny D	$dlogq_7$	$dlogp_7$	w_7	7
	Tropicana	$dlogq_8$	$dlogp_8$	w_8	8
	Welch's	$dlogq_9$	$dlogp_9$	w_9	9
Fruit Drinks	Capri Sun	$dlogq_{10}$	$dlogp_{10}$	w_{10}	10
	Gatorade	$dlogq_{11}$	$dlogp_{11}$	w_{11}	11
	Hi C	$dlogq_{12}$	$dlogp_{12}$	w_{12}	12
	POWERade	$dlogq_{13}$	$dlogp_{13}$	w_{13}	13
	Sunny D	$dlogq_{14}$	$dlogp_{14}$	w_{14}	14
	Tropicana	$dlogq_{15}$	$dlogp_{15}$	w_{15}	15

Promotional Model

The Rotterdam model allows advertising variables to be directly incorporated into the demand function, making it possible to estimate the effect of promotions on demand (Theil 1980; Clements and Selvanathan 1988; Brown and Lee 2007). The model can be written as

(5.9a) $$w_{it} d\log q_{it} = \theta_i d\log Q + \sum_{j=1}^{N} \pi_{ij} \left(d\log p_{jt} - \sum_k \gamma^k da_{jt} \right), \text{ or}$$

(5.9b) $$w_{it} d\log q_{it} = \theta_i d\log Q + \sum_{j=1}^{N} \pi_{ij} \left(d\log p_{jt} - \gamma^1 dd_{jt} - \gamma^2 df_{jt} - \gamma^3 dfd_{jt} \right) \text{or}$$

(5.9c) $$w_{it} d\log q_{it} = \theta_i d\log Q + \sum_{j=1}^{N} \pi_{ij} pa_{jt}$$

where w_{it}, log $q_{it}, \theta_i, d\log Q, \pi_{ij}$, $d\log p_{jt}, and d\log da_{jt}$ retain the definitions given in the previous model and $d\log d_{jt}, d\log f_{jt}$, and dlog$fd_{jt}$ are the level of promotional tactics for displays, feature advertisements, and a combination of feature and displays, respectively. Equation (5.9a) is simplified in equation (5.8b) where $d\log pa_{jt} = d\log p_{jt} - \gamma^1 dd_{jt} - \gamma^2 df_{jt} - \gamma^3 dfd_{jt}$ and represents the perceived price. The level of each promotional tactic is measured by the percentage of all commodity volume (ACV). The coefficient γ^k symbolizes the impact of promotional tactic *k* on the marginal utility of beverage *j*. This coefficient is expected to be positive because retailers use promotional tactics to encourage consumption or demand. This model imposes the restrictions on the parameter γ^k to reduce the number of parameter estimated, ensure the results are reliable, and to prevent the loss of all degrees of freedom. Specifically, γ^k is assumed to remain constant across all beverage brands, as found in studies conducted by Theil (1980) and Brown and Lee (2007).

Both the retailer adopting a non-price competitive philosophy (Retailer X) and the discount retailer implementing a price competitive strategy (Retailer Y) contain 14 brands. Thus, the same model is used to analyze the impact of promotional strategies on beverage demand. Positive autocorrelation was also detected in the demand equations estimated in equation (5.8). The Cochran-Orcutt method was used to correct for first order autocorrelation. The AR(1) model is a follows:

$$w_{it} d\log q_{it} = \rho w_{i,t-1} d\left(\log q_{i,t-1}\right) + \theta_i \left(d\log Q_t - \rho d\log Q_{t-1}\right) + \sum_j \pi_{ij}\left(d\log pa_{jt} - \rho d\log pa_{j,t-1}\right) + \varepsilon_{it} \quad (5.10)$$

The equation associated with the 14th brand is omitted to prevent singularity of the variance-covariance matrix of the disturbance terms and the general restrictions of demand theory are directly applied to the parameters of the Rotterdam model in (5.9), specifically,

(5.11 a) Adding up: $\sum_{i=1}^{14} \theta_1 = 1$ and $\sum_{i=1}^{14} \pi_{ij} = 0$

(5.11 b) Homogeneity: $\sum_{j=1}^{14} \pi_{ij} = 0$

(5.11c) Symmetry: $\pi_{ij} = \pi_{ji}$

The uncompensated and compensated price elasticities and the income elasticities are calculated in the same manner discussed in equations using the parameters of the Rotterdam model presented in equations (5.4), (5.5), and (5.6), respectively. Promotional elasticities are derived as follows:

(5.12) promotional elasticity: $\dfrac{\partial \log q_i}{\partial \log a_j^k} = -(\pi_{ij}\gamma^k / w_i)\, a^k$.

Compensated price elasticities make it possible to identify substitutes or complements of the brands of orange juice, fruit juice and fruit drinks included in this study. Brands included in

the Rotterdam model for Retailer X and Retailer Z are included Tables 5-2 and 5-3, respectively. In addition, income and promotional elasticities are also estimated. Since elasticities are specific to a supermarket account and each retailer imposes a different pricing philosophy, one can determine the influence the store's strategy has on promotions. For example, shoppers at "everyday low price" stores may be more responsive to temporary price reductions than shoppers at stores focusing on providing quality products that do not compete so heavily on price. Additionally, this study will be able to assess if brand promotions increase the demand for a brand advertisements. This study will also provide information regarding the relationship between of the leading brands of fruit juice beverages, the effectiveness of promotional strategies and the impact of one brand's promotions on the demand for complementary and substitutable products.

Table 5-2. Retailer X variable description

Category	Brands	Quantity log changes	Price log changes	Budget Shares	Codes
Orange Juice	Private Label	$dlogq_1$	$dlogp_1$	w_1	1
	Minute Maid	$dlogq_2$	$dlogp_2$	w_2	2
	Tropicana	$dlogq_3$	$dlogp_3$	w_3	3
Fruit Juices	Private Label	$dlogq_4$	$dlogp_4$	w_4	4
	Welch's	$dlogq_5$	$dlogp_5$	w_5	5
	Sunny Delight	$dlogq_6$	$dlogp_6$	w_6	6
	Minute Maid	$dlogq_7$	$dlogp_7$	w_7	7
	Tropicana	$dlogq_8$	$dlogp_8$	w_8	8
	Sunny D	$dlogq_9$	$dlogp_9$	w_9	9
Fruit Drinks	Capri Sun	$dlogq_{10}$	$dlogp_{10}$	w_{10}	10
	Kool-Aid	$dlogq_{11}$	$dlogp_{11}$	w_{11}	11
	Gatorade	$dlogq_{12}$	$dlogp_{12}$	w_{12}	12
	POWERade	$dlogq_{13}$	$dlogp_{13}$	w_{13}	13
	Private Label	$dlogq_{14}$	$dlogp_{14}$	w_{14}	14

Table 5-3. Retailer Z codes

Category	Brand	Quantity log changes	Price log changes	Budget Shares	Codes
Orange Juice	Florida's Natural	$dlogq_1$	$dlogp_1$	w_1	1
	Minute Maid	$dlogq_2$	$dlogp_2$	w_2	2
	Tropicana	$dlogq_3$	$dlogp_3$	w_3	3
Fruit Juices	Minute Maid	$dlogq_4$	$dlogp_4$	w_4	4
	Newman's Own	$dlogq_5$	$dlogp_5$	w_5	5
	Turkey Hill	$dlogq_6$	$dlogp_6$	w_6	6
	Vita J	$dlogq_7$	$dlogp_7$	w_7	7
	Welch's	$dlogq_8$	$dlogp_8$	w_8	8
	Tropicana	$dlogq_9$	$dlogp_9$	w_9	9
Fruit Drinks	Capri Sun	$dlogq_{10}$	$dlogp_{10}$	w_{10}	10
	Gatorade	$dlogq_{11}$	$dlogp_{11}$	w_{11}	11
	Minute Maid	$dlogq_{12}$	$dlogp_{12}$	w_{12}	12
	POWERade	$dlogq_{13}$	$dlogp_{13}$	w_{13}	13
	Snapple	$dlogq_{14}$	$dlogp_{14}$	w_{14}	14

CHAPTER 6
RESULTS

The results from the Rotterdam models used to test for separability within the juice/drink market and the impact of promotions on the demand for beverages in this category are presented in this chapter. Results from the separability model provide information on demand relationship and the structure of the fruit juice/drink market. This study also compares and contrasts the impact of promotion across two stores adopting different pricing philosophies. Retailer X represents a major grocery retailer whose strategy is to provide consumers with quality products, superb customer service and an enriching shopping experience. Retailer Z represents a discount grocery retailer whose strategy is to provide consumers with low prices. Parameter estimates associated with the Separability Model, Retailer X Model, and Retailer Z Model are shown in Appendix A, B, and C, respectively.

Separability Model

In an effort to understand the structure of the beverage industry, tests were run to see if block-wise dependence amongst beverage categories exists. The Wald Test was used to test for separability within the beverage category and results from the separability tests are exhibited in Table 4- The hypothesis of block-wise dependence suggests that the specific cross price effect between any two products in two different product groups is identical for all pairs of products in the two groups. The hypothesis of block dependence is rejected (Table 6-1), which implies that equation (5.8) does not hold. The factor of proportionality, ϕ_{GH}, is not identical for all brand combinations within the two categories in question (i.e. orange juice and fruit juice), hence, one can conclude that products belonging to different product categories are competitors; hence, orange juice is not only competing with the breakfast juices, but with brands in other fruit market

categories. Since block dependence is rejected, it is not plausible to believe that block independence, a stronger hypothesis will hold and test for block independence were not run.

Table 6-2. Separability results

Categories	Chi-Squared	Test Statistic	df	P-value
Orange Juice (OJ) and Fruit Juice (FJ)	1992.21	45.32	20	0.000
Orange Juice and Fruit Drinks	467.71	49.73	23	0.000
Fruit Juice and Fruit Drinks (FD)	568.47	59.70	30	0.000

Block-wise dependence directly impacts specific effect of the Slutsky equation which is partly determined by the marginal relationship between goods *i* and *j*. Block-wise dependence suggests the specific effect is identical for all products in groups *i* and *j*. Rejecting the block-wise dependence hypothesis suggests that the change in marginal utility of a dollar spent on a product caused by an extra dollar spent on another product is not the same for all pairs of products within the same category. Thus, consumers do not perceive brands within a category as the same and brands to influence consumers' purchases. This result also suggests that a change in the marginal utility of a dollar spent on a brand in one product group caused by an extra dollar spent on another brand in a different product category varies for each combination of brands within the two categories. Thus, an extra dollar spent on any brand of orange juice (i.e. Tropicana) affects the marginal utility of another dollar spent on any brand in the fruit drinks category (i.e. Gatorade). In conclusion when analyzing the demand for beverages, brand managers should not focus solely other breakfast juices or other isotonics, but one must focus on all beverage simultaneously.

Promotional Models

Retailer X

Econometric estimates associated with the autoregressive model are shown in Appendix B- The marginal expenditure shares (θ_i) for all beverage brands are positive and significantly different from zero. These values range from 0.004 (Private Label fruit juice) to 0.373 (Gatorade). Summing the across marginal expenditure share within each category, orange juice sales increases 28% given a one dollar increase in beverage expenditures, fruit juices increase 9% and fruit drinks increase by 63%. As suggested by theory, all own compensated price coefficients are negative and statistically significant (Appendix B Table B-2). Slutsky coefficients measure the net substitution effect of a change of the i^{th} product given a change in the price of the j^{th} good holding income constant. As discussed in Chapter 3 the sign of the slutsky coefficient, π_{ij}, determines the relationship between *i* and *j* which provides information on the structure of the market. Products are net substitutes when π_{ij} is positive and net complements when π_{ij} is negative. Based upon that compensated price coefficients one can concludes that brands compete with products within the same category, as well as products in the other categories.

Expenditure and cross price elasticities also provide insights on the structure of the fruit juice market and demand relationships. All expenditure elasticities are estimates at the sample mean and vary from 0.423 (Minute Maid orange juice) to 1.878 (Gatorade) suggesting consumers perceive some beverages as necessities and others as luxury goods (Table 6-3). For example, Retailer X's private label beverages in the orange juice, fruit juice, and fruit drinks categories are perceived as necessities and fruit drinks such as Sunny Delight, Capri Sun, Gatorade, and POWERade are viewed as luxury products. The expenditure elasticities for the

luxury goods are in the elastic range suggesting that consumers have a strong preference for this goods-hence luxury goods. The income elasticities for both necessities and luxury goods are positive, but the demand for luxury goods is more responsive to changes in income. Thus, as consumer's expenditures increases by one more than one percent of their increased income would be allocated to the luxury products. As a result of the increased expenditures, the orange juice industry would be worse off relative to the fruit juice and fruit drink markets because consumers would purchase more of the luxury goods for which they have a stronger preference. For example, as income increase by 1% the expenditure on Private Label, Minute Maid, and Tropicana orange juice increase by 68%, 42%, and 65%, respectively. However, Sunny Delight, Capri Sun, Kool-Aid, and Gatorade (fruit drinks) increase 104%, 131%, 141%, and 188% given a 1% increase income. Results from the separability test suggest that consumer have an expenditure budget and the all beverages are competing for a share of the budget. Thus, as expenditure increase, expenditure share on brands of fruit drinks and fruit juices will increase because more consumers are coming into the market.

Table 6-3. Retailer X Expenditure Elasticities

Categories	Brands	Estimate	Std. Error	P-value
Orange Juice	Private Label	0.684	0.093	[.000]
	Minute Maid	0.423	0.084	[.000]
	Tropicana	0.652	0.076	[.000]
Fruit Juice	Private Label	0.827	0.165	[.000]
	Welch's	0.868	0.133	[.000]
	Sunny Delight	1.095	0.174	[.000]
	Minute Maid	0.905	0.078	[.000]
	Tropicana	0.650	0.108	[.000]
Fruit Drinks	Sunny Delight	1.040	0.325	[.001]
	Capri Sun	1.318	0.186	[.000]
	Kool-Aid	1.414	0.200	[.000]
	Gatorade	1.878	0.178	[.000]
	POWERade	0.970	0.167	[.000]
	Private Label	0.843	0.096	[.000]

Compensated price elasticities include the income effect and determine if two products are net substitutes or complements. Net complements are negative and statistically significant compensated cross price elasticities. Whereas, net substitutes have positive and statistically significant compensated cross price elasticities. All the fourteen own price elasticities were significant and all of the products except private label fruit juice were in the elastic range. The own price elasticity values range from -0.926 (Private label FD) and -2.827 (Sunny Delight FD). Seventy-nine percent of the cross price elasticities were significant (Tables 6-4 through 6-6). Of the significant cross price elasticities, 96 % were positive suggesting that the products were net substitutes. Estimates indicate that products within the same product line were complements. Though this may seem counterintuitive, this result is expected as brand managers position their products in this manner to prevent cannibalism.

Brands of orange juice were more responsive to price change for products within the same category. Cross price elasticities when both brands were orange juice beverages ranged from 0.229 to 0.388, indicating the change in demand for one brand of orange juice ranges from 23% to 38% given a 1% price change in another brand. Whereas, the changes in the demand for orange juice ranged from -3 % to 10 % in response to a 1 % change in the price of a fruit juice and 3.2 % to 19.3% given an 1 % change in the price of brands of fruit drinks. Own category cross price elasticities for fruit juice beverages were ranging from -0.076 to 0.447. Cross price elasticities fruit juice given a 1% change in orange juices ranged from -0.456 to 0.468 and the elasticity for fruit juice given a 1% in fruit drinks ranges from –0.265 to 0.644. The demand for fruit drinks change by -17% to 31% given a 1% increase in the price of another fruit drink. In contrast, the demand for fruit drinks changed from 9 % to 51 % in response to a 1 % change in

the price of orange juice and 11% to 26 % given a 1 % change in the price of brands of fruit juices.

The findings from this study suggest that the brands of orange juice included in this study are substitutes for brands in the fruit juice and fruit drink categories. Furthermore, the demands for fruit juices and fruit drinks brands were more responsive to price changes in brands of orange juice. For example, a 1 % increase in the price of Tropicana orange juice causes the demand for Sunny Delight (FJ) to increase by 47 %. Conversely, a 1 % increase in the price of Sunny Delight (FJ) causes the demand for Tropicana orange juice 4 %. Additionally, a 1 % increase in the price of Tropicana orange juice causes the demand for Capri Sun (FD) to increase by 46 % and a 1 % increase in the price of Capri Sun (FD) causes the demand for Tropicana orange juice to increase by 14 %. These results suggest that competitors of orange juice are not limited to other breakfast juices but also include single serve beverages and sports drinks. Furthermore, the fruit juice and fruit drinks categories experience substantial increases in demand given small price changes in orange juice products.

Overall, the majority of the cross price elasticities were in the inelastic range suggesting consumers' demand for products within the orange juice, fruit juice and fruit drink categories does not significantly increase in response to prices of other brands within these categories. Features without displays, displays without features, and display accompanied by feature advertisements are promotional tactics used by retailers in to increase the demand of the product in question by changing the perceived price of the brand. It is expected that the coefficients for promotional tactics are positive because advertising is thought to have a positive impact on marginal utility. Results indicate that all promotional tactics were significantly different from zero and had a positive impact on the marginal utility (Appendix B Table B-2). Feature

advertisements accompanied by displays had the largest impact on marginal utility, followed by in-store displays.

Promotional elasticities for Retailer X are presented in Appendix B Table B-3 through Table B-11. These values represent the change in the quantity of good *i* demand relative to changes in a promotional activity. For example, increasing the display activity by 1 % increases the demand for private label orange juice by 2%. Own promotional elasticities should be positive. Additionally, positive cross promotional elasticities indicate two products in question are complements and negative promotional cross elasticities indicate the goods are substitutes. The demand for Retailer X's private label products is less responsive to promotional tactics when compared to national branded products. The demand for private label products also were more responsive to promotional efforts of national brands than the demand for national brands were impacted by the promotional tactics of private label products. This behavior may be observed because consumers possess a stronger preference for national brands and because these products possess higher brand equity. All of the significant cross promotional elasticities were in the inelastic range suggesting that large increases in promotional tactics have small impacts on the demand for the brands of orange juice, fruit juice, fruit drinks included in this study. The fruit juice market is extremely mature therefore demands for products within this market are less deal elastic. Results suggest that brand promotions utilized by Retailer X do not necessarily increase demand. Thus, Retailer X may use promotional tactics to simply increase store traffic.

Retailer Z

Econometric estimates associated with the autoregressive model are shown in Appendix C. The marginal expenditure shares (θ_i) for eleven of the fourteen beverage brands are positive and significantly different from zero. These values range from 0.024 (Minute Maid FD) to 0.377

(Tropicana OJ). Orange juice sales experience the largest marginal increase in demand given a one dollar increase in expenditures followed by fruit drinks then fruit juices. All own compensated price coefficients are negative and statistically significant (Appendix C Table C-2) which is consistent with consumer demand theory. Slutsky coefficients make it possible to identity relationships between products.

One can make inferences regarding the demand relationships of beverage within the fruit juice market based upon expenditure and cross price elasticities. Expenditure elasticities vary from 0.477(Snapple) to 3.292 (Welch's) suggesting some beverages are perceived as necessities and others as luxury goods (Table 6-3). Various brands of orange juice, fruit juice, and drinks were considered luxury goods. Specifically, Florida's Natural, Newman's Own, Capri Sun, Gatorade, and POWERade were perceived as luxury products suggesting that consumers preferred these goods over the other brands included in the study. Based upon these results, the orange juice category would benefit from an increase in consumer's expenditures due to their marginal share values and income elasticities.

Table 6-4. Expenditure Elasticities for Brands at Retailer Z

Categories	Brands	Estimate	Std. Error	P-value
Orange Juice	Florida's Natural	1.210	0.394	[.002]
	Minute Maid	0.655	0.537	[.223]
	Tropicana	0.807	0.104	[.000]
Fruit Juice	Minute Maid	0.715	0.206	[.001]
	Newman's Own	3.501	0.675	[.000]
	Turkey Hill	1.045	0.221	[.000]
	Vita J	0.901	0.294	[.002]
	Welch's	0.477	0.293	[.103]
	Tropicana	0.605	0.206	[.003]
Fruit Drinks	Capri Sun	1.790	0.308	[.000]
	Gatorade	1.202	0.251	[.000]
	Minute Maid	1.288	0.288	[.000]
	POWERade	3.292	0.665	[.000]
	Snapple	0.464	0.298	[.120]

Compensated price elasticities identify whether products were net substitute and complements. Thirteen of the fourteen own price elasticities were significant and eleven of the products were in the elastic range. Own price elasticities values ranged from -0.783 (Troipanca OJ) to -5.344 (POWERade). Nearly fifty-five % of the cross price elasticities were significant (Tables 6.13 through 6.22). Of the cross price elasticities that are significant, 98 % were positive suggesting that the products were net substitutes. Unlike Retailer X's results, many cross price elasticities between orange juice brands and fruit juice brands were insignificant. However, some similarities existed. For example, Capri Sun, Gatorade, and POWERade were still substitutes to brands of orange juice, but these results show the cross price elasticities between POWERade and the brands of orange juice are in the elastic range. This implies that a small percentage change in the price orange juice will equate to large changes in the quantity of POWERade demanded. In this model, orange juice products were more responsive to price change for products within the same category, but the demand for fruit juices and fruit drinks

responded more to change in the price of orange juice. For example, a 1 % increase in the price of Tropicana orange juice causes the demand for POWERade to increase by 168 %. One the other hand, a 1 % increase in the price POWERade causes the demand for Tropicana orange juice to increase 54 %. Additionally, a 1 % increase in the price of Tropicana orange juice causes the demand for Newman's Own (FJ) to increase by 189 %. Whereas, a 1 % increase in the price of Newman's Own (FJ) causes the demand for Tropicana orange juice to increase 17%. These results suggest that the fruit juice and fruit drink market would expand at the expense of the orange juice market given any shock that causes the prices of orange juice to increase.

Promotional elasticities for Retailer Z are presented in Appendix C Tables C-3 through Table C-11. Demand theory suggests that own promotional elasticities should be positive and cross promotional elasticities are negative if the two products in question are substitutes and positive if the two goods are complements. The promotional coefficients (Appendix C Table C-2) for Retailer Z are larger the coefficient at Retailer X. Recall, that Retailer Z is a discount retailer; therefore, one can assume that this store would attract customers that are price sensitive and deal seekers. Magnitudes of the promotional coefficients suggest that display and feature advertisement had the highest impact on demand followed by display only, and feature only.

The demands for different orange juice brands were more responsive to the promotional activity orange juice brand when compared to changes in the demand for orange juice given changes in promotional activities of fruit juice and fruit drink products. The overall impact of brand promotions on demand is minimal and in the inelastic range. These results further support the notion that the demand in a mature market is less responsive to suggesting that large increases in promotional tactics. The fruit juice market is extremely mature therefore the demands for products within this market are less deal elastic. Results suggest that brand

promotions utilized by Retailer X do not necessarily increase demand. Thus, Retailer X may use promotional tactics to simply increase store traffic.

Results from this study suggest the consumers do not allocate their beverage expenditure according to product type and that all beverages are competing for consumer dollars. Additionally results from Retailer X and Retailer Z identify brands such as Gatorade, POWERade, and Capri Sun as competitors of orange juice brands, but that these relationships are asymmetric. Shoppers at Retailer Z were found to be more deal sensitive. Feature advertisements and displays were promotional tactics that had the most profound impact on beverage demand.

Table 6-5. Orange juice own and cross category compensated price elasticities for Retailer X

Category	Brands	Estimate	Std. Error	P-Value
Orange Juice/Orange Juice	Private Label/Private Label	-1.227	0.039	[.000]
	Private Label/Minute Maid	0.285	0.025	[.000]
	Private Label/Tropicana	0.310	0.026	[.000]
	Minute Maid/Private Label	0.298	0.026	[.000]
	Minute Maid/Minute Maid	-1.409	0.042	[.000]
	Minute Maid/Tropicana	0.388	0.027	[.000]
	Tropicana/Private Label	0.229	0.019	[.000]
	Tropicana/Minute Maid	0.274	0.019	[.000]
	Tropicana/Tropicana	-1.208	0.038	[.000]
Orange Juice/Fruit Juice	Private Label/Private Label	-0.011	0.007	[.082]
	Private Label/Welch's	0.048	0.011	[.000]
	Private Label/Sunny Delight	0.038	0.012	[.001]
	Private Label/Minute Maid	0.069	0.012	[.000]
	Private Label/Tropicana	0.013	0.007	[.058]
	Minute Maid/Private Label	0.016	0.003	[.000]
	Minute Maid/Welch's	0.021	0.009	[.017]
	Minute Maid/Sunny Delight	0.041	0.008	[.000]
	Minute Maid/Minute Maid	0.101	0.012	[.000]
	Minute Maid/Tropicana	0.021	0.004	[.000]
	Tropicana/Private Label	0.012	0.003	[.000]
	Tropicana/Welch's	0.039	0.006	[.000]
	Tropicana/Sunny Delight	0.036	0.006	[.000]
	Tropicana/Minute Maid	0.079	0.007	[.000]
	Tropicana/Tropicana	-0.030	0.004	[.000]

Table 6-5. Continued

Category	Brands	Estimate	Std. Error	P-Value
Orange Juice/ Fruit Drinks	Private/Sunny Delight	0.091	0.021	[.000]
	Private/Capri Sun	0.056	0.028	[.045]
	Private/Kool-Aid	0.064	0.020	[.001]
	Private/Gatorade	0.205	0.041	[.000]
	Private/POWERade	0.077	0.026	[.003]
	Private/Private	-0.018	0.023	[.435]
	Minute Maid/Sunny Delight	0.047	0.018	[.008]
	Minute Maid/Capri Sun	0.167	0.027	[.000]
	Minute Maid/Kool-Aid	0.075	0.019	[.000]
	Minute Maid/Gatorade	0.122	0.036	[.001]
	Minute Maid/POWERade	0.070	0.023	[.002]
	Minute Maid/Private	0.042	0.015	[.004]
	Tropicana/Sunny Delight	0.059	0.014	[.000]
	Tropicana/Capri Sun	0.137	0.021	[.000]
	Tropicana/Kool-Aid	0.075	0.013	[.000]
	Tropicana/Gatorade	0.193	0.033	[.000]
	Tropicana/POWERade	0.072	0.016	[.000]
	Tropicana/Private	0.032	0.011	[.003]

Table 6-6. Fruit juice own and cross category compensated price elasticities for Retailer X

Category	Brands	Estimate	Std. Error	P-Value
Fruit Juice/Orange Juice	Private/Private	-0.320	0.184	[.082]
	Private/Minute Maid	0.427	0.081	[.000]
	Private/Tropicana	0.458	0.096	[.000]
	Welch's/Private	0.316	0.073	[.000]
	Welch's/Minute Maid	0.133	0.056	[.017]
	Welch's/Tropicana	0.345	0.053	[.000]
	Sunny Delight/Private	0.363	0.112	[.001]
	Sunny Delight/Minute Maid	0.375	0.071	[.000]
	Sunny Delight/Tropicana	0.468	0.078	[.000]
	Minute Maid/Private	0.234	0.041	[.000]
	Minute Maid/Minute Maid	0.328	0.038	[.000]
	Minute Maid/Tropicana	0.365	0.031	[.000]
	Tropicana/Private	0.145	0.076	[.058]
	Tropicana/Minute Maid	0.227	0.044	[.000]
	Tropicana/Tropicana	-0.456	0.061	[.000]
Fruit Juice/Fruit Juice	Private Label/Private Label	-1.452	0.177	[.000]
	Private Label/Welch's	0.410	0.139	[.003]
	Private Label/Sunny Delight	-0.447	0.236	[.058]
	Private Label/Minute Maid	-0.142	0.125	[.257]
	Private Label/Tropicana	-0.046	0.138	[.737]
	Welch's/Private Label	0.097	0.033	[.003]
	Welch's/Welch's	-2.484	0.105	[.000]
	Welch's/Sunny Delight	0.122	0.073	[.096]
	Welch's/Minute Maid	0.412	0.075	[.000]
	Welch's/Tropicana	0.077	0.043	[.073]
	Sunny Delight/Private Label	-0.152	0.08	[.058]
	Sunny Delight/Welch's	0.175	0.105	[.096]
	Sunny Delight/Sunny Delight	-2.174	0.218	[.000]
	Sunny Delight/Minute Maid	-0.045	0.095	[.638]
	Sunny Delight/Tropicana	-0.019	0.093	[.835]
	Minute Maid/Private Label	-0.017	0.015	[.257]
	Minute Maid/Welch's	0.212	0.039	[.000]
	Minute Maid/Sunny Delight	-0.016	0.034	[.638]
	Minute Maid/Minute Maid	-2.161	0.058	[.000]

Table 6-6. Continued

Category	Brands	Estimate	Std. Error	P-Value
Fruit Juice/Fruit Juice	Minute Maid/Tropicana	0.044	0.021	[.032]
	Tropicana/Private Label	-0.019	0.055	[.737]
	Tropicana/Welch's	0.130	0.072	[.073]
	Tropicana/Sunny Delight	-0.023	0.109	[.835]
	Tropicana/Minute Maid	0.144	0.067	[.032]
	Tropicana/Tropicana	-1.075	0.092	[.000]
Fruit Juice/Fruit Drinks	Private Label/Sunny Delight	0.644	0.268	[.016]
	Private Label/Capri Sun	0.145	0.089	[.102]
	Private Label/Kool-Aid	0.037	0.158	[.813]
	Private Label/Gatorade	0.303	0.071	[.000]
	Private Label/POWERade	0.097	0.115	[.932]
	Private Label/Private Label	-0.027	0.322	[.933]
	Welch's/Sunny Delight	-0.024	0.088	[.780]
	Welch's/Capri Sun	0.169	0.057	[.003]
	Welch's/Kool-Aid	-0.152	0.105	[.147]
	Welch's/Gatorade	0.335	0.059	[.000]
	Welch's/POWERade	0.393	0.081	[.000]
	Welch's/Private Label	0.262	0.137	[.057]
	Sunny Delight/Sunny Delight	0.058	0.247	[.814]
	Sunny Delight/Capri Sun	0.161	0.076	[.035]
	Sunny Delight/Kool-Aid	-0.265	0.123	[.031]
	Sunny Delight/Gatorade	0.392	0.076	[.000]
	Sunny Delight/POWERade	0.174	0.092	[.057]
	Sunny Delight/Private Label	0.487	0.229	[.033]
	Minute Maid/Sunny Delight	0.158	0.043	[.000]
	Minute Maid/Capri Sun	0.108	0.034	[.002]
	Minute Maid/Kool-Aid	0.084	0.058	[.150]
	Minute Maid/Gatorade	0.273	0.035	[.000]
	Minute Maid/POWERade	0.244	0.048	[.000]
	Minute Maid/Private Label	0.144	0.068	[.035]
	Tropicana/Sunny Delight	0.129	0.125	[.301]
	Tropicana/Capri Sun	0.146	0.05	[.003]
	Tropicana/Kool-Aid	0.282	0.086	[.001]
	Tropicana/Gatorade	0.180	0.047	[.000]
	Tropicana/POWERade	0.069	0.062	[.263]
	Tropicana/Private Label	0.121	0.167	[.470]

Table 6-7. Fruit drink own and cross category compensated price elasticities for Retailer X

Category	Brands	Estimate	Std. Error	P-Value
Fruit Drinks/Orange Juice	Sunny Delight/Private Label	0.517	0.120	[.000]
	Sunny Delight/Minute Maid	0.256	0.097	[.008]
	Sunny Delight/Tropicana	0.458	0.105	[.000]
	Capri Sun/Private Label	0.117	0.058	[.045]
	Capri Sun/Minute Maid	0.331	0.053	[.000]
	Capri Sun/Tropicana	0.384	0.059	[.000]
	Kool-Aid/Private Label	0.256	0.079	[.001]
	Kool-Aid/Minute Maid	0.285	0.072	[.000]
	Kool-Aid/Tropicana	0.403	0.068	[.000]
	Gatorade/Private Label	0.148	0.030	[.000]
	Gatorade/Minute Maid	0.085	0.025	[.001]
	Gatorade/Tropicana	0.189	0.033	[.000]
	POWERade/Private Label	0.230	0.076	[.003]
	POWERade/Minute Maid	0.198	0.064	[.002]
	POWERade/Tropicana	0.291	0.064	[.000]
	Private Label/Private Label	-0.052	0.066	[.435]
	Private Label/Minute Maid	0.115	0.040	[.004]
	Private Label/Tropicana	0.124	0.041	[.003]
Fruit Drinks/Fruit Juice	Sunny Delight/Private Label	0.132	0.055	[.016]
	Sunny Delight/Welch's	-0.021	0.076	[.780]
	Sunny Delight/Sunny Delight	0.035	0.149	[.814]
	Sunny Delight/Minute Maid	0.266	0.072	[.000]
	Sunny Delight/Tropicana	0.066	0.064	[.301]
	Capri Sun/Private Label	0.011	0.007	[.102]
	Capri Sun/Welch's	0.053	0.018	[.003]
	Capri Sun/Sunny Delight	0.035	0.017	[.035]
	Capri Sun/Minute Maid	0.066	0.021	[.002]
	Capri Sun/Tropicana	0.027	0.009	[.003]
	Kool-Aid/Private Label	0.053	0.023	[.813]
	Kool-Aid/Welch's	-0.092	0.063	[.147]
	Kool-Aid/Sunny Delight	-0.111	0.052	[.031]
	Kool-Aid/Minute Maid	0.098	0.068	[.150]
	Kool-Aid/Tropicana	0.100	0.031	[.001]
	Gatorade/Private Label	0.078	0.002	[.000]
	Gatorade/Welch's	0.037	0.006	[.000]
	Gatorade/Sunny Delight	0.030	0.006	[.000]
	Gatorade/Minute Maid	0.058	0.007	[.000]
	Gatorade/Tropicana	0.012	0.003	[.000]
	POWERade/Private Label	0.010	0.012	[.932]

Table 6-7. Continued

Category	Brands	Estimate	Std. Error	P-Value
Fruit Drinks/Fruit Juice	POWERade/Welch's	0.177	0.036	[.000]
	POWERade/Sunny Delight	0.055	0.029	[.057]
	POWERade/Minute Maid	0.213	0.042	[.000]
	POWERade/Tropicana	0.018	0.016	[.263]
	Private Label/Private Label	-0.003	0.033	[.933]
	Private Label/Welch’s	0.113	0.059	[.057]
	Private Label/Sunny Delight	0.147	0.069	[.033]
	Private Label/Minute Maid	0.121	0.057	[.035]
	Private Label/Tropicana	0.031	0.043	[.470]
Fruit Drinks/Fruit Drinks	Sunny Delight/Sunny Delight	-2.827	0.193	[.000]
	Sunny Delight/Capri Sun	0.387	0.111	[.001]
	Sunny Delight/Kool-Aid	0.523	0.103	[.000]
	Sunny Delight/Gatorade	0.224	0.144	[.120]
	Sunny Delight/POWERade	0.185	0.104	[.075]
	Sunny Delight/Private Label	-0.202	0.163	[.216]
	Capri Sun/Sunny Delight	0.140	0.040	[.001]
	Capri Sun/Capri Sun	-1.857	0.097	[.000]
	Capri Sun/Kool-Aid	0.045	0.042	[.292]
	Capri Sun/Gatorade	0.315	0.081	[.000]
	Capri Sun/POWERade	0.163	0.049	[.001]
	Capri Sun/Private Label	0.171	0.035	[.000]
	Kool-Aid/Sunny Delight	0.365	0.072	[.000]
	Kool-Aid/Capri Sun	0.086	0.081	[.292]
	Kool-Aid/Kool-Aid	-2.106	0.146	[.000]
	Kool-Aid/Gatorade	0.376	0.088	[.000]
	Kool-Aid/POWERade	0.173	0.087	[.049]
	Kool-Aid/Private Label	0.162	0.109	[.137]
	Gatorade/Sunny Delight	0.028	0.018	[.120]
	Gatorade/Capri Sun	0.110	0.028	[.000]
	Gatorade/Kool-Aid	0.068	0.016	[.000]
	Gatorade/Gatorade	-0.905	0.081	[.000]
	Gatorade/POWERade	0.075	0.018	[.000]
	Gatorade/Private Label	0.059	0.011	[.000]
	POWERade/Sunny Delight	0.096	0.054	[.075]
	POWERade/Capri Sun	0.234	0.070	[.001]
	POWERade/Kool-Aid	0.129	0.065	[.049]
	POWERade/Gatorade	0.306	0.074	[.000]

Table 6-7. Continued

Category	Brands	Estimate	Std. Error	P-Value
Fruit Drinks/Fruit Drinks	POWERade/POWERade	-1.988	0.117	[.000]
	POWERade/Private Label	0.042	0.061	[.499]
	Private Label/Sunny Delight	-0.101	0.081	[.216]
	Private Label/Capri Sun	0.236	0.048	[.000]
	Private Label/Kool-Aid	0.116	0.078	[.137]
	Private Label /Gatorade	0.232	0.042	[.000]
	Private Label/POWERade	0.040	0.059	[.499]
	Private Label/Private Label	-0.926	0.198	[.000]

Table 6-8. Orange juice own and cross category compensated price elasticities for Retailer Z

Category	Brands	Estimate	Std. Error	P-value
Orange Juice/Orange Juice	Florida’s Natural\Florida’s Natural	-2.868	0.146	[.000]
	Florida’s Natural\Minute Maid	0.511	0.075	[.000]
	Florida’s Natural\Tropicana	1.153	0.107	[.000]
	Minute Maid\Florida’s Natural	1.071	0.157	[.000]
	Minute Maid\Minute Maid	-3.769	0.249	[.000]
	Minute Maid\Tropicana	1.495	0.167	[.000]
	Tropicana\Florida’s Natural	0.241	0.022	[.000]
	Tropicana\Minute Maid	0.149	0.017	[.000]
	Tropicana\Tropicana	-0.754	0.040	[.000]
Orange Juice/Fruit Juice	Florida's Natural\Minute Maid	-0.018	0.036	[.616]
	Florida's Natural\Newman's Own	0.149	0.036	[.000]
	Florida's Natural\Turkey Hill	0.035	0.014	[.016]
	Florida's Natural\Vita J	0.013	0.006	[.033]
	Florida's Natural\Welch’s	0.049	0.023	[.032]
	Florida's Natural\Tropicana	0.097	0.032	[.002]
	Minute Maid\Minute Maid	0.170	0.072	[.018]
	Minute Maid\Newman's Own	0.169	0.051	[.001]
	Minute Maid\Turkey Hill	0.027	0.020	[.174]
	Minute Maid\Vita J	0.008	0.008	[.313]
	Minute Maid\Welch’s	0.049	0.037	[.186]
	Minute Maid\Tropicana	0.152	0.082	[.064]
	Tropicana\Minute Maid	0.021	0.006	[.000]
	Tropicana\Newman's Own	0.030	0.005	[.000]
	Tropicana\Turkey Hill	0.010	0.002	[.000]
	Tropicana\Vita J	0.003	0.001	[.000]
	Tropicana\Welch’s	0.018	0.003	[.000]
	Tropicana\Tropicana	0.029	0.007	[.000]

Table 6-8. Continued

Category	Brands	Estimate	Std. Error	P-value
Orange Juice/Fruit Drink	Florida's Natural\Capri Sun	0.103	0.051	[.046]
	Florida's Natural\Gatorade	0.391	0.105	[.000]
	Florida's Natural\Minute Maid	0.168	0.053	[.002]
	Florida's Natural\POWERade	0.171	0.034	[.000]
	Florida's Natural\Snapple	0.047	0.039	[.232]
	Minute Maid\Capri Sun	0.125	0.128	[.330]
	Minute Maid\Gatorade	0.330	0.212	[.118]
	Minute Maid\Minute Maid	-0.038	0.056	[.492]
	Minute Maid\POWERade	0.339	0.090	[.000]
	Minute Maid\Snapple	-0.128	0.092	[.167]
	Tropicana\Capri Sun	0.064	0.012	[.000]
	Tropicana\Gatorade	0.130	0.025	[.000]
	Tropicana\Minute Maid	0.007	0.005	[.176]
	Tropicana\POWERade	0.054	0.008	[.000]
	Tropicana\Snapple	0.000	0.007	[.971]

Table 6-9. Fruit juice own and cross category compensated price elasticities for Retailer Z

Category	Brands	Estimate	Std. Error	P-value
Fruit Juice/Orange Juice	Minute Maid\Florida's Natural	-0.056	0.111	[.616]
	Minute Maid\Minute Maid	0.248	0.105	[.018]
	Minute Maid\Tropicana	0.314	0.084	[.000]
	Newman's Own\Florida's Natural	1.992	0.475	[.000]
	Newman's Own\Minute Maid	1.075	0.323	[.001]
	Newman's Own\Tropicana	1.893	0.294	[.000]
	Turkey Hill\Florida's Natural	0.389	0.161	[.016]
	Turkey Hill\Minute Maid	0.144	0.106	[.174]
	Turkey Hill\Tropicana	0.524	0.093	[.000]
	Vita J\Florida's Natural	0.498	0.234	[.033]
	Vita J\Minute Maid	0.142	0.141	[.313]
	Vita J\Tropicana	0.446	0.123	[.000]
	Welch’s\Florida's Natural	0.389	0.181	[.032]
	Welch’s\Minute Maid	0.184	0.139	[.186]
	Welch’s\Tropicana	0.671	0.112	[.000]
	Tropicana\Florida's Natural	0.229	0.075	[.002]
	Tropicana\Minute Maid	0.171	0.092	[.064]
	Tropicana\Tropicana	0.329	0.073	[.000]
Fruit Juice/Fruit Juice	Minute Maid\Minute Maid	-2.020	0.153	[.000]
	Minute Maid\Newman’s Own	0.212	0.093	[.022]
	Minute Maid\Turkey Hill	0.042	0.034	[.217]
	Minute Maid\Vita J	0.021	0.015	[.145]
	Minute Maid\Welch’s	0.000	0.059	[.996]
	Minute Maid\Tropicana	0.337	0.071	[.000]
	Newman's Own\Minute Maid	0.927	0.406	[.022]
	Newman's Own\Newman’s Own	-8.100	0.643	[.000]
	Newman's Own\Turkey Hill	0.061	0.189	[.747]
	Newman's Own\Vita J	-0.054	0.084	[.519]
	Newman's Own\Welch’s	1.113	0.290	[.000]
	Newman's Own\Tropicana	0.293	0.221	[.186]
	Turkey Hill\Minute Maid	0.154	0.125	[.217]
	Turkey Hill\Newman’s Own	0.051	0.158	[.747]
	Turkey Hill\Turkey Hill	-2.356	0.107	[.000]
	Turkey Hill\Vita J	0.054	0.039	[.165]
	Turkey Hill\Welch’s	0.489	0.105	[.000]
	Turkey Hill\Tropicana	0.191	0.072	[.008]

Table 6-9. Continued

Category	Brands	Estimate	Std. Error	P-value
Fruit Juice/Fruit Juice	Vita J\Minute Maid	0.260	0.179	[.145]
	Vita J\Newman's Own	-0.150	0.232	[.519]
	Vita J\Turkey Hill	0.179	0.129	[.165]
	Vita J\Vita J	-0.883	0.128	[.000]
	Vita J\Welch's	-0.272	0.149	[.067]
	Vita J\Tropicana	0.179	0.090	[.048]
	Welch's\Minute Maid	0.001	0.152	[.996]
	Welch's\Newman's Own	0.658	0.171	[.000]
	Welch's\Turkey Hill	0.346	0.074	[.000]
	Welch's\Vita J	-0.058	0.032	[.067]
	Welch's\Welch's	-3.589	0.161	[.000]
	Welch's\Tropicana	0.292	0.082	[.000]
	Tropicana\Minute Maid	0.259	0.055	[.000]
	Tropicana\Newman's Own	0.052	0.039	[.186]
	Tropicana\Turkey Hill	0.040	0.015	[.008]
	Tropicana\Vita J	0.011	0.006	[.048]
	Tropicana\Welch's	0.087	0.024	[.000]
	Tropicana\Tropicana	-1.637	0.080	[.000]
Fruit Juice/Fruit Drinks	Minute Maid\Capri Sun	0.034	0.069	[.624]
	Minute Maid\Gatorade	0.137	0.090	[.128]
	Minute Maid\Minute Maid	0.474	0.104	[.000]
	Minute Maid\POWERade	0.005	0.109	[.962]
	Minute Maid\Snapple	0.251	0.100	[.012]
	Newman's Own\Capri Sun	0.743	0.223	[.001]
	Newman's Own\Gatorade	1.003	0.277	[.000]
	Newman's Own\Minute Maid	-0.959	0.522	[.066]
	Newman's Own\POWERade	-0.169	0.348	[.627]
	Newman's Own\Snapple	0.182	0.329	[.581]
	Turkey Hill\Capri Sun	0.261	0.071	[.000]
	Turkey Hill\Gatorade	0.206	0.093	[.027]
	Turkey Hill\Minute Maid	-0.185	0.182	[.309]
	Turkey Hill\POWERade	-0.014	0.104	[.896]
	Turkey Hill\Snapple	0.094	0.099	[.343]
	Vita J\Capri Sun	0.125	0.092	[.174]
	Vita J\Gatorade	0.082	0.118	[.490]
	Vita J\Minute Maid	-0.440	0.273	[.107]
	Vita J\POWERade	-0.078	0.157	[.619]

Table 6-9. Continued

Category	Brands	Estimate	Std. Error	P-value
Fruit Juice/Fruit Drinks	Vita J\Snapple	-0.087	0.137	[.528]
	Welch's\Capri Sun	0.122	0.088	[.163]
	Welch's\Gatorade	0.153	0.126	[.226]
	Welch's\Minute Maid	-0.005	0.200	[.981]
	Welch's\POWERade	0.533	0.129	[.000]
	Welch's\Snapple	0.303	0.123	[.014]
	Tropicana\Capri Sun	0.225	0.066	[.001]
	Tropicana\Gatorade	-0.126	0.087	[.149]
	Tropicana\Minute Maid	0.147	0.043	[.001]
	Tropicana\POWERade	0.047	0.073	[.520]
	Tropicana\Snapple	0.166	0.069	[.015]

Table 6-10. Fruit drink own and cross category compensated price elasticities for Retailer Z

Category	Brands	Estimate	Std. Error	P-value
Fruit Drinks/Orange Juice	Capri Sun\Florida's Natural	0.183	0.092	[.046]
	Capri Sun\Minute Maid	0.106	0.109	[.330]
	Capri Sun\Tropicana	0.545	0.101	[.000]
	Gatorade\Florida's Natural	0.232	0.062	[.000]
	Gatorade\Minute Maid	0.093	0.060	[.118]
	Gatorade\Tropicana	0.370	0.070	[.000]
	Minute Maid\Florida's Natural	0.880	0.280	[.002]
	Minute Maid\Minute Maid	-0.096	0.140	[.492]
	Minute Maid\Tropicana	0.171	0.126	[.176]
	POWERade\Florida's Natural	1.121	0.223	[.000]
	POWERade\Minute Maid	1.064	0.283	[.000]
	POWERade\Tropicana	1.686	0.244	[.000]
	Snapple\Florida's Natural	0.146	0.122	[.232]
	Snapple\Minute Maid	-0.191	0.138	[.167]
	Snapple\Tropicana	-0.004	0.108	[.971]
Fruit Drinks/Fruit Juices	Capri Sun\Minute Maid	0.020	0.040	[.624]
	Capri Sun\Newman's Own	0.099	0.030	[.001]
	Capri Sun\Turkey Hill	0.042	0.011	[.000]
	Capri Sun\Vita J	0.006	0.004	[.174]
	Capri Sun\Welch’s	0.028	0.020	[.163]
	Capri Sun\Tropicana	0.171	0.050	[.001]
	Gatorade\Minute Maid	0.027	0.017	[.128]
	Gatorade\Newman's Own	0.044	0.012	[.000]
	Gatorade\Turkey Hill	0.011	0.005	[.027]
	Gatorade\Vita J	0.001	0.002	[.490]
	Gatorade\Welch’s	0.011	0.009	[.226]
	Gatorade\Tropicana	-0.032	0.022	[.149]
	Minute Maid\Minute Maid	0.816	0.178	[.000]
	Minute Maid\Newman's Own	-0.377	0.205	[.066]
	Minute Maid\Turkey Hill	-0.087	0.085	[.309]
	Minute Maid\Vita J	-0.062	0.039	[.107]
	Minute Maid\Welch’s	-0.003	0.133	[.981]
	Minute Maid\Tropicana	0.328	0.097	[.001]
	POWERade\Minute Maid	0.011	0.234	[.962]
	POWERade\Newman's Own	-0.083	0.171	[.627]
	POWERade\Turkey Hill	-0.008	0.061	[.896]
	POWERade\Vita J	-0.014	0.028	[.619]

Table 6-10. Continued

Category	Brands	Estimate	Std. Error	P-value
Fruit Drinks/Fruit Juices	POWERade\Welch’s	0.444	0.107	[.000]
	POWERade\Tropicana	0.131	0.204	[.520]
	Snapple\Minute Maid	0.257	0.102	[.012]
	Snapple\Newman's Own	0.043	0.077	[.581]
	Snapple\Turkey Hill	0.026	0.028	[.343]
	Snapple\Vita J	-0.007	0.012	[.528]
	Snapple\Welch's	0.120	0.049	[.014]
	Snapple\Tropicana	0.221	0.091	[.015]
Fruit Drinks/Fruit Drinks	Capri Sun\Capri Sun	-1.996	0.123	[.000]
	Capri Sun\Gatorade	0.661	0.121	[.000]
	Capri Sun\Minute Maid	0.106	0.032	[.001]
	Capri Sun\POWERade	0.093	0.058	[.109]
	Capri Sun\Snapple	-0.063	0.056	[.255]
	Gatorade\Capri Sun	0.219	0.040	[.000]
	Gatorade\Gatorade	-1.094	0.105	[.000]
	Gatorade\Minute Maid	0.032	0.014	[.019]
	Gatorade\POWERade	0.068	0.023	[.003]
	Gatorade\Snapple	0.017	0.025	[.484]
	Minute Maid\Capri Sun	0.313	0.094	[.001]
	Minute Maid\Gatorade	0.282	0.120	[.019]
	Minute Maid\Minute Maid	-1.474	0.340	[.000]
	Minute Maid\POWERade	-0.055	0.143	[.699]
	Minute Maid\Snapple	-0.636	0.141	[.000]
	POWERade\Capri Sun	0.342	0.213	[.109]
	POWERade\Gatorade	0.752	0.253	[.003]
	POWERade\Minute Maid	-0.069	0.178	[.699]
	POWERade\POWERade	-5.312	0.400	[.000]
	POWERade\Snapple	-0.064	0.305	[.834]
	Snapple\Capri Sun	-0.111	0.098	[.255]
	Snapple\Gatorade	0.091	0.131	[.484]
	Snapple\Minute Maid	-0.379	0.084	[.000]
	Snapple\POWERade	-0.031	0.145	[.834]
	Snapple\Snapple	-0.531	0.311	[.088]

CHAPTER 7
CONCLUSIONS AND IMPLICATIONS

The Rotterdam model developed by Theil and Barten was used to estimate the demand interrelationship between brands of orange juice, fruit juice, and fruit drinks. The study used aggregate store level scanner data containing weekly sales, price, and promotional information on all individual brands. These data were used to test for separability within the fruit juice market and to evaluate the impact of promotional strategies on the fruit juice/drink demand. Block-wise separability is a form of weak separability that imposes restrictions on consumer behavior limiting the degree of substitution between goods in different groups. Results from the separability tests carried out in this study reject the hypothesis of block-wise dependence suggesting that the marginal utility of orange juice is impacted by changes in fruit juice and fruit drink expenditures and consumption. The impact of promotional strategies on the demand for brands within the fruit juice market was also evaluated in this study. Results indicate that displays combined with feature advertisements had the largest impact on the demand for the beverages studied.

Compensated price elasticities and income elasticities suggest that consumers have a stronger preference for fruit drink beverages. Thus, increases in consumers' expenditures would increase the demand for brands in this category at the expense of orange juice beverages. Additionally, the cross price elasticities for orange juice given a price change in fruit juices and fruit juices given a price change in orange juice were asymmetric. Fruit juice and fruit drinks were more responsive to price changes of brands of orange juice than orange juice brands were to price changes in either fruit juices or fruit drinks. The results also suggest that the majority of the cross price elasticities were in the inelastic range. Based upon these results, one can concluded that competition within fruit juice market in not restricted to competition within

groups. In fact, fruit drinks and orange juice seem to be major competitors and price shocks and decreases in orange juice supply causes the demand for this fruit drinks to increase.

This study also assessed the impact of retail promotional strategies on the demand for various brands of orange juice, fruit juice, and fruit drinks at two retailers with different pricing philosophies. Store level elasticities differ because consumers respond to retailing policies across stores. Retailer X competes on quality rather than price and Retail Z is a discount retailer. Coefficients for all promotional tactics, display only, feature only, and display with feature, are all positive. Promotional elasticities explain the impact of increasing the promotional activity of good *j* on the demand for good *i*. Shoppers at Retailer Z were more deal sensitive than shoppers at Retailer X. This is expected since Retailer Z is discount retailer and attracts consumers that are search of a deal. Hoch *et al.* (1995) suggest that elasticity measures are closely related to the characteristics of the consumers and the competitive environment. Despite this difference in magnitude of elasticities, the overall impact of promotions on demand is relatively the same. For both retailers the promotional elasticities were the in elastic range. Since consumers view beverage products as necessities consumers will purchase the goods regardless of a deal. Therefore, retailers may promote beverages as a means of increasing store traffic and increasing store revenue by using a loss leader strategy. The beverage promotions may entice the consumer to the store and the retailer increases it profits when the shopper purchases other full margin products. Additionally, the maturity of fruit juice market and the popularity of brands included in the study may contribute to the inelastic finding. Previous research suggests that higher market share brands possess lower deal elasticities. This study focuses on brands that control at least 5 % of the market share in their respective markets. This study suggests that retail promotions do not result into large increases in demand, but it does not suggest that retail

promotion do not increase store sales. To assess the impact of promotions on the retailer, future research can evaluate the manner in which store revenue changes in response to promotions.

Since brands of orange juice, fruit juice, and fruit drinks are all competing for a portion of consumers' beverage expenditures orange juice manufacturers must survey the complete beverage landscape in order to develop an effective marketing plan that will increase its brands market share. The orange juice industry must pay particular attention to the single serve brands and isotonics which have adverse effects on the demand for orange juice. Promotional strategies were found to have minimal impacts on demand for fruit juices. Future research should include a lag effect to observe stockpiling and switching behavior caused by retail promotions.

As block-wise dependence is rejected, it is not plausible to believe that block independence, a stronger hypothesis will hold. Thus, when analyzing the demand for beverages, brand managers should not focus solely other breakfast juices or other isotonics, but one must focus on all beverages simultaneously. Compensated price elasticities indicate that orange juices, fruit juices, and fruit drinks are substitutes. Since separability among selected fruit juice categories is rejected, future research should test separability of fruit juice, water, and carbonated drinks to fully understand the beverage industry.

APPENDIX A
PARAMETER ESTIMATES FOR SEPARABILITY MODEL

Table A-1. Marginal propensity to consume estimates

Categories	Brands	Estimate	Std. Error	P-value
Orange Juice	Florida's Natural	0.026	0.017	[.132]
	Minute Maid	0.085	0.013	[.000]
	Private Label	0.082	0.012	[.000]
	Tropicana	0.159	0.024	[.000]
Fruit Juices	Minute Maid	0.040	0.005	[.000]
	Private Label	0.002	0.001	[.057]
	Sunny D	0.009	0.001	[.000]
	Tropicana	0.024	0.003	[.000]
	Welch's	0.016	0.003	[.000]
Fruit Drinks	Capri Sun	0.091	0.011	[.000]
	Gatorade	0.344	0.024	[.000]
	Hi C	0.023	0.007	[.001]
	POWERade	0.056	0.005	[.000]
	Sunny D	0.013	0.003	[.000]
	Tropicana	0.069	0.009	[.000]

Table A-2. Separability model Slutsky coefficients

Brands	Estimate	Std. Error	P-value
Florida's Natural (OJ)/Florida's Natural	-0.200	0.015	[.000]
Florida's Natural (OJ)/Minute Maid (OJ)	0.037	0.010	[.000]
Florida's Natural (OJ)/Private Label (OJ)	0.017	0.010	[.093]
Florida's Natural (OJ)/Tropicana (OJ)	0.089	0.014	[.000]
Florida's Natural (OJ)/Minute Maid (FJ)	0.008	0.004	[.051]
Florida's Natural (OJ)/Private Label (FJ)	-0.001	0.001	[.484]
Florida's Natural (OJ)/Sunny D (FJ)	0.001	0.001	[.452]
Florida's Natural (OJ)/Tropicana (FJ)	0.007	0.003	[.018]
Florida's Natural (OJ)/Welch's (FJ)	0.004	0.002	[.062]
Florida's Natural (OJ)/Capri Sun (FD)	0.011	0.009	[.199]
Florida's Natural (OJ)/Gatorade (FD)	0.004	0.012	[.727]
Florida's Natural (OJ)/Hi C (FD)	0.002	0.006	[.721]
Florida's Natural (OJ)/POWERade (FD)	0.005	0.004	[.185]
Florida's Natural (OJ)/Sunny D (FD)	0.002	0.002	[.358]
Florida's Natural (OJ)/Tropicana (FD)	0.013	0.007	[.055]
Minute Maid (OJ)/Minute Maid (OJ)	-0.216	0.013	[.000]
Minute Maid (OJ)/Private Label (OJ)	0.018	0.010	[.061]
Minute Maid (OJ)/Tropicana (OJ)	0.087	0.012	[.000]
Minute Maid (OJ)/Minute Maid (FJ)	0.010	0.005	[.037]
Minute Maid (OJ)/Private Label (FJ)	-0.0001	0.001	[.911]
Minute Maid (OJ)/Sunny D (FJ)	0.001	0.001	[.377]
Minute Maid (OJ)/Tropicana (FJ)	0.005	0.003	[.106]
Minute Maid (OJ)/Welch's (FJ)	0.006	0.003	[.033]
Minute Maid (OJ)/Capri Sun (FD)	0.030	0.009	[.000]
Minute Maid (OJ)/Gatorade (FD)	0.024	0.010	[.015]
Minute Maid (OJ)/Hi C (FD)	-0.005	0.007	[.401]
Minute Maid (OJ)/POWERade (FD)	0.001	0.004	[.737]
Minute Maid (OJ)/Sunny D (FD)	0.008	0.003	[.001]
Minute Maid (OJ)/Tropicana (FD)	-0.007	0.008	[.391]
Private Label (OJ)/Private Label (OJ)	-0.171	0.015	[.000]
Private Label (OJ)/Tropicana (OJ)	0.051	0.012	[.000]
Private Label (OJ)/Minute Maid (FJ)	0.003	0.003	[.271]
Private Label (OJ)/Private Label (FJ)	0.001	0.001	[.451]
Private Label (OJ)/Sunny D (FJ)	0.004	0.002	[.017]
Private Label (OJ)/Tropicana (FJ)	0.004	0.004	[.284]
Private Label (OJ)/Welch's (FJ)	0.005	0.004	[.138]
Private Label (OJ)/Capri Sun (FD)	0.005	0.009	[.558]
Private Label (OJ)/Gatorade (FD)	0.033	0.009	[.000]

Table A-2. Continued

Brands	Estimate	Std. Error	P-value
Private Label (OJ)/Hi C (FD)	0.031	0.008	[.000]
Private Label (OJ)/POWERade (FD)	-0.003	0.005	[.535]
Private Label (OJ)/Sunny D (FD)	0.010	0.003	[.000]
Private Label (OJ)/Tropicana (FD)	-0.008	0.009	[.387]
Tropicana (OJ)/Tropicana (OJ)	-0.433	0.025	[.000]
Tropicana (OJ)/Minute Maid (FJ)	0.015	0.005	[.002]
Tropicana (OJ)/Private Label (FJ)	0.0001	0.001	[.915]
Tropicana (OJ)/Sunny D (FJ)	0.004	0.001	[.010]
Tropicana (OJ)/Tropicana (FJ)	0.004	0.004	[.244]
Tropicana (OJ)/Welch's (FJ)	0.007	0.003	[.026]
Tropicana (OJ)/Capri Sun (FD)	0.041	0.010	[.000]
Tropicana (OJ)/Gatorade (FD)	0.065	0.017	[.000]
Tropicana (OJ)/Hi C (FD)	0.031	0.007	[.000]
Tropicana (OJ)/POWERade (FD)	0.020	0.005	[.000]
Tropicana (OJ)/Sunny D (FD)	0.006	0.003	[.016]
Tropicana (OJ)/Tropicana (FD)	0.013	0.009	[.132]
Minute Maid (FJ)/Minute Maid (FJ)	-0.054	0.005	[.000]
Minute Maid (FJ)/Private Label (FJ)	0.001	0.001	[.112]
Minute Maid (FJ)/Sunny D (FJ)	-0.001	0.001	[.426]
Minute Maid (FJ)/Tropicana (FJ)	0.005	0.003	[.133]
Minute Maid (FJ)/Welch's (FJ)	0.010	0.003	[.001]
Minute Maid (FJ)/Capri Sun (FD)	0.011	0.005	[.014]
Minute Maid (FJ)/Gatorade (FD)	0.015	0.004	[.000]
Minute Maid (FJ)/Hi C (FD)	-0.016	0.006	[.008]
Minute Maid (FJ)/POWERade (FD)	-0.007	0.003	[.040]
Minute Maid (FJ)/Sunny D (FD)	0.006	0.002	[.002]
Minute Maid (FJ)/Tropicana (FD)	-0.007	0.006	[.272]
Private Label (FJ)/Private Label (FJ)	-0.008	0.000	[.000]
Private Label (FJ)/Sunny D (FJ)	0.002	0.001	[.003]
Private Label (FJ)/Tropicana (FJ)	0.002	0.001	[.000]
Private Label (FJ)/Welch's (FJ)	-0.001	0.001	[.214]
Private Label (FJ)/Capri Sun (FD)	-0.001	0.001	[.430]
Private Label (FJ)/Gatorade (FD)	-0.001	0.001	[.415]
Private Label (FJ)/Hi C (FD)	0.005	0.001	[.000]
Private Label(FJ)/POWERade (FD)	0.0004	0.001	[.492]
Private Label (FJ)/Sunny D (FD)	-0.003	0.001	[.000]
Private Label (FJ)/Tropicana (FD)	0.002	0.001	[.147]
Sunny D (FJ)/Sunny D (FJ)	-0.021	0.002	[.000]

Table A-2. Continued

Brands	Estimate	Std. Error	P-value
Sunny D (FJ)/Tropicana (FJ)	0.002	0.001	[.089]
Sunny D (FJ)/Welch's (FJ)	-0.002	0.002	[.187]
Sunny D (FJ)/Capri Sun (FD)	0.000	0.001	[.888]
Sunny D (FJ)/Gatorade (FD)	0.002	0.001	[.045]
Sunny D (FJ)/Hi C (FD)	0.007	0.002	[.002]
Sunny D (FJ)/POWERade (FD)	-0.001	0.001	[.469]
Sunny D (FJ)/Sunny D (FD)	0.000	0.002	[.850]
Sunny D (FJ)/Tropicana (FD)	0.003	0.002	[.102]
Tropicana (FJ)/Tropicana (FJ)	-0.052	0.003	[.000]
Tropicana (FJ)/Welch's (FJ)	0.002	0.002	[.502]
Tropicana (FJ)/Capri Sun (FD)	0.011	0.003	[.001]
Tropicana (FJ)/Gatorade (FD)	0.010	0.003	[.000]
Tropicana (FJ)/Hi C (FD)	0.004	0.004	[.339]
Tropicana (FJ)/POWERade (FD)	-0.009	0.002	[.000]
Tropicana (FJ)/Sunny D (FD)	0.001	0.001	[.431]
Tropicana (FJ)/Tropicana (FD)	0.004	0.005	[.409]
Welch's (FJ)/Welch's (FJ)	-0.042	0.004	[.000]
Welch's (FJ)/Capri Sun (FD)	0.004	0.003	[.162]
Welch's (FJ)/Gatorade (FD)	0.004	0.002	[.078]
Welch's (FJ)/Hi C (FD)	0.006	0.005	[.210]
Welch's (FJ)/POWERade (FD)	-0.004	0.002	[.083]
Welch's (FJ)/Sunny D (FD)	0.001	0.002	[.546]
Welch's (FJ)/Tropicana (FD)	0.001	0.004	[.826]
Capri Sun (FD)/Capri Sun (FD)	-0.182	0.011	[.000]
Capri Sun (FD)/Gatorade (FD)	0.034	0.008	[.000]
Capri Sun (FD)/Hi C (FD)	0.024	0.007	[.000]
Capri Sun (FD)/POWERade (FD)	0.009	0.004	[.035]
Capri Sun (FD)/Sunny D (FD)	0.008	0.002	[.001]
Capri Sun (FD)/Tropicana (FD)	-0.006	0.008	[.408]
Gatorade (FD)/Gatorade (FD)	-0.217	0.019	[.000]
Gatorade (FD)/Hi C (FD)	0.008	0.005	[.115]
Gatorade (FD)/POWERade (FD)	0.019	0.004	[.000]
Gatorade (FD)/Sunny D (FD)	0.001	0.002	[.521]
Gatorade (FD)/Tropicana (FD)	-0.001	0.007	[.923]
Hi C (FD)/Hi C (FD)	-0.134	0.013	[.000]
Hi C (FD)/POWERade (FD)	0.012	0.005	[.022]
Hi C (FD)/Sunny D (FD)	0.010	0.003	[.003]
Hi C (FD)/Tropicana (FD)	0.016	0.009	[.072]

Table A-2. Continued

Brands	Estimate	Std. Error	P-value
POWERade (FD)/POWERade (FD)	-0.051	0.004	[.000]
POWERade (FD)/Sunny D (FD)	-0.007	0.002	[.000]
POWERade (FD)/Tropicana (FD)	0.016	0.005	[.003]
Sunny D (FD)/Sunny D (FD)	-0.041	0.002	[.000]
Sunny D (FD)/Tropicana (FD)	-0.003	0.003	[.323]
Tropicana (FD)/Tropicana (FD)	-0.036	0.013	[.006]

APPENDIX B
PARAMETER ESTIMATES AND PROMOTIONAL ELASTICITIES FOR RETAILER X

Table B-1. Marginal Expenditure Shares

Category	Brands	Estimate	Std. Error	P-Value
Orange Juice	Private Label	0.098	0.013	[.000]
	Minute Maid	0.058	0.012	[.000]
	Tropicana	0.127	0.015	[.000]
Fruit Juices	Private Label	0.004	0.001	[.000]
	Welch's	0.019	0.003	[.000]
	Sunny D	0.017	0.003	[.000]
	Minute Maid	0.038	0.003	[.000]
	Tropicana	0.008	0.001	[.000]
Fruit Drinks	Sunny D	0.026	0.008	[.001]
	Capri Sun	0.091	0.013	[.000]
	Kool-Aid	0.051	0.007	[.000]
	Gatorade	0.373	0.035	[.000]
	POWERade	0.047	0.008	[.000]
	Private Label	0.042	0.005	[.000]

Table B-2. Parameter Estimates

Brands	Estimate	Std. Error	P-value
Display	0.001	0.000	[.000]
Feature	0.0002	0.000	[.001]
Feature & Display	0.002	0.000	[.000]
RHO	0.917	0.014	[.000]
Private Label (OJ)/Private Label (OJ)	-0.176	0.006	[.000]
Private Label (OJ) /Minute Maid (OJ)	0.041	0.004	[.000]
Private Label(OJ)/Tropicana (OJ)	0.044	0.004	[.000]
Private Label (OJ)/Private Label (FJ)	-0.002	0.001	[.082]
Private Label (OJ)/Welch's (FJ)	0.007	0.002	[.000]
Private Label (OJ)/Sunny Delight (FJ)	0.005	0.002	[.001]
Private Label (OJ)/Minute Maid (FJ)	0.010	0.002	[.000]
Private Label (OJ)/Tropicana (FJ)	0.002	0.001	[.058]
Private Label (OJ)/Sunny Delight (FD)	0.013	0.003	[.000]
Private Label (OJ)/Capri Sun (FD)	0.008	0.004	[.045]
Private Label (OJ)/Kool-Aid (FD)	0.009	0.003	[.001]
Private Label (OJ)/Gatorade (FD)	0.029	0.006	[.000]
Private Label (OJ)/POWERade(FD)	0.011	0.004	[.003]
Private Label (OJ)/Private Label (FD)	-0.003	0.003	[.435]
Minute Maid (OJ) /Minute Maid (OJ)	-0.194	0.006	[.000]
Minute Maid (OJ)/Tropicana (OJ)	0.053	0.004	[.000]
Minute Maid (OJ)/Private Label (FJ)	0.002	0.000	[.000]
Minute Maid (OJ)/Welch's (FJ)	0.003	0.001	[.017]
Minute Maid (OJ)/Sunny Delight (FJ)	0.006	0.001	[.000]
Minute Maid (OJ)/Minute Maid (FJ)	0.014	0.002	[.000]
Minute Maid (OJ)/Tropicana (FJ)	0.003	0.001	[.000]
Minute Maid (OJ)/Sunny Delight (FD)	0.006	0.002	[.008]
Minute Maid (OJ)/Capri Sun (FD)	0.023	0.004	[.000]
Minute Maid (OJ)/Kool-Aid (FD)	0.010	0.003	[.000]
Minute Maid (OJ)/Gatorade (FD)	0.017	0.005	[.001]
Minute Maid (OJ)/POWERade(FD)	0.010	0.003	[.002]
Minute Maid (OJ)/Private Label (FD)	0.006	0.002	[.004]
Tropicana (OJ)/Tropicana (OJ)	-0.235	0.007	[.000]
Tropicana (OJ)/Private Label (FJ)	0.002	0.000	[.000]
Tropicana (OJ)/Welch's (FJ)	0.008	0.001	[.000]
Tropicana (OJ)/Sunny Delight (FJ)	0.007	0.001	[.000]
Tropicana (OJ)/Minute Maid (FJ)	0.015	0.001	[.000]

Table B-2. Continued

Brands	Estimate	Std. Error	P-value
Tropicana (OJ)/Tropicana (FJ)	-0.006	0.001	[.000]
Tropicana (OJ)/Sunny Delight (FD)	0.012	0.003	[.000]
Tropicana (OJ)/Capri Sun (FD)	0.027	0.004	[.000]
Tropicana (OJ)/Kool-Aid (FD)	0.015	0.002	[.000]
Tropicana (OJ)/Gatorade (FD)	0.038	0.006	[.000]
Tropicana (OJ)/POWERade(FD)	0.014	0.003	[.000]
Tropicana (OJ)/Private Label (FD)	0.006	0.002	[.003]
Private Label (FJ)/Private Label (FJ)	-0.007	0.001	[.000]
Private Label (FJ)/Welch's (FJ)	0.002	0.001	[.003]
Private Label (FJ)/Sunny Delight (FJ)	-0.002	0.001	[.058]
Private Label (FJ)/Minute Maid (FJ)	-0.001	0.001	[.257]
Private Label (FJ)/Tropicana (FJ)	0.000	0.001	[.737]
Private Label (FJ)/Sunny Delight (FD)	0.003	0.001	[.016]
Private Label (FJ)/Capri Sun (FD)	0.001	0.000	[.102]
Private Label (FJ)/Kool-Aid (FD)	0.000	0.001	[.813]
Private Label (FJ)/Gatorade (FD)	0.002	0.000	[.000]
Private Label (FJ)/POWERade(FD)	0.000	0.001	[.932]
Private Label (FJ)/Private Label (FD)	0.000	0.002	[.933]
Welch's (FJ)/Welch's (FJ)	-0.054	0.002	[.000]
Welch's (FJ)/Sunny Delight (FJ)	0.003	0.002	[.096]
Welch's (FJ)/Minute Maid (FJ)	0.009	0.002	[.000]
Welch's (FJ)/Tropicana (FJ)	0.002	0.001	[.073]
Welch's (FJ)/Sunny Delight (FD)	-0.001	0.002	[.780]
Welch's (FJ)/Capri Sun (FD)	0.004	0.001	[.003]
Welch's (FJ)/Kool-Aid (FD)	-0.003	0.002	[.147]
Welch's (FJ)/Gatorade (FD)	0.007	0.001	[.000]
Welch's (FJ)/POWERade(FD)	0.009	0.002	[.000]
Welch's (FJ)/Private Label (FD)	0.006	0.003	[.057]
Sunny Delight (FJ)/Sunny Delight (FJ)	-0.033	0.003	[.000]
Sunny Delight (FJ)/Minute Maid (FJ)	-0.001	0.001	[.638]
Sunny Delight (FJ)/Tropicana (FJ)	0.000	0.001	[.835]
Sunny Delight (FJ)/Sunny Delight (FD)	0.001	0.004	[.814]
Sunny Delight (FJ)/Capri Sun (FD)	0.002	0.001	[.035]
Sunny Delight (FJ)/Kool-Aid (FD)	-0.004	0.002	[.031]
Sunny Delight (FJ)/Gatorade (FD)	0.006	0.001	[.000]
Sunny Delight (FJ)/POWERade(FD)	0.003	0.001	[.057]
Sunny Delight (FJ)/Private Label (FD)	0.007	0.003	[.033]

Table B-2. Continued

Brands	Estimate	Std. Error	P-value
Minute Maid (FJ)/Minute Maid (FJ)	-0.090	0.002	[.000]
Minute Maid (FJ)/Tropicana (FJ)	0.002	0.001	[.016]
Minute Maid (FJ)/Sunny Delight (FD)	0.007	0.002	[.000]
Minute Maid (FJ)/Capri Sun (FD)	0.005	0.001	[.000]
Minute Maid (FJ)/Kool-Aid (FD)	0.003	0.002	[.224]
Minute Maid (FJ)/Gatorade (FD)	0.011	0.001	[.000]
Minute Maid (FJ)/POWERade(FD)	0.010	0.002	[.000]
Minute Maid (FJ)/Private Label (FD)	0.006	0.003	[.039]
Tropicana (FJ)/Tropicana (FJ)	-0.015	0.001	[.000]
Tropicana (FJ)/Sunny Delight (FD)	0.001	0.002	[.469]
Tropicana (FJ)/Capri Sun (FD)	0.002	0.001	[.003]
Tropicana (FJ)/Kool-Aid (FD)	0.004	0.001	[.000]
Tropicana (FJ)/Gatorade (FD)	0.002	0.001	[.001]
Tropicana (FJ)/POWERade(FD)	0.001	0.001	[.249]
Tropicana (FJ)/Private Label (FD)	0.003	0.002	[.236]
Sunny Delight (FD)/Sunny Delight (FD)	-0.075	0.005	[.000]
Sunny Delight (FD)/Capri Sun (FD)	0.009	0.003	[.000]
Sunny Delight (FD)/Kool-Aid (FD)	0.014	0.003	[.000]
Sunny Delight (FD)/Gatorade (FD)	0.007	0.003	[.038]
Sunny Delight (FD)/POWERade(FD)	0.005	0.003	[.076]
Sunny Delight (FD)/Private Label (FD)	-0.002	0.004	[.692]
Capri Sun (FD)/Capri Sun (FD)	-0.126	0.006	[.000]
Capri Sun (FD)/Kool-Aid (FD)	0.001	0.003	[.653]
Capri Sun (FD)/Gatorade (FD)	0.022	0.005	[.000]
Capri Sun (FD)/POWERade(FD)	0.011	0.003	[.001]
Capri Sun (FD)/Private Label (FD)	0.012	0.002	[.000]
Kool-Aid (FD)/Kool-Aid (FD)	-0.074	0.005	[.000]
Kool-Aid (FD)/Gatorade (FD)	0.014	0.003	[.000]
Kool-Aid (FD)/POWERade(FD)	0.006	0.003	[.073]
Kool-Aid (FD)/Private Label (FD)	0.005	0.004	[.212]
Gatorade (FD)/Gatorade (FD)	-0.182	0.015	[.000]
Gatorade (FD)/POWERade(FD)	0.015	0.003	[.000]
Gatorade (FD)/Private Label (FD)	0.012	0.002	[.000]
POWERade (FD)/POWERade(FD)	-0.096	0.006	[.000]
POWERade (FD)/Private Label (FD)	0.002	0.003	[.538]
Private Label (FD)/Private Label (FD)	-0.050	0.010	[.000]

Table B-3. Orange juice display elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-Value
Orange Juice/Orange Juice	Private Label/Private Label	0.020	0.003	[.000]
	Private Label/Minute Maid	-0.005	0.001	[.000]
	Private Label/Tropicana	-0.005	0.001	[.000]
	Minute Maid/Private Label	-0.004	0.001	[.000]
	Minute Maid/Minute Maid	0.017	0.002	[.000]
	Minute Maid/Tropicana	-0.005	0.001	[.000]
	Tropicana/Private Label	-0.005	0.001	[.000]
	Tropicana/Minute Maid	-0.005	0.001	[.000]
	Tropicana/Tropicana	0.024	0.003	[.000]
Orange Juice/Fruit Juice	Private Label/Private Label	0.000	0.000	[.094]
	Private Label/Welch's	-0.001	0.000	[.000]
	Private Label/Sunny Delight	-0.001	0.000	[.003]
	Private Label/Minute Maid	-0.001	0.000	[.000]
	Private Label/Tropicana	0.000	0.000	[.065]
	Minute Maid/Private Label	0.000	0.000	[.000]
	Minute Maid/Welch's	0.000	0.000	[.022]
	Minute Maid/Sunny Delight	-0.001	0.000	[.000]
	Minute Maid/Minute Maid	-0.001	0.000	[.000]
	Minute Maid/Tropicana	0.000	0.000	[.000]
	Tropicana/Private Label	0.000	0.000	[.000]
	Tropicana/Welch's	-0.001	0.000	[.000]
	Tropicana/Sunny Delight	-0.001	0.000	[.000]
	Tropicana/Minute Maid	-0.002	0.000	[.000]
	Tropicana/Tropicana	0.001	0.000	[.000]

Table B-3. Continued

Category	Brands	Estimate	Std. Error	P-Value
Orange Juice/ Fruit Drinks	Private/Sunny Delight	-0.001	0.000	[.000]
	Private/Capri Sun	-0.001	0.000	[.057]
	Private/Kool-Aid	-0.001	0.000	[.004]
	Private/Gatorade	-0.003	0.001	[.000]
	Private/POWERade	-0.001	0.000	[.006]
	Private/Private	0.000	0.000	[.438]
	Minute Maid/Sunny Delight	-0.001	0.000	[.015]
	Minute Maid/Capri Sun	-0.002	0.000	[.000]
	Minute Maid/Kool-Aid	-0.001	0.000	[.001]
	Minute Maid/Gatorade	-0.002	0.000	[.002]
	Minute Maid/POWERade	-0.001	0.000	[.005]
	Minute Maid/Private	-0.001	0.000	[.008]
	Tropicana/Sunny Delight	-0.001	0.000	[.000]
	Tropicana/Capri Sun	-0.003	0.001	[.000]
	Tropicana/Kool-Aid	-0.001	0.000	[.000]
	Tropicana/Gatorade	-0.004	0.001	[.000]
	Tropicana/POWERade	-0.001	0.000	[.000]
	Tropicana/Private	-0.001	0.000	[.006]

Table B-4. Fruit Juice display elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-Value
Fruit Juice/Orange Juice	Private/Private	0.001	0.000	[.094]
	Private/Minute Maid	-0.001	0.000	[.000]
	Private/Tropicana	-0.001	0.000	[.000]
	Welch's/Private	0.000	0.000	[.000]
	Welch's/Minute Maid	0.000	0.000	[.022]
	Welch's/Tropicana	0.000	0.000	[.000]
	Sunny Delight/Private	-0.004	0.002	[.003]
	Sunny Delight/Minute Maid	-0.005	0.001	[.000]
	Sunny Delight/Tropicana	-0.006	0.001	[.000]
	Minute Maid/Private	-0.002	0.001	[.000]
	Minute Maid/Minute Maid	-0.003	0.001	[.000]
	Minute Maid/Tropicana	-0.004	0.001	[.000]
	Tropicana/Private	-0.001	0.000	[.065]
	Tropicana/Minute Maid	-0.001	0.000	[.000]
	Tropicana/Tropicana	0.002	0.000	[.000]
Fruit Juice/Fruit Juice	Private Label/Private Label	0.003	0.001	[.000]
	Private Label/Welch's	-0.001	0.000	[.007]
	Private Label/Sunny Delight	0.001	0.001	[.068]
	Private Label/Minute Maid	0.000	0.000	[.264]
	Private Label/Tropicana	0.000	0.000	[.738]
	Welch's/Private Label	0.000	0.000	[.007]
	Welch's/Welch's	0.003	0.000	[.000]
	Welch's/Sunny Delight	0.000	0.000	[.106]
	Welch's/Minute Maid	0.000	0.000	[.000]
	Welch's/Tropicana	0.000	0.000	[.081]
	Sunny Delight/Private Label	0.002	0.001	[.068]
	Sunny Delight/Welch's	-0.002	0.001	[.106]
	Sunny Delight/Sunny Delight	0.027	0.005	[.000]
	Sunny Delight/Minute Maid	0.001	0.001	[.639]
	Sunny Delight/Tropicana	0.000	0.001	[.835]

Table B-4. Continued

Category	Brands	Estimate	Std. Error	P-Value
Fruit Juice/Fruit Juice	Minute Maid/Private Label	0.000	0.000	[.264]
	Minute Maid/Welch's	-0.002	0.001	[.000]
	Minute Maid/Sunny Delight	0.000	0.000	[.639]
	Minute Maid/Minute Maid	0.023	0.003	[.000]
	Minute Maid/Tropicana	0.000	0.000	[.042]
	Tropicana/Private Label	0.000	0.000	[.738]
	Tropicana/Welch's	-0.001	0.000	[.081]
	Tropicana/Sunny Delight	0.000	0.001	[.835]
	Tropicana/Minute Maid	-0.001	0.000	[.042]
	Tropicana/Tropicana	0.005	0.001	[.000]
Fruit Juice/Fruit Drinks	Private Label/Sunny Delight	-0.001	0.001	[.023]
	Private Label/Capri Sun	0.000	0.000	[.108]
	Private Label/Kool-Aid	0.000	0.000	[.814]
	Private Label/Gatorade	-0.001	0.000	[.000]
	Private Label/POWERade	0.000	0.000	[.932]
	Private Label/Private Label	0.000	0.001	[.933]
	Welch's/Sunny Delight	0.000	0.000	[.781]
	Welch's/Capri Sun	0.000	0.000	[.005]
	Welch's/Kool-Aid	0.000	0.000	[.151]
	Welch's/Gatorade	0.000	0.000	[.000]
	Welch's/POWERade	0.000	0.000	[.000]
	Welch's/Private Label	0.000	0.000	[.063]
	Sunny Delight/Sunny Delight	-0.001	0.003	[.814]
	Sunny Delight/Capri Sun	-0.002	0.001	[.043]
	Sunny Delight/Kool-Aid	0.003	0.002	[.041]
	Sunny Delight/Gatorade	-0.005	0.001	[.000]
	Sunny Delight/POWERade	-0.002	0.001	[.068]
	Sunny Delight/Private Label	-0.006	0.003	[.043]
	Minute Maid/Sunny Delight	-0.002	0.001	[.001]
	Minute Maid/Capri Sun	-0.001	0.000	[.003]
	Minute Maid/Kool-Aid	-0.001	0.001	[.157]
	Minute Maid/Gatorade	-0.003	0.001	[.000]
	Minute Maid/POWERade	-0.003	0.001	[.000]
	Minute Maid/Private Label	-0.002	0.001	[.041]

Table B-4. Continued

Category	Brands	Estimate	Std. Error	P-Value
Fruit Juice/Fruit Drinks	Tropicana/Sunny Delight	-0.001	0.001	[.304]
	Tropicana/Capri Sun	-0.001	0.000	[.005]
	Tropicana/Kool-Aid	-0.001	0.000	[.004]
	Tropicana/Gatorade	-0.001	0.000	[.001]
	Tropicana/POWERade	0.000	0.000	[.269]
	Tropicana/Private Label	-0.001	0.001	[.473]

Table B-5. Fruit Drink display elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-Value
Fruit Drinks/Orange Juice	Sunny Delight/Private Label	-0.011	0.003	[.000]
	Sunny Delight/Minute Maid	-0.005	0.002	[.015]
	Sunny Delight/Tropicana	-0.009	0.003	[.000]
	Capri Sun/Private Label	-0.004	0.002	[.057]
	Capri Sun/Minute Maid	-0.011	0.002	[.000]
	Capri Sun/Tropicana	-0.012	0.002	[.000]
	Kool-Aid/Private Label	-0.004	0.001	[.004]
	Kool-Aid/Minute Maid	-0.004	0.001	[.001]
	Kool-Aid/Tropicana	-0.006	0.001	[.000]
	Gatorade/Private Label	-0.010	0.003	[.000]
	Gatorade/Minute Maid	-0.006	0.002	[.002]
	Gatorade/Tropicana	-0.013	0.003	[.000]
	POWERade/Private Label	-0.007	0.002	[.006]
	POWERade/Minute Maid	-0.006	0.002	[.005]
	POWERade/Tropicana	-0.008	0.002	[.000]
	Private Label/Private Label	0.001	0.002	[.438]
	Private Label/Minute Maid	-0.003	0.001	[.008]
	Private Label/Tropicana	-0.003	0.001	[.006]
Fruit Drinks/Fruit Juice	Sunny Delight/Private Label	-0.003	0.001	[.023]
	Sunny Delight/Welch's	0.000	0.002	[.781]
	Sunny Delight/Sunny Delight	-0.001	0.003	[.814]
	Sunny Delight/Minute Maid	-0.005	0.002	[.001]
	Sunny Delight/Tropicana	-0.001	0.001	[.304]
	Capri Sun/Private Label	0.000	0.000	[.108]
	Capri Sun/Welch's	-0.002	0.001	[.005]
	Capri Sun/Sunny Delight	-0.001	0.001	[.043]
	Capri Sun/Minute Maid	-0.002	0.001	[.003]
	Capri Sun/Tropicana	-0.001	0.000	[.005]
	Kool-Aid/Private Label	0.000	0.000	[.814]
	Kool-Aid/Welch's	0.001	0.001	[.151]
	Kool-Aid/Sunny Delight	0.002	0.001	[.041]
	Kool-Aid/Minute Maid	-0.001	0.001	[.157]
	Kool-Aid/Tropicana	-0.002	0.001	[.004]

Table B-5. Continued

Category	Brands	Estimate	Std. Error	P-Value
Fruit Drinks/Fruit Juice	Gatorade/Private Label	-0.001	0.000	[.000]
	Gatorade/Welch’s	-0.002	0.001	[.000]
	Gatorade/Sunny Delight	-0.002	0.000	[.000]
	Gatorade/Minute Maid	-0.004	0.001	[.000]
	Gatorade/Tropicana	-0.001	0.000	[.001]
	POWERade/Privat Label	0.000	0.000	[.932]
	POWERade/Welch's	-0.005	0.001	[.000]
	POWERade/Sunny Delight	-0.002	0.001	[.068]
	POWERade/Minute Maid	-0.006	0.002	[.000]
	POWERade/Tropicana	-0.001	0.000	[.269]
	Private Label/Private Label	0.000	0.001	[.933]
	Private Label/Welch’s	-0.003	0.002	[.063]
	Private Label/Sunny Delight	-0.004	0.002	[.043]
	Private Label/Minute Maid	-0.003	0.001	[.041]
	Private Label/Tropicana	-0.001	0.001	[.473]
Fruit Drinks/Fruit Drinks	Sunny Delight/Sunny Delight	0.058	0.009	[.000]
	Sunny Delight/Capri Sun	-0.008	0.003	[.002]
	Sunny Delight/Kool-Aid	-0.011	0.003	[.000]
	Sunny Delight/Gatorade	-0.005	0.003	[.134]
	Sunny Delight/POWERade	-0.004	0.002	[.086]
	Sunny Delight/Private Label	0.004	0.003	[.224]
	Capri Sun/Sunny Delight	-0.005	0.001	[.002]
	Capri Sun/Capri Sun	0.060	0.008	[.000]
	Capri Sun/Kool-Aid	-0.001	0.001	[.300]
	Capri Sun/Gatorade	-0.010	0.003	[.000]
	Capri Sun/POWERade	-0.005	0.002	[.002]
	Capri Sun/Private Label	-0.005	0.001	[.000]
	Kool-Aid/Sunny Delight	-0.006	0.001	[.000]
	Kool-Aid/Capri Sun	-0.001	0.001	[.300]
	Kool-Aid/Kool-Aid	0.032	0.005	[.000]
	Kool-Aid/Gatorade	-0.006	0.002	[.000]
	Kool-Aid/POWERade	-0.003	0.001	[.057]
	Kool-Aid/Private Label	-0.002	0.002	[.147]
	Gatorade/Sunny Delight	-0.002	0.001	[.134]
	Gatorade/Capri Sun	-0.007	0.002	[.000]
	Gatorade/Kool-Aid	-0.005	0.001	[.000]
	Gatorade/Gatorade	0.061	0.010	[.000]
	Gatorade/POWERade	-0.005	0.001	[.000]

Table B-5. Continued

Category	Brands	Estimate	Std. Error	P-Value
	Gatorade/Private Label	-0.004	0.001	[.000]
	POWERade/Sunny Delight	-0.003	0.002	[.086]
	POWERade/Capri Sun	-0.007	0.002	[.002]
	POWERade/Kool-Aid	-0.004	0.002	[.057]
	POWERade/Gatorade	-0.009	0.002	[.000]
	POWERade/POWERade	0.058	0.009	[.000]
	POWERade/Private Label	-0.001	0.002	[.503]
	Private Label/Sunny Delight	0.003	0.002	[.224]
	Private Label/Capri Sun	-0.006	0.001	[.000]
	Private Label/Kool-Aid	-0.003	0.002	[.147]
	Private Label /Gatorade	-0.006	0.001	[.000]
	Private Label/POWERade	-0.001	0.002	[.503]
	Private Label/Private Label	0.023	0.006	[.000]

Table B-6. Orange juice feature elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-Value
Orange Juice/Orange Juice	Private Label/Private Label	0.020	0.003	[.000]
	Private Label/Minute Maid	-0.005	0.001	[.000]
	Private Label/Tropicana	-0.005	0.001	[.000]
	Minute Maid/Private Label	-0.004	0.001	[.000]
	Minute Maid/Minute Maid	0.017	0.002	[.000]
	Minute Maid/Tropicana	-0.005	0.001	[.000]
	Tropicana/Private Label	-0.005	0.001	[.000]
	Tropicana/Minute Maid	-0.005	0.001	[.000]
	Tropicana/Tropicana	0.024	0.003	[.000]
Orange Juice/Fruit Juice	Private Label/Private Label	0.000	0.000	[.094]
	Private Label/Welch's	-0.001	0.000	[.000]
	Private Label/Sunny Delight	-0.001	0.000	[.003]
	Private Label/Minute Maid	-0.001	0.000	[.000]
	Private Label/Tropicana	0.000	0.000	[.065]
	Minute Maid/Private Label	0.000	0.000	[.000]
	Minute Maid/Welch's	0.000	0.000	[.022]
	Minute Maid/Sunny Delight	-0.001	0.000	[.000]
	Minute Maid/Minute Maid	-0.001	0.000	[.000]
	Minute Maid/Tropicana	0.000	0.000	[.000]
	Tropicana/Private Label	0.000	0.000	[.000]
	Tropicana/Welch's	-0.001	0.000	[.000]
	Tropicana/Sunny Delight	-0.001	0.000	[.000]
	Tropicana/Minute Maid	-0.002	0.000	[.000]
	Tropicana/Tropicana	0.001	0.000	[.000]

Table B-6. Continued

Category	Brands	Estimate	Std. Error	P-Value
Orange Juice/ Fruit Drinks	Private/Sunny Delight	-0.001	0.000	[.000]
	Private/Capri Sun	-0.001	0.000	[.057]
	Private/Kool-Aid	-0.001	0.000	[.004]
	Private/Gatorade	-0.003	0.001	[.000]
	Private/POWERade	-0.001	0.000	[.006]
	Private/Private	0.000	0.000	[.438]
	Minute Maid/Sunny Delight	-0.001	0.000	[.015]
	Minute Maid/Capri Sun	-0.002	0.000	[.000]
	Minute Maid/Kool-Aid	-0.001	0.000	[.001]
	Minute Maid/Gatorade	-0.002	0.000	[.002]
	Minute Maid/POWERade	-0.001	0.000	[.005]
	Minute Maid/Private	-0.001	0.000	[.008]
	Tropicana/Sunny Delight	-0.001	0.000	[.000]
	Tropicana/Capri Sun	-0.003	0.001	[.000]
	Tropicana/Kool-Aid	-0.001	0.000	[.000]
	Tropicana/Gatorade	-0.004	0.001	[.000]
	Tropicana/POWERade	-0.001	0.000	[.000]
	Tropicana/Private	-0.001	0.000	[.006]

Table B-7. Fruit Juice feature elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-Value
Fruit Juice/Orange Juice	Private/Private	0.001	0.000	[.094]
	Private/Minute Maid	-0.001	0.000	[.000]
	Private/Tropicana	-0.001	0.000	[.000]
	Welch's/Private	0.000	0.000	[.000]
	Welch's/Minute Maid	0.000	0.000	[.022]
	Welch's/Tropicana	0.000	0.000	[.000]
	Sunny Delight/Private	-0.004	0.002	[.003]
	Sunny Delight/Minute Maid	-0.005	0.001	[.000]
	Sunny Delight/Tropicana	-0.006	0.001	[.000]
	Minute Maid/Private	-0.002	0.001	[.000]
	Minute Maid/Minute Maid	-0.003	0.001	[.000]
	Minute Maid/Tropicana	-0.004	0.001	[.000]
	Tropicana/Private	-0.001	0.000	[.065]
	Tropicana/Minute Maid	-0.001	0.000	[.000]
	Tropicana/Tropicana	0.002	0.000	[.000]
Fruit Juice/Fruit Juice	Private Label/Private Label	0.003	0.001	[.000]
	Private Label/Welch's	-0.001	0.000	[.007]
	Private Label/Sunny Delight	0.001	0.001	[.068]
	Private Label/Minute Maid	0.000	0.000	[.264]
	Private Label/Tropicana	0.000	0.000	[.738]
	Welch's/Private Label	0.000	0.000	[.007]
	Welch's/Welch's	0.003	0.000	[.000]
	Welch's/Sunny Delight	0.000	0.000	[.106]
	Welch's/Minute Maid	0.000	0.000	[.000]
	Welch's/Tropicana	0.000	0.000	[.081]
	Sunny Delight/Private Label	0.002	0.001	[.068]
	Sunny Delight/Welch's	-0.002	0.001	[.106]
	Sunny Delight/Sunny Delight	0.027	0.005	[.000]
	Sunny Delight/Minute Maid	0.001	0.001	[.639]
	Sunny Delight/Tropicana	0.000	0.001	[.835]

Table B-7. Continued

Category	Brands	Estimate	Std. Error	P-Value
Fruit Juice/Fruit Juice	Minute Maid/Private Label	0.000	0.000	[.264]
	Minute Maid/Welch's	-0.002	0.001	[.000]
	Minute Maid/Sunny Delight	0.000	0.000	[.639]
	Minute Maid/Minute Maid	0.023	0.003	[.000]
	Minute Maid/Tropicana	0.000	0.000	[.042]
	Tropicana/Private Label	0.000	0.000	[.738]
	Tropicana/Welch's	-0.001	0.000	[.081]
	Tropicana/Sunny Delight	0.000	0.001	[.835]
	Tropicana/Minute Maid	-0.001	0.000	[.042]
	Tropicana/Tropicana	0.005	0.001	[.000]
Fruit Juice/Fruit Drinks	Private Label/Sunny Delight	-0.001	0.001	[.023]
	Private Label/Capri Sun	0.000	0.000	[.108]
	Private Label/Kool-Aid	0.000	0.000	[.814]
	Private Label/Gatorade	-0.001	0.000	[.000]
	Private Label/POWERade	0.000	0.000	[.932]
	Private Label/Private Label	0.000	0.001	[.933]
	Welch's/Sunny Delight	0.000	0.000	[.781]
	Welch's/Capri Sun	0.000	0.000	[.005]
	Welch's/Kool-Aid	0.000	0.000	[.151]
	Welch's/Gatorade	0.000	0.000	[.000]
	Welch's/POWERade	0.000	0.000	[.000]
	Welch's/Private Label	0.000	0.000	[.063]
	Sunny Delight/Sunny Delight	-0.001	0.003	[.814]
	Sunny Delight/Capri Sun	-0.002	0.001	[.043]
	Sunny Delight/Kool-Aid	0.003	0.002	[.041]
	Sunny Delight/Gatorade	-0.005	0.001	[.000]
	Sunny Delight/POWERade	-0.002	0.001	[.068]
	Sunny Delight/Private Label	-0.006	0.003	[.043]
	Minute Maid/Sunny Delight	-0.002	0.001	[.001]
	Minute Maid/Capri Sun	-0.001	0.000	[.003]
	Minute Maid/Kool-Aid	-0.001	0.001	[.157]
	Minute Maid/Gatorade	-0.003	0.001	[.000]

Table B-7. Continued

Category	Brands	Estimate	Std. Error	P-Value
Fruit Juice/Fruit Drinks	Minute Maid/POWERade	-0.003	0.001	[.000]
	Minute Maid/Private Label	-0.002	0.001	[.041]
	Tropicana/Sunny Delight	-0.001	0.001	[.304]
	Tropicana/Capri Sun	-0.001	0.000	[.005]
	Tropicana/Kool-Aid	-0.001	0.000	[.004]
	Tropicana/Gatorade	-0.001	0.000	[.001]
	Tropicana/POWERade	0.000	0.000	[.269]
	Tropicana/Private Label	-0.001	0.001	[.473]

Table B-8. Fruit drink feature elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-Value
Fruit Drinks/Orange Juice	Sunny Delight/Private Label	-0.011	0.003	[.000]
	Sunny Delight/Minute Maid	-0.005	0.002	[.015]
	Sunny Delight/Tropicana	-0.009	0.003	[.000]
	Capri Sun/Private Label	-0.004	0.002	[.057]
	Capri Sun/Minute Maid	-0.011	0.002	[.000]
	Capri Sun/Tropicana	-0.012	0.002	[.000]
	Kool-Aid/Private Label	-0.004	0.001	[.004]
	Kool-Aid/Minute Maid	-0.004	0.001	[.001]
	Kool-Aid/Tropicana	-0.006	0.001	[.000]
	Gatorade/Private Label	-0.010	0.003	[.000]
	Gatorade/Minute Maid	-0.006	0.002	[.002]
	Gatorade/Tropicana	-0.013	0.003	[.000]
	POWERade/Private Label	-0.007	0.002	[.006]
	POWERade/Minute Maid	-0.006	0.002	[.005]
	POWERade/Tropicana	-0.008	0.002	[.000]
	Private Label/Private Label	0.001	0.002	[.438]
	Private Label/Minute Maid	-0.003	0.001	[.008]
	Private Label/Tropicana	-0.003	0.001	[.006]
Fruit Drinks/Fruit Juice	Sunny Delight/Private Label	-0.003	0.001	[.023]
	Sunny Delight/Welch's	0.000	0.002	[.781]
	Sunny Delight/Sunny Delight	-0.001	0.003	[.814]
	Sunny Delight/Minute Maid	-0.005	0.002	[.001]
	Sunny Delight/Tropicana	-0.001	0.001	[.304]
	Capri Sun/Private Label	0.000	0.000	[.108]
	Capri Sun/Welch's	-0.002	0.001	[.005]
	Capri Sun/Sunny Delight	-0.001	0.001	[.043]
	Capri Sun/Minute Maid	-0.002	0.001	[.003]
	Capri Sun/Tropicana	-0.001	0.000	[.005]
	Kool-Aid/Private Label	0.000	0.000	[.814]
	Kool-Aid/Welch's	0.001	0.001	[.151]
	Kool-Aid/Sunny Delight	0.002	0.001	[.041]
	Kool-Aid/Minute Maid	-0.001	0.001	[.157]
	Kool-Aid/Tropicana	-0.002	0.001	[.004]
	Gatorade/Private Label	-0.001	0.000	[.000]
	Gatorade/Welch's	-0.002	0.001	[.000]
	Gatorade/Sunny Delight	-0.002	0.000	[.000]
	Gatorade/Minute Maid	-0.004	0.001	[.000]
	Gatorade/Tropicana	-0.001	0.000	[.001]

Table B-8. Continued

Category	Brands	Estimate	Std. Error	P-Value
Fruit Drinks/Fruit Juice	POWERade/Private Label	0.000	0.000	[.932]
	POWERade/Welch's	-0.005	0.001	[.000]
	POWERade/Sunny Delight	-0.002	0.001	[.068]
	POWERade/Minute Maid	-0.006	0.002	[.000]
	POWERade/Tropicana	-0.001	0.000	[.269]
	Private Label/Private Label	0.000	0.001	[.933]
	Private Label/Welch’s	-0.003	0.002	[.063]
	Private Label/Sunny Delight	-0.004	0.002	[.043]
	Private Label/Minute Maid	-0.003	0.001	[.041]
	Private Label/Tropicana	-0.001	0.001	[.473]
Fruit Drinks/Fruit Drinks	Sunny Delight/Sunny Delight	0.058	0.009	[.000]
	Sunny Delight/Capri Sun	-0.008	0.003	[.002]
	Sunny Delight/Kool-Aid	-0.011	0.003	[.000]
	Sunny Delight/Gatorade	-0.005	0.003	[.134]
	Sunny Delight/POWERade	-0.004	0.002	[.086]
	Sunny Delight/Private Label	0.004	0.003	[.224]
	Capri Sun/Sunny Delight	-0.005	0.001	[.002]
	Capri Sun/Capri Sun	0.060	0.008	[.000]
	Capri Sun/Kool-Aid	-0.001	0.001	[.300]
	Capri Sun/Gatorade	-0.010	0.003	[.000]
	Capri Sun/POWERade	-0.005	0.002	[.002]
	Capri Sun/Private Label	-0.005	0.001	[.000]
	Kool-Aid/Sunny Delight	-0.006	0.001	[.000]
	Kool-Aid/Capri Sun	-0.001	0.001	[.300]
	Kool-Aid/Kool-Aid	0.032	0.005	[.000]
	Kool-Aid/Gatorade	-0.006	0.002	[.000]
	Kool-Aid/POWERade	-0.003	0.001	[.057]
	Kool-Aid/Private Label	-0.002	0.002	[.147]
	Gatorade/Sunny Delight	-0.002	0.001	[.134]
	Gatorade/Capri Sun	-0.007	0.002	[.000]
	Gatorade/Kool-Aid	-0.005	0.001	[.000]
	Gatorade/Gatorade	0.061	0.010	[.000]
	Gatorade/POWERade	-0.005	0.001	[.000]
	Gatorade/Private Label	-0.004	0.001	[.000]

Table B-8. Continued

Category	Brands	Estimate	Std. Error	P-Value
Fruit Drinks/Fruit Drinks	POWERade/Sunny Delight	-0.003	0.002	[.086]
	POWERade/Capri Sun	-0.007	0.002	[.002]
	POWERade/Kool-Aid	-0.004	0.002	[.057]
	POWERade/Gatorade	-0.009	0.002	[.000]
	POWERade/POWERade	0.058	0.009	[.000]
	POWERade/Private Label	-0.001	0.002	[.503]
	Private Label/Sunny Delight	0.003	0.002	[.224]
	Private Label/Capri Sun	-0.006	0.001	[.000]
	Private Label/Kool-Aid	-0.003	0.002	[.147]
	Private Label /Gatorade	-0.006	0.001	[.000]
	Private Label/POWERade	-0.001	0.002	[.503]
	Private Label/Private Label	0.023	0.006	[.000]

Table B-9. Orange juice feature and display elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-Value
Orange Juice/Orange Juice	Private Label/Private Label	0.0209	0.0017	[.000]
	Private Label/Minute Maid	-0.0049	0.0005	[.000]
	Private Label/Tropicana	-0.0053	0.0006	[.000]
	Minute Maid/Private Label	-0.0063	0.0007	[.000]
	Minute Maid/Minute Maid	0.0299	0.0021	[.000]
	Minute Maid/Tropicana	-0.0082	0.0008	[.000]
	Tropicana/Private Label	-0.0072	0.0008	[.000]
	Tropicana/Minute Maid	-0.0087	0.0008	[.000]
	Tropicana/Tropicana	0.0383	0.0027	[.000]
Orange Juice/Fruit Juice	Private Label/Private Label	0.0002	0.0001	[.088]
	Private Label/Welch's	-0.0008	0.0002	[.000]
	Private Label/Sunny Delight	-0.0007	0.0002	[.002]
	Private Label/Minute Maid	-0.0012	0.0002	[.000]
	Private Label/Tropicana	-0.0002	0.0001	[.059]
	Minute Maid/Private Label	-0.0003	0.0001	[.000]
	Minute Maid/Welch's	-0.0004	0.0002	[.020]
	Minute Maid/Sunny Delight	-0.0009	0.0002	[.000]
	Minute Maid/Minute Maid	-0.0021	0.0003	[.000]
	Minute Maid/Tropicana	-0.0004	0.0001	[.000]
	Tropicana/Private Label	-0.0004	0.0001	[.000]
	Tropicana/Welch's	-0.0012	0.0002	[.000]
	Tropicana/Sunny Delight	-0.0012	0.0002	[.000]
	Tropicana/Minute Maid	-0.0025	0.0003	[.000]
	Tropicana/Tropicana	0.0010	0.0001	[.000]

Table B-9. Continued

Category	Brands	Estimate	Std. Error	P-Value
Orange Juice/ Fruit Drinks	Private/Sunny Delight	-0.0015	0.0004	[.000]
	Private/Capri Sun	-0.0010	0.0005	[.048]
	Private/Kool-Aid	-0.0011	0.0004	[.002]
	Private/Gatorade	-0.0035	0.0007	[.000]
	Private/POWERade	-0.0013	0.0005	[.004]
	Private/Private	0.0003	0.0004	[.437]
	Minute Maid/Sunny Delight	-0.0010	0.0004	[.009]
	Minute Maid/Capri Sun	-0.0036	0.0006	[.000]
	Minute Maid/Kool-Aid	-0.0016	0.0004	[.000]
	Minute Maid/Gatorade	-0.0026	0.0008	[.001]
	Minute Maid/POWERade	-0.0015	0.0005	[.003]
	Minute Maid/Private	-0.0009	0.0003	[.005]
	Tropicana/Sunny Delight	-0.0019	0.0004	[.000]
	Tropicana/Capri Sun	-0.0043	0.0007	[.000]
	Tropicana/Kool-Aid	-0.0024	0.0004	[.000]
	Tropicana/Gatorade	-0.0061	0.0011	[.000]
	Tropicana/POWERade	-0.0023	0.0005	[.000]
	Tropicana/Private	-0.0010	0.0003	[.003]

Table B-10. Fruit juice feature and display elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-Value
Fruit Juice/Orange Juice	Private/Private	0.0000	0.0000	[.088]
	Private/Minute Maid	0.0000	0.0000	[.000]
	Private/Tropicana	0.0000	0.0000	[.000]
	Welch's/Private	-0.0003	0.0001	[.000]
	Welch's/Minute Maid	-0.0001	0.0001	[.020]
	Welch's/Tropicana	-0.0004	0.0001	[.000]
	Sunny Delight/Private	-0.0047	0.0015	[.002]
	Sunny Delight/Minute Maid	-0.0049	0.0010	[.000]
	Sunny Delight/Tropicana	-0.0061	0.0011	[.000]
	Minute Maid/Private	-0.0016	0.0003	[.000]
	Minute Maid/Minute Maid	-0.0023	0.0003	[.000]
	Minute Maid/Tropicana	-0.0025	0.0003	[.000]
Fruit Juice/Fruit Juice	Private Label/Private Label	0.0001	0.0000	[.000]
	Private Label/Welch's	0.0000	0.0000	[.004]
	Private Label/Sunny Delight	0.0000	0.0000	[.060]
	Private Label/Minute Maid	0.0000	0.0000	[.259]
	Private Label/Tropicana	0.0000	0.0000	[.737]
	Welch's/Private Label	-0.0001	0.0000	[.004]
	Welch's/Welch's	0.0027	0.0002	[.000]
	Welch's/Sunny Delight	-0.0001	0.0001	[.099]
	Welch's/Minute Maid	-0.0004	0.0001	[.000]
	Welch's/Tropicana	-0.0001	0.0000	[.077]
	Sunny Delight/Private Label	0.0020	0.0011	[.060]
	Sunny Delight/Welch's	-0.0023	0.0014	[.099]
	Sunny Delight/Sunny Delight	0.0283	0.0036	[.000]
	Sunny Delight/Minute Maid	0.0006	0.0012	[.638]
	Sunny Delight/Tropicana	0.0003	0.0012	[.835]
	Minute Maid/Private Label	0.0001	0.0001	[.259]
	Minute Maid/Welch's	-0.0015	0.0003	[.000]
	Minute Maid/Sunny Delight	0.0001	0.0002	[.638]
	Minute Maid/Minute Maid	0.0149	0.0012	[.000]
	Minute Maid/Tropicana	-0.0003	0.0001	[.034]

Table B-10. Continued

Category	Brands	Estimate	Std. Error	P-Value
Fruit Juice/Fruit Drinks	Private Label/Sunny Delight	0.0000	0.0000	[.018]
	Private Label/Capri Sun	0.0000	0.0000	[.101]
	Private Label/Kool-Aid	0.0000	0.0000	[.813]
	Private Label/Gatorade	0.0000	0.0000	[.000]
	Private Label/POWERade	0.0000	0.0000	[.932]
	Private Label/Private Label	0.0000	0.0000	[.933]
	Welch's/Sunny Delight	0.0000	0.0001	[.780]
	Welch's/Capri Sun	-0.0002	0.0001	[.003]
	Welch's/Kool-Aid	0.0002	0.0001	[.148]
	Welch's/Gatorade	-0.0004	0.0001	[.000]
	Welch's/POWERade	-0.0004	0.0001	[.000]
	Welch's/Private Label	-0.0003	0.0001	[.059]
	Sunny Delight/Sunny Delight	-0.0008	0.0032	[.814]
	Sunny Delight/Capri Sun	-0.0021	0.0010	[.035]
	Sunny Delight/Kool-Aid	0.0034	0.0016	[.033]
	Sunny Delight/Gatorade	-0.0051	0.0010	[.000]
	Sunny Delight/POWERade	-0.0023	0.0012	[.061]
	Sunny Delight/Private Label	-0.0063	0.0030	[.035]
	Minute Maid/Sunny Delight	-0.0011	0.0003	[.000]
	Minute Maid/Capri Sun	-0.0007	0.0002	[.002]
	Minute Maid/Kool-Aid	-0.0006	0.0004	[.153]
	Minute Maid/Gatorade	-0.0019	0.0003	[.000]
	Minute Maid/POWERade	-0.0017	0.0004	[.000]
	Minute Maid/Private Label	-0.0010	0.0005	[.037]

Table B-11. Fruit drinks feature and display elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-Value
Fruit Drinks/Orange Juice	Sunny Delight/Private Label	-0.0091	0.0022	[.000]
	Sunny Delight/Minute Maid	-0.0045	0.0017	[.009]
	Sunny Delight/Tropicana	-0.0081	0.0019	[.000]
	Capri Sun/Private Label	-0.0032	0.0016	[.048]
	Capri Sun/Minute Maid	-0.0090	0.0015	[.000]
	Capri Sun/Tropicana	-0.0104	0.0017	[.000]
	Kool-Aid/Private Label	-0.0036	0.0012	[.002]
	Kool-Aid/Minute Maid	-0.0040	0.0010	[.000]
	Kool-Aid/Tropicana	-0.0056	0.0010	[.000]
	Gatorade/Private Label	-0.0098	0.0021	[.000]
	Gatorade/Minute Maid	-0.0056	0.0017	[.001]
	Gatorade/Tropicana	-0.0125	0.0023	[.000]
	POWERade/Private Label	-0.0030	0.0010	[.004]
	POWERade/Minute Maid	-0.0026	0.0009	[.003]
	POWERade/Tropicana	-0.0038	0.0009	[.000]
	Private Label/Private Label	0.0003	0.0004	[.437]
	Private Label/Minute Maid	-0.0007	0.0002	[.005]
	Private Label/Tropicana	-0.0007	0.0002	[.003]
Fruit Drinks/Fruit Juice	Sunny Delight/Private Label	-0.0023	0.0010	[.018]
	Sunny Delight/Welch's	0.0004	0.0013	[.780]
	Sunny Delight/Sunny Delight	-0.0006	0.0026	[.814]
	Sunny Delight/Minute Maid	-0.0047	0.0013	[.000]
	Sunny Delight/Tropicana	-0.0012	0.0011	[.302]
	Capri Sun/Private Label	-0.0003	0.0002	[.101]
	Capri Sun/Welch's	-0.0014	0.0005	[.003]
	Capri Sun/Sunny Delight	-0.0010	0.0005	[.035]
	Capri Sun/Minute Maid	-0.0018	0.0006	[.002]
	Capri Sun/Tropicana	-0.0007	0.0002	[.003]
	Kool-Aid/Private Label	-0.0001	0.0003	[.813]
	Kool-Aid/Welch's	0.0013	0.0009	[.148]
	Kool-Aid/Sunny Delight	0.0016	0.0007	[.033]
	Kool-Aid/Minute Maid	-0.0014	0.0010	[.153]
	Kool-Aid/Tropicana	-0.0014	0.0004	[.002]
	Gatorade/Private Label	-0.0005	0.0001	[.000]
	Gatorade/Welch's	-0.0024	0.0005	[.000]
	Gatorade/Sunny Delight	-0.0020	0.0004	[.000]
	Gatorade/Minute Maid	-0.0038	0.0005	[.000]
	Gatorade/Tropicana	-0.0008	0.0002	[.000]

Table 8-11. Continued

Category	Brands	Estimate	Std. Error	P-Value
Fruit Drinks/Fruit Juice	POWERade/Private Label	0.0000	0.0002	[.932]
	POWERade/Welch's	-0.0023	0.0005	[.000]
	POWERade/Sunny Delight	-0.0007	0.0004	[.061]
	POWERade/Minute Maid	-0.0028	0.0006	[.000]
	POWERade/Tropicana	-0.0002	0.0002	[.265]
	Private Label/Private Label	0.0000	0.0002	[.933]
	Private Label/Welch’s	-0.0007	0.0003	[.059]
	Private Label/Sunny Delight	-0.0008	0.0004	[.035]
	Private Label/Minute Maid	-0.0007	0.0003	[.037]
	Private Label/Tropicana	-0.0002	0.0002	[.472]
Fruit Drinks/Fruit Drinks	Sunny Delight/Sunny Delight	0.0497	0.0051	[.000]
	Sunny Delight/Capri Sun	-0.0068	0.0020	[.001]
	Sunny Delight/Kool-Aid	-0.0092	0.0019	[.000]
	Sunny Delight/Gatorade	-0.0039	0.0025	[.122]
	Sunny Delight/POWERade	-0.0033	0.0018	[.078]
	Sunny Delight/Private Label	0.0035	0.0029	[.216]
	Capri Sun/Sunny Delight	-0.0038	0.0011	[.001]
	Capri Sun/Capri Sun	0.0503	0.0038	[.000]
	Capri Sun/Kool-Aid	-0.0012	0.0011	[.286]
	Capri Sun/Gatorade	-0.0085	0.0023	[.000]
	Capri Sun/POWERade	-0.0044	0.0013	[.001]
	Capri Sun/Private Label	-0.0046	0.0010	[.000]
	Kool-Aid/Sunny Delight	-0.0051	0.0010	[.000]
	Kool-Aid/Capri Sun	-0.0012	0.0011	[.286]
	Kool-Aid/Kool-Aid	0.0294	0.0030	[.000]
	Kool-Aid/Gatorade	-0.0052	0.0013	[.000]
	Kool-Aid/POWERade	-0.0024	0.0012	[.053]
	Kool-Aid/Private Label	-0.0023	0.0015	[.141]
	Gatorade/Sunny Delight	-0.0019	0.0012	[.122]
	Gatorade/Capri Sun	-0.0073	0.0020	[.000]
	Gatorade/Kool-Aid	-0.0045	0.0011	[.000]
	Gatorade/Gatorade	0.0601	0.0067	[.000]
	Gatorade/POWERade	-0.0049	0.0012	[.000]
	Gatorade/Private Label	-0.0039	0.0007	[.000]
	POWERade/Sunny Delight	-0.0013	0.0007	[.078]
	POWERade/Capri Sun	-0.0031	0.0009	[.001]
	POWERade/Kool-Aid	-0.0017	0.0009	[.053]

Table B-11. Continued

Category	Brands	Estimate	Std. Error	P-Value
Fruit Drinks/Fruit Drinks	POWERade/Gatorade	-0.0040	0.0010	[.000]
	POWERade/POWERade	0.0262	0.0025	[.000]
	POWERade/Private Label	-0.0005	0.0008	[.500]
	Private Label/Sunny Delight	0.0006	0.0005	[.216]
	Private Label/Capri Sun	-0.0014	0.0003	[.000]
	Private Label/Kool-Aid	-0.0007	0.0005	[.141]
	Private Label /Gatorade	-0.0013	0.0003	[.000]
	Private Label/POWERade	-0.0002	0.0003	[.500]
	Private Label/Private Label	0.0054	0.0012	[.000]

APPENDIX C
PARAMETER ESTIMATES AND PROMOTIONAL ELASTICITIES FOR RETAILER Z

Table C-1. Marginal propensity to consume estimates

Category	Brand	Estimate	Std. Error	P-value
Orange Juice	Florida's Natural	0.118	0.038	[.002]
	Minute Maid	0.031	0.025	[.223]
	Tropicana	0.377	0.049	[.000]
Fruit Juice	Minute Maid	0.023	0.007	[.001]
	Newman's Own	0.026	0.005	[.000]
	Turkey Hill	0.009	0.002	[.000]
	Vita J	0.002	0.001	[.002]
	Welch’s	0.006	0.004	[.103]
	Tropicana	0.025	0.009	[.003]
Fruit Drinks	Capri Sun	0.098	0.017	[.000]
	Gatorade	0.198	0.041	[.000]
	Minute Maid	0.024	0.005	[.000]
	POWERade	0.049	0.010	[.000]
	Snapple	0.014	0.009	[.120]

Table C-2. Promotional and Slutsky coefficients for Retailer Z

Brands	Estimate	Std. Error	P-value
Displays	0.003	0.000	[.000]
Features	0.000	0.000	[.191]
Displays and Features	0.006	0.000	[.000]
RHO	0.311	0.035	[.000]
Florida's Natural (OJ)/Florida's Natural (OJ)	-0.280	0.014	[.000]
Florida's Natural (OJ)/Minute Maid (OJ)	0.050	0.007	[.000]
Florida's Natural (OJ)/Tropicana (OJ)	0.112	0.010	[.000]
Florida's Natural (OJ)/Minute Maid (FJ)	-0.002	0.004	[.616]
Florida's Natural (OJ)/Newman's Own (FJ)	0.015	0.003	[.000]
Florida's Natural (OJ)/Turkey Hill (FJ)	0.003	0.001	[.016]
Florida's Natural (OJ)/Vita J (FJ)	0.001	0.001	[.033]
Florida's Natural (OJ)/Welch's (FJ)	0.005	0.002	[.032]
Florida's Natural (OJ)/Tropicana (FJ)	0.009	0.003	[.002]
Florida's Natural (OJ)/Capri Sun (FD)	0.010	0.005	[.046]
Florida's Natural (OJ)/Gatorade (FD)	0.038	0.010	[.000]
Florida's Natural (OJ)/Minute Maid (FD)	0.016	0.005	[.002]
Florida's Natural (OJ)/POWERade (FD)	0.017	0.003	[.000]
Florida's Natural (OJ)/Snapple (FD)	0.005	0.004	[.232]
Minute Maid (OJ)/Minute Maid (OJ)	-0.175	0.012	[.000]
Minute Maid (OJ)/Tropicana (OJ)	0.070	0.008	[.000]
Minute Maid (OJ)/Minute Maid (FJ)	0.008	0.003	[.018]
Minute Maid (OJ)/Newman's Own (FJ)	0.008	0.002	[.001]
Minute Maid (OJ)/Turkey Hill (FJ)	0.001	0.001	[.174]
Minute Maid (OJ)/Vita J (FJ)	0.000	0.000	[.313]
Minute Maid (OJ)/Welch's (FJ)	0.002	0.002	[.186]
Minute Maid (OJ)/Tropicana (FJ)	0.007	0.004	[.064]
Minute Maid (OJ)/Capri Sun (FD)	0.006	0.006	[.330]
Minute Maid (OJ)/Gatorade (FD)	0.015	0.010	[.118]
Minute Maid(OJ)/Minute Maid (FD)	-0.002	0.003	[.492]
Minute Maid (OJ)/POWERade (FD)	0.016	0.004	[.000]
Minute Maid (OJ)/Snapple (FD)	-0.006	0.004	[.167]
Tropicana (OJ)/Tropicana (OJ)	-0.352	0.019	[.000]
Tropicana (OJ)/Minute Maid (FJ)	0.010	0.003	[.000]
Tropicana (OJ)/Newman's Own (FJ)	0.014	0.002	[.000]
Tropicana (OJ)/Turkey Hill (FJ)	0.005	0.001	[.000]
Tropicana (OJ)/Vita J (FJ)	0.001	0.000	[.000]

Table C-2. Continued

Brands	Estimate	Std. Error	P-value
Tropicana (OJ)/Welch's (FJ)	0.008	0.001	[.000]
Tropicana (OJ)/Tropicana (FJ)	0.014	0.003	[.000]
Tropicana (OJ)/Capri Sun (FD)	0.030	0.006	[.000]
Tropicana (OJ)/Gatorade (FD)	0.061	0.011	[.000]
Tropicana (OJ)/Minute Maid (FD)	0.003	0.002	[.176]
Tropicana (OJ)/POWERade (FD)	0.025	0.004	[.000]
Tropicana (OJ)/Snapple (FD)	0.000	0.003	[.971]
Minute Maid (FJ)/Minute Maid (FJ)	-0.065	0.005	[.000]
Minute Maid (FJ)/Newman’s Own (FJ)	0.007	0.003	[.022]
Minute Maid (FJ)/Turkey Hill (FJ)	0.001	0.001	[.217]
Minute Maid (FJ)/Vita J (FJ)	0.001	0.000	[.145]
Minute Maid (FJ)/Welch's (FJ)	0.000	0.002	[.996]
Minute Maid (FJ)/Tropicana (FJ)	0.011	0.002	[.000]
Minute Maid (FJ)/Capri Sun (FD)	0.001	0.002	[.624]
Minute Maid (FJ)/Gatorade (FD)	0.004	0.003	[.128]
Minute Maid (FJ)/Minute Maid (FD)	0.015	0.003	[.000]
Minute Maid (FJ)/POWERade (FD)	0.000	0.003	[.962]
Minute Maid (FJ)/Snapple (FD)	0.008	0.003	[.012]
Newman’s Own (FJ)/Newman’s Own (FJ)	-0.059	0.005	[.000]
Newman’s Own (FJ)/Turkey Hill (FJ)	0.000	0.001	[.747]
Newman’s Own (FJ)/Vita J (FJ)	0.000	0.001	[.519]
Newman’s Own (FJ)/Welch's (FJ)	0.008	0.002	[.000]
Newman’s Own (FJ)/Tropicana (FJ)	0.002	0.002	[.186]
Newman’s Own (FJ)/Capri Sun (FD)	0.005	0.002	[.001]
Newman’s Own (FJ)/Gatorade (FD)	0.007	0.002	[.000]
Newmans Own (FJ)/Minute Maid (FD)	-0.007	0.004	[.066]
Newmans Own (FJ)/POWERade (FD)	-0.001	0.003	[.627]
Newmans Own (FJ)/Snapple (FD)	0.001	0.002	[.581]
Turkey Hill (FJ)/Turkey Hill (FJ)	-0.021	0.001	[.000]
Turkey Hill (FJ)/Vita J (FJ)	0.000	0.000	[.165]
Turkey Hill (FJ)/Welch's (FJ)	0.004	0.001	[.000]
Turkey Hill (FJ)/Tropicana (FJ)	0.002	0.001	[.008]
Turkey Hill (FJ)/Capri Sun (FD)	0.002	0.001	[.000]
Turkey Hill (FJ)/Gatorade (FD)	0.002	0.001	[.027]
Turkey Hill (FJ)/Minute Maid (FD)	-0.002	0.002	[.309]
Turkey Hill (FJ)/POWERade (FD)	0.000	0.001	[.896]
Turkey Hill (FJ)/Snapple (FD)	0.001	0.001	[.343]

Table C-2 Continued

Brands	Estimate	Std. Error	P-value
Vita J (FJ)/Vita J (FJ)	-0.002	0.000	[.000]
Vita J (FJ)/Welch's (FJ)	-0.001	0.000	[.067]
Vita J(FJ)/Tropicana (FJ)	0.000	0.000	[.048]
Vita J (FJ)/Capri Sun (FD)	0.000	0.000	[.174]
Vita J (FJ)/Gatorade (FD)	0.000	0.000	[.490]
Vita J (FJ)/Minute Maid (FD)	-0.001	0.001	[.107]
Vita J (FJ)/POWERade (FD)	0.000	0.000	[.619]
Vita J (FJ)/Snapple (FD)	0.000	0.000	[.528]
Welch's (FJ)/Welch's (FJ)	-0.044	0.002	[.000]
Welch's (FJ)/Tropicana (FJ)	0.004	0.001	[.000]
Welch's (FJ)/Capri Sun (FD)	0.002	0.001	[.163]
Welch's (FJ)/Gatorade (FD)	0.002	0.002	[.226]
Welch's (FJ)/Minute Maid (FD)	0.000	0.002	[.981]
Welch's (FJ)/POWERade (FD)	0.007	0.002	[.000]
Welch's (FJ)/Snapple (FD)	0.004	0.002	[.014]
Tropicana (FJ)/Tropicana (FJ)	-0.068	0.003	[.000]
Tropicana (FJ)/Capri Sun (FD)	0.009	0.003	[.001]
Tropicana (FJ)/Gatorade (FD)	-0.005	0.004	[.149]
Tropicana (FJ)/Minute Maid (FD)	0.006	0.002	[.001]
Tropicana (FJ)/POWERade (FD)	0.002	0.003	[.520]
Tropicana (FJ)/Snapple (FD)	0.007	0.003	[.015]
Capri Sun (FD)/Capri Sun (FD)	-0.109	0.007	[.000]
Capri Sun (FD)/Gatorade (FD)	0.036	0.007	[.000]
Capri Sun (FD)/Minute Maid (FD)	0.006	0.002	[.001]
Capri Sun (FD)/(FJ)/POWERade (FD)	0.005	0.003	[.109]
Capri Sun (FD)/(FJ)/Snapple (FD)	-0.003	0.003	[.255]
Gatorade (FD)/Gatorade (FD)	-0.180	0.017	[.000]
Gatorade (FD)/Minute Maid (FD)	0.005	0.002	[.019]
Gatorade (FD)/(FJ)/POWERade (FD)	0.011	0.004	[.003]
Gatorade (FD)/(FJ)/Snapple (FD)	0.003	0.004	[.484]
Minute Maid (FD)/Minute Maid (FD)	-0.027	0.006	[.000]
Minute Maid (FD)/POWERade (FD)	-0.001	0.003	[.699]
Gatorade (FD)/Snapple (FD)	-0.012	0.003	[.000]
Minute Maid (FD)/POWERade (FD)	-0.079	0.006	[.000]
Gatorade (FD)/Snapple (FD)	-0.001	0.005	[.834]
Snapple (FD)/Snapple (FD)	-0.017	0.010	[.088]

Table C-3. Orange juice display elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-value
Orange Juice/Orange Juice	Florida’s Natural	0.0670	0.8384	[.000]
	Florida’s Natural\Minute Maid	-0.0119	0.0023	[.000]
	Florida’s Natural\Tropicana	-0.0269	0.0038	[.000]
	Minute Maid\Florida’s Natural	-0.0056	0.0011	[.000]
	Minute Maid\Minute Maid	0.0196	0.0027	[.000]
	Minute Maid\Tropicana	-0.0078	0.0012	[.000]
	Tropicana\Florida’s Natural	-0.0122	0.0017	[.000]
	Tropicana\Minute Maid	-0.0076	0.0012	[.000]
	Tropicana\Tropicana	0.0382	0.0047	[.000]
Orange Juice/Fruit Juice	Florida's Natural\Minute Maid	0.0004	0.0009	[.617]
	Florida's Natural\Newman's Own	-0.0035	0.0009	[.000]
	Florida's Natural\Turkey Hill	-0.0008	0.0003	[.019]
	Florida's Natural\Vita J	-0.0003	0.0002	[.039]
	Florida's Natural\Welch’s	-0.0012	0.0006	[.038]
	Florida's Natural\Tropicana	-0.0023	0.0008	[.005]
	Minute Maid\Minute Maid	-0.0009	0.0004	[.024]
	Minute Maid\Newman's Own	-0.0009	0.0003	[.002]
	Minute Maid\Turkey Hill	-0.0001	0.0001	[.174]
	Minute Maid\Vita J	0.0000	0.0000	[.319]
	Minute Maid\Welch’s	-0.0003	0.0002	[.194]
	Minute Maid\Tropicana	-0.0008	0.0004	[.070]
	Tropicana\Minute Maid	-0.0011	0.0003	[.000]
	Tropicana\Newman's Own	-0.0015	0.0003	[.000]
	Tropicana\Turkey Hill	-0.0005	0.0001	[.000]
	Tropicana\Vita J	-0.0001	0.0000	[.001]
	Tropicana\Welch’s	-0.0009	0.0002	[.000]
	Tropicana\Tropicana	-0.0015	0.0004	[.000]

Table C-3. Continued

Category	Brands	Estimate	Std. Error	P-value
Orange Juice/Fruit Drink	Florida's Natural\Capri Sun	-0.0024	0.0012	[.050]
	Florida's Natural\Gatorade	-0.0091	0.0027	[.001]
	Florida's Natural\Minute Maid	-0.0039	0.0013	[.003]
	Florida's Natural\POWERade	-0.0040	0.0009	[.000]
	Florida's Natural\Snapple	-0.0011	0.0009	[.236]
	Minute Maid\Capri Sun	-0.0006	0.0007	[.340]
	Minute Maid\Gatorade	-0.0017	0.0011	[.123]
	Minute Maid\Minute Maid	0.0002	0.0003	[.494]
	Minute Maid\POWERade	-0.0018	0.0005	[.001]
	Minute Maid\Snapple	0.0007	0.0005	[.175]
	Tropicana\Capri Sun	-0.0032	0.0007	[.000]
	Tropicana\Gatorade	-0.0066	0.0015	[.000]
	Tropicana\Minute Maid	-0.0003	0.0003	[.179]
	Tropicana\POWERade	-0.0027	0.0005	[.000]
	Tropicana\Snapple	0.0000	0.0004	[.971]

Table C-4. Fruit juice display elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-value
Fruit Juice/Orange Juice	Minute Maid\Florida's Natural	0.0012	0.0024	[.617]
	Minute Maid\Minute Maid	-0.0054	0.0024	[.024]
	Minute Maid\Tropicana	-0.0068	0.0019	[.000]
	Turkey Hill\Florida's Natural	-0.0047	0.0020	[.019]
	Turkey Hill\Minute Maid	-0.0018	0.0013	[.174]
	Turkey Hill\Tropicana	-0.0064	0.0013	[.000]
	Vita J\Florida's Natural	-0.0019	0.0009	[.039]
	Vita J\Minute Maid	-0.0005	0.0005	[.319]
	Vita J\Tropicana	-0.0017	0.0005	[.001]
	Welch’s\Florida's Natural	-0.0014	0.0007	[.038]
	Welch’s\Minute Maid	-0.0007	0.0005	[.194]
	Welch’s\Tropicana	-0.0024	0.0005	[.000]
	Tropicana\Florida's Natural	-0.0058	0.0020	[.005]
	Tropicana\Minute Maid	-0.0043	0.0024	[.070]
	Tropicana\Tropicana	-0.0083	0.0021	[.000]
Fruit Juice/Fruit Juice	Minute Maid\Minute Maid	0.0438	0.0061	[.000]
	Minute Maid\Newman’s Own	-0.0046	0.0021	[.028]
	Minute Maid\Turkey Hill	-0.0009	0.0008	[.228]
	Minute Maid\Vita J	-0.0005	0.0003	[.151]
	Minute Maid\Welch’s	0.0000	0.0013	[.996]
	Minute Maid\Tropicana	-0.0073	0.0017	[.000]
	Turkey Hill\Minute Maid	-0.0019	0.0016	[.228]
	Turkey Hill\Newman’s Own	-0.0006	0.0019	[.747]
	Welch’s\Minute Maid	0.0287	0.0036	[.000]
	Welch’s\Newman’s Own	-0.0007	0.0005	[.172]
	Welch’s\Minute Maid	-0.0059	0.0015	[.000]
	Welch’s\Newman’s Own	-0.0023	0.0009	[.011]
	Vita J\Minute Maid	-0.0010	0.0007	[.151]
	Vita J\Newman’s Own	0.0006	0.0009	[.519]
	Vita J\Turkey Hill	-0.0007	0.0005	[.172]
	Vita J\Vita J	0.0034	0.0007	[.000]
	Vita J\Welch’s	0.0010	0.0006	[.074]
	Vita J\Tropicana	-0.0007	0.0004	[.054]
	Welch’s\Minute Maid	0.0000	0.0006	[.996]
	Welch’s\Newman’s Own	-0.0024	0.0007	[.001]
	Welch's\Turkey Hill	-0.0013	0.0003	[.000]
	Welch's\Vita J	0.0002	0.0001	[.074]

Table C-4. Continued

Category	Brands	Estimate	Std. Error	P-value
Fruit Juice/Fruit Juice	Welch's\Welch’s	0.0131	0.0018	[.000]
	Welch's\Tropicana	-0.0011	0.0003	[.001]
	Tropicana\Minute Maid	-0.0066	0.0016	[.000]
	Tropicana\Newman’s Own	-0.0013	0.0010	[.196]
	Tropicana\Turkey Hill	-0.0010	0.0004	[.011]
	Tropicana\Vita J	-0.0003	0.0001	[.054]
	Tropicana\Welch’s	-0.0022	0.0007	[.001]
	Tropicana\Tropicana	0.0415	0.0055	[.000]
Fruit Juice/Fruit Drinks	Minute Maid\Capri Sun	-0.0007	0.0015	[.624]
	Minute Maid\Gatorade	-0.0030	0.0020	[.130]
	Minute Maid\Minute Maid	-0.0103	0.0025	[.000]
	Minute Maid\POWERade	-0.0001	0.0024	[.962]
	Minute Maid\Snapple	-0.0054	0.0023	[.017]
	Turkey Hill\Capri Sun	-0.0032	0.0009	[.001]
	Turkey Hill\Gatorade	-0.0025	0.0012	[.033]
	Turkey Hill\Minute Maid	0.0022	0.0022	[.310]
	Turkey Hill\POWERade	0.0002	0.0013	[.896]
	Turkey Hill\Snapple	-0.0011	0.0012	[.345]
	Vita J\Capri Sun	-0.0005	0.0004	[.181]
	Vita J\Gatorade	-0.0003	0.0005	[.493]
	Vita J\Minute Maid	0.0017	0.0011	[.112]
	Vita J\POWERade	0.0003	0.0006	[.620]
	Vita J\Snapple	0.0003	0.0005	[.531]
	Welch’s\Capri Sun	-0.0004	0.0003	[.170]
	Welch’s\Gatorade	-0.0006	0.0005	[.231]
	Welch’s\Minute Maid	0.0000	0.0007	[.981]
	Welch’s\POWERade	-0.0019	0.0005	[.000]
	Welch’s\Snapple	-0.0011	0.0005	[.017]
	Tropicana\Capri Sun	-0.0057	0.0018	[.002]
	Tropicana\Gatorade	0.0032	0.0022	[.154]
	Tropicana\Minute Maid	-0.0037	0.0012	[.002]
	Tropicana\POWERade	-0.0012	0.0018	[.519]
	Tropicana\Snapple	-0.0042	0.0018	[.020]

Table C-5. Fruit drink display elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-value
Fruit Drinks/Orange Juice	Capri Sun\Florida's Natural	-0.0049	0.0025	[.050]
	Capri Sun\Minute Maid	-0.0028	0.0030	[.340]
	Capri Sun\Tropicana	-0.0145	0.0032	[.000]
	Gatorade\Florida's Natural	-0.0192	0.0057	[.001]
	Gatorade\Minute Maid	-0.0078	0.0050	[.123]
	Gatorade\Tropicana	-0.0307	0.0068	[.000]
	Minute Maid\Florida's Natural	-0.0031	0.0010	[.003]
	Minute Maid\Minute Maid	0.0003	0.0005	[.494]
	Minute Maid\Tropicana	-0.0006	0.0004	[.179]
	POWERade\Florida's Natural	-0.0171	0.0039	[.000]
	POWERade\Minute Maid	-0.0162	0.0048	[.001]
	POWERade\Tropicana	-0.0257	0.0046	[.000]
	Snapple\Florida's Natural	-0.0030	0.0026	[.236]
	Snapple\Minute Maid	0.0040	0.0029	[.175]
	Snapple\Tropicana	0.0001	0.0022	[.971]
Fruit Drinks/Fruit Juices	Capri Sun\Minute Maid	-0.0005	0.0011	[.624]
	Capri Sun\Newman's Own	-0.0026	0.0009	[.002]
	Capri Sun\Turkey Hill	-0.0011	0.0003	[.001]
	Capri Sun\Vita J	-0.0002	0.0001	[.181]
	Capri Sun\Welch’s	-0.0007	0.0005	[.170]
	Capri Sun\Tropicana	-0.0045	0.0015	[.002]
	Gatorade\Minute Maid	-0.0022	0.0015	[.130]
	Gatorade\Newman's Own	-0.0037	0.0011	[.001]
	Gatorade\Turkey Hill	-0.0009	0.0004	[.033]
	Gatorade\Vita J	-0.0001	0.0002	[.493]
	Gatorade\Welch’s	-0.0010	0.0008	[.231]
	Gatorade\Tropicana	0.0026	0.0018	[.154]
	Minute Maid\Minute Maid	-0.0029	0.0007	[.000]
	Minute Maid\Newman's Own	0.0013	0.0007	[.070]
	Minute Maid\Turkey Hill	0.0003	0.0003	[.310]
	Minute Maid\Vita J	0.0002	0.0001	[.112]
	Minute Maid\Welch’s	0.0000	0.0005	[.981]
	Minute Maid\Tropicana	-0.0012	0.0004	[.002]
	POWERade\Minute Maid	-0.0002	0.0036	[.962]
	POWERade\Newman's Own	0.0013	0.0026	[.626]
	POWERade\Turkey Hill	0.0001	0.0009	[.896]
	POWERade\Vita J	0.0002	0.0004	[.620]

Table C-5. Continued

Category	Brands	Estimate	Std. Error	P-value
	POWERade\Welch’s	-0.0068	0.0018	[.000]
	POWERade\Tropicana	-0.0020	0.0031	[.519]
	Snapple\Minute Maid	-0.0053	0.0022	[.017]
	Snapple\Newman's Own	-0.0009	0.0016	[.582]
	Snapple\Turkey Hill	-0.0005	0.0006	[.345]
	Snapple\Vita J	0.0002	0.0002	[.531]
	Snapple\Welch's	-0.0025	0.0010	[.017]
	Snapple\Tropicana	-0.0046	0.0020	[.020]
Fruit Drinks/Fruit Drinks	Capri Sun\Capri Sun	0.0531	0.0073	[.000]
	Capri Sun\Gatorade	-0.0176	0.0038	[.000]
	Capri Sun\Minute Maid	-0.0028	0.0009	[.002]
	Capri Sun\POWERade	-0.0025	0.0016	[.116]
	Capri Sun\Snapple	0.0017	0.0015	[.258]
	Gatorade\Capri Sun	-0.0182	0.0039	[.000]
	Gatorade\Gatorade	0.0908	0.0134	[.000]
	Gatorade\Minute Maid	-0.0026	0.0012	[.022]
	Gatorade\POWERade	-0.0056	0.0020	[.004]
	Gatorade\Snapple	-0.0014	0.0021	[.487]
	Minute Maid\Capri Sun	-0.0011	0.0004	[.002]
	Minute Maid\Gatorade	-0.0010	0.0004	[.022]
	Minute Maid\Minute Maid	0.0052	0.0013	[.000]
	Minute Maid\POWERade	0.0002	0.0005	[.699]
	Minute Maid\Snapple	0.0022	0.0006	[.000]
	POWERade\Capri Sun	-0.0052	0.0033	[.116]
	POWERade\Gatorade	-0.0115	0.0040	[.004]
	POWERade\Minute Maid	0.0011	0.0027	[.699]
	POWERade\POWERade	0.0809	0.0115	[.000]
	POWERade\Snapple	0.0010	0.0046	[.833]
	Snapple\Capri Sun	0.0023	0.0020	[.258]
	Snapple\Gatorade	-0.0019	0.0027	[.487]
	Snapple\Minute Maid	0.0079	0.0020	[.000]
	Snapple\POWERade	0.0006	0.0030	[.833]
	Snapple\Snapple	0.0110	0.0067	[.098]

Table C-6. Orange juice feature elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-value
Orange Juice/Orange Juice	Florida’s Natural	0.0053	0.0041	[.191]
	Florida’s Natural\Minute Maid	-0.0010	0.0007	[.199]
	Florida’s Natural\Tropicana	-0.0021	0.0017	[.195]
	Minute Maid\Florida’s Natural	-0.0012	0.0010	[.199]
	Minute Maid\Minute Maid	0.0043	0.0033	[.192]
	Minute Maid\Tropicana	-0.0017	0.0013	[.195]
	Tropicana\Florida’s Natural	-0.0010	0.0008	[.195]
	Tropicana\Minute Maid	-0.0006	0.0005	[.195]
	Tropicana\Tropicana	0.0031	0.0024	[.192]
Orange Juice/Fruit Juice	Florida's Natural\Minute Maid	0.0000	0.0001	[.630]
	Florida's Natural\Newman's Own	-0.0003	0.0002	[.209]
	Florida's Natural\Turkey Hill	-0.0001	0.0001	[.242]
	Florida's Natural\Vita J	0.0000	0.0000	[.267]
	Florida's Natural\Welch’s	-0.0001	0.0001	[.259]
	Florida's Natural\Tropicana	-0.0002	0.0001	[.226]
	Minute Maid\Minute Maid	-0.0002	0.0002	[.258]
	Minute Maid\Newman's Own	-0.0002	0.0002	[.216]
	Minute Maid\Turkey Hill	0.0000	0.0000	[.340]
	Minute Maid\Vita J	0.0000	0.0000	[.420]
	Minute Maid\Welch’s	-0.0001	0.0001	[.358]
	Minute Maid\Tropicana	-0.0002	0.0002	[.286]
	Tropicana\Minute Maid	-0.0001	0.0001	[.233]
	Tropicana\Newman's Own	-0.0001	0.0001	[.199]
	Tropicana\Turkey Hill	0.0000	0.0000	[.202]
	Tropicana\Vita J	0.0000	0.0000	[.217]
	Tropicana\Welch’s	-0.0001	0.0001	[.198]
	Tropicana\Tropicana	-0.0001	0.0001	[.207]

Table C-6. Continued

Category	Brands	Estimate	Std. Error	P-value
Orange Juice/Fruit Drink	Florida's Natural\Capri Sun	-0.0002	0.0002	[.276]
	Florida's Natural\Gatorade	-0.0007	0.0006	[.217]
	Florida's Natural\Minute Maid	-0.0003	0.0003	[.214]
	Florida's Natural\POWERade	-0.0003	0.0002	[.201]
	Florida's Natural\Snapple	-0.0001	0.0001	[.371]
	Minute Maid\Capri Sun	-0.0001	0.0002	[.430]
	Minute Maid\Gatorade	-0.0004	0.0004	[.311]
	Minute Maid\Minute Maid	0.0000	0.0001	[.542]
	Minute Maid\POWERade	-0.0004	0.0003	[.218]
	Minute Maid\Snapple	0.0001	0.0002	[.338]
	Tropicana\Capri Sun	-0.0003	0.0002	[.206]
	Tropicana\Gatorade	-0.0005	0.0004	[.203]
	Tropicana\Minute Maid	0.0000	0.0000	[.329]
	Tropicana\POWERade	-0.0002	0.0002	[.200]
	Tropicana\Snapple	0.0000	0.0000	[.971]

Table C-7. Fruit juice feature elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-value
Fruit Juice/Orange Juice	Minute Maid\Florida's Natural	0.0001	0.0001	[.630]
	Minute Maid\Minute Maid	-0.0003	0.0002	[.258]
	Minute Maid\Tropicana	-0.0003	0.0003	[.233]
	Newman's Own\Florida's Natural	0.0000	0.0000	[1.00]
	Newman's Own\Minute Maid	0.0000	0.0000	[1.00]
	Newman's Own\Tropicana	0.0000	0.0000	[1.00]
	Turkey Hill\Florida's Natural	0.0000	0.0000	[.242]
	Turkey Hill\Minute Maid	0.0000	0.0000	[.340]
	Turkey Hill\Tropicana	-0.0001	0.0000	[.202]
	Vita J\Florida's Natural	-0.0003	0.0002	[.267]
	Vita J\Minute Maid	-0.0001	0.0001	[.420]
	Vita J\Tropicana	-0.0002	0.0002	[.217]
	Welch’s\Florida's Natural	-0.0001	0.0001	[.259]
	Welch’s\Minute Maid	-0.0001	0.0001	[.358]
	Welch’s\Tropicana	-0.0002	0.0002	[.198]
	Tropicana\Florida's Natural	-0.0001	0.0001	[.226]
	Tropicana\Minute Maid	-0.0001	0.0001	[.286]
	Tropicana\Tropicana	-0.0001	0.0001	[.207]
Fruit Juice/Fruit Juice	Minute Maid\Minute Maid	0.0021	0.0016	[.197]
	Minute Maid\Newman’s Own	-0.0002	0.0002	[.270]
	Minute Maid\Turkey Hill	0.0000	0.0000	[.366]
	Minute Maid\Vita J	0.0000	0.0000	[.333]
	Minute Maid\Welch’s	0.0000	0.0001	[.996]
	Minute Maid\Tropicana	-0.0003	0.0003	[.198]
	Newman's Own\Minute Maid	0.0000	0.0000	[1.00]
	Newman's Own\Newman’s Own	0.0000	0.0000	[1.00]
	Newman's Own\Turkey Hill	0.0000	0.0000	[1.00]
	Newman's Own\Vita J	0.0000	0.0000	[1.00]
	Newman's Own\Welch’s	0.0000	0.0000	[1.00]
	Newman's Own\Tropicana	0.0000	0.0000	[1.00]
	Turkey Hill\Minute Maid	0.0000	0.0000	[.366]
	Turkey Hill\Newman’s Own	0.0000	0.0000	[.753]
	Welch’s\Minute Maid	0.0003	0.0002	[.192]
	Welch’s\Newman’s Own	0.0000	0.0000	[.331]
	Welch’s\Minute Maid	-0.0001	0.0000	[.212]
	Welch’s\Newman’s Own	0.0000	0.0000	[.245]

Table C-7. Continued

Category	Brands	Estimate	Std. Error	P-value
Fruit Juice/Fruit Juice	Vita J\Minute Maid	-0.0001	0.0001	[.333]
	Vita J\Newman's Own	0.0001	0.0001	[.560]
	Vita J\Turkey Hill	-0.0001	0.0001	[.331]
	Vita J\Vita J	0.0005	0.0004	[.191]
	Vita J\Welch's	0.0001	0.0001	[.286]
	Vita J\Tropicana	-0.0001	0.0001	[.272]
	Welch's\Minute Maid	0.0000	0.0001	[.996]
	Welch's\Newman's Own	-0.0002	0.0002	[.216]
	Welch's\Turkey Hill	-0.0001	0.0001	[.212]
	Welch's\Vita J	0.0000	0.0000	[.286]
	Welch's\Welch's	0.0012	0.0009	[.191]
	Welch's\Tropicana	-0.0001	0.0001	[.221]
	Tropicana\Minute Maid	-0.0001	0.0001	[.198]
	Tropicana\Newman's Own	0.0000	0.0000	[.355]
	Tropicana\Turkey Hill	0.0000	0.0000	[.245]
	Tropicana\Vita J	0.0000	0.0000	[.272]
	Tropicana\Welch's	0.0000	0.0000	[.221]
	Tropicana\Tropicana	0.0007	0.0006	[.191]
Fruit Juice/Fruit Drinks	Minute Maid\Capri Sun	0.0000	0.0001	[.659]
	Minute Maid\Gatorade	-0.0001	0.0002	[.362]
	Minute Maid\Minute Maid	-0.0005	0.0004	[.201]
	Minute Maid\POWERade	0.0000	0.0001	[.962]
	Minute Maid\Snapple	-0.0003	0.0002	[.228]
	Newman's Own\Capri Sun	0.0000	0.0000	[1.00]
	Newman's Own\Gatorade	0.0000	0.0000	[1.00]
	Newman's Own\Minute Maid	0.0000	0.0000	[1.00]
	Newman's Own\POWERade	0.0000	0.0000	[1.00]
	Newman's Own\Snapple	0.0000	0.0000	[1.00]
	Turkey Hill\Capri Sun	0.0000	0.0000	[.217]
	Turkey Hill\Gatorade	0.0000	0.0000	[.261]
	Turkey Hill\Minute Maid	0.0000	0.0000	[.412]
	Turkey Hill\POWERade	0.0000	0.0000	[.896]
	Turkey Hill\Snapple	0.0000	0.0000	[.442]
	Vita J\Capri Sun	-0.0001	0.0001	[.341]
	Vita J\Gatorade	0.0000	0.0001	[.538]
	Vita J\Minute Maid	0.0002	0.0002	[.314]
	Vita J\POWERade	0.0000	0.0001	[.644]

Table C-7. Continued

Category	Brands	Estimate	Std. Error	P-value
Fruit Juice/Fruit Drinks	Vita J\Snapple	0.0000	0.0001	[.566]
	Welch's\Capri Sun	0.0000	0.0000	[.337]
	Welch's\Gatorade	-0.0001	0.0001	[.371]
	Welch's\Minute Maid	0.0000	0.0001	[.981]
	Welch's\POWERade	-0.0002	0.0001	[.212]
	Welch's\Snapple	-0.0001	0.0001	[.249]
	Tropicana\Capri Sun	-0.0001	0.0001	[.219]
	Tropicana\Gatorade	0.0001	0.0001	[.338]
	Tropicana\Minute Maid	-0.0001	0.0001	[.231]
	Tropicana\POWERade	0.0000	0.0000	[.566]
	Tropicana\Snapple	-0.0001	0.0001	[.255]

Table C-8. Fruit drink feature elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-value
Fruit Juice/Orange Juice	Minute Maid\Florida's Natural	0.0001	0.0001	[.630]
	Minute Maid\Minute Maid	-0.0003	0.0002	[.258]
	Minute Maid\Tropicana	-0.0003	0.0003	[.233]
	Turkey Hill\Florida's Natural	0.0000	0.0000	[.242]
	Turkey Hill\Minute Maid	0.0000	0.0000	[.340]
	Turkey Hill\Tropicana	-0.0001	0.0000	[.202]
	Vita J\Florida's Natural	-0.0003	0.0002	[.267]
	Vita J\Minute Maid	-0.0001	0.0001	[.420]
	Vita J\Tropicana	-0.0002	0.0002	[.217]
	Welch’s\Florida's Natural	-0.0001	0.0001	[.259]
	Welch’s\Minute Maid	-0.0001	0.0001	[.358]
	Welch’s\Tropicana	-0.0002	0.0002	[.198]
	Tropicana\Florida's Natural	-0.0001	0.0001	[.226]
	Tropicana\Minute Maid	-0.0001	0.0001	[.286]
	Tropicana\Tropicana	-0.0001	0.0001	[.207]
Fruit Juice/Fruit Juice	Minute Maid\Minute Maid	0.0021	0.0016	[.197]
	Minute Maid\Newman’s Own	-0.0002	0.0002	[.270]
	Minute Maid\Turkey Hill	0.0000	0.0000	[.366]
	Minute Maid\Vita J	0.0000	0.0000	[.333]
	Minute Maid\Welch’s	0.0000	0.0001	[.996]
	Minute Maid\Tropicana	-0.0003	0.0003	[.198]
	Turkey Hill\Minute Maid	0.0000	0.0000	[.366]
	Turkey Hill\Newman’s Own	0.0000	0.0000	[.753]
	Welch’s\Minute Maid	0.0003	0.0002	[.192]
	Welch’s\Newman’s Own	0.0000	0.0000	[.331]
	Welch’s\Minute Maid	-0.0001	0.0000	[.212]
	Welch’s\Newman’s Own	0.0000	0.0000	[.245]
Fruit Juice/Fruit Juice	Vita J\Minute Maid	-0.0001	0.0001	[.333]
	Vita J\Newman’s Own	0.0001	0.0001	[.560]
	Vita J\Turkey Hill	-0.0001	0.0001	[.331]
	Vita J\Vita J	0.0005	0.0004	[.191]
	Vita J\Welch’s	0.0001	0.0001	[.286]
	Vita J\Tropicana	-0.0001	0.0001	[.272]
	Welch’s\Minute Maid	0.0000	0.0001	[.996]
	Welch’s\Newman’s Own	-0.0002	0.0002	[.216]
	Welch's\Turkey Hill	-0.0001	0.0001	[.212]
	Welch's\Vita J	0.0000	0.0000	[.286]

Table C-8. Continued

Category	Brands	Estimate	Std. Error	P-value
	Welch's\Welch's	0.0012	0.0009	[.191]
	Welch's\Tropicana	-0.0001	0.0001	[.221]
	Tropicana\Minute Maid	-0.0001	0.0001	[.198]
	Tropicana\Newman's Own	0.0000	0.0000	[.355]
	Tropicana\Turkey Hill	0.0000	0.0000	[.245]
	Tropicana\Vita J	0.0000	0.0000	[.272]
	Tropicana\Welch's	0.0000	0.0000	[.221]
	Tropicana\Tropicana	0.0007	0.0006	[.191]
Fruit Juice/Fruit Drinks	Minute Maid\Capri Sun	0.0000	0.0001	[.659]
	Minute Maid\Gatorade	-0.0001	0.0002	[.362]
	Minute Maid\Minute Maid	-0.0005	0.0004	[.201]
	Minute Maid\POWERade	0.0000	0.0001	[.962]
	Minute Maid\Snapple	-0.0003	0.0002	[.228]
	Turkey Hill\Capri Sun	0.0000	0.0000	[.217]
	Turkey Hill\Gatorade	0.0000	0.0000	[.261]
	Turkey Hill\Minute Maid	0.0000	0.0000	[.412]
	Turkey Hill\POWERade	0.0000	0.0000	[.896]
	Turkey Hill\Snapple	0.0000	0.0000	[.442]
	Vita J\Capri Sun	-0.0001	0.0001	[.341]
	Vita J\Gatorade	0.0000	0.0001	[.538]
	Vita J\Minute Maid	0.0002	0.0002	[.314]
	Vita J\POWERade	0.0000	0.0001	[.644]
Fruit Juice/Fruit Drinks	Vita J\Snapple	0.0000	0.0001	[.566]
	Welch's\Capri Sun	0.0000	0.0000	[.337]
	Welch's\Gatorade	-0.0001	0.0001	[.371]
	Welch's\Minute Maid	0.0000	0.0001	[.981]
	Welch's\POWERade	-0.0002	0.0001	[.212]
	Welch's\Snapple	-0.0001	0.0001	[.249]
	Tropicana\Capri Sun	-0.0001	0.0001	[.219]
	Tropicana\Gatorade	0.0001	0.0001	[.338]
	Tropicana\Minute Maid	-0.0001	0.0001	[.231]
	Tropicana\POWERade	0.0000	0.0000	[.566]
	Tropicana\Snapple	-0.0001	0.0001	[.255]

Table C-9. Orange juice feature and display elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-value
Orange Juice/Orange Juice	Florida’s Natural	0.2341	0.0146	[.000]
	Florida’s Natural\Minute Maid	-0.0417	0.0064	[.000]
	Florida’s Natural\Tropicana	-0.0941	0.0087	[.000]
	Minute Maid\Florida’s Natural	-0.0320	0.0049	[.000]
	Minute Maid\Minute Maid	0.1126	0.0089	[.000]
	Minute Maid\Tropicana	-0.0447	0.0052	[.000]
	Tropicana\Florida’s Natural	-0.0386	0.0036	[.000]
	Tropicana\Minute Maid	-0.0239	0.0028	[.000]
	Tropicana\Tropicana	0.1210	0.0075	[.000]
Orange Juice/Fruit Juice	Florida's Natural\Minute Maid	0.0015	0.0030	[.615]
	Florida's Natural\Newman's Own	-0.0122	0.0029	[.000]
	Florida's Natural\Turkey Hill	-0.0028	0.0012	[.016]
	Florida's Natural\Vita J	-0.0011	0.0005	[.032]
	Florida's Natural\Welch’s	-0.0040	0.0019	[.033]
	Florida's Natural\Tropicana	-0.0079	0.0026	[.003]
	Minute Maid\Minute Maid	-0.0051	0.0021	[.018]
	Minute Maid\Newman's Own	-0.0050	0.0015	[.001]
	Minute Maid\Turkey Hill	-0.0008	0.0006	[.173]
	Minute Maid\Vita J	-0.0002	0.0002	[.315]
	Minute Maid\Welch’s	-0.0015	0.0011	[.187]
	Minute Maid\Tropicana	-0.0045	0.0025	[.065]
	Tropicana\Minute Maid	-0.0034	0.0009	[.000]
	Tropicana\Newman's Own	-0.0047	0.0008	[.000]
	Tropicana\Turkey Hill	-0.0016	0.0003	[.000]
	Tropicana\Vita J	-0.0004	0.0001	[.000]
	Tropicana\Welch’s	-0.0028	0.0005	[.000]
	Tropicana\Tropicana	-0.0047	0.0011	[.000]

Table C-9. Continued

Category	Brands	Estimate	Std. Error	P-value
Orange Juice/Fruit Drink	Florida's Natural\Capri Sun	-0.0084	0.0042	[.049]
	Florida's Natural\Gatorade	-0.0319	0.0087	[.000]
	Florida's Natural\Minute Maid	-0.0137	0.0043	[.001]
	Florida's Natural\POWERade	-0.0139	0.0029	[.000]
	Florida's Natural\Snapple	-0.0038	0.0032	[.232]
	Minute Maid\Capri Sun	-0.0037	0.0038	[.332]
	Minute Maid\Gatorade	-0.0099	0.0063	[.118]
	Minute Maid\Minute Maid	0.0011	0.0017	[.491]
	Minute Maid\POWERade	-0.0101	0.0028	[.000]
	Minute Maid\Snapple	0.0038	0.0028	[.168]
	Tropicana\Capri Sun	-0.0102	0.0018	[.000]
	Tropicana\Gatorade	-0.0209	0.0041	[.000]
	Tropicana\Minute Maid	-0.0011	0.0008	[.178]
	Tropicana\POWERade	-0.0086	0.0013	[.000]
	Tropicana\Snapple	0.0000	0.0012	[.971]

Table C-10. Fruit juice feature and display elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-value
Fruit Juice/Orange Juice	Minute Maid\Florida's Natural	0.0011	0.0021	[.615]
	Minute Maid\Minute Maid	-0.0048	0.0020	[.018]
	Minute Maid\Tropicana	-0.0060	0.0016	[.000]
	Turkey Hill\Florida's Natural	-0.0002	0.0001	[.016]
	Turkey Hill\Minute Maid	-0.0001	0.0000	[.173]
	Turkey Hill\Tropicana	-0.0002	0.0000	[.000]
	Vita J\Florida's Natural	-0.0034	0.0016	[.032]
	Vita J\Minute Maid	-0.0010	0.0010	[.315]
	Vita J\Tropicana	-0.0030	0.0009	[.000]
	Welch’s\Florida's Natural	-0.0019	0.0009	[.033]
	Welch’s\Minute Maid	-0.0009	0.0007	[.187]
	Welch’s\Tropicana	-0.0033	0.0006	[.000]
	Tropicana\Florida's Natural	-0.0023	0.0008	[.003]
	Tropicana\Minute Maid	-0.0017	0.0009	[.065]
	Tropicana\Tropicana	-0.0033	0.0007	[.000]
Fruit Juice/Fruit Juice	Minute Maid\Minute Maid	0.0389	0.0035	[.000]
	Minute Maid\Newman’s Own	-0.0041	0.0018	[.024]
	Minute Maid\Turkey Hill	-0.0008	0.0007	[.222]
	Minute Maid\Vita J	-0.0004	0.0003	[.145]
	Minute Maid\Welch’s	0.0000	0.0011	[.996]
	Minute Maid\Tropicana	-0.0065	0.0014	[.000]
	Turkey Hill\Minute Maid	-0.0001	0.0001	[.222]
	Turkey Hill\Newman’s Own	0.0000	0.0001	[.747]
	Welch’s\Minute Maid	0.0011	0.0001	[.000]
	Welch’s\Newman’s Own	0.0000	0.0000	[.168]
	Welch’s\Minute Maid	-0.0002	0.0001	[.000]
	Welch’s\Newman’s Own	-0.0018	0.0012	[.145]
Fruit Juice/Fruit Juice	Vita J\Minute Maid	0.0010	0.0016	[.519]
	Vita J\Newman’s Own	-0.0012	0.0009	[.168]
	Vita J\Turkey Hill	0.0060	0.0010	[.000]
	Vita J\Vita J	0.0019	0.0010	[.068]
	Vita J\Welch’s	-0.0012	0.0006	[.049]
	Vita J\Tropicana	0.0000	0.0008	[.996]
	Welch’s\Minute Maid	-0.0033	0.0009	[.000]
	Welch’s\Newman’s Own	-0.0017	0.0004	[.000]
	Welch's\Turkey Hill	0.0003	0.0002	[.068]
	Welch's\Vita J	0.0178	0.0014	[.000]
	Welch's\Welch’s	-0.0014	0.0004	[.001]

Table C-10.Continued

Category	Brands	Estimate	Std. Error	P-value
	Welch's\Tropicana	-0.0026	0.0006	[.000]
	Tropicana\Minute Maid	-0.0005	0.0004	[.191]
	Tropicana\Newman's Own	-0.0004	0.0002	[.010]
	Tropicana\Turkey Hill	-0.0001	0.0001	[.049]
	Tropicana\Vita J	-0.0009	0.0002	[.001]
	Tropicana\Welch's	0.0162	0.0013	[.000]
	Tropicana\Tropicana	-0.0007	0.0013	[.623]
Fruit Juice/Fruit Drinks	Minute Maid\Capri Sun	-0.0026	0.0017	[.126]
	Minute Maid\Gatorade	-0.0091	0.0020	[.000]
	Minute Maid\Minute Maid	-0.0001	0.0021	[.962]
	Minute Maid\POWERade	-0.0048	0.0019	[.013]
	Minute Maid\Snapple	0.0000	0.0000	[1.00]
	Newman's Own\Capri Sun	0.0000	0.0000	[1.00]
	Newman's Own\Gatorade	0.0000	0.0000	[1.00]
	Newman's Own\Minute Maid	0.0000	0.0000	[1.00]
	Newman's Own\POWERade	0.0000	0.0000	[1.00]
	Newman's Own\Snapple	-0.0001	0.0000	[.010]
	Turkey Hill\Capri Sun	-0.0001	0.0000	[.000]
	Turkey Hill\Gatorade	-0.0001	0.0000	[.027]
	Turkey Hill\Minute Maid	0.0001	0.0001	[.308]
	Turkey Hill\POWERade	0.0000	0.0000	[.896]
	Turkey Hill\Snapple	0.0000	0.0000	[.344]
	Vita J\Capri Sun	-0.0009	0.0006	[.174]
	Vita J\Gatorade	-0.0006	0.0008	[.490]
	Vita J\Minute Maid	0.0030	0.0018	[.104]
	Vita J\POWERade	0.0005	0.0011	[.619]
Fruit Juice/Fruit Drinks	Vita J\Snapple	0.0006	0.0009	[.528]
	Welch's\Capri Sun	-0.0006	0.0004	[.164]
	Welch's\Gatorade	-0.0008	0.0006	[.229]
	Welch's\Minute Maid	0.0000	0.0010	[.981]
	Welch's\POWERade	-0.0026	0.0007	[.000]
	Welch's\Snapple	-0.0015	0.0006	[.014]
	Tropicana\Capri Sun	-0.0022	0.0007	[.001]
	Tropicana\Gatorade	0.0012	0.0009	[.150]
	Tropicana\Minute Maid	-0.0015	0.0004	[.001]
	Tropicana\POWERade	-0.0005	0.0007	[.519]
	Tropicana\Snapple	-0.0016	0.0007	[.017]

Table C-11. Fruit drink feature and display elasticities with respect to other beverages

Category	Brands	Estimate	Std. Error	P-value
Fruit Drinks/Orange Juice	Capri Sun\Florida's Natural	-0.0153	0.0078	[.049]
	Capri Sun\Minute Maid	-0.0089	0.0091	[.332]
	Capri Sun\Tropicana	-0.0456	0.0082	[.000]
	Gatorade\Florida's Natural	-0.0201	0.0055	[.000]
	Gatorade\Minute Maid	-0.0081	0.0052	[.118]
	Gatorade\Tropicana	-0.0320	0.0063	[.000]
	POWERade\Florida's Natural	-0.0098	0.0021	[.000]
	POWERade\Minute Maid	-0.0093	0.0025	[.000]
	POWERade\Tropicana	-0.0148	0.0022	[.000]
	Snapple\Florida's Natural	-0.0095	0.0079	[.232]
	Snapple\Minute Maid	0.0123	0.0089	[.168]
	Snapple\Tropicana	0.0003	0.0070	[.971]
Fruit Drinks/Fruit Juices	Capri Sun\Minute Maid	-0.0017	0.0034	[.623]
	Capri Sun\Newman's Own	-0.0083	0.0025	[.001]
	Capri Sun\Turkey Hill	-0.0035	0.0010	[.000]
	Capri Sun\Vita J	-0.0005	0.0004	[.174]
	Capri Sun\Welch’s	-0.0023	0.0017	[.164]
	Capri Sun\Tropicana	-0.0143	0.0043	[.001]
	Gatorade\Minute Maid	-0.0023	0.0015	[.126]
	Gatorade\Newman's Own	-0.0039	0.0011	[.000]
	Gatorade\Turkey Hill	-0.0009	0.0004	[.027]
	Gatorade\Vita J	-0.0001	0.0002	[.490]
	Gatorade\Welch’s	-0.0010	0.0008	[.229]
	Gatorade\Tropicana	0.0027	0.0019	[.150]
	POWERade\Minute Maid	0.0000	0.0000	[1.00]
	POWERade\Newman's Own	0.0000	0.0000	[1.00]
	POWERade\Turkey Hill	-0.0001	0.0020	[.962]
	POWERade\Vita J	0.0007	0.0015	[.626]
	POWERade\Welch’s	0.0001	0.0005	[.896]
	POWERade\Tropicana	0.0001	0.0002	[.619]
	Snapple\Minute Maid	-0.0039	0.0010	[.000]
	Snapple\Newman's Own	-0.0012	0.0018	[.519]
	Snapple\Turkey Hill	-0.0166	0.0067	[.013]
	Snapple\Vita J	-0.0028	0.0050	[.580]
	Snapple\Welch's	-0.0017	0.0018	[.344]
	Snapple\Tropicana	0.0005	0.0007	[.528]

Table C-11. Continued

Category	Brands	Estimate	Std. Error	P-value
Fruit Drinks/Fruit Drinks	Capri Sun\Capri Sun	0.1669	0.0115	[.000]
	Capri Sun\Gatorade	-0.0552	0.0102	[.000]
	Capri Sun\Minute Maid	-0.0089	0.0027	[.001]
	Capri Sun\POWERade	-0.0078	0.0049	[.110]
	Capri Sun\Snapple	0.0053	0.0047	[.255]
	Gatorade\Capri Sun	-0.0190	0.0035	[.000]
	Gatorade\Gatorade	0.0947	0.0098	[.000]
	Gatorade\Minute Maid	-0.0028	0.0012	[.019]
	Gatorade\POWERade	-0.0059	0.0020	[.003]
	Gatorade\Snapple	-0.0015	0.0021	[.485]
	POWERade\Capri Sun	-0.0030	0.0019	[.110]
	POWERade\Gatorade	-0.0066	0.0022	[.003]
	POWERade\Minute Maid	0.0006	0.0016	[.699]
	POWERade\POWERade	0.0465	0.0045	[.000]
	POWERade\Snapple	0.0006	0.0027	[.833]
	Snapple\Capri Sun	0.0072	0.0063	[.255]
	Snapple\Gatorade	-0.0059	0.0085	[.485]
	Snapple\Minute Maid	0.0245	0.0056	[.000]
	Snapple\POWERade	0.0020	0.0094	[.833]
	Snapple\Snapple	0.0343	0.0203	[.092]

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