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CONDITIONAL DEMAND SYSTEM FOR BEVERAGES

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Abstract

Estimates of a conditional demand system for twelve beverages, based on the Rotterdam model subject to a full, first-order autoregressive process, are discussed. Impacts of beverage prices, total beverage expenditures and promotions on beverage quantities demanded are provided. The results indicate that all beverages were normal goods; the majority had price elastic demands; most had a relatively large own-promotion effect; and a number of significant cross-promotional effects exist, indicating a relatively high level of competition for market share among the beverages studied.

Key Words: beverage demand, Rotterdam model.

Conditional Demand System for Beverages

Introduction

Demands for beverages were studied using Nielsen data based on retail scanner sales for grocery stores, drug stores, mass merchandisers along with an estimate of Wal-Mart sales based on a consumer panel.[1] Beverages were grouped into twelve categories: 1) 100% orange juice, 2) 100% grapefruit juice, 3) 100% apple juice, 4) 100% grape juice, 5) remaining 100% juice, 6) vegetable juice, 7) less-than-100% juice drinks, 8) carbonated water, 9) water, 10) regular and diet soda, 11) liquid tea or tea for short, and 12) milk and shakes.

The data are weekly, running from week ending July 21, 2007 through August 7, 2010 (160 weekly observations). The raw data included gallon and dollar sales, and the share of dollar sales on promotion. In the empirical analysis, quantity demanded was measured by per capita gallon sales, obtained by dividing raw gallon sales by the U.S. population; prices were obtained by dividing dollar sales by gallon sales. Promotions included features, displays, features and displays together and temporary price reductions. Features include best-food-day ads in newspapers, store flyers, circulars, and similar materials. Displays are exhibits of actual products in secondary store locations, cut cases placed next to regular shelf locations, as well as in primary locations when special effort is made in presenting the product. Displays give the product focused on more visibility. Temporary price reductions impact demand through price as well as possibly influencing consumer perceptions and preferences.

Sample mean per capita gallon sales, prices, budget shares and promotional shares are shown in Table 1. The budget share for each beverage is that beverage's dollar sales divided by total dollar sales for the twelve beverages studies. These budget shares are called conditional budget shares as they are based on total beverage expenditure as opposed to total consumer expenditures across all goods.

Rotterdam Model

The Rotterdam model (Theil 1971, 1975, 1976, 1980a, 1980b) specified in this study is a system of 12 differential beverage-demand equations. The model is directly related to the utility maximization problem confronting consumers---how to allocate income over available goods. The solution is the affordable bundle of goods that yields the greatest utility. In this problem, promotional variables are directly incorporated in the utility function as indicators of consumer preferences. The (unconditional) problem can be written as maximization of $u = u(q, z)$ subject to $p'q = x$, where u is utility; $p' = (p_1, \ldots, p_n)$ and $q' = (q_1, \ldots, q_n)$ are price and quantity vectors with p_i and q_i being the price and quantity of good i, respectively; z is a vector of promotional variables and x is total expenditures or income. The first order conditions for this problem are $\partial u/\partial q = \lambda p$ and $p'q = x$, where λ is the Lagrange multiplier which is equal to $\partial u/\partial x$ or the marginal utility of income. The solution to the first order conditions is the set of demand equations $q = q(p, x, z)$, and the Lagrange multiplier equation $\lambda = \lambda(p, x, z)$. The Rotterdam demand model is an approximation of this set of demand equations.

Assuming separability, we focus on the conditional demands for the subset of 12 beverages mentioned above. Following Theil (1976, 1980b), the conditional Rotterdam (differential) demand equation for beverage i can be written as

(1) $$w_i \, d(\log q_i) = \theta_i \, d(\log Q) + \sum_j \pi_{ij} \, d(\log p_j) + \sum_j \alpha_{ij} \, dz_j + \beta_i + \gamma_{1i} \, ds_1 + \gamma_{2i} \, ds_2 + \varepsilon_i$$

$i=1, \ldots, 12,$

where now subscript i stands for a beverage; p_i and q_i are the price and quantity of beverage i, respectively; $w_i = p_i q_i / x$ or the budget share for beverage i, with $x = \sum_i p_i q_i$ or total expenditures on the 12 beverages or conditional income (referred to as income, for short), z_j is the share of dollar sales on promotion for beverage j; $\theta_i = p_i(\partial q_i / \partial x)$ is the marginal propensity to consume (MPC) for beverage i; $d(\log Q) = \sum_i w_i\, d(\log q_i)$ is the Divisia volume index or change in real income;[2] ds_1 and ds_2 are changes in sine and cosine variables to account for seasonality; $\pi_{ij} = (p_i p_j/x)\, k_{ij}$ is the Slutsky coefficient, with $k_{ij} = (\partial q_i / \partial p_j + q_j\, \partial q_i / \partial x)$ being the $(i,j)^{th}$ substitution effect; the α's are promotional coefficients; the β's are constants to account for trends in sales; γ_{1i} and γ_{2i} are seasonality coefficients; and ε_i is a disturbance term. The seasonality variables underlying ds_1 and ds_2 are $s_1 = \text{sine}(2\pi t/52)$ and $s_2 = \text{cosine}(2\pi t/52)$, respectively, where $\pi = 3.14\ldots$, observation $t = 1, \ldots, 160$, and 52 is the number of weeks in a year.

The general restrictions on demand, imposed as part of the maintained hypothesis, are (e.g., Theil 1980a, 1980b)

(2) adding up: $\sum_i \theta_i = 1, \quad \sum_i \pi_{ij} = 0, \quad \sum_i \alpha_{ij} = 0, \quad \sum_i \beta_i = 0, \quad \sum_i \gamma_{ki} = 0,$

(3) homogeneity: $\sum_j \pi_{ij} = 0;$

(4) symmetry: $\pi_{ij} = \pi_{ji}\,.$

The empirical analysis indicated that the disturbance term followed a full autoregressive process (Berndt and Savin), i.e.,

(5) $\varepsilon_{it} = \sum_j \rho_{ij}\, \varepsilon_{jt-1} + \nu_{it},$

where $\nu_{1t}, \nu_{2t}, \ldots$ are independently identically distributed random terms with mean zero and covariance matrix Ω which follows the seemingly unrelated regression assumption of contemporaneously correlated disturbances. For the system of equations, adding up requires that the errors across equations sum to zero, i.e., $\sum_i \varepsilon_{it} = 0$, $\sum_j \varepsilon_{jt-1} = 0$ and $\sum_i \nu_{it} = 0$. Hence, there is a singularity problem with the error structure which, as will be discussed below, can be handled by removing one equation from the system and imposing on specification (5) the adding up condition

$$\varepsilon_{nt-1} = -\sum_{j = 1 \text{ to } n-1} \varepsilon_{jt-1},$$

where n stands for the last good in equation (5), i.e.,

$$\varepsilon_{it} = \sum_{j = t \text{ to } n-1} \rho_{ij}^{n} \varepsilon_{jt-1} + \nu_{it}, \tag{6}$$

where $\rho_{ij}^{n} = (\rho_{ij} - \rho_{in})$.

Application

The infinitely small changes in the logarithms of quantities and prices, promotional variables and the sine and cosine variables in the differential model were measured by discrete differences (Theil 1975, 1976), i.e., $d(\log q_{it}) = \log q_{it} - \log q_{it-1}$, $d(\log p_{it}) = \log p_{it} - \log p_{it-1}$, $dz_{it} = z_{it} - z_{it-1}$, and $ds_{kt} = s_{kt} - s_{kt-1}$. Average budget share values associated with the differencing were used in constructing the dependent variables and the Divisia volume index---$w_{i,t}$ was replaced by $(w_{i,t} + w_{i,t-1})/2$.

The demand specifications studied are conditional on expenditure or income allocated to the 12 beverage categories. Income allocated to the beverage group is measured by the conditional Divisia volume index for this group which was treated as independent of the error term for each beverage-demand equation, based on the theory of rational random behavior (Theil 1980a; Brown, Behr and Lee). As the data add up by construction---the left-hand-side variables in the Rotterdam model sum over i to the conditional Divisia volume index--the error covariance matrix was singular and an arbitrary equation was excluded. The model estimates are invariant to the equation deleted (Barten, 1969). The parameters of the excluded equation can be obtained from the adding-up conditions or by re-estimating the model omitting a different equation. The equation error terms were assumed to be contemporaneously correlated and the full information maximum likelihood procedure (TSP) was used to estimate the system of equations under the full auto regressive process, equation (3) in the previous section.

Several versions of the model were estimated. Initially, the model included intercepts that reflect trends in demand. Two sets of estimates of this specification were obtained: one set had a full, first-order autocorrelation error structure, while the other set assumed autocorrelation was not present. The likelihood ratio test at any reasonable level of significance supports the autocorrelation specification, although many of the corresponding parameters in the two models were similar. Additionally, the restricted autocorrelation model that assumes that each equation is only affected by its own lagged error was rejected against the full autocorrelation model, based on the likelihood ratio test.

Table 2 shows the parameter estimates of the model under the full, first-order autocorrelation error structure. Table 3 shows the elasticity estimates corresponding to the model estimates under autocorrelation in Table 2. For comparison, elasticities for the model assuming autocorrelation is not present are also shown in the Table 3. Conditional income elasticities ($e_i = \theta_i/w_i$) and uncompensated price elasticities ($e_{ij} = \pi_{ij}/w_i - w_j e_i$) were estimated at sample mean budget shares. The promotion estimates (α_{ij}/w_i) in Table 3 are also calculated at mean budget shares. Although referred to as elasticities because of their close similarity, the promotional estimates are not strictly elasticities as the promotional variables in the model are in levels---α_{ij}/w_i indicates the percentage change in demand when the promotional share goes from zero to 100 percent.

Although previous work (Brown and Lee, 2007, 2008) suggests that trend or growth coefficients should be included in the beverage demand equations, the individual trend coefficients(constants or intercepts) in Table 2 were all statistically insignificant at the $\alpha = .10$ level, based on their asymptotic t values. The likelihood ratio test also indicated that the set of intercepts was not significant. Hence, the intercepts were omitted and the model was re-estimated assuming full autocorrelation. The coefficients for this specification are shown in Table 4. All of the MPCs were positive and statistically significant and all of the own-price Slutsky coefficients were negative and statistically significant. Over seventy percent of the cross-price coefficients were positive suggesting a predominance of substitute relationships, although some of these coefficients and many of the negative cross coefficients were insignificant, indicating neutral cross-price relationships. Sixteen out of twenty-two of the seasonality coefficients were statistically significant. About a third of the autocorrelation coefficients were significant.

Conditional income elasticities, uncompensated price elasticities and promotional elasticities for the no-intercept model are shown in Table 5. Focusing on OJ and GJ, their conditional income elasticities were .85 and .78, respectively, indicating these beverages are normal goods. The OJ and GJ own-price elasticities were -1.43 and -1.81, respectively. The latter own-price elasticities are similar to estimates made by Brown and Lee (2008), based on the first-difference specification of the Rotterdam model, but higher in absolute value than estimates based on the 52 difference Rotterdam model (Brown and Lee (2007). Harri, Brorsen, Muhammad and Anderson provide an argument that suggests that the model estimates based on 52^{nd} differencing to account for seasonality may be less efficient than the model estimates based on first-differencing with the sine and cosine variables used to account for seasonality. This issue may involve dynamics related to habit and inventory effects. The own-promotion elasticity (α_{ii}/w_i) for OJ was statistically significant at .16, while that for GJ was .03, but insignificant.

Concluding Comments

This study provides updated beverage demand elasticity estimates. The OJ and GJ demand own-price elasticities were estimated at -1.43 and -1.81, respectively. The cross-price estimates suggest a relatively high degree of price substitution between beverages. OJ and GJ, as well as the other beverages, were found to be normal goods with positive income effects. Overall, the estimates are consistent with some of the results found in past studies, although notable differences also exist with other studies. The own-price estimates are relatively large in absolute value compared to some early estimates, and this appears to be related to how seasonality is handled in the model. When 52^{nd} differencing is used to account for seasonality, the elasticities tend to be smaller in absolute value. On the other hand, the use of the sine and cosine variables to account for seasonality, along with first differencing, results in larger own-price effects for OJ and GJ. The first difference results appear to be more efficient than the 52^{nd} difference results, based on recent findings by Harri, Brorsen, Muhammad and Anderson, supporting the present, higher own-price elasticity estimates for OJ and GJ. Further study of the dynamics of beverage demand may provide additional insight.

Footnotes

[1] Data are for U.S. grocery stores doing $2 million and greater annual sales, Wal-Mart stores excluding Sam's Clubs, mass-merchandisers, and drug stores doing $1 million and greater annual sales.

[2] The Divisia volume index is a close approximation of $d(\log x) - \sum w_i \, d(\log p_i)$, as shown by Theil, 1971; $d(\log Q)$ is used instead of $d(\log x) - \sum w_i \, d(\log p_i)$ to insure adding-up.

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Table 1. Descriptive Statistics of Beverage Sample, 7/21/07 through 8/07/10.

Beverage	Gallons/Week		Price: $/Gallon		Share on Promotion		Budget Share	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Orange[1]	0.0384	0.0029	5.6689	0.2125	0.3575	0.0216	6.21%	0.56%
Grapefruit[1]	0.0015	0.0001	6.3106	0.1021	0.2796	0.0366	0.27%	0.02%
Apple[1]	0.0146	0.0018	4.4517	0.2690	0.3098	0.0458	1.86%	0.27%
Grape[1]	0.0041	0.0006	6.4572	0.2919	0.2296	0.0439	0.75%	0.10%
Remaining Fruit Juice[1]	0.0139	0.0010	7.2119	0.1886	0.2590	0.0194	2.86%	0.21%
Vegetable	0.0083	0.0008	7.3337	0.1976	0.1820	0.0435	1.73%	0.18%
Juice Drinks[2]	0.1084	0.0160	3.9878	0.1444	0.3656	0.0341	12.24%	1.17%
Carbonated Water	0.0137	0.0011	3.0553	0.1466	0.2396	0.0247	1.19%	0.07%
Water	0.2252	0.0328	1.6716	0.0585	0.4006	0.0374	10.69%	1.19%
Soda	0.3740	0.0392	3.1176	0.1318	0.4755	0.0322	33.11%	1.91%
Liquid Tea	0.0306	0.0054	3.6977	0.1072	0.3899	0.0448	3.21%	0.44%
Milk & Shakes	0.2438	0.0078	3.7249	0.3623	0.2449	0.0845	25.88%	2.43%

[1] 100% juice.

[2] Less than 100% juice.

Table 2. Maximum Likelihood Estimates of the Conditional Rotterdam Demand System for Beverages With Promotional Tactic Effects and First-Order Autocorrelation .[1]

Beverage	R^2	MPC	Slutsky Coefficient											
			OJ	GJ	AJ	GRAPEJ	RJ	VJ	JD	CWATER	WATER	SODA	TEA	MILK
Orange Juice	0.855	0.0530	-0.0858	0.0008	0.0047	0.0014	-0.0026	-0.0012	0.0218	0.0012	0.0072	0.0334	-0.0037	0.0228
		(0.0031)	(0.0063)	(0.0005)	(0.0029)	(0.0015)	(0.0022)	(0.0022)	(0.0042)	(0.0017)	(0.0036)	(0.0047)	(0.0030)	(0.0067)
Grapefruit Juice	0.812	0.0021		-0.0048	-0.0002	0.0002	0.0007	-0.0001	-0.0004	0.0005	0.0011	0.0018	0.0005	0.0001
		(0.0002)		(0.0003)	(0.0003)	(0.0003)	(0.0004)	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0005)
Apple Juice	0.827	0.0151			-0.0262	0.0003	0.0017	0.0005	0.0047	-0.0033	0.0009	0.0143	-0.0021	0.0046
		(0.0018)			(0.0026)	(0.0009)	(0.0014)	(0.0014)	(0.0025)	(0.0010)	(0.0021)	(0.0027)	(0.0019)	(0.0037)
Grape Juice	0.841	0.0044				-0.0053	-0.0022	0.0007	0.0017	-0.0006	0.0024	0.0038	0.0033	-0.0058
		(0.0007)				(0.0009)	(0.0009)	(0.0007)	(0.0010)	(0.0008)	(0.0009)	(0.0011)	(0.0009)	(0.0016)
Rem. Fruit Juice	0.873	0.0238					-0.0380	0.0025	0.0011	0.0013	0.0075	0.0185	0.0062	0.0034
		(0.0015)					(0.0017)	(0.0011)	(0.0019)	(0.0010)	(0.0016)	(0.0022)	(0.0014)	(0.0029)
Vegetable Juice	0.840	0.0187						-0.0253	-0.0026	-0.0001	0.0018	0.0171	0.0076	-0.0010
		(0.0016)						(0.0015)	(0.0021)	(0.0008)	(0.0018)	(0.0024)	(0.0015)	(0.0032)
Juice Drinks	0.902	0.1563							-0.1293	0.0058	-0.0064	0.1082	-0.0123	0.0078
		(0.0077)							(0.0092)	(0.0011)	(0.0067)	(0.0105)	(0.0028)	(0.0098)
Carbonated Water	0.847	0.0129								-0.0164	0.0055	0.0097	-0.0014	-0.0022
		(0.0008)									(0.0010)	(0.0012)	(0.0010)	(0.0018)
Water	0.831	0.1165									-0.0914	0.0613	0.0029	0.0072
		(0.0091)										(0.0114)	(0.0025)	(0.0098)
Soda	0.987	0.4084										-0.3828	0.0255	0.0892
		(0.0167)											(0.0031)	(0.0141)
Tea	0.940	0.0386											-0.0240	-0.0024
		(0.0023)												(0.0040)
Milk	0.793	0.1504												-0.1237
		(0.0109)												(0.0178)

[1] Standard errors in parentheses.

Table 2 Continued.[1]

Constant	Sine	Cosine	Promotion Coefficient											
			OJ	GJ	AJ	GRAPEJ	RJ	VJ	JD	CWATER	WATER	SODA	TEA	MILK
-0.0001	0.0019	0.0057	0.0094	0.0001	0.0024	0.0000	0.0088	-0.0034	-0.0019	0.0161	0.0010	-0.0199	0.0000	-0.0016
(0.0001)	(0.0009)	(0.0009)	(0.0039)	(0.0021)	(0.0031)	(0.0021)	(0.0048)	(0.0027)	(0.0040)	(0.0040)	(0.0042)	(0.0049)	(0.0026)	(0.0022)
0.0000	0.0002	0.0002	0.0001	0.0001	0.0001	0.0003	0.0007	0.0000	-0.0004	0.0006	0.0013	-0.0008	0.0004	-0.0002
(0.0000)	(0.0000)	(0.0000)	(0.0003)	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0002)	(0.0001)
0.0000	-0.0003	0.0023	-0.0064	0.0004	0.0186	-0.0009	-0.0025	-0.0001	-0.0006	0.0016	-0.0101	0.0033	-0.0009	-0.0013
(0.0000)	(0.0004)	(0.0004)	(0.0022)	(0.0012)	(0.0020)	(0.0012)	(0.0027)	(0.0015)	(0.0022)	(0.0022)	(0.0024)	(0.0027)	(0.0015)	(0.0012)
0.0000	0.0004	0.0008	0.0008	-0.0009	-0.0009	0.0072	-0.0021	0.0014	-0.0024	0.0014	0.0023	0.0002	0.0013	-0.0009
(0.0000)	(0.0002)	(0.0002)	(0.0009)	(0.0005)	(0.0008)	(0.0006)	(0.0012)	(0.0007)	(0.0009)	(0.0010)	(0.0010)	(0.0012)	(0.0006)	(0.0005)
0.0000	0.0012	0.0011	-0.0029	-0.0015	0.0027	0.0017	0.0092	0.0028	-0.0049	0.0024	0.0062	-0.0061	0.0022	-0.0008
(0.0000)	(0.0003)	(0.0004)	(0.0018)	(0.0010)	(0.0015)	(0.0010)	(0.0023)	(0.0013)	(0.0019)	(0.0019)	(0.0020)	(0.0023)	(0.0012)	(0.0010)
0.0000	0.0008	0.0013	-0.0003	-0.0004	0.0020	0.0016	0.0018	0.0091	-0.0021	-0.0037	0.0095	-0.0068	0.0021	-0.0021
(0.0000)	(0.0005)	(0.0005)	(0.0019)	(0.0011)	(0.0016)	(0.0011)	(0.0025)	(0.0015)	(0.0020)	(0.0020)	(0.0021)	(0.0025)	(0.0013)	(0.0011)
0.0000	-0.0027	-0.0073	-0.0094	0.0008	0.0069	0.0138	0.0034	0.0010	0.0949	0.0028	0.0071	-0.0570	-0.0101	0.0005
(0.0001)	(0.0016)	(0.0017)	(0.0095)	(0.0053)	(0.0071)	(0.0050)	(0.0115)	(0.0060)	(0.0101)	(0.0098)	(0.0103)	(0.0116)	(0.0062)	(0.0049)
0.0000	0.0001	-0.0005	-0.0003	0.0000	-0.0019	-0.0006	-0.0014	-0.0003	0.0005	0.0009	0.0009	-0.0014	0.0007	-0.0004
(0.0000)	(0.0002)	(0.0002)	(0.0010)	(0.0005)	(0.0009)	(0.0006)	(0.0012)	(0.0007)	(0.0010)	(0.0011)	(0.0011)	(0.0012)	(0.0007)	(0.0005)
-0.0001	-0.0023	-0.0103	-0.0034	-0.0071	-0.0081	0.0051	0.0000	0.0077	0.0010	-0.0065	0.0992	-0.0576	-0.0028	0.0091
(0.0001)	(0.0017)	(0.0018)	(0.0113)	(0.0062)	(0.0083)	(0.0058)	(0.0135)	(0.0070)	(0.0118)	(0.0116)	(0.0118)	(0.0134)	(0.0073)	(0.0057)
0.0003	0.0023	-0.0046	0.0339	0.0026	-0.0188	-0.0237	-0.0212	0.0123	-0.0326	-0.0702	-0.1054	0.2335	-0.0204	0.0029
(0.0003)	(0.0035)	(0.0038)	(0.0205)	(0.0115)	(0.0152)	(0.0110)	(0.0251)	(0.0132)	(0.0220)	(0.0213)	(0.0220)	(0.0256)	(0.0132)	(0.0108)
0.0000	-0.0013	-0.0030	-0.0040	-0.0005	-0.0056	0.0025	-0.0003	0.0028	-0.0010	-0.0016	-0.0019	-0.0071	0.0298	0.0004
(0.0000)	(0.0004)	(0.0004)	(0.0028)	(0.0015)	(0.0022)	(0.0014)	(0.0033)	(0.0017)	(0.0029)	(0.0028)	(0.0030)	(0.0033)	(0.0021)	(0.0014)
-0.0002	-0.0004	0.0144	-0.0174	0.0063	0.0026	-0.0070	0.0036	-0.0333	-0.0506	0.0563	-0.0099	-0.0803	-0.0023	-0.0055
(0.0002)	(0.0018)	(0.0020)	(0.0133)	(0.0072)	(0.0097)	(0.0067)	(0.0156)	(0.0081)	(0.0138)	(0.0135)	(0.0137)	(0.0159)	(0.0089)	(0.0065)

[1] Standard errors in parentheses.

Table 2 Continued.[1]

Lagged Error Coefficient (Less lagged Error Coeff. for MILK)										
OJ	GJ	AJ	GRAPEJ	RJ	VJ	JD	CWATER	WATER	SODA	TEA
0.1511	-3.1163	0.3374	0.1947	0.5948	0.0090	0.0102	0.9594	0.0868	0.0598	-0.0148
(0.1099)	(1.5836)	(0.1680)	(0.4595)	(0.2630)	(0.2171)	(0.0468)	(0.4122)	(0.0427)	(0.0275)	(0.1465)
0.0154	-0.2916	0.0095	-0.0181	0.0068	0.0191	-0.0007	0.0764	-0.0009	0.0013	0.0073
(0.0068)	(0.0972)	(0.0103)	(0.0284)	(0.0165)	(0.0136)	(0.0029)	(0.0256)	(0.0026)	(0.0017)	(0.0089)
0.0161	-0.0940	0.0218	-0.4161	0.1558	0.1972	0.0263	0.1473	0.0220	0.0040	0.0590
(0.0601)	(0.8558)	(0.0908)	(0.2486)	(0.1426)	(0.1174)	(0.0252)	(0.2238)	(0.0229)	(0.0148)	(0.0794)
0.0065	-0.2403	-0.0311	-0.0981	0.1291	0.0318	-0.0148	0.1958	-0.0066	0.0010	0.0937
(0.0236)	(0.3378)	(0.0357)	(0.0978)	(0.0563)	(0.0466)	(0.0100)	(0.0890)	(0.0092)	(0.0059)	(0.0313)
0.0957	-0.8919	-0.0787	-0.2656	0.2658	-0.1122	-0.0688	0.4675	0.0345	0.0088	0.1013
(0.0473)	(0.6807)	(0.0722)	(0.1979)	(0.1135)	(0.0941)	(0.0201)	(0.1787)	(0.0185)	(0.0119)	(0.0633)
0.1396	-0.7162	-0.2675	0.0320	0.0049	0.2256	-0.0123	0.2885	0.0320	0.0258	0.0736
(0.0544)	(0.7821)	(0.0831)	(0.2278)	(0.1303)	(0.1077)	(0.0232)	(0.2050)	(0.0213)	(0.0138)	(0.0728)
1.0598	-6.4841	-0.9350	2.6283	-0.7238	0.0431	-0.2284	0.3418	-0.1211	0.0357	0.5541
(0.2527)	(3.6481)	(0.3861)	(1.0611)	(0.6094)	(0.5014)	(0.1079)	(0.9422)	(0.0968)	(0.0618)	(0.3330)
0.0273	-0.6978	-0.0388	-0.1106	-0.2132	0.1796	0.0217	0.0444	-0.0195	0.0037	0.0104
(0.0250)	(0.3554)	(0.0377)	(0.1032)	(0.0597)	(0.0493)	(0.0105)	(0.0933)	(0.0096)	(0.0062)	(0.0329)
0.0459	-5.4809	-1.0135	-0.3129	-1.9801	0.5857	-0.0468	1.7118	-0.4909	-0.1028	0.0150
(0.2855)	(4.1893)	(0.4437)	(1.2199)	(0.7010)	(0.5763)	(0.1229)	(1.0809)	(0.1093)	(0.0695)	(0.3793)
-0.5657	15.6765	2.9331	-2.6333	-0.0296	-2.1122	-0.2615	-7.7491	0.2288	-0.4173	-0.1932
(0.5019)	(7.3988)	(0.7851)	(2.1558)	(1.2413)	(1.0189)	(0.2194)	(1.9320)	(0.1971)	(0.1251)	(0.6826)
0.0645	1.9298	-0.2808	0.2059	-0.3561	0.0815	-0.0253	-0.0111	0.0013	0.0088	-0.4058
(0.0712)	(1.0156)	(0.1071)	(0.2952)	(0.1710)	(0.1410)	(0.0297)	(0.2633)	(0.0264)	(0.0169)	(0.0913)
-1.0563	0.4067	-0.6562	0.7939	2.1456	0.8517	0.6005	3.5273	0.2336	0.3713	-0.3006
(0.3292)	(4.7554)	(0.5025)	(1.3858)	(0.7971)	(0.6584)	(0.1402)	(1.2278)	(0.1247)	(0.0794)	(0.4297)

[1] Standard errors in parentheses.

Table 3. Conditional Beverage Demand Growth Rates, and Income, Price and Promotion Elasticities at Sample Mean Budget Shares.

				Uncompensated Price Elasticity											
		Growth Rate	Expend. Elasticity	Price											
Beverage	Model			OJ	GJ	AJ	GRAPEJ	RJ	VJ	JD	CWATER	WATER	SODA	TEA	MILK
Orange Juice	Auto.	-0.051	0.852	-1.432	0.010	0.060	0.016	-0.067	-0.035	0.246	0.010	0.026	0.255	-0.087	0.146
	No Auto.	-0.061	0.930	-1.466	0.010	0.088	0.019	-0.015	-0.030	0.197	0.019	-0.032	0.363	-0.076	-0.007
Grapefruit Juice	Auto.	-0.020	0.782	0.237	-1.806	-0.081	0.063	0.231	-0.064	-0.245	0.177	0.319	0.394	0.165	-0.173
	No Auto.	-0.020	0.792	0.244	-1.931	-0.009	0.059	0.332	-0.019	-0.176	0.006	0.286	0.447	0.304	-0.334
Apple Juice	Auto.	0.009	0.812	0.203	-0.012	-1.422	0.011	0.067	0.015	0.154	-0.189	-0.036	0.501	-0.140	0.037
	No Auto.	-0.006	0.950	0.292	-0.002	-1.447	-0.010	0.067	0.034	-0.069	-0.150	-0.064	0.660	-0.114	-0.147
Grape Juice	Auto.	-0.077	0.577	0.151	0.023	0.031	-0.701	-0.303	0.083	0.149	-0.087	0.260	0.312	0.422	-0.918
	No Auto.	-0.069	0.732	0.167	0.021	-0.020	-0.819	-0.317	0.144	-0.088	-0.069	0.195	0.483	0.470	-0.898
Rem. Fruit Juice	Auto.	-0.018	0.831	-0.144	0.022	0.044	-0.082	-1.353	0.074	-0.063	0.034	0.172	0.372	0.190	-0.097
	No Auto.	-0.024	0.863	-0.028	0.031	0.045	-0.085	-1.343	0.092	-0.106	0.027	0.167	0.442	0.229	-0.333
Vegetable Juice	Auto.	0.016	1.079	-0.139	-0.011	0.011	0.033	0.115	-1.481	-0.282	-0.018	-0.009	0.631	0.405	-0.334
	No Auto.	-0.002	1.129	-0.120	-0.004	0.033	0.060	0.144	-1.375	-0.344	-0.002	0.013	0.682	0.335	-0.551
Juice Drinks	Auto.	0.018	1.278	0.099	-0.007	0.015	0.004	-0.027	-0.043	-1.214	0.032	-0.189	0.461	-0.142	-0.267
	No Auto.	0.008	1.226	0.082	-0.005	-0.016	-0.009	-0.035	-0.050	-1.097	0.054	-0.081	0.438	-0.114	-0.393
Carbonated Water	Auto.	0.015	1.081	0.037	0.039	-0.300	-0.059	0.075	-0.026	0.354	-1.389	0.344	0.460	-0.156	-0.460
	No Auto.	0.022	0.943	0.100	0.001	-0.234	-0.045	0.062	0.000	0.591	-1.527	0.303	0.290	-0.155	-0.328
Water	Auto.	-0.034	1.091	0.000	0.007	-0.011	0.015	0.039	-0.002	-0.193	0.038	-0.972	0.213	-0.008	-0.215
	No Auto.	-0.035	0.932	-0.019	0.007	-0.011	0.012	0.043	0.006	-0.057	0.034	-0.921	0.147	0.029	-0.202
Soda	Auto.	0.045	1.233	0.024	0.002	0.020	0.002	0.021	0.030	0.176	0.015	0.053	-1.564	0.037	-0.050
	No Auto.	0.055	1.173	0.053	0.003	0.033	0.008	0.029	0.035	0.169	0.008	0.022	-1.640	0.023	0.086
Tea	Auto.	0.008	1.203	-0.190	0.013	-0.089	0.095	0.159	0.217	-0.532	-0.059	-0.039	0.396	-0.787	-0.385
	No Auto.	0.017	1.120	-0.160	0.025	-0.070	0.108	0.197	0.181	-0.421	-0.060	0.076	0.255	-0.890	-0.361
Milk	Auto.	-0.038	0.581	0.052	-0.001	0.007	-0.027	-0.004	-0.014	-0.041	-0.015	-0.034	0.152	-0.028	-0.629
	No Auto.	-0.042	0.725	0.011	-0.003	-0.006	-0.026	-0.033	-0.030	-0.124	-0.013	-0.061	0.258	-0.032	-0.665

Table 3 Continued.

		Promotion											
Beverage	Model	Orange Juice	Grapefruit Juice	Apple Juice	Grape Juice	Rem. Fruit Juice	Vegetable Juice	Juice Drinks	Carbonated Water	Water	Soda	Tea	Milk
Orange Juice	Auto.	0.152	0.002	0.039	-0.001	0.142	-0.054	-0.031	0.259	0.015	-0.320	-0.126	-0.014
	No Auto.	0.158	-0.018	-0.006	-0.017	0.040	-0.017	-0.008	0.199	-0.046	-0.257	-0.048	-0.079
Grapefruit Juice	Auto.	0.038	0.028	0.032	0.095	0.252	-0.014	-0.130	0.215	0.477	-0.295	0.162	-0.070
	No Auto.	0.023	0.029	-0.044	0.052	0.272	-0.025	-0.155	0.124	0.520	-0.191	0.156	-0.055
Apple Juice	Auto.	-0.342	0.023	1.001	-0.047	-0.132	-0.005	-0.033	0.084	-0.544	0.178	-0.050	-0.072
	No Auto.	-0.215	0.031	1.058	0.005	-0.272	0.176	-0.130	0.079	-0.639	0.310	-0.066	-0.086
Grape Juice	Auto.	0.104	-0.122	-0.120	0.957	-0.276	0.190	-0.315	0.184	0.299	0.031	0.174	-0.118
	No Auto.	0.124	-0.068	-0.266	0.866	-0.369	0.193	-0.325	0.245	0.272	0.059	0.156	-0.183
Rem. Fruit Juice	Auto.	-0.102	-0.052	0.096	0.061	0.322	0.096	-0.171	0.082	0.215	-0.214	0.078	-0.029
	No Auto.	-0.102	-0.041	-0.008	-0.022	0.381	0.102	-0.138	0.118	0.173	-0.140	0.050	-0.045
Vegetable Juice	Auto.	-0.018	-0.022	0.113	0.095	0.104	0.524	-0.120	-0.211	0.548	-0.392	0.123	-0.122
	No Auto.	-0.140	0.049	0.074	0.034	0.233	0.592	-0.124	-0.100	0.603	-0.341	0.000	-0.143
Juice Drinks	Auto.	-0.077	0.007	0.056	0.113	0.028	0.009	0.776	0.023	0.058	-0.466	-0.083	0.004
	No Auto.	-0.165	0.031	0.007	0.103	0.104	-0.030	0.746	0.170	0.046	-0.460	-0.067	0.002
Carbonated Water	Auto.	-0.028	0.001	-0.162	-0.053	-0.118	-0.025	0.041	0.077	0.078	-0.115	0.059	-0.031
	No Auto.	-0.098	0.061	-0.087	-0.073	0.036	-0.047	0.052	0.047	0.214	-0.197	0.070	-0.051
Water	Auto.	-0.032	-0.067	-0.076	0.048	0.000	0.072	0.010	-0.061	0.930	-0.540	-0.026	0.085
	No Auto.	-0.120	0.009	-0.119	0.062	0.095	-0.036	-0.066	-0.006	1.037	-0.477	0.014	0.026
Soda	Auto.	0.102	0.008	-0.057	-0.072	-0.064	0.037	-0.099	-0.212	-0.318	0.705	-0.062	0.009
	No Auto.	0.114	-0.016	-0.029	-0.041	-0.087	0.001	-0.025	-0.239	-0.338	0.611	-0.064	0.005
Tea	Auto.	-0.126	-0.014	-0.174	0.077	-0.010	0.087	-0.031	-0.051	-0.060	-0.221	0.928	0.012
	No Auto.	-0.048	-0.079	-0.145	0.020	0.188	0.099	-0.008	-0.070	-0.022	-0.279	0.877	0.022
Milk	Auto.	-0.067	0.024	0.010	-0.027	0.014	-0.128	-0.195	0.218	-0.038	-0.310	-0.009	-0.021
	No Auto.	-0.023	0.003	0.035	-0.043	-0.042	-0.047	-0.249	0.166	-0.039	-0.246	-0.015	0.007

Table 4. No Intercept Model, Maximum Likelihood Estimates of the Conditional Rotterdam Demand System for Beverages With Promotional Tactic Effects and First-Order Autocorrelation .[1]

Beverage	R^2	MPC	Slutsky Coefficient											
			OJ	GJ	AJ	GRAPEJ	RJ	VJ	JD	CWATER	WATER	SODA	TEA	MILK
Orange Juice	0.855	0.0530	-0.0858	0.0008	0.0046	0.0014	-0.0027	-0.0013	0.0214	0.0012	0.0075	0.0334	-0.0039	0.0235
		(0.0031)	(0.0064)	(0.0005)	(0.0029)	(0.0015)	(0.0022)	(0.0022)	(0.0042)	(0.0017)	(0.0036)	(0.0047)	(0.0030)	(0.0067)
Grapefruit Juice	0.812	0.0021		-0.0049	-0.0002	0.0002	0.0007	-0.0001	-0.0004	0.0005	0.0011	0.0017	0.0005	0.0001
		(0.0002)		(0.0003)	(0.0003)	(0.0003)	(0.0004)	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0005)
Apple Juice	0.827	0.0151			-0.0262	0.0003	0.0017	0.0006	0.0047	-0.0033	0.0009	0.0143	-0.0021	0.0045
		(0.0018)			(0.0026)	(0.0009)	(0.0014)	(0.0014)	(0.0025)	(0.0010)	(0.0021)	(0.0027)	(0.0019)	(0.0037)
Grape Juice	0.841	0.0044				-0.0053	-0.0022	0.0007	0.0016	-0.0006	0.0024	0.0038	0.0033	-0.0057
		(0.0007)				(0.0009)	(0.0009)	(0.0007)	(0.0010)	(0.0008)	(0.0009)	(0.0011)	(0.0009)	(0.0016)
Rem. Fruit Juice	0.873	0.0238					-0.0379	0.0026	0.0013	0.0014	0.0074	0.0186	0.0062	0.0029
		(0.0015)					(0.0017)	(0.0011)	(0.0019)	(0.0010)	(0.0016)	(0.0022)	(0.0014)	(0.0029)
Vegetable Juice	0.840	0.0187						-0.0253	-0.0025	-0.0001	0.0018	0.0172	0.0077	-0.0013
		(0.0016)						(0.0015)	(0.0021)	(0.0008)	(0.0018)	(0.0024)	(0.0015)	(0.0032)
Juice Drinks	0.901	0.1565							-0.1279	0.0059	-0.0069	0.1094	-0.0123	0.0057
		(0.0077)							(0.0092)	(0.0011)	(0.0067)	(0.0105)	(0.0028)	(0.0098)
Carbonated Water	0.847	0.0128								-0.0162	0.0054	0.0097	-0.0014	-0.0024
		(0.0008)								(0.0013)	(0.0010)	(0.0012)	(0.0010)	(0.0018)
Water	0.831	0.1166									-0.0915	0.0610	0.0028	0.0082
		(0.0091)									(0.0096)	(0.0114)	(0.0025)	(0.0098)
Soda	0.987	0.4078										-0.3819	0.0256	0.0873
		(0.0168)										(0.0243)	(0.0031)	(0.0142)
Tea	0.940	0.0386											-0.0240	-0.0024
		(0.0023)											(0.0030)	(0.0040)
Milk	0.793	0.1506												-0.1204
		(0.0110)												(0.0178)

[1] Standard errors in parentheses.

Table 4 Continued.[1]

Sine	Cosine	Promotion Coefficient											
		OJ	GJ	AJ	GRAPEJ	RJ	VJ	JD	CWATER	WATER	SODA	TEA	MILK
0.0019	0.0057	0.0096	0.0000	0.0024	0.0002	0.0086	-0.0034	-0.0021	0.0158	0.0009	-0.0200	0.0000	-0.0015
(0.0009)	(0.0009)	(0.0039)	(0.0021)	(0.0031)	(0.0022)	(0.0048)	(0.0028)	(0.0040)	(0.0040)	(0.0043)	(0.0049)	(0.0026)	(0.0022)
0.0002	0.0002	0.0001	0.0001	0.0001	0.0003	0.0007	0.0000	-0.0003	0.0006	0.0013	-0.0008	0.0004	-0.0002
(0.0000)	(0.0000)	(0.0003)	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0002)	(0.0001)
-0.0003	0.0023	-0.0064	0.0004	0.0186	-0.0009	-0.0024	0.0000	-0.0006	0.0016	-0.0101	0.0033	-0.0009	-0.0013
(0.0004)	(0.0004)	(0.0022)	(0.0012)	(0.0020)	(0.0012)	(0.0027)	(0.0015)	(0.0022)	(0.0022)	(0.0024)	(0.0027)	(0.0015)	(0.0012)
0.0004	0.0008	0.0008	-0.0009	-0.0009	0.0072	-0.0021	0.0014	-0.0024	0.0013	0.0023	0.0002	0.0013	-0.0009
(0.0002)	(0.0002)	(0.0009)	(0.0005)	(0.0008)	(0.0006)	(0.0012)	(0.0007)	(0.0009)	(0.0010)	(0.0010)	(0.0012)	(0.0006)	(0.0005)
0.0012	0.0011	-0.0029	-0.0015	0.0027	0.0017	0.0093	0.0028	-0.0049	0.0024	0.0062	-0.0060	0.0023	-0.0009
(0.0003)	(0.0004)	(0.0018)	(0.0010)	(0.0015)	(0.0010)	(0.0023)	(0.0013)	(0.0019)	(0.0019)	(0.0020)	(0.0023)	(0.0012)	(0.0010)
0.0008	0.0013	-0.0003	-0.0004	0.0020	0.0016	0.0018	0.0091	-0.0020	-0.0037	0.0095	-0.0067	0.0021	-0.0021
(0.0005)	(0.0005)	(0.0019)	(0.0011)	(0.0016)	(0.0011)	(0.0025)	(0.0015)	(0.0020)	(0.0020)	(0.0021)	(0.0025)	(0.0013)	(0.0011)
-0.0027	-0.0073	-0.0098	0.0010	0.0068	0.0136	0.0034	0.0012	0.0950	0.0031	0.0072	-0.0561	-0.0100	0.0004
(0.0016)	(0.0017)	(0.0095)	(0.0053)	(0.0071)	(0.0050)	(0.0115)	(0.0060)	(0.0101)	(0.0098)	(0.0102)	(0.0116)	(0.0062)	(0.0049)
0.0001	-0.0005	-0.0003	0.0000	-0.0019	-0.0007	-0.0013	-0.0003	0.0005	0.0010	0.0010	-0.0014	0.0007	-0.0004
(0.0002)	(0.0002)	(0.0010)	(0.0005)	(0.0009)	(0.0006)	(0.0012)	(0.0007)	(0.0010)	(0.0011)	(0.0011)	(0.0012)	(0.0007)	(0.0005)
-0.0022	-0.0103	-0.0031	-0.0072	-0.0082	0.0050	0.0000	0.0074	0.0010	-0.0069	0.0993	-0.0582	-0.0028	0.0089
(0.0017)	(0.0018)	(0.0113)	(0.0062)	(0.0083)	(0.0058)	(0.0135)	(0.0070)	(0.0119)	(0.0116)	(0.0119)	(0.0134)	(0.0073)	(0.0057)
0.0022	-0.0046	0.0332	0.0031	-0.0185	-0.0235	-0.0211	0.0125	-0.0327	-0.0691	-0.1053	0.2349	-0.0201	0.0032
(0.0036)	(0.0038)	(0.0206)	(0.0116)	(0.0153)	(0.0110)	(0.0253)	(0.0133)	(0.0221)	(0.0214)	(0.0221)	(0.0257)	(0.0132)	(0.0108)
-0.0013	-0.0030	-0.0041	-0.0004	-0.0055	0.0024	-0.0003	0.0028	-0.0010	-0.0016	-0.0019	-0.0071	0.0298	0.0004
(0.0004)	(0.0004)	(0.0028)	(0.0015)	(0.0022)	(0.0014)	(0.0033)	(0.0017)	(0.0029)	(0.0028)	(0.0030)	(0.0033)	(0.0021)	(0.0014)
-0.0003	0.0144	-0.0168	0.0059	0.0025	-0.0069	0.0035	-0.0335	-0.0505	0.0555	-0.0103	-0.0822	-0.0027	-0.0055
(0.0019)	(0.0020)	(0.0134)	(0.0073)	(0.0098)	(0.0068)	(0.0158)	(0.0081)	(0.0139)	(0.0136)	(0.0138)	(0.0161)	(0.0090)	(0.0066)

[1] Standard errors in parentheses.

Table 4 Continued.[1]

Lagged Error Coefficient (Less lagged Error Coeff. for MILK)										
OJ	GJ	AJ	GRAPEJ	RJ	VJ	JD	CWATER	WATER	SODA	TEA
0.1596	-3.1325	0.3370	0.1909	0.6023	0.0034	0.0069	0.9570	0.0882	0.0590	-0.0093
(0.1100)	(1.5889)	(0.1686)	(0.4610)	(0.2639)	(0.2176)	(0.0469)	(0.4131)	(0.0429)	(0.0276)	(0.1469)
0.0157	-0.2926	0.0094	-0.0177	0.0066	0.0188	-0.0009	0.0749	-0.0009	0.0013	0.0076
(0.0068)	(0.0972)	(0.0103)	(0.0285)	(0.0165)	(0.0135)	(0.0029)	(0.0255)	(0.0026)	(0.0017)	(0.0089)
0.0168	-0.0892	0.0205	-0.4126	0.1525	0.1953	0.0250	0.1399	0.0223	0.0032	0.0609
(0.0600)	(0.8565)	(0.0909)	(0.2489)	(0.1427)	(0.1175)	(0.0252)	(0.2237)	(0.0229)	(0.0148)	(0.0793)
0.0086	-0.2482	-0.0310	-0.0946	0.1290	0.0310	-0.0154	0.1895	-0.0062	0.0008	0.0956
(0.0236)	(0.3386)	(0.0358)	(0.0981)	(0.0565)	(0.0467)	(0.0100)	(0.0891)	(0.0092)	(0.0059)	(0.0314)
0.0950	-0.8716	-0.0786	-0.2598	0.2598	-0.1148	-0.0702	0.4480	0.0345	0.0078	0.1037
(0.0472)	(0.6812)	(0.0723)	(0.1981)	(0.1136)	(0.0941)	(0.0201)	(0.1786)	(0.0185)	(0.0119)	(0.0632)
0.1393	-0.7077	-0.2669	0.0359	0.0002	0.2250	-0.0127	0.2768	0.0319	0.0254	0.0748
(0.0543)	(0.7821)	(0.0831)	(0.2279)	(0.1303)	(0.1077)	(0.0232)	(0.2048)	(0.0213)	(0.0137)	(0.0727)
1.0361	-6.3775	-0.9244	2.6045	-0.7382	0.0461	-0.2210	0.3319	-0.1275	0.0370	0.5393
(0.2528)	(3.6562)	(0.3870)	(1.0639)	(0.6108)	(0.5021)	(0.1079)	(0.9426)	(0.0970)	(0.0617)	(0.3332)
0.0272	-0.6962	-0.0383	-0.1072	-0.2147	0.1793	0.0217	0.0381	-0.0197	0.0033	0.0115
(0.0249)	(0.3554)	(0.0377)	(0.1033)	(0.0597)	(0.0493)	(0.0105)	(0.0932)	(0.0096)	(0.0062)	(0.0328)
0.0693	-5.6012	-1.0142	-0.2794	-1.9785	0.5809	-0.0513	1.6461	-0.4841	-0.1028	0.0294
(0.2856)	(4.1955)	(0.4445)	(1.2221)	(0.7022)	(0.5768)	(0.1230)	(1.0815)	(0.1095)	(0.0694)	(0.3796)
-0.6263	15.9970	2.9281	-2.6944	-0.0531	-2.0958	-0.2485	-7.6082	0.2187	-0.4121	-0.2378
(0.5041)	(7.4431)	(0.7898)	(2.1691)	(1.2487)	(1.0240)	(0.2202)	(1.9409)	(0.1983)	(0.1253)	(0.6858)
0.0653	1.9120	-0.2811	0.2070	-0.3605	0.0814	-0.0251	-0.0165	0.0018	0.0090	-0.4065
(0.0711)	(1.0154)	(0.1072)	(0.2954)	(0.1710)	(0.1409)	(0.0296)	(0.2630)	(0.0264)	(0.0169)	(0.0913)
-1.0065	0.1079	-0.6604	0.8273	2.1946	0.8494	0.5916	3.5226	0.2409	0.3681	-0.2691
(0.3316)	(4.8004)	(0.5074)	(1.3998)	(0.8048)	(0.6642)	(0.1413)	(1.2378)	(0.1259)	(0.0797)	(0.4333)

[1] Standard errors in parentheses.

Table 5. No Intercept Model, Conditional Beverage Demand Income, Price and Promotion Elasticities at Sample Mean Budget Shares.

		Uncompensated Price Elasticity											
	Expend. Elasticity	Price											
Beverage		OJ	GJ	AJ	GRAPEJ	RJ	VJ	JD	CWATER	WATER	SODA	TEA	MILK
Orange Juice	0.853	-1.432	0.010	0.059	0.016	-0.068	-0.036	0.239	0.009	0.029	0.254	-0.090	0.158
Grapefruit Juice	0.781	0.237	-1.811	-0.078	0.065	0.229	-0.061	-0.243	0.172	0.318	0.392	0.167	-0.170
Apple Juice	0.812	0.199	-0.011	-1.423	0.011	0.070	0.017	0.155	-0.188	-0.036	0.501	-0.138	0.031
Grape Juice	0.580	0.149	0.024	0.031	-0.704	-0.302	0.086	0.143	-0.088	0.262	0.309	0.421	-0.911
Rem. Fruit Juice	0.831	-0.147	0.021	0.045	-0.082	-1.348	0.076	-0.058	0.038	0.169	0.375	0.191	-0.113
Vegetable Juice	1.078	-0.143	-0.010	0.014	0.034	0.119	-1.477	-0.275	-0.016	-0.013	0.633	0.409	-0.353
Juice Drinks	1.279	0.095	-0.007	0.015	0.004	-0.026	-0.042	-1.202	0.033	-0.193	0.471	-0.141	-0.284
Carbonated Water	1.078	0.032	0.038	-0.299	-0.059	0.085	-0.024	0.361	-1.374	0.337	0.458	-0.153	-0.480
Water	1.092	0.002	0.007	-0.011	0.015	0.038	-0.002	-0.198	0.037	-0.974	0.209	-0.009	-0.206
Soda	1.231	0.024	0.002	0.020	0.002	0.021	0.030	0.180	0.015	0.053	-1.561	0.038	-0.055
Tea	1.204	-0.197	0.013	-0.087	0.094	0.160	0.219	-0.531	-0.058	-0.042	0.399	-0.787	-0.386
Milk	0.582	0.055	-0.001	0.006	-0.027	-0.005	-0.015	-0.049	-0.016	-0.030	0.145	-0.028	-0.616

Table 5 Continued.

	Promotion											
Beverage	Orange Juice	Grapefruit Juice	Apple Juice	Grape Juice	Rem. Fruit Juice	Vegetable Juice	Juice Drinks	Carbonated Water	Water	Soda	Tea	Milk
Orange Juice	0.155	0.001	0.039	0.003	0.138	-0.054	-0.033	0.254	0.014	-0.322	-0.126	-0.014
Grapefruit Juice	0.038	0.026	0.033	0.093	0.253	-0.013	-0.129	0.212	0.480	-0.296	0.162	-0.070
Apple Juice	-0.342	0.023	1.001	-0.047	-0.131	-0.002	-0.032	0.084	-0.542	0.180	-0.050	-0.072
Grape Juice	0.106	-0.124	-0.122	0.956	-0.277	0.191	-0.315	0.179	0.299	0.027	0.173	-0.119
Rem. Fruit Juice	-0.102	-0.053	0.096	0.060	0.324	0.098	-0.170	0.083	0.218	-0.210	0.079	-0.030
Vegetable Juice	-0.019	-0.022	0.113	0.092	0.106	0.527	-0.118	-0.211	0.550	-0.389	0.123	-0.124
Juice Drinks	-0.080	0.008	0.055	0.111	0.028	0.010	0.776	0.025	0.059	-0.459	-0.082	0.003
Carbonated Water	-0.028	0.000	-0.162	-0.056	-0.111	-0.024	0.044	0.082	0.082	-0.114	0.059	-0.033
Water	-0.029	-0.067	-0.077	0.047	0.000	0.069	0.010	-0.065	0.930	-0.545	-0.027	0.084
Soda	0.100	0.009	-0.056	-0.071	-0.064	0.038	-0.099	-0.209	-0.318	0.709	-0.061	0.010
Tea	-0.126	-0.014	-0.173	0.076	-0.010	0.087	-0.031	-0.050	-0.060	-0.220	0.929	0.011
Milk	-0.065	0.023	0.010	-0.027	0.013	-0.130	-0.195	0.215	-0.040	-0.318	-0.010	-0.021