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GENERIC ADVERTISING IMPACTS ON DEMANDS FOR ORANGE JUICE IN FIFTY NIELSEN METROPOLITAN REGIONS

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Introduction

In this study, impacts of Florida Department of Citrus (FDOC) generic orange juice (OJ) advertising on retail OJ demands in fifty metropolitan regions or cities are analyzed. The analysis is based on estimated (city) demand equations that relate retail OJ gallon sales to FDOC generic OJ advertising, brand OJ advertising and the price of OJ. The equations were estimated using Nielsen sales and advertising data for grocery stores doing at least $2 million annual business. In addition, generic advertising expenditure data from the advertiser for the FDOC, the Richard's Group, were analyzed.

The Nielsen sales data are on a weekly basis and include OJ dollar and gallon sales. OJ prices were derived by dividing dollar sales by gallon sales. U.S. Department of Commerce data on the consumer price index (CPI) were used to deflate the OJ price data. The gallon and dollar data were complete for the period from August 5, 1995 through October 25, 1997 (117 weekly observations).

The Nielsen advertising data are TV gross rating points (GRPs) for OJ. The GRP data are monthly and were combined with the Nielsen weekly sales data by equally allocating monthly GRPs across weeks. The GRP data allowed construction of an additional 43 weekly observations from October 29, 1994 through October 25, 1997 (160 observations). These additional observations on

GRPs were used in estimating the lagged effects of advertising.

The Richard's Group advertising expenditure data were on TV and radio advertising for the period from July 1, 1996 through July 21, 1997; the expenditures are for specific flight time periods and were allocated to the Nielsen weeks according to the fraction of time that the Nielsen period accounted for the flight period.

Income and population may also affect demand but were treated as constant given the relatively short time period studied.

Model

For each city, a double log OJ demand equation was estimated. Formally, the model can be written as

$$\begin{aligned}(1)\quad \log q_t = \beta_0 + \beta_1 \log p_t + \beta_2 \log a_{1t} + \beta_3 \textstyle\sum_j w_j \log a_{1,t-j} \\ + \beta_2 \log a_{2t} + \beta_3 \textstyle\sum_j w_j \log a_{2,t-j} \\ + \beta_4 \log a_{3t} + \beta_5 \textstyle\sum_j w_j \log a_{3,t-j} \\ + \beta_6 \log a_{4t} + \beta_7 \textstyle\sum_j w_j \log a_{4,t-j};\end{aligned}$$

where subscript t stands for time (week); q_t is OJ gallon sales; p_t is the CPI deflated OJ price; a_{1t}, a_{2t}, a_{3t}, and a_{4t} are Nielsen generic TV GRPs for OJ, Richard's Group generic TV advertising expenditures on OJ, Richard's Group generic radio advertising expenditures on OJ, and Nielsen brand TV GRPs for OJ, respectively; (lag) subscript j runs from 1 to 43; and w_j's are weights

declining linearly in value as lag length j increases (w_1=43/44, ..., w_{43}=1/44). The parameters to be estimated are the β s. Preliminary analysis indicated effects of TV GRPs and TV advertising expenditures were statistically the same (β_2 and β_3). Present advertising was not included in the lag structure (w_j's) for past advertising to allow immediate impulse buying.

To account for seasonality, equation (1) was 52 nd differenced (for the 52 weeks in a year), i.e.,

$$
\begin{aligned}
(2) \qquad d \log q_t = {} & \beta_1 d \log p_t + \beta_2 d \log a_{1t} + \beta_3 \textstyle\sum_j w_j d \log a_{1,t-j} \\
& + \beta_2 d \log a_{2t} + \beta_3 \textstyle\sum_j w_j d \log a_{2,t-j} \\
& + \beta_4 d \log a_{3t} + \beta_5 \textstyle\sum_j w_j d \log a_{3,t-j} \\
& + \beta_6 d \log a_{4t} + \beta_7 \textstyle\sum_j w_j d \log a_{4,t-j} ;
\end{aligned}
$$

where, for variable x in general, $dx_t = x_t - x_{t-52}$.

Results

Equation (2) was estimated by ordinary least squares. The results are shown in shown in Tables 1 (parameter estimates), 2 (corresponding t statistics) and 3 (corresponding probabilities greater than the absolute values of the t statistics). Negative generic advertising parameter estimates were restricted to zero. The R2's ranged from .21 to.85. All the price parameter estimates were negative and statistically significant at the α=.10 level, i.e., statistically different from zero with a type I error of 10%. Many of the present and lagged or past brand advertising parameter estimates

were negative and many of these were not statistically significant. About a quarter (51) of the generic advertising parameters were statistically significant at α=.10; about a third (63) were statistically significant at α=.20.

The parameter estimates in Table 2 were used to estimate the impact of advertising over the 65 week period from August 8, 1996 through October 25, 1997 (the 52 weeks prior to this period were lost due to differencing of the data). Table 4 shows city-by-city estimated OJ gallon sales generated by generic TV advertising, corresponding GRPs, and average gallons generated per GRP. The cities are ranked by gallons generated per GRP. Using this criteria, generic TV advertising was most affective in San Diego, Buffalo, Sacramento, etc.

Table 5 shows city-by-city estimated OJ gallon sales generated by generic radio advertising, corresponding radio advertising expenditures, and average gallons generated per dollar expenditure. Ranking the cities by gallons generated per dollar radio advertising expenditure, generic radio advertising was most affective in Philadelphia, Omaha, Baltimore, etc.

Table 6 shows city-by-city estimated OJ gallon sales generated by generic TV and radio advertising together and the percentage increase in OJ gallon sales or demand due to the generic advertising. Ranking the cities by the latter advertising-induced increase in OJ demand, generic advertising was most affective in San Diego, Charlotte, Portland, etc.

The present analysis suggests two ways to increase U.S. OJ sales. First, increase the

effectiveness of advertising in cities where advertising appears to perform relatively poorly. Across the 50 cities, generic advertising is estimated to increase OJ demand by 3.1% (Table 6). As shown in Table 7, if the effectiveness of advertising were increased in cities with presently below average estimated effectiveness, the increase in the aggregate-fifty-city OJ demand as a result of advertising would be 4.0% or .9% over the fifty city average.

Another way to increase the overall performance of advertising in the U.S. is to allocate advertising across cities in a more optimal fashion. For example, GRPs might be taken out of cities where they have little effect and put in cities where they are most effective. In the present analysis, the impact of advertising on gallon sales in a city depends on the magnitude of the estimated advertising parameter estimates in Table 1 and the size of the city. The advertising parameter estimates indicate percentage changes in gallon sales for a percentage change in advertising. Estimates of changes in gallon sales per unit changes in GRPs or advertising expenditures can be obtained by multiplying the estimated elasticities by the total gallon sales in the city and dividing the result by the city GRP or advertising expenditure level. Table 8 shows the long-run impact of advertising (GRPs) on a weekly average basis. The long-run impact of GRPs on OJ demand is the present effect of GRPs plus all the lagged GRP effects. For example, allocation of a weekly average 27.6 GRPs to Los Angeles would increase OJ sales by 672,672 gallons in the long-run (the present week plus 43 future weeks). Similar GRP allocations across the other cities would result in a fifty city long-run increase OJ demand of 4.7%. Note that the marginal effect of one GRP in Los Angeles is 439 gallons for the above allocation. Also note that the cities in Table 8 have been ranked according to their marginal effects and that the marginal effects are much greater for the cities on the top of Table 8 (Los Angeles, San Diego, etc.) compared to the marginal effects for cities on the

bottom of the table. If the given fifty-city GRP level of 1479 per week were reallocated across cities to maximize OJ sales in the long-run, OJ demand would increase by 5.3% or .6% over result for the non-optimal allocation.

Concluding Comments.

The empirical analysis shows that in the last 65 weeks the effectiveness of generic OJ advertising varied from city to city. On average, generic advertising was estimated to increase OJ demand by 3.1%. However, the effect in some cities was much greater than in other cities, with the shifts in OJ demand across cities ranging from zero to 10.5%.

Advertising performance might be increased in two ways. First, cities where advertising does not work well might be given special attention in developing advertising programs that are more effective. If the relatively poor advertising performing cities were brought up to the average, the shift in fifty city OJ demand would be 4%. Alternatively, cities where advertising performs relatively well (poorly) might be given more (less) GRPs.

Table 1. Model Coefficient Estimates

CITY	R-Square	Coefficient Estimates*									
			FDOC Advertising								
		Log OJ Price (B1)	Log Present TV (B2)	Log Past TV (B3)	Log Present Radio (B4)	Log Past Radio (B5)	L. Present Brand TV (B6)	L. Past Brand TV (B7)	Log Present TV	Log Past TV	GRP Impact Wt. Sum
ALBANY	0.50	-1.1867	0.0090	.	.	0.0012	-0.0113	-0.0014	0.009	.	0.009
ATLANTA	0.55	-0.9076	.	0.0010	0.0010	.	-0.0004	0.0002	.	0.001	0.021
BALTIMORE	0.60	-1.2905	.	.	0.0020	0.0029	-0.0075	0.0009	.	.	0.000
BIRMINGHAM	0.59	-1.1570	0.0001	0.0013	0.0088	0.0004	0.0048	-0.0024	0.000	0.001	0.028
BOSTON	0.21	-0.7235	0.0041	.	0.0014	0.0004	-0.0093	0.0001	0.004	.	0.004
BUFFALO	0.69	-1.8355	0.0141	0.0008	0.0015	.	0.0034	-0.0004	0.014	0.001	0.032
CHARLOTTE	0.45	-1.1687	.	0.0016	0.0017	0.0011	0.0030	-0.0011	.	0.002	0.035
CHICAGO	0.37	-0.8021	.	0.0001	0.0052	.	0.0022	-0.0025	.	0.000	0.002
CINCINNATI	0.75	-1.0991	0.0009	.	.	0.0024	-0.0037	-0.0000	0.001	.	0.001
CLEVELAND	0.56	-1.0752	0.0032	.	0.0055	0.0008	-0.0055	0.0006	0.003	.	0.003
COLUMBUS	0.85	-1.6035	0.0058	0.0008	0.0047	0.0009	-0.0093	-0.0015	0.006	0.001	0.022
DALLAS	0.58	-1.5122	.	0.0016	0.0066	0.0006	0.0073	-0.0021	.	0.002	0.035
DENVER	0.72	-1.2004	0.0006	0.0008		0.0013	-0.0045	-0.0004	0.001	0.001	0.019
DES MOINES	0.73	-0.8554	0.0126	0.0005	.	.	-0.0044	-0.0039	0.013	0.001	0.024
DETROIT	0.57	-1.2276	0.0062	0.0007	0.0058	0.0002	0.0011	-0.0032	0.006	0.001	0.021
GRAND RAPIDS	0.85	-1.5307	.	0.0007	.	.	-0.0061	-0.0014	.	0.001	0.016
HARTFORD	0.24	-0.7872	.	.	.	.	-0.0200	-0.0008	.	.	0.000
HOUSTON	0.63	-1.1382	0.0051	0.0012	0.0028	0.0005	-0.0018	-0.0010	0.005	0.001	0.031
INDIANAPOLIS	0.85	-1.2652	0.0015	0.0008	.	0.0000	-0.0050	-0.0025	0.002	0.001	0.018
JACKSONVILLE	0.75	-0.9131	0.0014	0.0010	.	.	-0.0025	-0.0005	0.001	0.001	0.023
KANSAS CITY	0.67	-1.3320	0.0038	0.0003	.	.	-0.0057	0.0007	0.004	0.000	0.011
LITTLE ROCK	0.68	-1.2466	0.0062	.	0.0083	.	-0.0090	-0.0018	0.006	.	0.006
LOS ANGELES	0.53	-1.0925	.	0.0008	0.0009	0.0005	0.0028	-0.0034	.	0.001	0.018
LOUISVILLE	0.85	-1.3191	0.0071	0.0001	0.0000	0.0010	-0.0109	-0.0017	0.007	0.000	0.008
MEMPHIS	0.71	-1.4018	.	0.0001	.	.	-0.0000	-0.0022	.	0.000	0.002
MIAMI	0.52	-0.7310	.	0.0002	0.0000	.	-0.0015	-0.0010	.	0.000	0.004
MILWAUKEE	0.60	-1.7986	0.0059	0.0008	.	.	0.0089	0.0006	0.006	0.001	0.022
MINNEAPOLIS	0.57	-1.1403	.	0.0011	0.0045	.	-0.0079	-0.0018	.	0.001	0.024
NASHVILLE	0.33	-0.9577	.	0.0001	.	0.0006	-0.0015	-0.0017	.	0.000	0.001
NEW ORLEANS	0.67	-1.4745	.	0.0002	0.0050	.	-0.0007	-0.0011	.	0.000	0.004
NEW YORK	0.40	-1.1940	.	.	0.0020	0.0003	0.0045	-0.0011	.	.	0.000
OKLAHOMA CITY	0.56	-1.2040	0.0065	0.0002	.	.	-0.0076	-0.0020	0.006	0.000	0.011
OMAHA	0.51	-0.9710	.	.	0.0071	0.0070	0.0024	-0.0003	.	.	0.000
ORLANDO	0.75	-0.9198	.	0.0008	.	0.0000	-0.0065	-0.0003	.	0.001	0.018
PHILADELPHIA	0.56	-1.0136	.	.	0.0059	0.0019	-0.0064	0.0010	.	.	0.000
PHOENIX	0.83	-1.3457	0.0098	0.0008	.	0.0007	0.0012	-0.0091	0.010	0.001	0.027
PITTSBURGH	0.77	-1.4304	.	0.0003	0.0052	.	-0.0087	0.0023	.	0.000	0.006
PORTLAND	0.83	-1.4921	0.0028	0.0013	0.0038	.	-0.0039	0.0000	0.003	0.001	0.031
RALEIGH	0.55	-1.0493	0.0011	0.0010	0.0018	.	-0.0040	-0.0008	0.001	0.001	0.023
RICHMOND	0.42	-0.9619	0.0039	0.0003	.	0.0020	-0.0038	0.0004	0.004	0.000	0.009
SACRAMENTO	0.65	-1.3337	.	0.0022	.	.	0.0043	-0.0031	.	0.002	0.048
ST. LOUIS	0.69	-1.5276	.	0.0010	.	.	-0.0037	-0.0045	.	0.001	0.022
SALT LAKE CITY	0.76	-1.7007	0.0012	.	.	.	0.0016	0.0014	0.001	.	0.001
SAN ANTONIO	0.42	-1.5857	0.0053	0.0010	0.0061		0.0053	-0.0010	0.005	0.001	0.028
SAN DIEGO	0.58	-1.4316	.	0.0036		.	0.0009	-0.0012	.	0.004	0.078
SAN FRANCISCO	0.42	-0.9278		0.0006	0.0030	0.0012	0.0092	-0.0064	.	0.001	0.013
SEATTLE	0.70	-1.3586		0.0014	.	.	0.0073	-0.0037		0.001	0.030
SYRACUSE	0.64	-1.4418	0.0146	0.0011			-0.0011	-0.0028	0.015	0.001	0.038
TAMPA	0.75	-0.8455	0.0023	0.0004	.	0.0006	0.0007	-0.0037	0.002	0.000	0.010
WASHINGTON D.C	0.59	-1.3102	0.0011	0.0003	0.0019	0.0006	-0.0061	-0.0007	0.001	0.000	0.007

* Model:

Levels Model:

log Q(t) = B0 + B1*log P(t) + B2*log A1(t) + ... + B7*log A6(t).

Differenced Model:

Dlog Q(t) = B1*Dlog P(t) + B2*Dlog A1(t) + ... + B7*Dlog A6(t).

Definitions:

DX(t) = X(t)- X(t-52) for Variable X in general.

Q(t)= Nielsen-$2-Million-Plus OJ Gallons for week t.

P(t)= OJ Price/CPI for week t.

A1(t)= Present (for week t) FDOC TV Advertising----log A1= log GRP's+ log Local Expenditures.

A2(t)= Past FDOC TV Advertising: log A2(t) = (43/44)* log A1(t-1)+ (42/44)*log A1(t-2)+...+ (1/44)*log A1(t-43).

A3(t)= Present (for week t) FDOC Radio Advertising----Local Expenditures.

A4(t)= Past FDOC Radio Advertising: log A4(t) = (43/44)* log A3(t-1)+ (42/44)*log A3(t-2)+...+ (1/44)* log A3(t-43).

A5(t)= Present (for week t) Brand Advertising----GRP's.

A6(t)= Past FDOC Radio Advertising: log A6(t) = (43/44)*log A5(t-1)+ (42/44)*log A5(t-2)+...+ (1/44)* log A5(t-43).

Complete data from 8-03-96 ... 10-25-97 (65 weeks).

Table 2. t Statistics for Coefficient Estimates

	t Statistics						
		FDOC Advertising					
CITY	Log OJ Price	Log Present TV	Log Past TV	Log Present Radio	Log Past Radio	L. Present Brand TV	L. Past Brand TV
ALBANY	-7.43	1.48	.	.	0.99	-2.21	-1.17
ATLANTA	-7.91	.	5.37	0.47	.	-0.12	0.28
BALTIMORE	-6.85	.	.	0.35	4.8	-0.97	0.43
BIRMINGHAM	-4.57	0.03	1.79	1.87	0.59	0.74	-2.08
BOSTON	-3.05	0.73	.	0.49	1.43	-1.45	0.05
BUFFALO	-11.25	1.89	1.76	0.25	.	0.35	-0.26
CHARLOTTE	-4.39	.	4.2	0.33	1.44	0.48	-0.78
CHICAGO	-5.1	.	0.17	1.62	.	0.29	-1.26
CINCINNATI	-11.22	0.19	.	.	4.79	-0.77	-0.04
CLEVELAND	-7.9	0.59	.	1.81	2.7	-0.86	0.56
COLUMBUS	-10.76	1.86	1.84	2.26	3.49	-2.71	-1.29
DALLAS	-6.17	.	3.42	2.69	2.54	1.73	-2.12
DENVER	-11.31	0.15	1.34	.	2.68	-0.74	-0.22
DES MOINES	-11.74	2.94	2.48	.	.	-1.22	-5.69
DETROIT	-6.88	1.94	1.89	1.25	0.18	0.21	-1.73
GRAND RAPIDS	-15.31	.	2.74	.	.	-1.2	-1.3
HARTFORD	-3.49	.	.	.	.	-2.17	-0.34
HOUSTON	-5.09	1.35	3.43	1.26	1.72	-0.47	-1.07
INDIANAPOLIS	-14.68	0.32	2.99	.	0.03	-1.12	-2.73
JACKSONVILLE	-8.28	0.43	4.97	.	.	-0.59	-0.74
KANSAS CITY	-9.79	0.57	0.7	.	.	-0.84	0.68
LITTLE ROCK	-9.87	0.95	.	1.39	.	-1.33	-1.34
LOS ANGELES	-6.62	.	2.22	0.41	2.37	0.66	-2.63
LOUISVILLE	-16.35	1.79	0.27	0	2.62	-2.73	-2.39
MEMPHIS	-11.97	.	0.44	.	.	-0.01	-1.8
MIAMI	-6.13	.	0.52	0.01	.	-0.2	-0.54
MILWAUKEE	-8.74	0.84	1.82	.	.	1.2	0.42
MINNEAPOLIS	-7.28	.	3.49	1.29	.	-1.45	-1.25
NASHVILLE	-3.48	.	0.2	.	1.78	-0.42	-2.17
NEW ORLEANS	-7.67	.	0.89	1.48	.	-0.24	-1.42
NEW YORK	-5.98	.	.	0.93	1.63	0.89	-0.86
OKLAHOMA CITY	-8.01	1.06	0.61	.	.	-1.23	-1.77
OMAHA	-4.58	.	.	0.46	1.14	0.29	-0.15
ORLANDO	-8.42	.	2.9	.	0.04	-1.6	-0.21
PHILADELPHIA	-6.68	.	.	1.77	4.87	-1.54	0.95
PHOENIX	-13.6	2.5	2.29	.	0.88	0.19	-6.18
PITTSBURGH	-13.39	.	0.72	1.05	.	-1.32	1.46
PORTLAND	-15.19	0.72	6.05	0.99	.	-0.7	0
RALEIGH	-7.14	0.22	3.55	0.43	.	-0.83	-0.83
RICHMOND	-4.74	1.25	1.11	.	2.69	-1.07	0.61
SACRAMENTO	-9.16	.	8.15	.	.	0.91	-2.25
ST. LOUIS	-10.31	.	3.62	.	.	-0.77	-3.49
SALT LAKE CITY	-12.89	0.37	.	.	.	0.34	1.57
SAN ANTONIO	-6.02	0.73	3.27	1.8	.	0.89	-1.09
SAN DIEGO	-8.97	.	7.14		.	0.17	-0.94
SAN FRANCISCO	-4.42	.	1.45	0.96	3.11	1.7	-3.43
SEATTLE	-10.37		5.2	.	.	1.44	-3.05
SYRACUSE	-9.35	1.95	2.82	.	.	-0.17	-3.82
TAMPA	-6.54	0.6	0.82	.	1.47	0.1	-2.08
WASHINGTON D.C	-7.33	0.17	0.61	0.51	1.26	-0.88	-0.46

Table 3. Probability > |t|

	Prob > |t|						
		FDOC Advertising					
	Log OJ Price	Log Present TV	Log Past TV	Log Present Radio	Log Past Radio	L. Present Brand TV	L. Past Brand TV
ALBANY	0	0.15	.	.	0.33	0.03	0.25
ATLANTA	0	.	0	0.64	.	0.9	0.78
BALTIMORE	0	.	.	0.73	0	0.34	0.67
BIRMINGHAM	0	0.98	0.08	0.07	0.56	0.46	0.04
BOSTON	0	0.47	.	0.63	0.16	0.15	0.96
BUFFALO	0	0.06	0.08	0.81	.	0.73	0.8
CHARLOTTE	0	.	0	0.75	0.16	0.64	0.44
CHICAGO	0	.	0.86	0.11	.	0.77	0.21
CINCINNATI	0	0.85	.	.	0	0.45	0.97
CLEVELAND	0	0.56	.	0.08	0.01	0.39	0.58
COLUMBUS	0	0.07	0.07	0.03	0	0.01	0.2
DALLAS	0	.	0	0.01	0.01	0.09	0.04
DENVER	0	0.88	0.19	.	0.01	0.46	0.83
DES MOINES	0	0	0.02	.	.	0.23	0
DETROIT	0	0.06	0.06	0.22	0.86	0.83	0.09
GRAND RAPIDS	0		0.01	.	.	0.24	0.2
HARTFORD	0	.	.	.	.	0.03	0.73
HOUSTON	0	0.18	0	0.21	0.09	0.64	0.29
INDIANAPOLIS	0	0.75	0	.	0.98	0.27	0.01
JACKSONVILLE	0	0.67	0	.	.	0.56	0.46
KANSAS CITY	0	0.57	0.48	.	.	0.4	0.5
LITTLE ROCK	0	0.35	.	0.17	.	0.19	0.19
LOS ANGELES	0	.	0.03	0.68	0.02	0.52	0.01
LOUISVILLE	0	0.08	0.79	1	0.01	0.01	0.02
MEMPHIS	0	.	0.66	.	.	0.99	0.08
MIAMI	0	.	0.6	0.99	.	0.84	0.59
MILWAUKEE	0	0.4	0.07	.	.	0.24	0.68
MINNEAPOLIS	0	.	0	0.2	.	0.15	0.22
NASHVILLE	0	.	0.85	.	0.08	0.68	0.03
NEW ORLEANS	0	.	0.38	0.15	.	0.81	0.16
NEW YORK	0	.	.	0.36	0.11	0.38	0.39
OKLAHOMA CITY	0	0.29	0.54	.	.	0.22	0.08
OMAHA	0	.	.	0.65	0.26	0.77	0.88
ORLANDO	0	.	0.01	.	0.97	0.12	0.84
PHILADELPHIA	0	.	.	0.08	0	0.13	0.35
PHOENIX	0	0.02	0.03	.	0.38	0.85	0
PITTSBURGH	0	.	0.47	0.3	.	0.19	0.15
PORTLAND	0	0.48	0	0.33	.	0.49	1
RALEIGH	0	0.82	0	0.67	.	0.41	0.41
RICHMOND	0	0.22	0.27	.	0.01	0.29	0.55
SACRAMENTO	0	.	0	.	.	0.37	0.03
ST LOUIS	0	.	0	.	.	0.44	0
SALT LAKE CITY	0	0.71	.	.	.	0.74	0.12
SAN ANTONIO	0	0.47	0	0.08	.	0.38	0.28
SAN DIEGO	0	.	0	.	.	0.86	0.35
SAN FRANCISCO	0	.	0.15	0.34	0	0.09	0
SEATTLE	0	.	0	.	.	0.16	0
SYRACUSE	0	0.06	0.01	.	.	0.86	0
TAMPA	0	0.55	0.41	.	0.15	0.92	0.04
WASHINGTON D.C	0	0.87	0.55	0.61	0.21	0.38	0.65

Table 4. National & Local TV FDOC Advertising Impact, By City.

City	GRP-Generated Gallons	GRP's	Gallons/ GRP
	65 Weeks : 8-03-96 ... 10-25-97		
SAN DIEGO	722106	1402	515.1
BUFFALO	915456	2038	449.2
SACRAMENTO	602829	1401	430.3
RALEIGH	452976	1080	419.4
LOS ANGELES	674126	1793	376.0
DALLAS	693253	2260	306.7
HOUSTON	521318	1702	306.3
PORTLAND	862702	2882	299.3
SEATTLE	721063	2446	294.8
DETROIT	816508	2887	282.8
BIRMINGHAM	350145	1249	280.3
CHARLOTTE	526864	1951	270.0
MINNEAPOLIS	574919	2168	265.2
ATLANTA	587441	2404	244.4
SYRACUSE	387651	1640	236.4
SAN ANTONIO	420203	1817	231.3
PHOENIX	676115	2945	229.6
SAN FRANCISCO	349350	1527	228.8
DENVER	456394	2022	225.7
JACKSONVILLE	253579	1559	162.7
GRAND RAPIDS	249349	1613	154.6
ST. LOUIS	434337	2812	154.5
INDIANAPOLIS	289847	1926	150.5
ORLANDO	401759	2796	143.7
MILWAUKEE	252060	1910	132.0
COLUMBUS	250132	1990	125.7
RICHMOND	193511	1664	116.3
TAMPA	200661	2125	94.4
DES MOINES	108717	1259	86.4
PITTSBURGH	165428	2100	78.8
WASHINGTON D.C	150949	2074	72.8
MIAMI	112358	1905	59.0
NEW ORLEANS	90276	1664	54.3
OKLAHOMA CITY	93210	1922	48.5
ALBANY	66801	1805	37.0
CHICAGO	63808	1802	35.4
KANSAS CITY	58612	1777	33.0
LOUISVILLE	50890	1586	32.1
BOSTON	48534	2018	24.1
MEMPHIS	26068	1724	15.1
LITTLE ROCK	21529	1668	12.9
NASHVILLE	15808	1595	9.9
CLEVELAND	18965	2397	7.9
SALT LAKE CITY	15779	2052	7.7
CINCINNATI	4592	1609	2.9
BALTIMORE	0	1930	0.0
HARTFORD	0	1496	0.0
NEW YORK	0	2104	0.0
OMAHA	0	1412	0.0
PHILADELPHIA	0	2212	0.0
50 City Total	14948980	96120	155.5

Table 5. Local Radio FDOC Advertising Impact, By City.

City	65 Weeks : 8-03-96 ... 10-25-97 Radio-Generated Gallons	$ Expenitures	Gallons/ $ Expend.
PHILADELPHIA	1430824	44646	32.0
OMAHA	64178	2091	30.7
BALTIMORE	692823	23962	28.9
CINCINNATI	274187	10633	25.8
ALBANY	61002	2992	20.4
CLEVELAND	378148	21667	17.5
RICHMOND	134289	8698	15.4
DENVER	611069	39806	15.4
BIRMINGHAM	93498	6749	13.9
CHARLOTTE	111454	9588	11.6
TAMPA	307025	26758	11.5
LOUISVILLE	88375	9085	9.7
PHOENIX	137620	14995	9.2
SAN FRANCISCO	480672	60223	8.0
COLUMBUS	176447	22737	7.8
WASHINGTON D.C	324462	49904	6.5
DETROIT	115163	20077	5.7
LITTLE ROCK	21298	4021	5.3
DALLAS	353256	70864	5.0
HOUSTON	286311	61043	4.7
PITTSBURGH	92254	20570	4.5
NASHVILLE	66557	16189	4.1
NEW YORK	1356455	333565	4.1
BOSTON	573122	143943	4.0
NEW ORLEANS	32338	8208	3.9
SAN ANTONIO	56631	15969	3.5
CHICAGO	351226	130063	2.7
LOS ANGELES	562151	228676	2.5
PORTLAND	37775	19295	2.0
MINNEAPOLIS	79223	44676	1.8
RALEIGH	7815	5874	1.3
BUFFALO	22471	22942	1.0
ATLANTA	18392	41735	0.4
ORLANDO	6427	29966	0.2
INDIANAPOLIS	1661	14820	0.1
MIAMI	578	43864	0.0
JACKSONVILLE	0	11607	0.0
SACRAMENTO	0	46039	0.0
SEATTLE	0	43724	0.0
ST. LOUIS	0	28696	0.0
MILWAUKEE	0	8279	0.0
MEMPHIS	0	11335	0.0
SALT LAKE CITY	0	16142	0.0
SAN DIEGO	0	0	.
SYRACUSE	0	0	.
GRAND RAPIDS	0	0	.
DES MOINES	0	0	.
OKLAHOMA CITY	0	0	.
KANSAS CITY	0	0	.
HARTFORD	0	0	.
50 City Total	9407176	1796714	5.2

Table 6. National & Local TV and Local Radio FDOC Advertising Radio Impact, By City.

City	Actual Gallons	Estimated Gallons	FDOC Advert. Generated Gallons	% Increase
	————65 Weeks : 8-03-96 ... 10-25-97————			
SAN DIEGO	7635895	7602177	722106	10.5
CHARLOTTE	8083464	8029338	632530	8.6
PORTLAND	11587647	11510817	896757	8.4
DENVER	15313860	15283181	1048761	7.4
SACRAMENTO	9140848	9087442	602829	7.1
BUFFALO	14122085	14133548	935671	7.1
DALLAS	16602757	16511216	1041868	6.7
SEATTLE	13538728	13463493	721063	5.7
PHOENIX	15091868	15077280	806095	5.6
BALTIMORE	12582386	12959602	692823	5.6
COLUMBUS	8130938	8125439	423189	5.5
MINNEAPOLIS	13627850	13525999	650629	5.1
HOUSTON	17430788	17401204	803270	4.8
SAN ANTONIO	10542863	10552299	475150	4.7
SYRACUSE	8829499	8760823	387651	4.6
BIRMINGHAM	10378182	10410708	441616	4.4
JACKSONVILLE	6312992	6295387	253579	4.2
DETROIT	23336607	23397284	926662	4.1
PHILADELPHIA	36662555	36567492	1430824	4.1
ST. LOUIS	11527365	11479718	434337	3.9
ORLANDO	11354150	11341864	408010	3.7
RALEIGH	13294311	13282905	460553	3.6
SAN FRANCISCO	24681786	24480565	827153	3.5
ATLANTA	18049901	17978398	605361	3.5
GRAND RAPIDS	8122091	8120558	249349	3.2
MILWAUKEE	8579670	8638932	252060	3.0
LOS ANGELES	42734994	42423527	1234202	3.0
RICHMOND	11547931	11561854	326558	2.9
INDIANAPOLIS	10780931	10767329	291485	2.8
TAMPA	19061304	19038520	505387	2.7
CINCINNATI	11895013	11843687	278714	2.4
CLEVELAND	16900535	16908175	396596	2.4
DES MOINES	4644561	4666425	108717	2.4
WASHINGTON D.C	26371854	26454115	474342	1.8
LOUISVILLE	8132373	8145096	139263	1.7
NEW YORK	80987649	82104672	1356455	1.7
ALBANY	8260272	8317462	127733	1.6
PITTSBURGH	16738941	16778265	256731	1.6
BOSTON	41750552	41906096	621445	1.5
OMAHA	4646569	4676995	64178	1.4
OKLAHOMA CITY	7853156	7875482	93210	1.2
CHICAGO	37186128	37768009	414653	1.1
NASHVILLE	8304581	8299326	82331	1.0
LITTLE ROCK	4735425	4813741	42815	0.9
NEW ORLEANS	13947970	13956512	122295	0.9
KANSAS CITY	7004594	7066092	58612	0.8
MIAMI	25772470	25722410	112934	0.4
MEMPHIS	6666794	6683608	26068	0.4
SALT LAKE CITY	10809201	10945129	15779	0.1
HARTFORD	14645118	14753719	0	0.0
50 City Total	795940002	797493921	24280397	3.1

Table 7. Increased National & Local TV and Local Radio FDOC Advertising Radio Impacts for Selected City.

	65 Weeks : 8-03-96 ... 10-25-97					
					--Minimum Adv. Impact--	
City	Estimated Without Adv Gallons	Estimated With Adv. Gallons	FDOC Adv.. Generated Gallons	% Increase	FDOC Adv.. Generated Gallons	% Increase
SAN DIEGO	6880071	7602177	722106	10.5	722106	10.5
CHARLOTTE	7396807	8029338	632530	8.6	632530	8.6
PORTLAND	10614060	11510817	896757	8.4	896757	8.4
DENVER	14234420	15283181	1048761	7.4	1048761	7.4
SACRAMENTO	8484614	9087442	602829	7.1	602829	7.1
BUFFALO	13197877	14133548	935671	7.1	935671	7.1
DALLAS	15469348	16511216	1041868	6.7	1041868	6.7
SEATTLE	12742430	13463493	721063	5.7	721063	5.7
PHOENIX	14271185	15077280	806095	5.6	806095	5.6
BALTIMORE	12266779	12959602	692823	5.6	692823	5.6
COLUMBUS	7702250	8125439	423189	5.5	423189	5.5
MINNEAPOLIS	12875370	13525999	650629	5.1	650629	5.1
HOUSTON	16597935	17401204	803270	4.8	803270	4.8
SAN ANTONIO	10077149	10552299	475150	4.7	475150	4.7
SYRACUSE	8373172	8760823	387651	4.6	387651	4.6
BIRMINGHAM	9969093	10410708	441616	4.4	441616	4.4
JACKSONVILLE	6041808	6295387	253579	4.2	253579	4.2
DETROIT	22470622	23397284	926662	4.1	926662	4.1
PHILADELPHIA	35136669	36567492	1430824	4.1	1430824	4.1
ST. LOUIS	11045380	11479718	434337	3.9	434337	3.9
ORLANDO	10933854	11341864	408010	3.7	408010	3.7
RALEIGH	12822353	13282905	460553	3.6	460553	3.6
SAN FRANCISCO	23653411	24480565	827153	3.5	827153	3.5
ATLANTA	17373037	17978398	605361	3.5	605361	3.5
GRAND RAPIDS	7871209	8120558	249349	3.2	249349	3.2
MILWAUKEE	8386872	8638932	252060	3.0	263364	3.1
LOS ANGELES	41189326	42423527	1234202	3.0	1293424	3.1
RICHMOND	11235296	11561854	326558	2.9	352810	3.1
INDIANAPOLIS	10475845	10767329	291485	2.8	328962	3.1
TAMPA	18533134	19038520	505387	2.7	581976	3.1
CINCINNATI	11564972	11843687	278714	2.4	363162	3.1
CLEVELAND	16511579	16908175	396596	2.4	518495	3.1
DES MOINES	4557708	4666425	108717	2.4	143121	3.1
WASHINGTON D.C	25979773	26454115	474342	1.8	815815	3.1
LOUISVILLE	8005833	8145096	139263	1.7	251399	3.1
NEW YORK	80748217	82104672	1356455	1.7	2535650	3.1
ALBANY	8189729	8317462	127733	1.6	257173	3.1
PITTSBURGH	16521535	16778265	256731	1.6	518808	3.1
BOSTON	41284652	41906096	621445	1.5	1296418	3.1
OMAHA	4612817	4676995	64178	1.4	144851	3.1
OKLAHOMA CITY	7782272	7875482	93210	1.2	244378	3.1
CHICAGO	37353357	37768009	414653	1.1	1172967	3.1
NASHVILLE	8216995	8299326	82331	1.0	258030	3.1
LITTLE ROCK	4770926	4813741	42815	0.9	149816	3.1
NEW ORLEANS	13834217	13956512	122295	0.9	434421	3.1
KANSAS CITY	7007480	7066092	58612	0.8	220048	3.1
MIAMI	25609476	25722410	112934	0.4	804187	3.1
MEMPHIS	6657540	6683608	26068	0.4	209060	3.1
SALT LAKE CITY	10929350	10945129	15779	0.1	343203	3.1
HARTFORD	14753719	14753719	0	0.0	463295	3.1
50 City Total	773213523	797493921	24280397	3.1	30842670	4.0

CITY	Without Advert. Est. Sales Gallons	Actual Allocation of GRP's: Est. Sales Gallons	GRP's	Marginal GRP Impact:Ga.	Optimal Allocation of GRP's: Est. Sales Gallons	GRP's	Marginal GRP Impact:Ga.	Long-Run Demand Elasticity***
LOS ANGELES	633,682	672,672	27.6	439	689,070	105.1	118	0.018
SAN DIEGO	105,847	134,499	21.6	486	151,623	100.3	118	0.078
DALLAS	237,990	269,464	34.8	271	277,726	82.4	118	0.035
HOUSTON	255,353	282,553	26.2	335	292,134	76.8	118	0.031
DETROIT	345,702	374,369	44.4	177	377,642	67.2	118	0.021
SACRAMENTO	130,533	151,262	21.6	337	159,480	64.9	118	0.048
BUFFALO	203,044	226,710	31.4	231	231,816	62.9	118	0.032
SEATTLE	196,037	218,577	37.6	174	221,230	56.3	118	0.030
PHOENIX	219,557	243,368	45.3	145	244,767	56.0	118	0.027
ATLANTA	267,277	288,330	37.0	164	290,364	51.7	118	0.021
PORTLAND	163,293	183,661	44.3	128	184,161	48.4	118	0.031
SYRACUSE	128,818	145,630	25.2	219	149,242	48.1	118	0.038
MINNEAPOLIS	198,083	215,478	33.4	155	216,931	44.1	118	0.024
SAN FRANCISCO	363,899	379,143	23.5	210	382,029	42.1	118	0.013
RALEIGH	197,267	210,439	16.6	291	214,965	41.9	118	0.023
SAN ANTONIO	155,033	170,186	28.0	170	172,001	40.8	118	0.028
BIRMINGHAM	153,371	166,604	19.2	243	170,104	40.4	118	0.028
CHARLOTTE	113,797	128,185	30.0	149	129,291	38.4	118	0.035
DENVER	218,991	233,771	31.1	143	234,637	37.8	118	0.019
ST. LOUIS	169,929	184,613	43.3	94	183,667	34.3	118	0.022
ORLANDO	168,213	179,997	43.0	75	178,523	27.2	118	0.018
INDIANAPOLIS	161,167	171,304	29.6	104	170,911	26.1	118	0.018
MILWAUKEE	129,029	138,991	29.4	104	138,599	25.8	118	0.022
TAMPA	285,125	295,243	32.7	90	294,448	25.0	118	0.010
WASHINGTON D.C	399,689	409,496	31.9	90	408,710	24.3	118	0.007
COLUMBUS	118,496	127,760	30.6	92	127,041	23.7	118	0.022
BOSTON	635,148	643,936	31.0	83	643,027	21.8	118	0.004
JACKSONVILLE	92,951	99,998	24.0	96	99,512	19.4	118	0.023
GRAND RAPIDS	121,096	127,481	24.8	82	126,734	17.2	118	0.016
DES MOINES	70,119	75,288	19.4	93	74,855	15.2	118	0.024
RICHMOND	172,851	177,970	25.6	63	176,948	13.5	118	0.009
MIAMI	393,992	399,352	29.3	55	398,115	13.5	118	0.004
PITTSBURGH	254,177	259,533	32.3	48	258,134	13.1	118	0.006
OKLAHOMA CITY	119,727	124,271	29.6	46	122,983	11.5	118	0.011
KANSAS CITY	107,807	111,802	27.3	45	110,610	10.3	118	0.011
ALBANY	125,996	129,822	27.8	42	128,612	9.8	118	0.009
CHICAGO	574,667	578,498	27.7	42	577,295	9.8	118	0.002
LOUISVILLE	123,167	126,355	24.4	41	125,293	8.5	118	0.008
NEW ORLEANS	212,834	215,613	25.6	34	214,530	7.3	118	0.004
CLEVELAND	254,024	256,788	36.9	21	255,454	6.5	118	0.003
LITTLE ROCK	73,399	74,842	25.7	17	73,985	3.8	118	0.006
MEMPHIS	102,424	103,098	26.5	8	102,537	1.7	118	0.002
CINCINNATI	177,923	178,495	24.8	7	177,996	1.5	118	0.001
SALT LAKE CITY	168,144	168,725	31.6	5	168,204	1.4	118	0.001
NASHVILLE	126,415	126,820	24.5	5	126,424	1.1	118	0.001
BALTIMORE	188,720	188,720	29.7	0	188,720	.	.	.
HARTFORD	226,980	226,980	23.0	0	226,980	.	.	
NEW YORK	1,242,280	1,242,280	32.4	0	1,242,280	.	.	.
OMAHA	70,966	70,966	21.7	0	70,966	.	.	.
PHILADELPHIA	540,564	540,564	34.0	0	540,564	.	.	.
Total	11895593	12450503.1	1478.769		12521871	1478.768		
Percentage Increase**		4.7%			5.3%			

* 65 Weeks : 8-03-96 ... 10-25-97.
** Over estimated sales without advertising.
*** Present advertising coefficient plus 43 lagged advertising coefficients.