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ESTIMATES OF FLORIDA DEPARTMENT OF CITRUS PROMOTIONAL IMPACTS ON ORANGE JUICE DEMAND BASED ON TIME-SERIES AND CROSS-SECTIONAL DATA

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Estimates of Florida Department of Citrus Promotional Impacts on Orange Juice Demand Based on Time-Series and Cross-Sectional Data

This paper reports estimates of the impacts of three Florida Department of Citrus (FDOC) promotional activities on the retail demand for orange juice (OJ). The promotional activities were 1) in-store television (TV), 2) in-store radio (RADIO) and 3) in-store health clinic, blood pressure stations (HC). These programs occurred over various weeks from 4/25/09 through 9/26/09. The analysis is based on sales data provided by Nielsen for grocery stores that do $2 million or greater business annually, and data provided by Wal-Mart. The data are by city and week over a period of about three years and eight months. Each promotional activity was measured by the percent of a city's all commodity volume (ACV) covered by the promotion. Prices and other retail promotions (features, displays, both features and display, and temporary price discounts) for OJ and six competitive products---1) OJ drinks, 2) OJ blends, 3) OJ blend drinks, 4) grapefruit juice (GJ), 5) GJ cocktail, and 6) GJ blends---were included in the analysis. Fifty two cities[1] were studied and the time period was from week ending 3/04/06 through 10/31/09 (192 weeks), resulting in a total of 9,984 observations (52 times 192). The raw Wal-Mart data included dollar sales and unit sales; units were transformed to single-strength-equivalent (SSE) gallons using the factor .582 SSE gallons per unit based on Nielsen panel data.

Data Review

A summary of the data is provided to help describe the demand situation. The time-period and cross-section dimensions of the data are considered separately, and the focus is on the more recent time covering the occurrence of the programs.

Time Series Dimension

Given there is seasonality in OJ demand, the review of the time-series dimension of the data focuses on comparing current season sales with previous period sales, by week. These data indicate there has been some increase in U.S. sales in 2008-09 versus last year (Figure 1). Given the TV, RADIO and HC programs occurred during the second half of 2008-09, this increase is consistent with positive program impacts.

OJ prices have declined significantly in the past year (Figure 2). In past studies, price has been found to be a major factor in explaining OJ gallon sales, and, given price was down during

[1] All major U.S. cities were included except New Orleans which was omitted due to its continued recovery from hurricane Katrina.

the period when the FDOC programs occurred, there is the question of how much of the increase in gallon sales in 2008-09 was due to price and how much was due to the FDOC programs?

Some insight into the relationship between OJ gallon sales and the occurrence of the FDOC programs can be found by removing the city-by-city dimension of the TV, RADIO and HC data. Given a promotional activity was measured by the percent of ACV covered by the promotion, an estimate of the OJ gallon sales occurring under the promotion was made by multiplying the promotion's coverage percentage by total OJ gallon sales, by city, by week. The results were then summed across cities to find aggregate or U.S. gallon sales occurring when the program was in effect. The relationship between these U.S. measures of the programs and total U.S. OJ gallon sales is shown in Figure 3. No strong relationship is apparent from this summary viewpoint.

Cross-Section Dimension

A review of the cross-section or city dimension of the data provides further insight. The period when RADIO promotions occurred in 2009 (eleven weeks) and the same period in the previous year are considered, by city (similar comparative results focusing on the TV and HC promotional periods also exist). The inverse relationship between own price and quantity is again seen in Figure 4---price is strongly related to gallon sales, consistent with Figure 2. Each point in Figure 4 indicates the percentage change in gallons versus the percentage change in price over the two periods for a particular city.

The overall weighted price of the other competitive products (cross price) is plotted against OJ gallon sales in Figure 5. The cross-price impact on OJ gallons is expected to be positive which is roughly supported by the graph.

In-store promotions (features, displays, features and displays together, and temporary price discounts) for OJ and the competitive products also appear to have positive and negative impacts on OJ gallons, respectively, based on the city-by-city summary data (Figures 6 and 7).

Notably for this study, the across-city relationship between the percentage change in gallons and the change in the RADIO variable (the city market share with the promotion) suggests this promotion positively impacts OJ demand (Figure 8). The visual relationship suggested by this graph, as well as those suggested by the others figures, however, does not reflect the true marginal impact of RADIO promotions as the impacts of other factors like price are also influencing the gallon sales in the graph. For example, removing the price impact on gallon sales under the assumption that the own-price elasticity of demand is unitary (-1), suggests a weaker relationship between the RADIO promotions and gallon sales (Figure 9).

As will be discussed in the next section, an econometric model was used to try to better determine the various marginal impacts of these explanatory variables, and, as suggested above, an important issue for estimation of OJ demand is seasonality. Over time OJ sales follow a wave pattern, peaking in the winter and reaching a trough in the summer, as illustrated in Figure 10.

Various factors likely underlie this pattern including changes in consumer preferences over the year. For example, individual and family schedules, routines and activities may change over the year with school, vacations and holidays, resulting in accommodating meal changes. Meals may be less structured during some seasons and changes in weather may make some drinks more or less appealing---e.g., hot (cold) drinks may be more preferred in winter (summer). Holiday periods may also impact OJ consumption, but the impact may not always be straightforward. OJ sales may rise with the general increased purchases of food that may occur. On the other hand, some holidays like Christmas tend to be accompanied by more fresh citrus purchases and, in general, more food and calories which may result in substitution of fresh citrus and other food items for OJ. The increased incidences of colds and the flu in the winter may also increase the demand for OJ and citrus. Finally, OJ advertising and promotional activities also follow a seasonal pattern that is relatively close to the seasonal pattern in OJ consumption. The question is what part of the seasonal impact on consumption is due to advertising and what part is due to other factors? In statistical parlance, there is multicollinearity involving seasonality variables and advertising variables, tending to blur their true individual impacts. The choice of the seasonality variables in this study was made to minimize this problem. In the analysis, seasonality was modeled using sine and cosine variables.

Finally, the downturn in the economy in the past year is an important factor in estimating the impacts of the FDOC programs. There are various macroeconomic variables that might be used to measure the state of the economy and its impact on consumer spending and, in particular, dollars spent on OJ. These variables are usually on an annual, quarterly or monthly basis. None of these variables are available on a weekly basis to precisely match with the retail data studied here. Neither are the macro data available for the same Nielsen-defined cities studied here. There are some clear trends, however, that some of the reported macro variables indicate. For example, personal income and unemployment, although at different levels across regions, generally follow similar trends. The unemployment rate appears to follow a trend in each region that looks like an increasing second degree polynomial or quadratic function (Figure 11). Consistently, personal income appears to follow a decreasing second degree polynomial across regions (Figure 12). Based on these trends, time and its square were included in this study's empirical model to capture the impacts of the downturn in the U.S. economy. These variables may also capture the impacts of some other factors like changes in consumer preferences over time. Often, a good measure for preference changes over time is not available, and a time-trend variable is used as a proxy to measure their impacts. Since time and income are often relatively highly correlated, however, it is difficult to get precise estimates of their individual impacts. As a result, one of the two variables is sometimes omitted from the model to avoid or lessen the problem of multicollinearity. The other included variable is then intended to pick up the aggregate impact of both collinear variables. Thus, the collinearity between time-trend variables used to measure preferences and some income variables provides another motivation for the use of just one of the two types of variables---the trends variables in the present study.

Model

Several models were estimated to try to determine the FDOC promotional impacts and other demand responses. First, ordinary least squares (OLS) and first-order autocorrelation models were estimated, city by city. Formally, the demand for OJ by city was specified as

(1) $\log q_t = \alpha_0 + \alpha_1 s_{1t} + \alpha_2 s_{2t} + \alpha_3 t + \alpha_4 t^2 + \varepsilon_1 \log p_t + \varepsilon_2 \log ps_t + \eta_1 z_t + \eta_2 zs_t + \beta_1 tv_t + \beta_2 radio_t + \beta_3 hc_t$,

where subscript t stands for time (week); q is OJ gallons; p and ps are prices for OJ and the six other competitive products (a weighted average price was used for ps), respectively; z and zs are promotional variables measured by the share of total dollar sales on promotion (feature, display, feature and display and temporary price discounts) for OJ and the six other competitive products, respectively; s1 and s2 are sine ($2*\pi*t/52$, π = 3.14...) and cosine ($2*\pi*t/52$) variables, respectively; and tv, radio and hc are ACV values (between 0 and 1) for the FDOC in-store TV, radio, and health clinic activities, respectively. The coefficient ε_1 and ε_2 are own- and cross-price elasticities, respectively. The coefficients α_1 and α_2 are seasonality coefficients; while $\alpha_3$and α_4 are trend coefficients for the economy, as well as preference changes. The coefficients η_1 and η_2 are for the in-store promotional activities for brands, and β_1, β_2, and β_3 are coefficients for the FDOC promotional activities, indicating percentage changes in demand for changes in the associated promotional activities.

Equation (1) was estimated for each city by OLS with no restrictions on the coefficients across cities. This specification was also estimated under the assumption of first-order autocorrelation, again by city. Finally, equation (1) was estimated under the restrictions that the coefficients across cities for each variable were the same, except the intercept.

In preliminary analysis, the lagged values of the FDOC promotional variables were also included in the model but were either insignificant or had the wrong sign (negative). Thus, only current FDOC promotional effects are considered.

The impacts of the advertising variables were simulated as follows. Consider the impact of the FDOC TV promotions. Base on equation (1), with (w) and without (w/o) TV promotions gallons sales are

(2) $q^w_t = \delta \exp(\beta_1 tv_t)$, (with TV),

and

(3) $q_t^{w/o} = \delta$, (without TV)

where $\delta = \exp(\alpha_0 + \alpha_1 s_{1t} + \alpha_2 s_{2t} + \alpha_3 t + \alpha_4 t^2 + \varepsilon_1 \log p_t + \varepsilon_2 \log ps_t + \eta_1 z_t + \eta_2 zs_t + \beta_2 radio_t + \beta_3 hc_t)$. When there are no promotions $tv_t = 0$, and thus $\exp(\beta_1 0) = 1$. Hence, without TV sales (δ) equal $q_t^w/\exp(\beta_1 tv_t)$, and the difference between the with and without sales are $q_t^w(1 - 1/\exp(\beta_1$

tv_t). Although New Orleans was excluded from the regression analysis due to the effects of hurricane Katrina, this city was included in the simulations, assuming its coefficients for the FDOC promotional variables were the same as for the remaining U.S. region for which estimates were made.

Results

Estimates of OJ demand equation (1), under the assumption that the coefficients across cities for each variable except the intercepts are the same, are shown in Table 1. The estimates provide a general indication of the effects of the different variables. The own-price and cross-price elasticities are -.95 and.08, roughly similar to previous estimates (Brown and Lee, "Impacts of Promotional Tactics in a Conditional Demand System for Beverages," *J. of Agribusiness*, Fall 2007). The own- and cross- in-store brand promotional coefficients are also consistent with the previous estimates noted above, although the own effect is somewhat higher. The sine and cosine estimates indicate seasonality; while the time and time-squared variables indicate a negative trend in OJ demand in the past year, consistent with expectations related to the relatively poor U.S. economy. The effects of the FDOC TV and Radio programs were positive, while the effect for the HC program was negative but insignificant at the 10 percent level.

The coefficient estimates in Table 1 were used to estimate the increase in SSE gallons due to each FDOC program (Table 2). The results for these estimates are shown in the last column of the table (restricted estimates). The insignificant, negative impact of the HC program was set to zero. In total, the three programs are estimated to have increased retail OJ sales by 2.5 million SSE gallons, with the RADIO program having the largest impact at 1.7 million SSE gallons.

The restrictions that all cities have the same coefficients (except the intercept), however, appear to be too severe. With 192 observations per city, there were enough data to estimate a separate demand equation for each of the 52 cities. The city-by-city r-square values for the OLS regressions ranged from .47 to .92, with all but three above .70. For many of the regressions, however, the Durbin-Watson statistics indicted an autocorrelation problem, and the city-by-city equations were re-estimated with a first-order autocorrelation structure for the error terms. Given the large number of coefficient estimates, the city-by-city OLS and autocorrelation results are not reported here, but, although there are some significant differences in the estimates between cities, they are generally similar to those in Table 1.

The impacts of the FDOC promotional programs based on the city-by-city regression results are shown in the first three columns of Table 2. These estimates suggest that the programs were more effective than indicted by the restricted model. The estimates for the 52 cities, for which regression equations were estimated, indicate the FDOC programs increased OJ sales by 3.3 to 3.4 million SSE gallons. In addition, for the autocorrelation model, estimates are provided for the total 53 cities that comprise the U.S. market, under the assumption that the impacts for the omitted city, New Orleans, follow those for the remaining U.S. category. These estimates indicate the total impact was 3.4 million SSE gallons with the TV, RADIO and HC program impacts at .6, 2.2 and .6 million SSE gallons, respectively. The corresponding percentage increases in OJ gallons sales for the TV, RADIO and HC programs were .5%, 1.9% and .4%, respectively.

City-by-city promotional impacts are provided in Table 3; and benefit-cost ratio (B/C) estimates, based on the methodology employed by Market Accountability Partnership (MAP), are shown in Table 4. Based on the regression analysis of this study, benefits exceeded cost only for the RADIO program. For this program the B/C was 1.40, i.e., the rate of return was a 40%. The overall B/C for the three programs was .8, given the small impacts for the TV and HC programs that were estimated.

Finally, to illustrate the importance of accounting for seasonality and the downturn in the U,S, economy in the model, the variables for these two factors were omitted, in turn, from the city-by-city autocorrelation model; i.e., the first of these models omitted the sine and cosine variables for the seasonality, while the second omitted the time and time squared variables for the downturn n the economy. For the omission of the seasonality variables, the aggregate impact of the three FDOC programs was 2.3 million SSE gallons, while for the omission of the time variables the impact was 1.7 million SSE gallons. Both of these estimates are significantly lower than the 3.4 million SSE gallon impact discussed above, based on the full specification that included both seasonality and trend factors. Seasonality helps explain the downturn in sales in the summer, and, since the FDOC programs occurred over this period, the negative impact of seasonality during the summer was picked up by the FDOC program coefficients in the model that omitted the sine and cosine variables. Similarly, the two time trend variables for the economy also help explain the downturn in sales in the past year when the FDOC programs occurred, and the negative impact of these variables was picked up by the FDOC program coefficients in the model that omitted time and time squared.

Conclusions

In this study, city-by-city, weekly grocery store sales data were used to estimate the impacts of the FDOC, TV, RADIO and HC promotional programs. The estimates indicate that the RADIO program was effective, having a B/C of 1.4. For the TV and HC programs, benefits were less than costs.

Regression analysis can provide useful information in analyzing sales data, but this methodology does have some limitations. A limitation for many econometric studies, including the present one, is related to how the data are generated. In the present study, the data were not generated by a controlled experiment and reflect the impacts of the numerous factors underlying consumer behavior, many of which data were not available. The regression analysis here attempted to estimate how important factors, for which data were available or reasonable proxy variables could be constructed, individually impacted OJ sales. In addition to the noise in the model due to omission of some factors or error in construction of proxy variables, this approach is inherently faced with the problem that the data on included factors are usually correlated to some extent. The greater the correlation among factors (multicollinearity), the more difficult it is to accurately determine their individual impacts. This problem is present to some extent in the present study, with the result that the estimates were somewhat unstable for alternative specifications. This problem is not unique to the current analysis and is often present in other such studies. Due to this issue, if possible, comparison of the regression results of this study with other independent information on the performance of the TV, RADIO and HC programs is an important further step in evaluation.

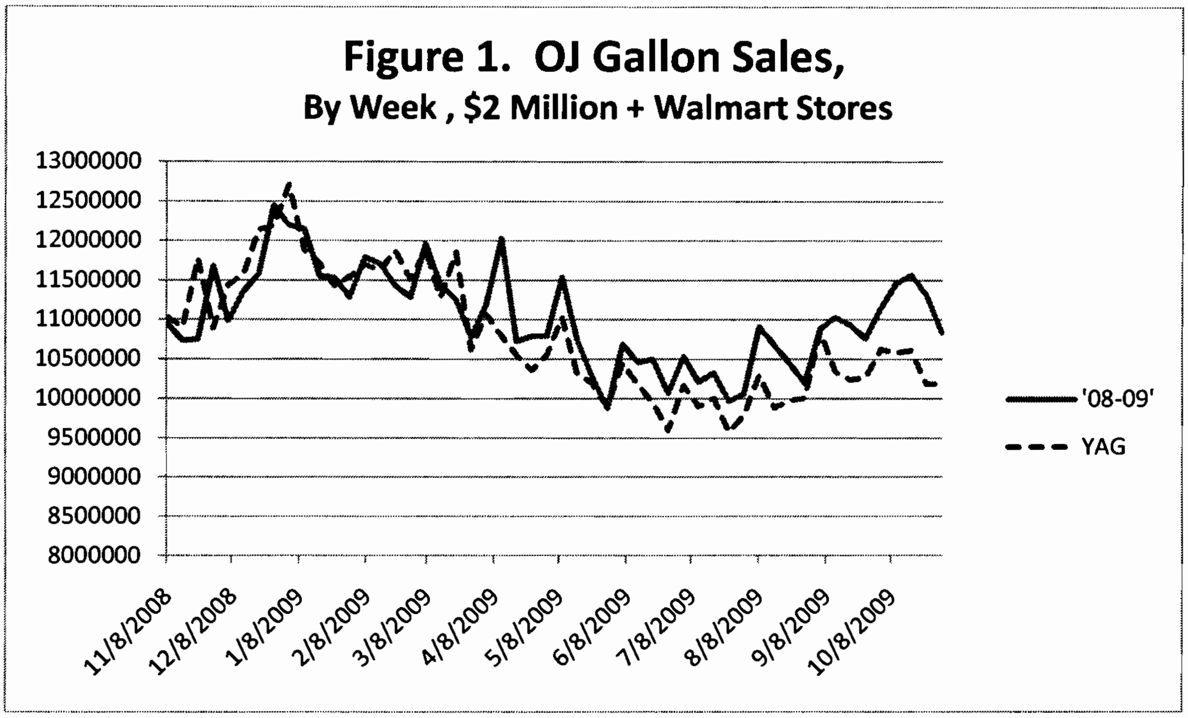
Figure 1. OJ Gallon Sales,
By Week , $2 Million + Walmart Stores
13000000
12500000
12000000
11500000
11000000
10500000
10000000
9500000
9000000
8500000
8000000
11/8/2008
12/8/2008
1/8/2009
2/8/2009
3/8/2009
4/8/2009
5/8/2009
6/8/2009
7/8/2009
8/8/2009
9/8/2009
10/8/2009
'08-09'
YAG

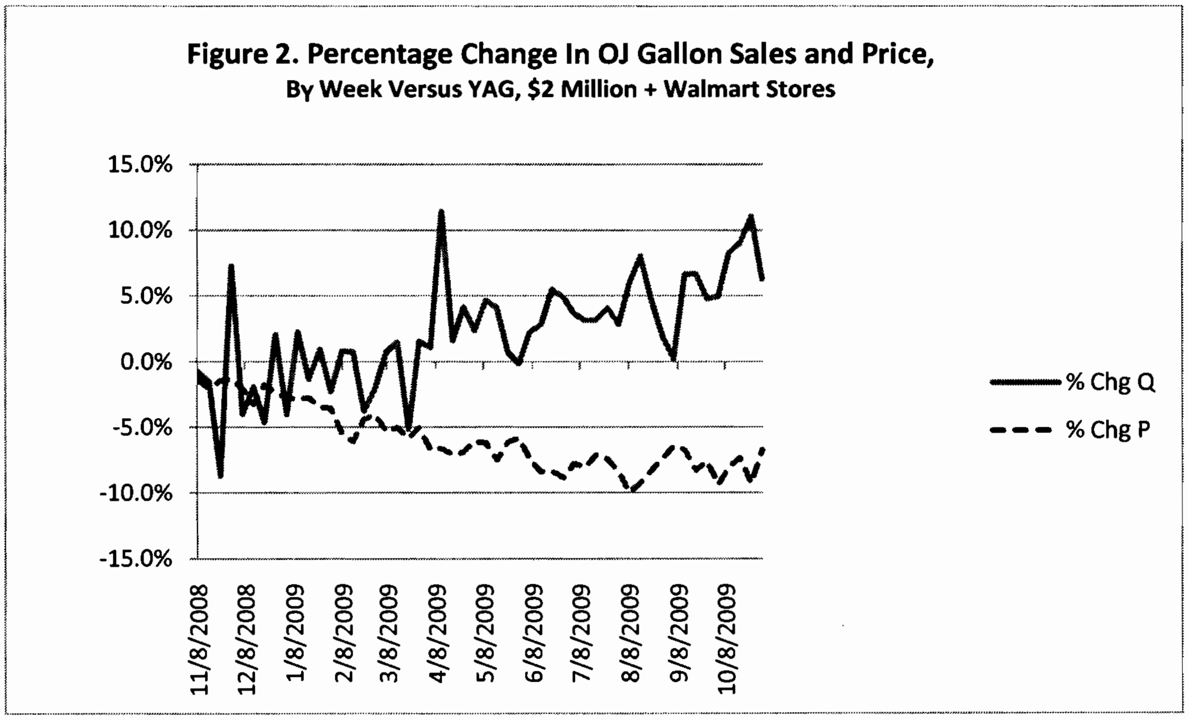
Figure 2. Percentage Change In OJ Gallon Sales and Price,
By Week Versus YAG, $2 Million + Walmart Stores
15.0%
10.0%
5.0%
0.0%
-5.0%
-10.0%
-15.0%
11/8/2008
12/8/2008
1/8/2009
2/8/2009
3/8/2009
4/8/2009
5/8/2009
6/8/2009
7/8/2009
8/8/2009
9/8/2009
10/8/2009
% Chg Q
% Chg P

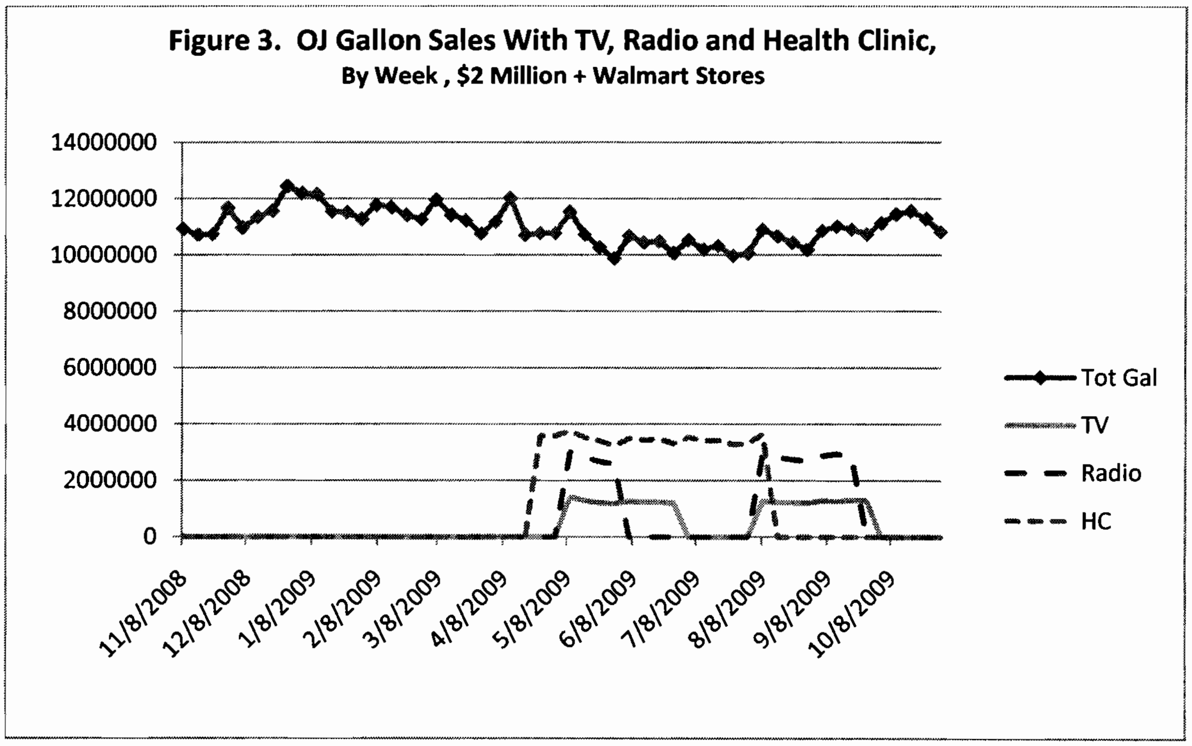
Figure 3. OJ Gallon Sales With TV, Radio and Health Clinic,
By Week , $2 Million + Walmart Stores
14000000
12000000
10000000
8000000
6000000
4000000
2000000
0
11/8/2008
12/8/2008
1/8/2009
2/8/2009
3/8/2009
4/8/2009
5/8/2009
6/8/2009
7/8/2009
8/8/2009
9/8/2009
10/8/2009
Tot Gal
TV
Radio
HC

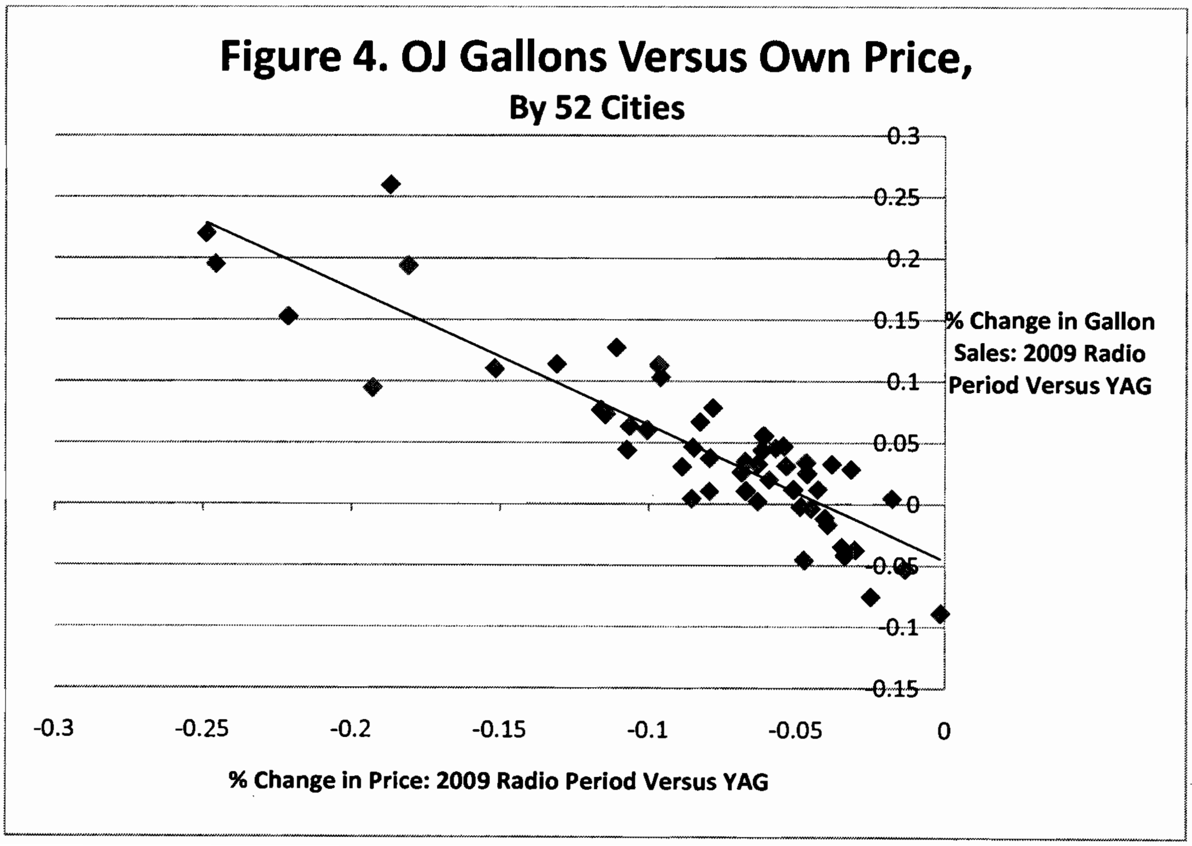
Figure 4. OJ Gallons Versus Own Price,
By 52 Cities
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
% Change in Gallon Sales: 2009 Radio Period Versus YAG
-0.3
-0.25
-0.2
-0.15
-0.1
-0.05
0
% Change in Price: 2009 Radio Period Versus YAG

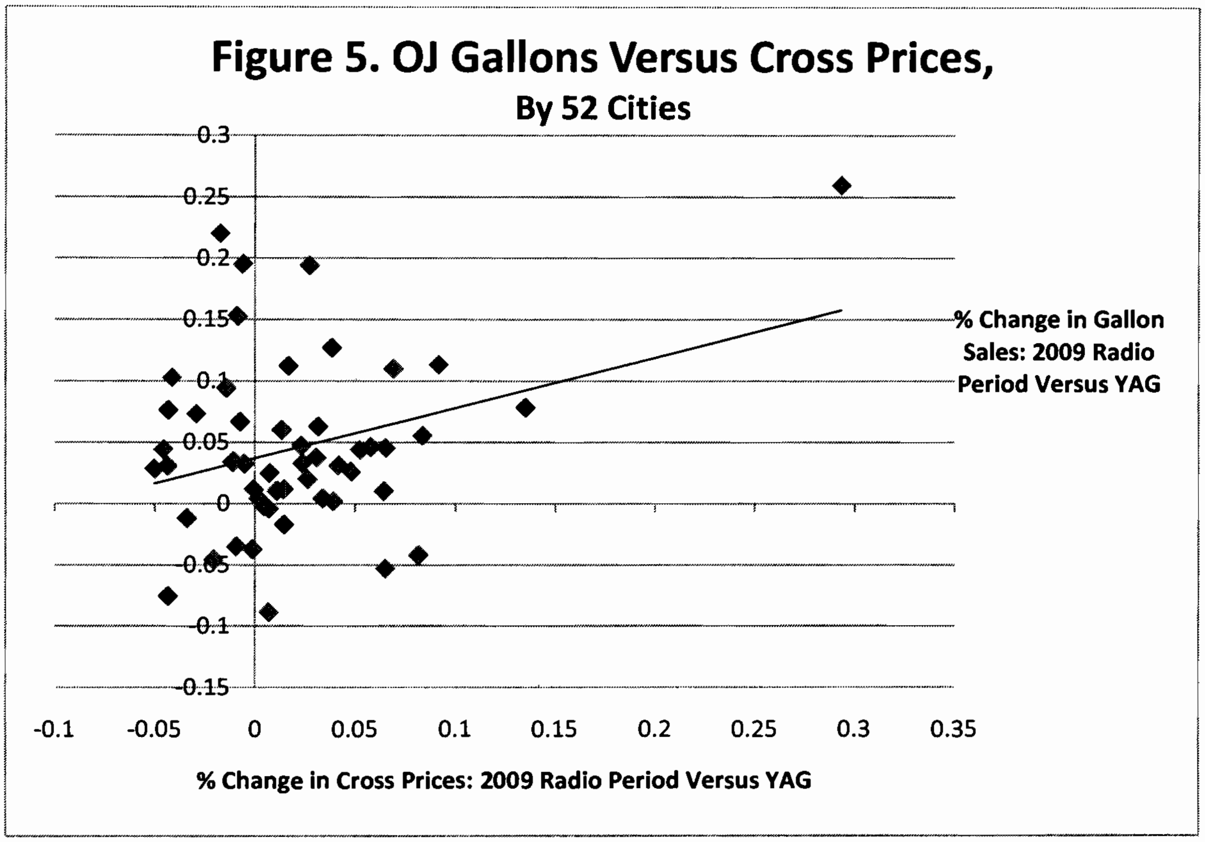

Figure 5. OJ Gallons Versus Cross Prices,
By 52 Cities
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.1
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
% Change in Gallon Sales: 2009 Radio Period Versus YAG
% Change in Cross Prices: 2009 Radio Period Versus YAG

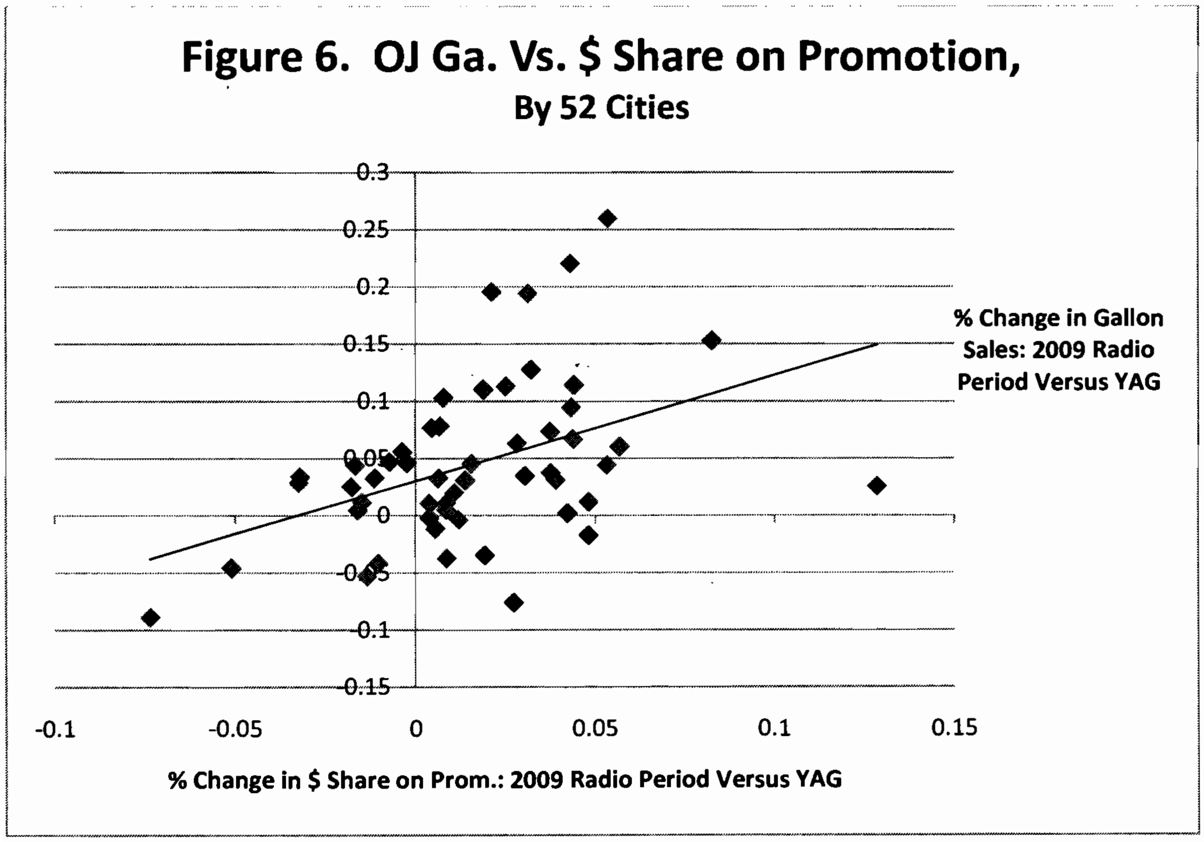

Figure 6. OJ Ga. Vs. $ Share on Promotion,
By 52 Cities
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.1
-0.05
0
0.05
0.1
0.15
% Change in Gallon Sales: 2009 Radio Period Versus YAG
% Change in $ Share on Prom.: 2009 Radio Period Versus YAG

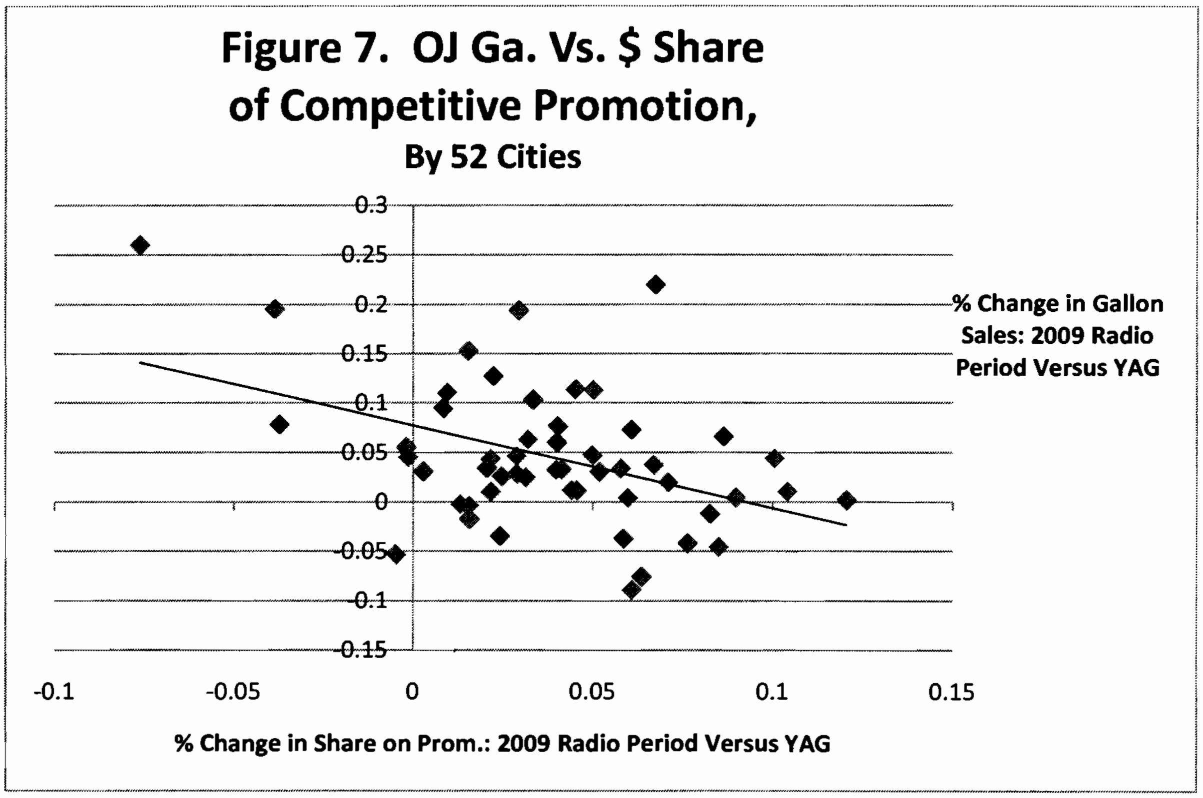
Figure 7. OJ Ga. Vs. $ Share
of Competitive Promotion,
By 52 Cities
% Change in Gallon Sales: 2009 Radio Period Versus YAG
% Change in Share on Prom.: 2009 Radio Period Versus YAG
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.1
-0.05
0
0.05
0.1
0.15

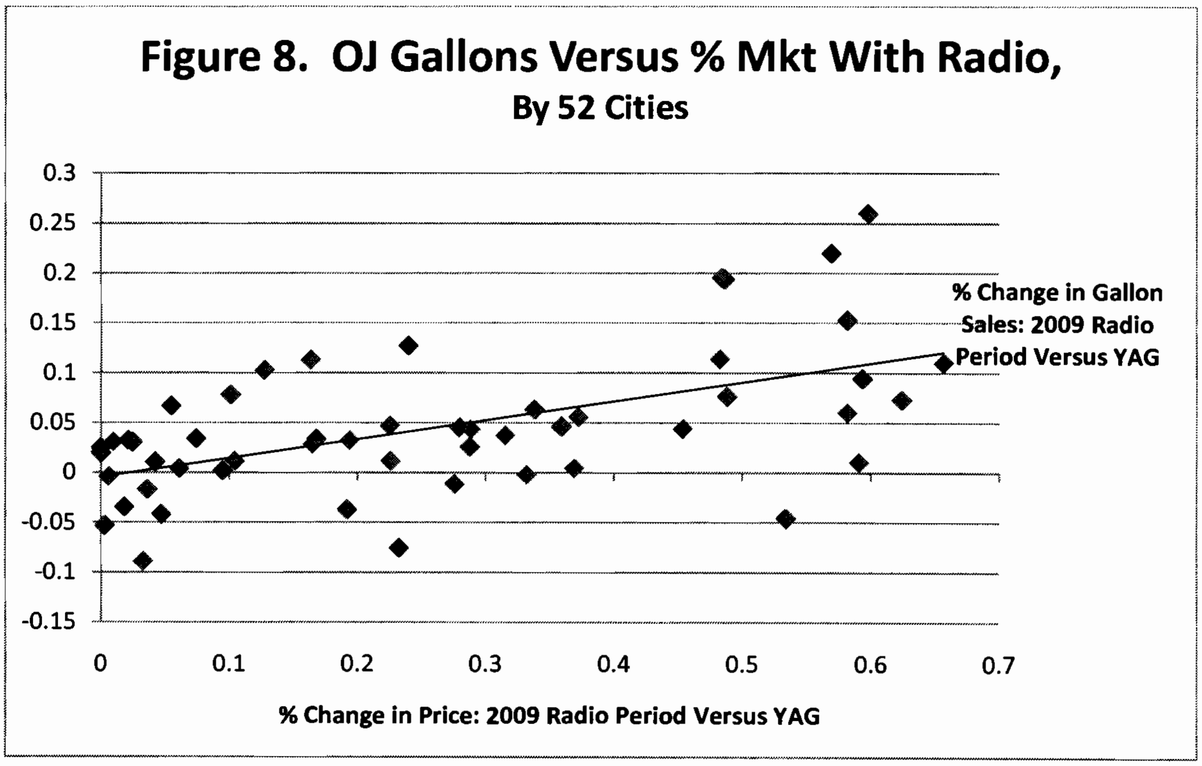
Figure 8. OJ Gallons Versus % Mkt With Radio,
By 52 Cities
% Change in Gallon Sales: 2009 Radio Period Versus YAG
% Change in Price: 2009 Radio Period Versus YAG
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7

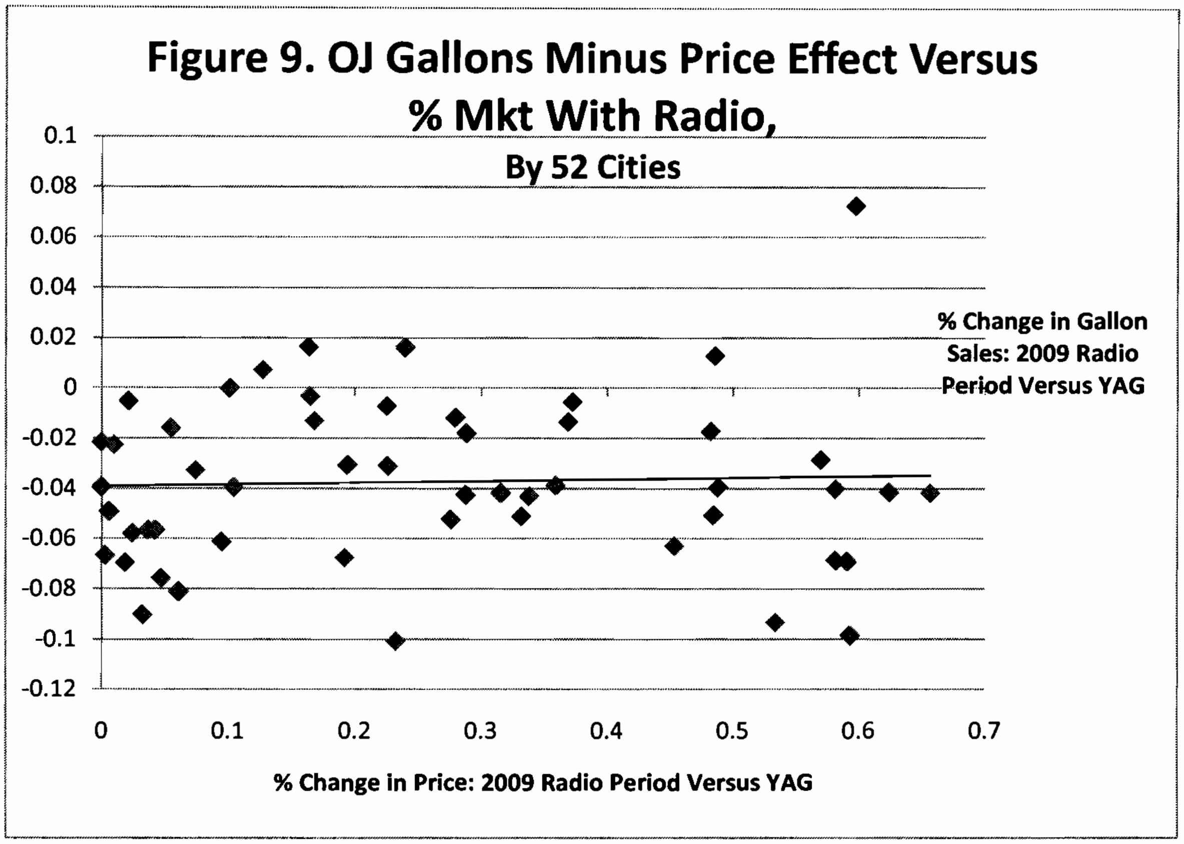

Figure 9. OJ Gallons Minus Price Effect Versus % Mkt With Radio,
By 52 Cities
0.1
0.08
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.12
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
% Change in Gallon Sales: 2009 Radio Period Versus YAG
% Change in Price: 2009 Radio Period Versus YAG

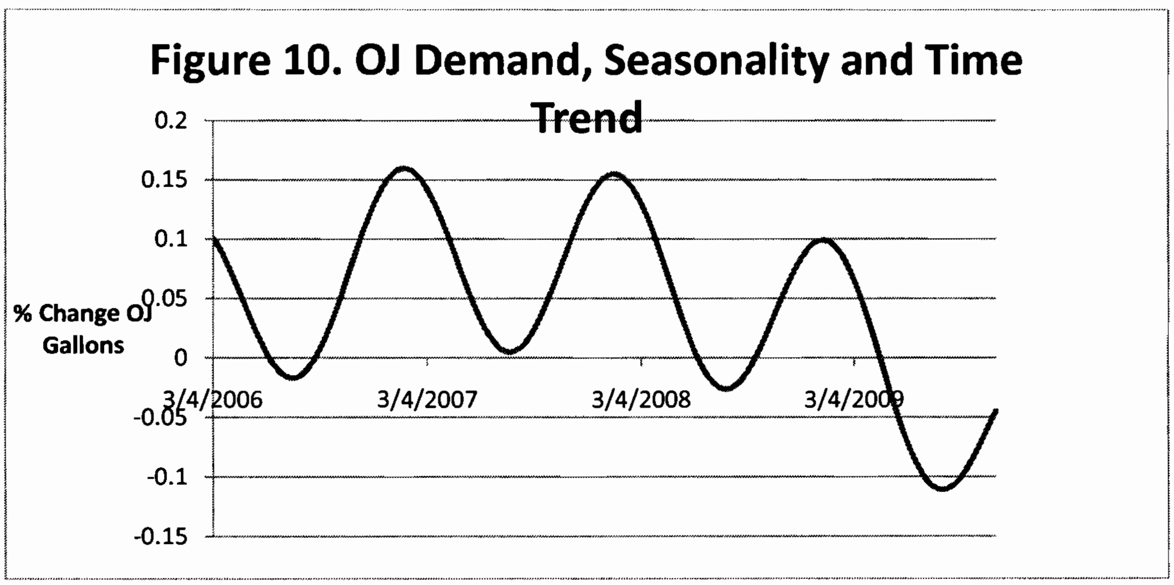

Figure 10. OJ Demand, Seasonality and Time Trend
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
% Change OJ Gallons
3/4/2006
3/4/2007
3/4/2008
3/4/2009

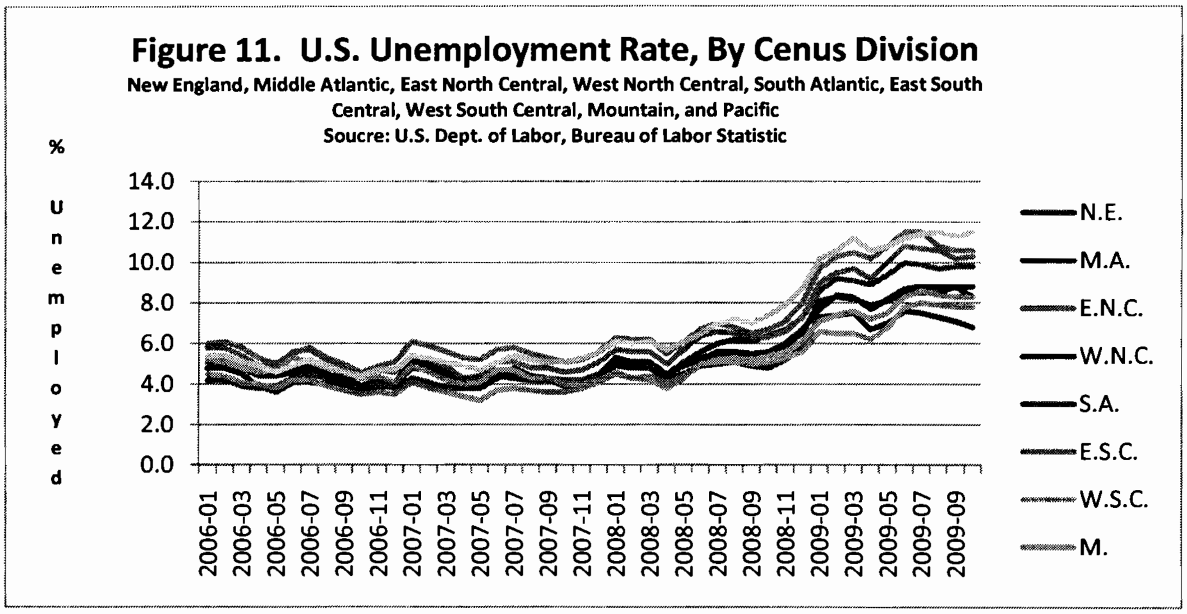
Figure 11. U.S. Unemployment Rate, By Cenus Division
New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, and Pacific
Soucre: U.S. Dept. of Labor, Bureau of Labor Statistic
% Unemployed
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
2006-01
2006-03
2006-05
2006-07
2006-09
2006-11
2007-01
2007-03
2007-05
2007-07
2007-09
2007-11
2008-01
2008-03
2008-05
2008-07
2008-09
2008-11
2009-01
2009-03
2009-05
2009-07
2009-09
N.E.
M.A.
E.N.C.
W.N.C.
S.A.
E.S.C.
W.S.C.
M.

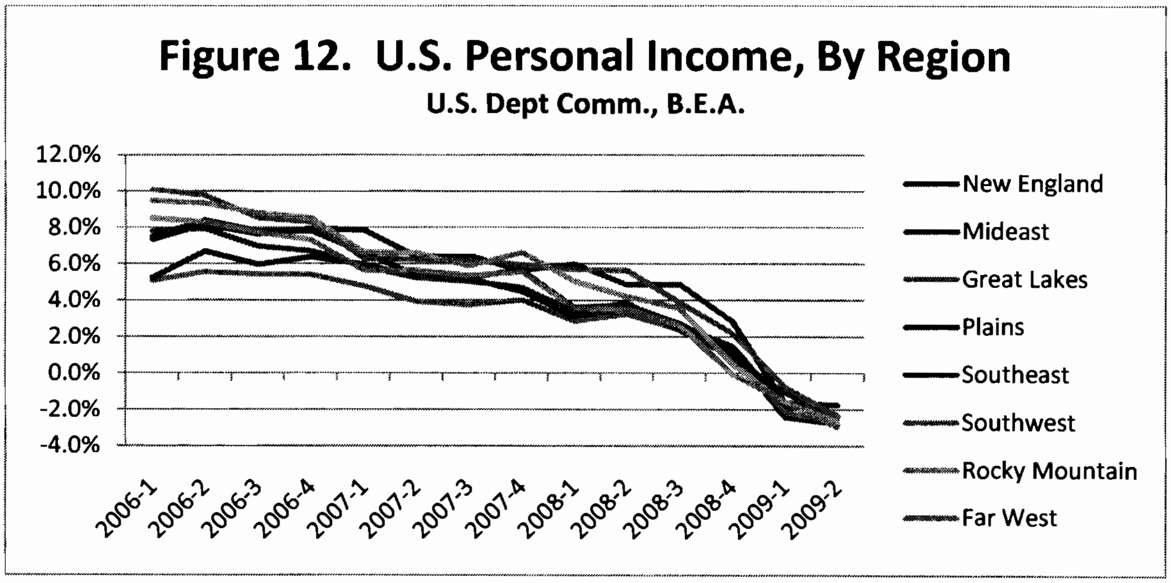
Figure 12. U.S. Personal Income, By Region
U.S. Dept Comm., B.E.A.
12.0%
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
-2.0%
-4.0%
2006-1
2006-2
2006-3
2006-4
2007-1
2007-2
2007-3
2007-4
2008-1
2008-2
2008-3
2008-4
2009-1
2009-2
New England
Mideast
Great Lakes
Plains
Southeast
Southwest
Rocky Mountain
Far West

Table 1. Selected Parameter Estimates of OJ Demand Equation (1), Assuming Same Coefficients Across Cities, Except Intercept.[1,2]

Variable	Parameter Estimate	Standard Error	t value	Pr >|t|
tv	0.04203	0.01555	2.700	0.0069
radio	0.05450	0.00819	6.650	<.0001
hc	-0.00831	0.00542	-1.530	0.1250
z	0.13593	0.01113	12.210	<.0001
zs	-0.01307	0.00889	-1.470	0.1414
log p	-0.95499	0.01350	-70.740	<.0001
log ps	0.08496	0.01015	8.370	<.0001
s1	0.05322	0.00083	63.900	<.0001
s2	-0.06155	0.00080	-77.370	<.0001
time	0.00167	0.00009	17.670	<.0001
time2	-0.00001	0.00000	-22.240	<.0001

[1] 52 city specific intercepts not reported for convenience.

[2] R^2 was .99.

Table 2. Summary of Estimated Increases in OJ Gallon Sales Due to FDOC Program.

Program	OLS, By city	AUTOREG, By City		Restricted
	52 Cities[1]	52 Cities[1]	53 Cities[2]	52 Cities[1]
		SSE Gallon Gain		
TV	690,064	611,383	611,383	844,808
Radio	2,013,150	2,126,449	2,159,046	1,686,596
HC	583,173	623,936	635,262	-
Total	3,286,387	3,361,768	3,405,691	2,531,404

[1] Excludes New Orleans.

[2] Includes New Orleans.

Table 3. City-By-City Estimated Increases in OJ Gallon Sales Due to FDOC Program.

	With FDOC Promotion			With/Out FDOC Promotion			FDOC Promotion Gain					
City	TV	RADIO	HC	TV	RADIO	HC	TV	RADIO	HC	TV	RADIO	HC
	SSE Gallons			SSE Gallons			SSE Gallons			% Gain		
ALBANY	1,446,351	997,216	1,437,572	1,446,351	969,943	1,414,834	-	27,274	22,738	0.0%	2.8%	1.6%
ATLANTA	3,850,870	2,704,115	3,740,293	3,756,522	2,625,104	3,740,293	94,348	79,011	-	2.5%	3.0%	0.0%
BALTIMORE	-	1,198,197	1,676,699	-	1,178,159	1,676,699	-	20,038	-	na	1.7%	0.0%
BIRMINGHAM	-	1,153,839	1,630,838	-	1,091,488	1,619,382	-	62,351	11,456	na	5.7%	0.7%
BOSTON	6,406,329	4,386,813	6,416,199	6,338,164	4,378,138	6,416,199	68,165	8,675	-	1.1%	0.2%	0.0%
BUFFALO-ROCHESTER	-	1,397,621	2,010,761	-	1,361,476	2,002,906	-	36,144	7,855	na	2.7%	0.4%
CHARLOTTE	-	-	1,454,405	-	-	1,448,005	-	-	6,400	na	na	0.4%
CHICAGO	4,613,762	3,168,651	4,484,245	4,613,762	3,147,593	4,484,245	-	21,058	-	0.0%	0.7%	0.0%
CINCINNATI	-	1,495,244	2,168,525	-	1,475,739	2,168,525	-	19,505	-	na	1.3%	0.0%
CLEVELAND	2,562,336	1,775,770	2,568,157	2,562,336	1,722,442	2,559,797	-	53,328	8,360	0.0%	3.1%	0.3%
COLUMBUS	-	1,179,745	1,639,564	-	1,155,488	1,639,564	-	24,257	-	na	2.1%	0.0%
DALLAS	3,231,235	2,244,317	3,138,598	3,213,402	2,187,527	3,138,598	17,833	56,790	-	0.6%	2.6%	0.0%
DENVER	2,571,944	1,778,872	2,539,516	2,571,944	1,739,228	2,539,516	-	39,644	-	0.0%	2.3%	0.0%
DES MOINES	-	431,722	618,647	-	424,457	610,475	-	7,265	8,172	na	1.7%	1.3%
DETROIT	4,067,856	2,810,349	3,989,022	4,067,856	2,734,389	3,951,961	-	75,960	37,061	0.0%	2.8%	0.9%
GRAND RAPIDS	-	1,035,685	1,475,041	-	1,030,153	1,475,041	-	5,532	-	na	0.5%	0.0%
HARTFORD-NEW HAVEN	2,072,762	1,402,614	2,074,173	2,057,202	1,402,614	2,074,173	15,560	-	-	0.8%	0.0%	0.0%
HOUSTON	3,435,816	2,390,919	3,375,303	3,435,816	2,329,615	3,375,303	-	61,304	-	0.0%	2.6%	0.0%
INDIANAPOLIS	-	1,319,625	1,802,462	-	1,257,154	1,802,462	-	62,471	-	na	5.0%	0.0%
JACKSONVILLE	-	818,523	1,147,852	-	808,910	1,147,852	-	9,613	-	na	1.2%	0.0%

KANSAS CITY	-	941,924	1,336,509	-	920,674	1,326,786	-	21,250	9,723	na	2.3%	0.7%
LAS VEGAS	1,228,458	857,373	1,212,551	1,228,458	825,860	1,168,257	-	31,513	44,294	0.0%	3.8%	3.8%
LITTLE ROCK	956,341	657,703	946,247	933,824	641,948	936,164	22,518	15,755	10,083	2.4%	2.5%	1.1%
LOS ANGELES	8,930,662	6,264,577	8,704,211	8,930,662	6,086,688	8,660,924	-	177,889	43,287	0.0%	2.9%	0.5%
LOUISVILLE	-	1,033,361	1,499,507	-	986,211	1,499,507	-	47,150	-	na	4.8%	0.0%
MEMPHIS	-	850,006	1,189,565	-	807,122	1,189,565	-	42,884	-	na	5.3%	0.0%
MIAMI	4,616,942	3,236,738	4,539,449	4,559,343	3,162,822	4,539,449	57,600	73,916	-	1.3%	2.3%	0.0%
MILWAUKEE	-	969,795	1,419,339	-	946,562	1,403,397	-	23,233	15,941	na	2.5%	1.1%
MINNEAPOLIS	2,365,305	1,613,933	2,368,466	2,334,235	1,608,142	2,341,719	31,069	5,791	26,747	1.3%	0.4%	1.1%
NASHVILLE	-	1,137,651	1,598,015	-	1,072,339	1,584,605	-	65,312	13,410	na	6.1%	0.8%
NEW ORLEANS-MOBILE	-	1,462,018	2,038,316	-	1,429,421	2,026,990	-	32,597	11,326	na	2.3%	0.6%
NEW YORK	11,433,342	7,828,572	11,324,442	11,405,751	7,785,730	11,324,442	27,591	42,842	-	0.2%	0.6%	0.0%
OKLAHOMA CITY-TULSA	-	-	1,475,250	-	-	1,441,198	-	-	34,053	na	na	2.4%
OMAHA	-	582,785	863,346	-	582,785	863,346	-	-	-	na	0.0%	0.0%
ORLANDO	2,669,031	1,858,356	2,635,774	2,647,338	1,851,731	2,635,774	21,693	6,625	-	0.8%	0.4%	0.0%
PHILADELPHIA	5,738,150	3,934,356	5,695,294	5,619,020	3,913,378	5,695,294	119,130	20,978	-	2.1%	0.5%	0.0%
PHOENIX	3,472,146	2,348,764	3,556,555	3,450,800	2,291,336	3,550,418	21,346	57,428	6,137	0.6%	2.5%	0.2%
PITTSBURGH	-	1,587,093	2,252,075	-	1,525,413	2,252,075	-	61,680	-	na	4.0%	0.0%
PORTLAND	-	1,398,051	1,994,855	-	1,387,062	1,994,855	-	10,989	-	na	0.8%	0.0%
RALEIGH-DURHAM	-	1,721,904	2,401,154	-	1,676,741	2,401,154	-	45,163	-	na	2.7%	0.0%
REMAINING US	33,349,995	23,051,224	33,014,850	33,349,995	22,590,624	32,853,262	-	460,601	161,588	0.0%	2.0%	0.5%
RICHMOND/NORFOLK	2,298,963	1,593,642	2,289,151	2,298,963	1,572,054	2,268,486	-	21,588	20,666	0.0%	1.4%	0.9%
SACRAMENTO	1,438,756	994,021	1,426,637	1,424,657	978,126	1,401,835	14,099	15,895	24,802	1.0%	1.6%	1.8%

SALT LAKE CITY-BOISE	2,171,408	1,503,234	2,163,648	2,171,408	1,487,142	2,163,648	-	16,091	-	0.0%	1.1%	0.0%
SAN ANTONIO	-	1,753,708	2,529,636	-	1,718,196	2,529,636	-	35,512	-	na	2.1%	0.0%
SAN DIEGO	1,595,957	1,114,343	1,564,047	1,595,957	1,078,568	1,564,047	-	35,776	-	0.0%	3.3%	0.0%
SAN FRANCISCO	3,001,836	2,061,411	2,955,764	2,996,703	2,047,762	2,955,764	5,133	13,649	-	0.2%	0.7%	0.0%
SEATTLE	2,897,415	2,032,492	2,763,854	2,897,415	1,974,686	2,711,445	-	57,806	52,409	0.0%	2.9%	1.9%
ST. LOUIS	-	1,236,461	1,766,268	-	1,228,804	1,729,526	-	7,657	36,743	na	0.6%	2.1%
SYRACUSE	-	961,050	1,393,916	-	957,357	1,382,575	-	3,693	11,341	na	0.4%	0.8%
TAMPA	3,591,914	2,495,835	3,574,810	3,546,575	2,495,835	3,574,810	45,340	-	-	1.3%	0.0%	0.0%
WASHINGTON, D.C.	4,987,836	3,441,739	4,901,574	4,937,878	3,419,341	4,901,574	49,958	22,398	-	1.0%	0.7%	0.0%
WEST TEXAS	-	684,429	1,009,977	-	669,263	999,305	-	15,166	10,672	na	2.3%	1.1%
Total	131,003,718	116,898,383	169,792,924	130,392,335	114,739,337	169,157,662	611,383	2,159,046	635,262	0.5%	1.9%	0.4%

Table 4. Estimated Benefit-Cost Ratios of FDOC, In-Store TV and Radio Promotions

	Increase Gallon Sales Due To Promotion	Chg. in Grower Price Per Mil. SSE Ga.	Change in Grower Price	2008-09 Grower Production	Grower Benefits	FDOC Cost	Benefit/Cost
	SSE ga.	$/Mil SSE ga.	$/SSE Ga.	Mil. Ga.	$	$	Ratio
tv	611,383	0.000625	0.000382	1,034	395,106	1,092,000	0.36
radio	2,159,046	0.000625	0.001349	1,034	1,395,284	1,000,000	1.40
hc	635,262	0.000625	0.000397	1,034	410,538	662,230	0.62
total	3,405,691	0.000625	0.002129	1,034	2,200,928	2,754,230	0.80