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Measures of Online Advertising Effectiveness: The Case of Orange Juice

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Introduction

Generic advertising differs from brand advertising in that it seeks to increase the consumption of all items in a product category, while brand advertising has a more unilateral focus. The literature regarding the impacts of generic advertising on food demand is broad and has touched on a number of food commodities (see Kaiser 2011 for a comprehensive review of the literature), such as meat (beef, pork, chicken, and fish), staples (rice, wheat, and sorghum), and other beverages (milk, coffee, tea). A number of previous studies examine the role of generic advertising efforts by the Florida Department of Citrus on orange juice consumption (Lee et al. 1988, Thomas and Cantor 2009, Salois and Reilly 2014).

Earlier studies focusing on the impact of generic advertising in citrus include Ward and Davis (1978), Ward and Tilley (1980), and Lee and Brown (1985). These studies tend to utilize aggregate annual or monthly time-series data on total Florida Department of Citrus (FDOC) advertising expenditure matched with orange juice retail volumes or consumer expenditure. More recent studies include Brown and Lee (1997, 1999), Capps et al. (2004), and Thomas and Cantor (2009). These more recent studies typically use Nielsen point-of-sale scanner data, aggregated at the market-level, and measure purchase only at retail, missing potential purchases made at restaurants and other establishments.

In general these studies find that the level of advertising expenditure has a direct impact on orange juice sales. However, these studies rely on the use of secondary data, which, although useful, may not leave out some information on the direct tie between effectiveness of the advertising and individual level behavior. Very few studies on generic advertising utilize micro-level survey data due lack of availability. This study differs by using individual-level survey data with respect to both the consumption and the advertising variables. In place of scanner data or retail volumes, we use stated purchase frequency provided directly by respondents. Second, instead of using dummy variables to represent when advertising occurred (or advertising expenditures), we use individual stated advertising awareness and recall. This allows us to account for advertisements that may have a lasting impact beyond the expenditure period.

In addition, the existing literature almost entirely focuses on television or traditional advertising. There is a clear need to better understand the role of non-traditional advertising

venues including online advertising and the influence of social media. This study differs from previous studies by examining the effectiveness of generic advertising with respect to online and social media.

Previous research on the Influence Generic Advertising

There are numerous examples of research exploring the influence of advertising in various industries. For example, many studies have been conducted to examine the effectiveness of producer-funded generic promotions for milk and cheese (Lenz, Kaiser and Chung 1998 ; Schmit et al. 2001; Kaiser and Roberte 1995). These studies found that the generic advertising generated positive and significant increases in demand. Others have investigated other food products, such as pork (Capps and Park 2002) and fast food (Scully, Dixon and Wakefield 2007).

As for the effects of generic advertising on beverages, studies have demonstrated the positive relation between advertising expenditure with orange juice demand (Ward et al. 2005) and beverages in general (Kinnucan et al. 2001). Kinnucan et al. (2001) found juice advertising had the largest influence within the nonalcoholic beverage group compared with other beverages. However, Zheng and Kaiser (2008) found the opposite. They argued that advertising significantly increased the demand for milk, soft-drink, and coffee/ tea, but not for juice and water.

In each of these examples, researchers used aggregate time-series data, and did not include information about demographics or personal characteristics which might influence demand and reaction to the advertising. Instead, the focus was placed on the relationship between advertising expenditure and retail price/volume.

Studies based on custom-level data are few and limited. Scully, Dixon and Wakefield (2007) examined the association between television advertising exposure and adults' consumption of fast foods via a cross-sectional telephone survey. Results from this study demonstrated a positive correlation between food advertising exposure and fast-food consumption. Capps and Park (2002) utilize the data from Continuing Survey of Food Intakes (CSFII) and Diet Health and Knowledge Survey (DHKS) to analyzing the impact of advertising on pork demand. The individual-level data allowed the assessment of the advertising impact while controlling for lifestyle, health, nutrition, and other demographics.

In these previous studies, the focus has been on the effectiveness of traditional advertising (TV advertising and in-store advertising). Numerous papers have examined the positive relationship between TV advertising exposure and in-store promotions with product demand (Kumar and Leone 1988, Bemmaor and Mouchoux. 1991, Anderson and Gabszewicz 2006, Myrland and Kinnucan 2001). However, few studies have investigated the effectiveness of media advertising in less traditional channels, such as online and social media.

Rui, Liu and Whinston (2012) investigated the relationship between positive word of mouth posts on Twitter with sales at cinemas. Onishi and Manchanda (2012) found out that new (blogs) and traditional media (TV advertising) act synergistically to affect the sales for new products (using movies as an example). Liu and Lopez (2013) apply the Berry, Levinsohn and Pakes model of market equilibrium to sales data for 18 carbonated soft drink brands, and argued that the social media exposure is a significant driver of consumer behavior.

Our study differs from previous research in that we incorporate advertisements placed via social media, compared to the traditional television or in-store advertising covered in previous research. In addition to testing social media advertising effectiveness on consumer's consumption behavior, we will also analyze the complex interactions among advertising exposure, consumers' attitudes and belief, and consumption intention. According to research conducted by Engels et al (1972), individual beliefs and perceptions are the basis for consumer's attitudes, which is a conditioning factor in the intention to buy and final consumption. Advertising has both direct and indirect influences towards consumers' purchase behavior. For the indirect influence, advertising first influences consumers' beliefs and attitudes about product attributes, which can lead to purchase intention. Direct influence is when advertising would cause consumers' emotional response to the ad campaign, thus cause the intention to purchase directly.

In this study, we will analyze the effectiveness of generic advertising based on consumer-level data. At first, we model the factors that influence the likelihood of a respondent to be exposed to different types of advertising. We then examine how awareness of different types of advertising (television and social media) impact purchase behavior for orange juice.

Data & Methods

An online survey conducted with a random panel of adult (age 18 or above) orange juice consumers recruited by Survey Sampling, Inc. began in January 2011 and covered the period until March 2014, with approximately 150 participants recruited on a monthly basis. In total, 5,817 respondents completed the survey. To qualify for the survey, participants had to indicate that they drink 100% orange juice at least once per week. The main purpose of the survey was to monitor awareness and effectiveness of online advertising. While taking the survey, respondents were shown different ads and then asked to identify if they had seen them, and if so, how often. This method of showing the ad may improve the accuracy of awareness assessment, as well as allows data to be collected on consumer perception of the ads.

In addition to questions about advertising awareness, respondents were asked a series of questions on if, how often and why (or why not) they purchase different types of orange juice, as well as demographic questions.

Respondents drank orange juice on average 4.5 times per week, with 27.3% of respondents indicating they drink orange juice daily. This compares to other beverages, such as coffee, that was consumed on average 4.3 times per week to grapefruit juice at 0.7 times per week (Table 1).

Table 1. Consumption frequency of various beverages by survey respondents.

	Mean consumption times per week	Percent of respondents who drink daily
100% orange juice	4.5	27.6%
Coffee	4.4	49.5%
Milk	4.0	33.6%
Other juices or blends	2.0	8.7%
Apple juice	1.4	5.0%
Gatorade	1.1	4.3%
Vitamin water	1.0	5.1%
100% grapefruit juice	0.7	3.2%

Demographics of the respondents are summarized in Table 2. As the respondents were screened to be 100% orange juice consumers, the sample is not expected to be U.S. representative. The age range of participants was 18 years of age to 95, with a mean of 49 years. Over half (58%) were female, and 55% had a college degree or higher. Number of days per week the participants consumed orange juice is shown in Figure 1.

Table 2. Demographics of survey respondents.

Category	Percent	Category	Percent
Percent Female	60.1	Employment Status	
Age		Full-time	39.3
18-24	8.7	Part-time	13.4
25-34	24.4	Homemaker	11.7
35-49	15.3	Retired	24.6
50-64	30.1	Not employed	10.7
65+	21.4		
		Income level	
Marital Status		\$25,000-\$34,999	23.0
Married	54.6	\$35,000-\$49,999	22.0
Single	20.6	\$50,000-\$74,999	25.0
Divorced/separated	10.3	\$75,000-\$99,999	12.6
Other	14.5	\$100,000 or more	17.4
Education level		Ethnicity	
High school graduate or less	44.4	White/Caucasian	28.9
College and post graduate	55.6	African American	9.4
		Hispanic	5.9
Children in house		Other	5.8
Percent with ages 6-18	20.5		
Percent with ages 5 and under	13.6	Percent primary shopper	74.3

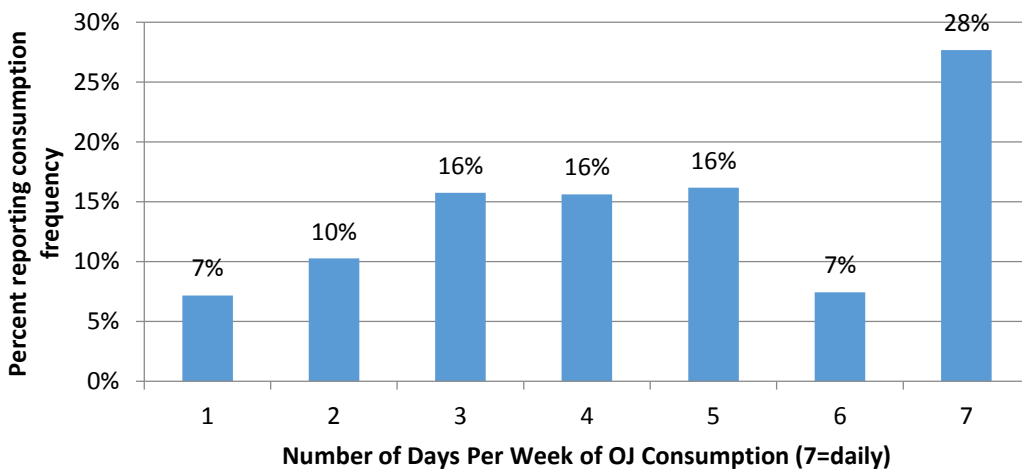


Figure 1. Frequency of consumption of orange juice among participants

Awareness of online, Facebook, and television ads varies over time (Figure 2). Data on awareness of Facebook ads was not collected until 2012, and therefore is not represented prior to this time. Awareness of television ads ranged from approximately 50-60% from the beginning of the survey until the second quarter of 2013. At that point in time, awareness of television advertising dropped significantly and has not returned to pre-2013 levels. Awareness of online ads was generally between 30-40%, however a strong peak of over 60% was seen in the third quarter of 2012, followed by a large drop back to the 30-40% range, and then a recovery to over 40%. Awareness of Facebook ads started lower, around 20%, and has generally stayed in the 15-25% range. Awareness of Facebook ads is calculated for all respondents, though it is worth noting that only 69-76% (depending on the quarter) reported belonging to Facebook.

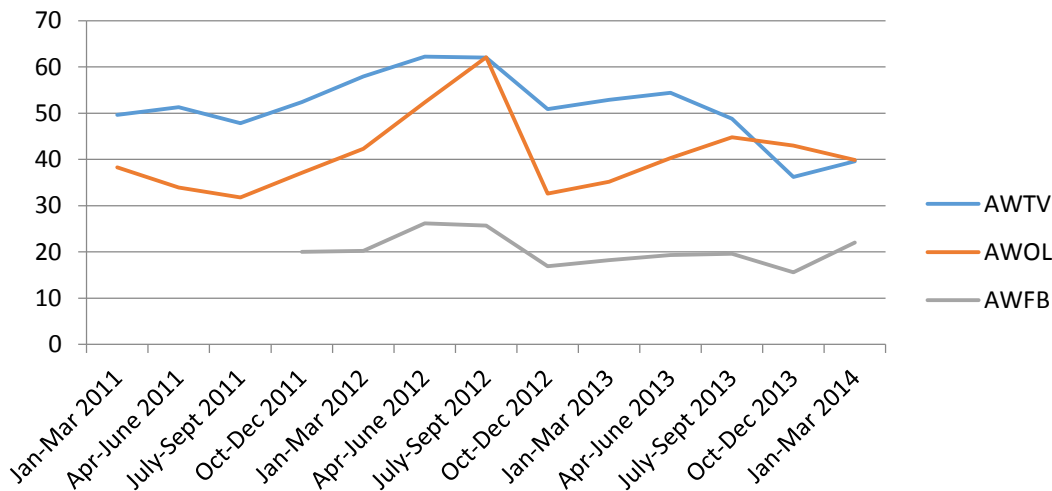


Figure 2. Awareness of television (AWTV), online (AWOL), and Facebook (AWFB) advertisements.

In addition to collecting information about demographics, consumption, and awareness of ads, information was collected on the type of orange juice consumer, as well as their perception of orange juice. These series of questions were used to develop psychographic variables for respondents. Questions and a summary of responses are provided in Table 3. A factor analysis was run to lower the number of variables included, and three factors were identified (as determined by eigenvalues above 1.0). The three factors (identified in Figure 2 by 1, 2, and 3) generally can be described as focused on: 1) numbers, such as calories and sugar (number focus);

2) the specific health benefits of orange juice (OJ-health focus); and 3) general nutrition (general nutrition segment).

Table 3. Perceptions of orange juice (1-10 scale with 1=strongly disagree; 10=strongly agree)

	Mean	Percent agreeing (top 3 of 10)
2) I prefer pure 100% orange juice	8.94	84.3
2) Vitamins and minerals are important for long term benefits	8.73	80.9
2) Drinking orange juice everyday is good for me	8.44	74.8
2) I tend to stick to drinking the same few brands of orange juice all the time	7.58	61.8
2) Drinking orange juice is just part of my daily routine	7.42	55.6
2) I eat/drink what I want	6.93	47
3) I try to eat healthy these days and pay attention to my nutrition	7.75	61.3
3) I try to eat a healthy breakfast every day	7.25	55.4
3) I actively seek out information about nutrition/diet	6.48	31.6
1) I don't care how my orange juice is made, as long as the juice tastes good	5.39	30
1) I think orange juice is too high in calories	4.4	19.6
1) I'm too busy to take care of myself as I should	4.32	18.7
1) Orange juice brands that are available everywhere just can't be that good	4.06	17.6
1) I only drink reduced calorie orange juice	3.67	16.9
1) I only drink orange juice when it is paired with other beverages, not by itself	3.26	14.7

Model Specification

In the study, two models were estimated. The first uses a probit regression model to determine the factors that have significant influence on the awareness of generic advertising, with a focus on the advertising channel. The second model focuses on consumption of orange juice, using an ordered probit regression model to find out the significant factors that influence consumers' frequency of consumption of orange juice, including advertising exposure via the different channels.

In the first portion, awareness of advertisements on Facebook (AWFB), other online sites (AWOL), and television (AWTV) were investigated. The empirical model was specified as follows:

Advertising Awareness:

$$AWFB = F_1 (X_i, S_i, Time, e_1) \quad (1)$$

$$AWOL = F_2 ((X_i, S_i, Time, e_2) \quad (2)$$

$$AWTV = F_3 ((X_i, S_i, Time, e_3) \quad (3)$$

Where AWFB, AWOL, and AWTV are binary variables equal to one if any advertisements were reported seen by the respondent via Facebook, online, and television, respectively (frequency of seeing the ad was not considered in this model); X is a vector of demographic variables (gender, age, education level, income, employment status, marital status, family size, role in grocery shopping, and race/ethnicity); S is a vector of variables created from the factor analysis based on consumer opinions of orange juice (number focused; OJ-health focused; general nutrition segment); Time is a monthly trend variable, and e is the error term.

In the second portion, frequency of consumption of orange juice is specified as:

$$Freq = F(X_i, S_i, Time, AWFB, AWOL, AWTV, e) \quad (4)$$

Where Freq is a categorical variable representing number of days per week the respondent consumed orange juice (=0 if consumes 1-3 days per week; =1 for 4-6 days per week; and =2 if consumed daily); X is the same vector of demographics (gender, age, education level, income, employment status, marital status, family size, role in grocery shopping, and race/ethnicity); S is the same vector representing the factor analysis related to perception of orange juice (number focused; OJ-health focused; and general nutrition segment); AWFB, AWOL, and AWFB are binary variables representing if the respondent was aware of the advertising; and e is the error term.

Results

The models were estimated using SAS and Limdep software. Results for the first three equations focused on factors influence awareness of advertisements are shown in Table 4. For awareness of online advertising, a number of demographic variables were statistically significantly related, including gender (males more likely to be aware); age (older less likely to be aware); Caucasian (less likely to be aware); income (higher incomes less likely to be aware);

and having children between the ages of 6-18 in the house (more likely to be aware). Additionally, all three factors were positively related, indicating that consumers more focused on the numbers (like calorie and sugar) related to orange juice, those focused on the health benefits of orange juice, and those focused on general nutrition, were more likely to be aware of the online advertising. The time trend variable was significant and positive, indicating awareness of online advertising has been increasing in the 2011-2014 period.

Awareness for television advertising was similar, with many of the same demographics significant. Those with older ages, Caucasians, and those with and higher incomes were less likely to be aware (similar to online advertising). Those with children ages 6-18 were still more likely to be aware of television advertising. Gender was not significantly related to awareness of television advertising, unlike online advertising. In this case, only two factors were statistically significantly related to awareness. Those that are more “number-focused” were not more (or less) likely to see television advertising. As opposed to the finding that awareness of online advertising has been increasing over this time, awareness of television advertisements was found to be statistically significantly decreasing over the same time period.

Awareness for advertisements placed on Facebook was statistically significantly related to demographics: older less likely to be aware; Caucasians less likely to be aware; and families with children ages 6-18 more likely to be aware, as was the case for the other awareness variables. Gender and income were not related to awareness of Facebook advertisements. Two additional demographics were related to awareness of Facebook advertisements: those with a college education were more likely to be aware of the Facebook ads compared to those without a college degree and those with younger children (ages 5 and below) were more likely to be aware of the ads. Awareness of Facebook ads was the only awareness variable that did not show a significant time trend. Again, all three variables from the factor analysis were statistically significant and positively related to awareness.

Table 4. Estimated relationship between advertising awareness and respondents' characteristics

Explanatory Variables	AWOL	AWTV	AWFB
Standard errors in parentheses			
Intercept	0.391*** (0.088)	0.836*** (0.087)	-0.127 (0.126)
Time	0.004*** (0.002)	-0.006*** (0.002)	-0.003 (0.003)
Male	0.100*** (0.038)	-0.032 (0.037)	0.013 (0.050)
Age	-0.010*** (0.001)	-0.010*** (0.001)	-0.015*** (0.002)
Education_College	0.013 (0.036)	-0.012 (0.035)	0.092* (0.049)
Primary Shopper	-0.068 (0.042)	-0.056 (0.041)	-0.012 (0.057)
Caucasian	-0.174*** (0.043)	-0.072* (0.043)	-0.165*** (0.054)
Income	-0.040*** (0.011)	-0.031*** (0.011)	-0.006 (0.015)
Children ages 6-18	0.204*** (0.045)	0.154*** (0.044)	0.369*** (0.054)
Children under 6	-0.028 (0.054)	-0.045 (0.054)	0.142** (0.067)
Number-focus	0.190*** (0.020)	-0.010 (0.020)	0.240*** (0.025)
OJ-health-focus	0.036* (0.020)	0.091*** (0.019)	0.089*** (0.027)
General-nutrition-focus	0.391*** (0.021)	0.066*** (0.020)	0.191*** (0.029)
Correct prediction	64.7%	58.1%	81.1%
Naïve prediction	58.1%	51.4%	79.6%

*, **, *** indicate significance at the 10%, 5%, and 1% levels respectively.

Factors Influencing Orange Juice Consumption Frequency

The coefficients presented in Table 5 show the influence of demographics, the factor scores, and awareness of advertising on the number of days per week the consumer drinks orange juice. It is important to note that all participants in the survey consume orange juice at least once per week, so this equation only examines the effectiveness of market penetration – the

relationship between the advertisements and consumption frequency by consumers, not the relationship between advertising and generating new consumers or the likelihood to consume.

Significant demographic variables include gender (males more likely to consume more days of the week), age (older more likely to consumer more days of the week), primary shopper (more likely to consumer more days of the week), and income (higher income more likely to consume more days of the week). Having children in the house, ethnicity, and education were not related to the number of days per week orange juice was consumed. Of the awareness variables, only the awareness of Facebook ads showed a statistically significant relationship (positive) with number of days consumed. Again, all three factors describing consumer opinions of orange juice were statistically significant and positive.

Table 5. Estimated relationship between orange juice consumption with awareness of advertising, consumers' perception about orange juice, characteristics

Explanatory Variable	Consumption of buying orange juice per week	
	Coefficient	Standard Error
Constant	-0.220**	0.105
Time	-0.003	0.002
Male	0.136***	0.037
Age	0.008***	0.001
Education_College	0.040	0.036
Primary Shopper	0.158***	0.042
Caucasian	0.030	0.043
Income	0.033***	0.011
Children ages 6-18	0.016	0.045
Children under 6	0.056	0.056
AWTV	-0.017	0.039
AWFB	0.182***	0.051
AWOL	0.017	0.041
Number-focus	0.060***	0.021
OJ-health-focus	0.375***	0.021
General-nutrition-focus	0.104***	0.021
Mu	1.119***	0.023
Correct prediction	45.9%	
Naïve prediction	39.4%	

Discussion and Conclusions

As other methods of advertisement increase in use, it is important to consider their impact on consumption of food products. Traditionally, research has been conducted on the impact of generic television advertising and in-store promotions on the consumption of orange juice. However, increased use of advertising using social media, such as online and Facebook advertisements needs investigation to determine if they have similar impacts. Using data collected to monitor the level of awareness of different types of advertisements, we investigated the factors related to both awareness of the ads, and the impact of the ads.

Awareness of advertisements on television, online, and Facebook was investigated to allow for comparison across the methods. A positive time trend was found with regard to online advertising, negative with television advertising, and no relationship with Facebook advertising. This is not unexpected as the use of online media for advertising had been increasing, and less emphasis has been placed recently on television advertising by the Florida Department of Citrus. The lack of relationship with Facebook advertising might be explained by the fact that this variable was not collected over the entire time period and may be too short to pick up a trend. Other demographic variables had the expected relationships. Younger age respondents and those with children ages 6-18 in the household were more likely to be aware of advertising. Higher income respondents tended to be less aware of advertising, with the exception of Facebook.

Using a series of questions about orange juice and health, we were able to conduct a factor analysis and identify three factors related to consumption. The first represented consumers focused on the “numbers” related to orange juice (such as sugar and calories). Those who focused more on this were more likely to be aware of online and Facebook ads. The other two factors (OJ-health factors and general nutrition) were positively related to awareness of all advertising methods. This is not unexpected as those more interested in a topic may be more likely to “hear” a related advertisement. The focus of ads during this time period for orange juice tends to be health and nutrition, so these findings are expected.

With regard to how many days per week orange juice was consumed, perhaps the most surprising finding was no relationship between the time trend variable and consumption. Consumption of orange juice has been declining steadily, so one might have expected to see evidence even in the short time period of this study. Two explanations may be offered for the lack of relationship. One is that the time period covered was too short to identify the trend.

Another may be related to the fact that only those that consume orange juice at least once per week were included in this study. These may all be considered strong proponents of orange juice and may be a segment that is not decreasing consumption, or at least not decreasing rapidly enough for us to identify that in a two-year time period.

Demographic variables related to consumption frequency include males, older consumers, and those with higher income. Variables representing the awareness of the three types of advertisements were included to determine both if advertisements influence consumption frequency. Somewhat surprisingly, only awareness of Facebook advertisements was positively related to the number of days per week orange juice was consumed. Although this may at first appear to be an unexpected relationship, there may be explanations. The Florida Department of Citrus, which is responsible for the funding and placement of the advertisements studied in this research, has recently decided to stop investing in television advertising. Perhaps the lack of relationship between awareness and consumption may in part be related to the higher advertising budgets for brand name orange juice over the generic ads tested in this study. The larger surprise is the lack of relationship between online advertising and consumption frequency. Additional research on whether or not the online ads are impacting non-consumers, or less frequency consumers, is needed to understand if the online ads are proving ineffective.

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