

**ALCOHOL ADVERTISING IN MAGAZINES:
DO BEER, WINE, AND SPIRITS ADS
TARGET YOUTH?**

JON P. NELSON*

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ABSTRACT

In 2003, the alcohol beverage industry spent more than \$1.6 billion on advertising, including \$394 million on ads in magazines. Critics allege that these activities target adolescents. This paper examines count data for alcohol ads placed in 28 magazines in 2001-03. Specifying a demand function for advertising space, regressions are estimated that are conditioned on magazine characteristics and readership demographics, including the percent of youth in the audience. The explanatory variables include real prices of advertisements and audience size. Results indicate significant effects for price, audience size, and adult demographics, but fail to support claims that advertisers target youth.

I. INTRODUCTION

In 2003, the alcohol beverage industry spent more than \$1.6 billion on advertising in measured media outlets, including \$394 million on ads placed in magazines. Industry critics allege that these activities intentionally target adolescent audiences and thereby contribute importantly to social problems associated with underage alcohol consumption (CAMY, 2005b; CSPI, 2002). The favored regulatory approach has been to advocate a placement standard based on the youth audience expressed as a proportion of the total audience. For example, the Center on Alcohol Marketing and Youth (2002, 2005a) claims that advertisements in media outlets that reach audiences with more than 15% underage youth result in “overexposure” to alcohol ads. Two reports by the Federal Trade Commission (1999, 2003) advocate a placement threshold of 25% as a “best practice” response by alcohol companies, while a report by the National Research Council’s Institute of Medicine (2004, p. 138) argues that the industry should move toward a 15% threshold for television and 25% for other media. Other organizations, such as the American Medical Association (2004), support a total statutory ban of alcohol advertising except for ads placed inside of retail and wholesale outlets. Following the FTC’s 1999 report, the major companies in the alcohol industry collectively altered their self-regulatory advertising codes and media buying guidelines: Beer Institute’s Advertising and Marketing Code; Wine Institute’s Code of Advertising Standards; and the Distilled Spirits Council of the United States (DISCUS), Code of Responsible Practices for Beverage Alcohol Advertising and Marketing. The Wine Institute amended its code in 2000 to adopt a 70% adult placement standard. In October 2003, the beer and spirits codes were amended to require that adults constitute at least 70% of the audience for TV, radio, and magazine advertisements, which represents an increase from the previous 50% adult standard (FTC, 2003). Further, the revised beer and spirits codes require that

industry members conduct post-placement audits, including a third-party review system for controversial beer and spirits advertisements (DISCUS, 2005).

Do alcohol advertisements target underage youth? The evidence on the affirmative side is based largely on a series of descriptive reports commissioned by an advocacy group, the Center on Alcohol Marketing and Youth (2002, 2005a). CAMY's studies measure the youth audience as a percent of the total audience for different alcohol brands and media outlets, which are aggregated to obtain measures of advertising exposure per capita for youth and adults. For magazines, CAMY's measures of gross rating points (GRP) account for an advertisement's frequency and reach (audience composition), but fail to account for audience size. Because underage youth constitute about 15% of the total population, CAMY characterizes any audience containing more than 15% adolescents as "youth-oriented." This designation is used regardless of other aspects of placement decisions, such as the number of adults in the audience or the number of adult readers per copy (FTC, 2003, p. 32). Further, CAMY's studies are descriptive and based on the simplistic notion that targeting occurs whenever the 15% threshold is exceeded. Magazines such as *Popular Mechanics* and *Sports Illustrated* with 17% and 25% youth readership, respectively, are characterized as "youth-oriented" despite other features of the audience and magazine (CAMY, 2002a). In addition to audience size, advertising content and costs are ignored by GRP-based measures.

Analytical evidence on youth exposure to alcohol advertisements in magazines is provided by two recent regression studies. Garfield et al. (2003) examined the occurrence (counts) of annual alcohol advertising placements for 35 major magazines that tracked youth readerships during 1997-2001. Ad counts that are zero were apparently excluded. Using a Poisson model, they regressed the count of annual ads in each magazine on a set of demographic

variables, including the number of youth readers (ages 12-19), number of young adults (ages 20-24), number of adults (ages 25+), number of male readers, number of black readers, number of low-income readers, and year dummy variables. Because popular magazines tend to have a large number of readers in all categories, many of these variables are highly correlated. Further, the explanatory variables were measured for 1999 only, and did not contain any temporal variation. Consequently, the results for youth readers can only capture cross-sectional differences in the ad counts. Garfield et al. (2003, p. 2428) concluded that magazine ads for beer and spirits were associated positively with adolescent readership and, at a minimum, indirect targeting of youth was occurring. In a second study, Nelson (2005) used the cumulative data in Garfield et al. to examine cross-sectional features of their model, collinearity among the readership demographics, zero counts, and overdispersion of the Poisson residuals (excess zero counts). Using alternative estimation methods and new variables for average age and income of adult readers, Nelson (2005) concluded that targeting of youth was not occurring for beer, wine, or distilled spirits.

The present study seeks to expand on the results in these two studies. First, the advertising count data cover a more recent time period of 2001-03, which includes the last year of beer and spirits advertising under the old 50% placement standard. Zero counts are included in the analysis. Second, the explanatory variables vary across magazines and over time, and include the temporal variation that was missing in both previous studies. Third, the data set allows examination of explanatory variables that were ignored in previous studies, including measures of audience size, magazine sales outlets, and standardized costs of advertisements across magazines and time. In particular, the study demonstrates the importance of each magazine's real advertising cost per 1000 copies (CPM) in circulation as a variable affecting placements. This variable is the advertising industry's measure of magazine cost efficiency, and

is available for standardized advertisements such as a full-page four-color ad. A cost variable (non-standardized) was discarded as insignificant by Garfield et al. and was unavailable in Nelson. The empirical results for price help to clarify some of the earlier findings, such as placement of ads in magazines with predominantly African-American readers (e.g., *Ebony*, *Jet*, and *Vibe* magazines). Fourth, following the emphasis in the regulatory literature, the present study focuses on the percent of youth in the audience as an explanatory variable, which was largely ignored by previous studies in favor of the absolute number of youth. As pointed out by Nelson, popular magazines tend to have a large number of readers in all age groups, which leads to collinearity in readership numbers as well as difficulties in formulating regulatory standards (see NRC, 2004, p. 139). Fifth, following Nelson (2005), both Poisson and negative binomial count models are estimated and compared.

The remainder of the paper is divided into five sections. Section II describes the model and selected aspects of the data. Section III presents the econometric results for Poisson and negative binomial regressions for total ad counts, including specification tests for overdispersion. Section IV considers the marginal importance of the explanatory variables, including audience size and price elasticities. Section V examines beer and spirits ads separately, which increases the number of zero counts in the analysis. Section VI contains the conclusions and discusses the policy implications of the study.

II. MODEL AND DATA

Previous econometric studies of media placements analyzed advertising economies of scale at the brand or industry level (Bresnahan, 1984; Seldon et al., 2000), inter-media choices at the brand and industry level (Färe et al., 2004; Seldon and Jung, 1993; Silk et al., 2002), and the

price of advertising (Depken, 2004; Depken and Wilson, 2001; Koschat and Putsis, 2000, 2002). None of these studies estimated a demand function for media. The present study estimates a model of the demand for media space across magazines and time, conditional on reader demographics, magazine characteristics, and real price of a standardized advertisement.

Assume that advertisers' demand for media space is derived from consumers' demand for information about the existence and attributes of products and brands, including information that is persuasive in nature (Ehrlich and Fisher, 1982). Assume also that the advertiser has solved the problem of media mix and must next decide on the choice of space in available magazines.

Magazines can be described in terms of various characteristics of the readers (age, gender, race, income); characteristics of the magazine (subject matter, paid circulation, audience size, single-copy sales, number of issues); and the magazine's price for a standardized advertisement, e.g., the cost of a one page four-color (P4C) advertisement. Because advertising is provided jointly with the magazine's subject matter and magazines also contain numerous ads, there is considerable "clutter" or noise in the information process. A number of specialized services exist to collect, verify, and provide data about readers and magazines to both publishers and advertisers, which implies that the advertisers attempt to reduce the noise in the information process through placement or "targeting" decisions. Such data are typically proprietary, but available to the public on a limited basis.

Specifying the demand function as a count model leads to the following equation for the expected number of occurrences (counts) of alcohol ads, N_{it} , placed in the i -th magazine in year t

$$(1) \quad E(N_{it}) = \exp(X'_{it}\beta + Z'_{it}\theta + \alpha P_{it} + \delta \ln(\text{issues}_i))$$

where X is a vector of reader demographics, Z is a vector of magazine characteristics, P is the real CPM for a P4C advertisement, and β , θ , and α represent the coefficients. Holding incidence

rates constant, weekly magazines have more annual alcohol advertisements than monthly magazines. Equation (1) treats the number of annual *issues* of each magazine as the “exposure” variable, which implies that the elasticity coefficient δ should be close to unity (Cameron and Trevedi, 1998, p. 81). For count data, the Poisson model offers a number of advantages, but distribution plots suggested that the negative binomial might be more appropriate (Winkelmann, 2003, p. 32). Following Nelson (2005), econometric results and tests are reported for both models. The price variable is identified by the existence of different real prices for a standardized advertisement, reflecting real changes over time for a given magazine and differences across magazines that reflect unobserved costs of supply that apply to all advertisers, including alcohol advertisers. Audience size is measured by readers per copy, and is a measure of the marginal benefits of advertising that should be important for placement decisions. The main hypothesis in the paper concerns the sign and significance of the variable for the percent of youth readers. The null hypothesis is that alcohol advertisers do not target youth, which means that the regression coefficient in (1) for youth readership should be insignificantly different from zero. According to Garfield et al. (2003, p. 2428), absent explicit evidence of intent, targeting occurs whenever a group is reached in a measurable or material manner. They argue that their significant results for a youth demographic variable demonstrate targeting of adolescent readers. The present paper offers a test of the robustness of the conclusions in Garfield et al. The test also is consistent with U.S. Supreme Court interpretations of First Amendment protections provided to commercial speech under the so-called Central Hudson doctrine (447 U.S. 557).¹

A. Variable Definitions and Data Sources

The sample consists of 28 major magazines for the time period 2001-03. Table 1 reports the data sources and definitions for the variables used in the regressions. Empirical results are reported in Section III for four demographic variables (percent youth readers, adult median age, adult median real income, percent adult male readers) and five magazine characteristics (real CPM price, percent single-copy sales, adult readers per copy, square of readers per copy, annual issues). The annual number of issues for each magazine is a measure of exposure in the count model, i.e., the expected ad count per year is the product of an incidence rate per issue and the level of exposure as measured by the annual number of issues. Because the number of alcohol ads can change for reasons external to the magazine market, some regressions also include year fixed-effects dummies. These variables control for changes in the prices of other media and changes in the total amount of alcohol advertising contained in other media. Due to possible discounting from published price lists, such as during the 2001 recession, the year dummies also permit a stronger test of the importance of price in placement decisions. According to the *Statistical Abstract*, total advertising revenues in magazines in 2003 were \$18.3 billion, including \$394 million in the alcohol category or only 2.2% of the total. Hence, the explanatory variables, including the CPMs, should be exogenous to advertising choices by alcohol producers, reflecting decisions made by all advertisers.

<INSERT TABLE 1 HERE>

Table 2 summarizes selected aspects of the data set, including the cumulative numbers of ads for 2001-03; percent of youth in each magazine's audience in 2003; rate base circulation used in the CPMs; real CPM-P4C in dollars; and the audience size. The number of alcohol ads for each magazine was drawn from CAMY (2005a, p. 20), which covers annual count data on alcohol ads in 124 consumer magazines for the years 2001-03. The ad counts reflect advertising

placements for all three alcohol beverages; that is, ads are combined for beer, wine, and distilled spirits. Reflecting constraints on broadcast advertising, CAMY's magazine counts are dominated by distilled spirits advertisements. For 2003, CAMY (2005a, p. 5) reported 495 magazine ads for beer, 417 ads for wine, and 2,330 spirits ads (72% of the total). In 2003, total spending on magazine ads was beer, \$70.6 million; wine, \$52.9 million; and spirits, \$271.0 million (69%). For the period 2001-03, the 28 magazines in my sample contained a total of 3,675 alcohol ads, including 652 beer ads, 118 wine ads, and 2,905 distilled spirits ads (79%). Hence, the dispersion of ads by beverage is reasonably representative of industry practices. Many magazines have very few youth readers, and CAMY (2005a, p. 10) selectively examines data for 21 magazines with a "disproportionately" high youth readership, i.e., the percent of adolescent readers exceeds 15%. For purposes of the present study, the on-line report *MRI+ Pocketpiece Magazine (Teen)* tracks annual data on youth readerships for 28 magazines, including 14 of the magazines on CAMY's "overexposed" list.² MRI defines youthful readers as ages 12-19, who make-up about 13.7% of the total population. As shown in Table 2, the youth audience in 2003 ranged from 4.7% for *Better Homes and Gardens* to 33.3% for *The Source* magazine. The 28 magazines in the sample are a small fraction of the total number of magazines. While exact comparisons are difficult, if anything, the sample is biased toward a positive relationship for youth readers. All of the sampled magazines accept alcohol ads, which is not the case for some popular youth-oriented magazines, e.g., *Seventeen*, *Teen*, and *YM* do not accept alcohol ads. Four magazines in my sample are among the most widely read magazines among adolescents (*People Weekly*, *Rolling Stone*, *Sports Illustrated*, *Vibe*). The percent of youth readers equals or exceeds 20% for 14 of 28 magazines in the sample.

<INSERT TABLE 2 HERE>

Standardized prices for advertisements are available publicly from the *SRDS Consumer Magazine Advertising Source*. In Table 2, the CPMs range from \$29.64 per thousand circulation for *Jet* magazine to \$114.33 for *Road & Track*. The low prices for ads in black magazines explain some of the ad placements in this category. The last column in the Table 2 is the estimated number of adult readers per copy, which is an industry measure of audience size. This variable reflects the “pass-along rate” per copy, since it measures the number of adult readers compared to the paid circulation. Other things being equal, advertisers prefer magazines that reach a larger audience. For example, in 2003, *Sports Illustrated* had a paid circulation of 3.262 million and an estimated adult audience of 20.12 million. The average number of adult readers per copy is therefore 6.17. This size variable is calculated for each magazine for each year, and varies from 3.33 for *Self* magazine in 2001 to 15.8 for *The Source* in 2003. The square of readers per copy is used to capture non-linearity in this variable.

B. Content Categories

Table 3 displays summary data on six magazine content categories: Automobiles; Black; Men’s Style & Sports; Women’s Style; Entertainment & Music; and General & Other magazines. In the next section, several model specifications are estimated that contain dummy variables for these content categories. This specification captures panel features of the data and allows additional tests of alcohol placement decisions that often are the subject of criticism, such as alcohol ads in conjunction with sports or automobiles. Using data for 2003, the Automobile category has the highest average youth readership percentage, although the number of alcohol ads in this category is quite small. The Entertainment & Music category has the second highest youth percentage, the lowest mean adult age, and a large number of alcohol ads. The

Entertainment & Music category also has a high “pass-along” rate as shown by the value of 8.8 for the mean number of adult readers per copy. Average adult reader income is lowest for Black magazines and highest for the General & Other category. In 2003, the average ad price was lowest for Black magazines and highest for Automobile magazines.

<INSERT TABLE 3 HERE>

III. EMPIRICAL RESULTS

Table 4 displays the regression results for the Poisson and negative binomial models. The results for the Poisson model allow comparison with earlier studies by Garfield et al. (2003) and Nelson (2005). Three alternative specifications are estimated for each model. First, regressions (1), (4), and (5) omit the year dummies. These regressions include four demographics, three magazine characteristics, real price, and the log of the annual number of issues. Regression (5) constrains the exposure elasticity coefficient to a unitary value. Second, regressions (2) and (6) include the year dummies for 2002 and 2003. Third, regressions (3) and (7) report fixed-effects specifications for six magazine categories and three years. All of the reported standard errors are based on robust procedures in Stata 8.2. All the youth coefficients in Table 4 are insignificantly different from zero, regardless of the specification or model. Statistical tests reported below indicate that the negative binomial is a better representation of the data, which confirms results reported in Nelson (2005).

<INSERT TABLE 4 HERE>

A. Poisson Results

The Poisson results in regressions (1) - (3) fail to demonstrate that targeting of adolescents is taking place, although there is evidence that advertisers tend to favor young adult audiences. All of the youth coefficients are insignificantly different from zero, and have standard errors equal to or greater than the coefficient magnitudes. Among the demographic variables, alcohol placements are negatively associated with the median age of adult readers. Median adult income and percent adult male readers have positive coefficients, but are neither variable is statistically significant. Among the magazine variables, positive effects are found for percent single-copy sales (newsstand sales) and adult readers per copy. In regression (2), the year dummies are not statistically significant. This result illustrates the weakness in the data and model used by Garfield et al. (2003). Regression (3) demonstrates that alcohol advertisers have the strongest preference for Men's Style & Sports magazines, followed by Entertainment & Music magazines. In this specification, the exposure elasticity was small in magnitude and insignificantly different from zero. Consequently, the annual issues variable was omitted from regressions (3) and (7).

B. Negative Binomial Results

In Table 4, regressions (4) - (7) contain the results for the negative binomial count model. For count data, the negative binomial is the main alternative to the Poisson model. Count data may be better described by the negative binomial if there is occurrence dependence or unobserved heterogeneity across magazines (Winkelmann, 2003, p. 22). The negative binomial model also relaxes the presumed equality of the mean and variance functions that underlies the Poisson model. The negative binomial results again fail to demonstrate that targeting of adolescents is taking place as all of the youth coefficients are insignificantly different from zero.

In other respects, the negative binomial results parallel the Poisson results, although the number of significant regressors increases. In particular, the real CPM price is statistically significant and negative. The exposure elasticities also are closer to unity. Comparing regressions (4) and (5), the results do not change much when the exposure elasticity is constrained to unity. Overall, the negative binomial results demonstrate the statistical importance of the real CPM price, adult median age, percent single-copy sales, adult readers per copy, square of readers per copy, and the exposure variable. The year dummies are insignificant in regression (6). The results for the fixed-effects specification are similar, except that the coefficient on the Automobile category is significantly negative in regression (7).

The positive results for readers per copy is of special importance, since it illustrates a criticism by the Federal Trade Commission (FTC, 2003, p. 32) of CAMY's methodology. Presumably, advertisers are concerned about the composition and size of the audience. CAMY's methodology addresses only the composition of the audience, and completely ignores its size. As pointed out by the FTC (2003, p. 33), the young adult population (ages 21-34) is about 50% larger than the underage youth population. Further, alcohol consumption per capita by younger adults is greater than older adults, and brand loyalty increases with age. Hence, there are several business reasons for alcohol companies to advertise in magazines with large young adult audiences who have not yet formed strong brand preferences.

C. Specification Tests

A well-know feature of the Poisson model is the presumed equality of the conditional mean and variance functions (equidispersion). This restriction may not hold due to occurrence dependence, unobserved heterogeneity, or because the zero outcomes of the data-generating

process are quantitatively different from the positive outcomes. Occurrence dependence or systematic contagion can reflect past advertising successes or perhaps a tendency by advertisers to focus on a few magazines during a given time period due to so-called “pulsing” behavior (see Winkelmann, 2003, pp. 16-22). Unobserved heterogeneity can arise if different models apply to different magazines due to random contagion, and this is reflected in a different proportion of zeros in the sample. For example, it is not clear if a zero placement occurs because advertisers did not happen to use a particular magazine during the study period or because that magazine would rarely be chosen for alcohol ads (e.g., zero counts for ads in *Better Homes and Gardens*). Using the results in Table 4, several specification tests were conducted. First, the Poisson model is nested within the negative binomial model (Winkelmann, 2003, p. 100). Using comparable results in Table 4, a likelihood ratio (LR) test strongly rejects the Poisson model in favor of the negative binomial model. The LR test statistics are 923.0, 912.0, and 1,031, respectively. The critical value of the chi-square distribution with one degree of freedom is 50.9 at the 99% confidence level. Second, the overdispersion parameters in the negative binomial regressions are significantly positive (see Cameron and Trevedi, 1998, p. 79). Third, formal tests for overdispersion due to Cameron and Trevedi (1990) and Wooldridge (1996) rejected the null for the three Poisson regressions. Overall, the results strongly favor the negative binomial model as the better representation of count data for alcohol advertisements in magazines. Combining the results in the present paper with Nelson (2005), this result is robust for a variety of data and model specifications.

IV. INCIDENCE RATE RATIOS, MARGINAL EFFECTS, AND ELASTICITIES

In order to assess or gauge the importance of different explanatory variables for placement of alcohol ads in magazines, it is useful to report standardized coefficients. Various standardized coefficients exist for count models (see Cameron and Trivedi, 1998, pp. 80-82; Winkelmann, 2003, pp. 68-71). In the conditional expectation function given by equation (1), each regression coefficient is the (constant) proportionate change in the conditional mean due to a unit change in the explanatory variable. If the regressor is a dummy variable, the coefficient gives the approximate relative impact. The incidence rate ratio (IRR) is given by $\exp(\text{coefficient})$, and is a common way of comparing relative impacts in count models. The IRRs show the relative change in advertising counts for each unit change in an explanatory variable. Marginal effects depend on the observation size, but an average marginal effect is found by multiplying the regression coefficient by the mean of the dependent variable. Lastly, average elasticity values are computed by multiplying the coefficient estimate by the mean of the respective explanatory variable (Cameron and Trivedi, 1998, p. 82).

For regression (4) above, Table 5 reports the incidence rate ratios, average marginal effects, and average elasticities. The standardized coefficients support the conclusion that the size of the adult audience is the most important variable for placement decisions. The audience IRR is 3.614 and the elasticity is 8.511. The price elasticity also is substantial, -1.955, and illustrates the importance of treating placement decisions as a demand function rather than just a marketing ploy. Ranked by the average elasticities, the statistically important variables are adult readers per copy, adult median age, square of readers per copy, real CPM price, annual issues, and percent single-copy sales.

<INSERT TABLE 5 HERE>

V. BEER AND SPIRITS ADVERTISING COUNTS

An extension of the analysis is an examination of advertising placements by beverage. The data by beverage are drawn from an on-line CAMY report. I collected count data for beer and spirits ads for 2001-03 for the sample of 28 magazines. For wine, there are too few positive counts to warrant analysis (65 out of 84 possible observations are zero or 77.4%). There are 38 zero counts for beer (45.2%) and 17 zero counts for spirits (20.2%). A larger proportion of zero counts suggests the analysis should consider more complicated empirical models. Given the findings in Section III, results are reported for the negative binomial model and the zero-inflated negative binomial model. The latter model allows for separate treatment of zeros and strictly positive outcomes (Winkelmann, 2003, p. 148).

Table 6 displays the results by beer and spirits. Adult median age is significantly negative in all of the regressions. Percent male readers is significantly positive in all six regressions, which is a change from Table 4. The CPM price of an advertisement is significantly negative for spirits, but insignificant for beer ads. Possibly there are too few magazines in the sample with positive placements to capture this aspect of decision-making by beer advertisers. Percent single-copy sales is significantly positive in the negative binomial model. Adult readers per copy is always significantly positive and the square of readers per copy is significantly negative. The log of the annual number of issues is significantly positive and close to unity in all regressions. The year dummies are not significant, which again illustrates the shortcomings of the model used by Garfield et al. (2003). The percent of youth readers is not significant in any of the regressions, regardless of the model or specification. The results fail to support the allegation that beer and spirits advertisers are “targeting” youth readers. Beer advertisers favor magazines with more young adults, male readers, and larger adult audiences, but not adolescents. Spirits

producers favor magazines with more young adults, male readers, and larger adult audiences, but not adolescents. Spirits producers also favor magazines with lower costs per advertisement.

<INSERT TABLE 6 HERE>

In a number of cases, the coefficients for beer and spirits are similar in magnitude, but the average marginal values depend on the mean of the respective dependent variable. For example, in the zero-inflated model, the beer and spirits coefficients are identical for adult median age and the average elasticities are -5.43 and -5.40, respectively, which suggests similar responses by beverage. However, the elasticities for adult readers per copy are 15.9 and 31.6 for beer and spirits, respectively. Hence, the results indicate that spirits producers advertise in magazines with a broader reach compared to beer producers. This outcome reflects the fact that magazines are the principal means of spirits advertising, given the long-standing voluntary ban of spirits ads on radio and television. Although this ban has been relaxed for cable TV, 70% of spirits ads in 2003 were in magazines compared to only 16% for broadcast media.³ The comparable percentages for beer are 6.6% for magazines and 80% for television.

VI. CONCLUSIONS

Advertisements for alcohol beverages appear in a variety of magazines, including those with adolescent readers. The empirical results in this paper illustrate some of the factors that affect advertising placement decisions for a sample of 28 major magazines, including the size of the adult audience and the price charged for an ad placement. The results for audience size capture criticisms by the FTC (2003, p. 33) of the methodology used by CAMY. The results for price are new economic evidence that was ignored by past researchers. Considerable controversy exists regarding the placement of alcohol ads in magazines where the youth

proportion of the audience is greater than 15%. The exact basis for this regulatory standard is difficult to discern, since several recent literature reviews fail to provide evidence that alcohol ads affect alcohol consumption in a material manner (Grube, 2004; Nelson, 2001, 2004; NIAAA, 2000, p. 422; NRC, 2004, p. 134). Using an improved data set and econometric methods, the results in the present paper fail to support claims that alcohol advertisers target underage youth. The empirical findings are contrary to the conclusions in Garfield et al. (2003), and also illustrate the shortcomings of the methodology used in a series of reports commissioned by the Center on Alcohol Marketing and Youth (2002, 2005a). Finally, policymakers in the alcohol area would be well advised to turn their attention to discussion of matters of importance for youthful drinking behaviors, rather than decisions made in the market for advertising space.

FOOTNOTES

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Department of Economics, 608 Kern Graduate Building, Pennsylvania State University,
University Park, PA 16803. Phone 814-865-0130. E-mail jpn@psu.edu.

1. See Nelson (2001, 2004) for discussion of alcohol advertising and the First Amendment. The third prong of the Central Hudson test requires that the government censor must demonstrate that an advertising ban or regulation will directly and materially advance a substantial government interest.

2. CAMY's list of 124 magazines includes many magazines that do not have large youth audiences, such as *Bon Appetit*, *Forbes*, and *The New Yorker*. Restricting the sample to magazines that allow alcohol ads and which are read by adolescents would appear to bias the results toward rejecting the null. Tables 2 and 3 can be used to judge the dispersion of magazines by youth readership, circulation, and subject content.

3. In June of 1996, the now defunct distiller Joseph E. Seagram aired television advertisements for Crown Royal Canadian Whiskey on an NBC-TV affiliate in Corpus Christi, TX, thereby breaking the industry's long-standing voluntary ban of broadcast advertising. Reactions to the ads included a full-page protest in the August 2 edition of the *New York Times* and a "Just Say No" bill introduced in Congress by Rep. Joseph Kennedy (D-MA). President William Clinton asked the industry to go back to the ban, calling Seagram's TV ads "simply irresponsible." He also requested an investigation by the Federal Communications Commission. In late 2001, NBC-TV announced its intention to allow alcohol ads after 9 p.m. on programs such as *Saturday Night Live*, and the controversy shifted focus onto the network. NBC eventually reinstated its voluntary ban to realign itself with the other three major networks. Since that date, public health groups have continued to pressure the industry and the FTC to prevent spirits ads from appearing on network TV. As a consequence, distilled spirits advertising continues to be dominated by print advertisements.

ABBREVIATIONS

CAMY: Center on Alcohol Marketing and Youth

CPM: Cost per Thousand Circulation

CSPI: Center for Science in the Public Interest

DISCUS: Distilled Spirits Council of the United States

FTC: Federal Trade Commission

GRP: Gross Rating Points

IRR: Incidence Rate Ratio

LR: Likelihood Ratio

NIAAA: National Institute on Alcohol Abuse and Alcoholism

NRC: National Research Council

P4C: Full-Page Four-Color Ad

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TABLE 1
Variable Descriptions and Data Sources

Variable	Definition, Units, and Summary Statistics	Data Source
Ad Count	Number of alcohol ads for 2001, 2002, & 2003, including 11 zero observations (13.1% of total observations). Sample mean (s.d.) = 43.8 (52.2); median = 16.0. Covers all three beverages.	CAMY 2005 Magazine Study
Beer Ad Count	Number of beer ads for 2001, 2002, & 2003, including 38 zero observations (45.2% of total observations). Sample mean (s.d.) = 7.8 (12.7); median = 1.0. Beer includes favored malt beverages.	CAMY Web site, interactive data tool
Spirits Ad Count	Number of spirits ads for 2001, 2002, & 2003, including 11 zero observations (20.2% of total observations). Sample mean (s.d.) = 34.6 (41.0); median = 14.0. Spirits include liqueurs and cordials.	CAMY Web site, interactive data tool
Percent Youth of Audience	Teen audience (ages 12-19 yrs.) divided by total audience (teens + adults). Mean (s.d.) = 17.1% (5.5). Range: 4.3 to 31.2%.	MRI Magazine Report (Teen)
Adult Median Age	Median age of adult readers. Mean (s.d.) = 34.8 yrs. (5.8). Range: 23.2 to 46.4 yrs.	MRI Magazine Report
Adult Median Real Income	Median household income of adult readers. Expressed in thousands of real dollars using the CPI (2000 = 100). Mean (s.d.) = \$54.8 (8.9). Range: \$33.3 to \$71.9.	MRI Magazine Report
Percent Adult Male Readers	Adult male audience divided by total adult audience (adult men + adult women). Mean (s.d.) = 49.8% (29.2). Range: 6.3 to 91.9%.	MRI Magazine Report
Real CPM Price of a P4C Ad	Real CPM price of a one-page four color (P4C) ad. Magazine's cost for a P4C ad divided by its rate base circulation (in thousands) for each year. Expressed in real dollars using the PPI (2000 = 100). Mean (s.d.) = \$63.1 (18.5). Range: \$26.1 to \$100.6 per P4C ad.	SRDS Magazine Advertising Source
Percent Single-Copy Sales	Percent of circulation accounted for by single-copy sales at newsstands. Mean (s.d.) = 23.5% (19.3). Range: 2.6 to 80.1%.	SRDS Magazine Advertising Source
Adult Readers per Copy	Total adult audience divided by circulation. Square of this variable is used to pick-up other non-linearity. Mean (s.d.) = 6.62 (2.3). Range: 11.1 to 248.7 readers per copy.	MRI Magazine Report
Magazine Category	Five dummy variables for magazines by category. Omitted category is General & Other. See Table 3 for categories.	Author constructed
Year Dummies	2002 dummy = one if year is 2002; 2003 dummy = one if year is 2003.	Author constructed
Annual No. of Issues	Log of annual no. of issues for "exposure" differences across magazines. Unlogged mean (s.d.) = 21.3 (16.0). Range: 12 to 53	MRI Circulation Report (no time variation)

All data for 2001-2003 from MRI Magazine Report, MRI Magazine Report (Teen), and MRI Circulation Report accessed at <http://www.mriplus.com/cgi-bin/WebObjects/mriplus.woa>. Center on Alcohol Marketing and Youth, "Youth Overexposed: Alcohol Advertising in Magazines, 2001 to 2003," Washington, DC: CAMY, 2005, p. 20, at <http://camy.org/>. CAMY Web site, interactive data tool for beverage data, "Magazine Alcohol Ads: Your Child and You," at <http://camy.org/>. Standard Rate and Data Service, *SRDS Consumer Magazine Advertising Source*, Des Plaines, IL: SRDS, July issue.

TABLE 2
Sample of Magazines and Selected Data for 2003

Magazine (circ. rank)	Alcohol Ads, 2001-03	Pct. Youth of Audience	Rate Base Circulation (000s)	AdCost per thous. Circulation	Adult Readers per Copy
Allure (88)	23	30.5	900	\$82.25	4.43
Better Homes & Gardens (5)	3	4.7	7600	42.16	4.97
Car & Driver (61)	23	22.5	1350	105.36	7.49
Cosmopolitan (19)	261	19.1	2600	62.22	6.29
ESPN The Magazine (40)	341	29.2	1500	90.00	6.21
Ebony (37)	84	18.6	1700	34.08	5.62
Entertainment Weekly (38)	332	16.7	1500	68.71	5.26
Fitness (58)	3	20.5	1100	76.34	4.16
Glamour (29)	39	18.1	2200	55.35	5.67
Hot Rod (na)	2	26.4	700	100.95	9.90
In Style (42)	291	18.9	1500	64.33	5.16
Jet (100)	102	21.3	900	29.64	8.32
Maxim (25)	453	15.0	2500	66.80	5.46
Motor Trend (67)	4	25.8	1250	101.71	5.27
Newsweek (17)	23	8.6	3100	61.77	6.08
People (12)	78	12.5	3250	52.62	10.16
Popular Mechanics (72)	47	16.3	1200	78.22	7.90
Popular Science (53)	30	19.9	1450	58.92	5.12
Road & Track (na)	12	21.4	750	114.33	7.27
Rolling Stone (66)	446	24.7	1250	88.66	7.90
Self (62)	35	19.0	1200	73.15	3.78
Shape (45)	5	15.8	1500	60.45	3.54
Spin (na)	185	29.3	525	94.17	4.77
Sports Illustrated (16)	463	20.5	3150	71.75	6.17
The Source (na)	7	33.3	475	66.63	15.77
Time (10)	51	9.8	4000	53.00	5.25
Vibe (na)	193	28.7	800	99.01	8.00
Vogue (75)	139	18.1	1100	81.02	8.75

See Table 1 for description of variables and data sources. Youth ages 12-19 are 13.7% of the U.S. population ages 12 and older. Circulation rank in 2003 is from MPA data on the top 100 magazines; <http://www.magazine.org/circulation>.

TABLE 3
Magazine Categories and Average Data for 2003

Magazine Category	Total Alcohol Ads, 2003	Mean Pct Youth, 2003	Mean Adult Age (yrs)	Mean Adult Income (\$000)	Mean Real P4C Price ^a	Mean Adult Readers per Copy
Automobiles	12	19.3	35.5	61.8	92.95	7.5
Black	137	18.5	34.2	38.1	47.75	7.3
Men's Style & Sports	345	17.6	32.0	64.4	67.06	5.9
Women's Style	186	15.6	33.5	63.3	57.86	6.5
Entertainment & Music	270	18.6	30.9	54.8	65.28	8.8
General & Other	74	13.5	39.8	66.0	57.34	5.0
All Magazines	1024	16.5	35.3	59.8	63.93	6.6

Automobiles: *Car & Driver, Hot Rod, Motor Trend, Road & Track.*

Black: *Ebony, Jet, Vibe.*

Men's Style & Sports: *ESPN, Maxim, Sports Illustrated.*

Women's Style: *Cosmopolitan, Glamour, In Style, Vogue.*

Entertainment & Music: *Entertainment Weekly, People, Rolling Stone, Spin, The Source.*

General & Other: *Allure, Better Homes & Gardens, Fitness, Newsweek, Popular Mechanics, Popular Science, Self, Shape, Time.*

^aPrice is measured in constant 2000 dollars for a P4C ad per 1000 circulation.

TABLE 4
Count Data Regressions for All Beverages

Variable	Poisson Model			Negative Binomial Model			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	-1.853 (2.28)	-1.711 (2.42)	2.368 (.467)*	0.701 (2.28)	1.172 (2.23)	0.607 (2.45)	2.184 (.585)*
Percent Youth (ages 12-19)	0.029 (.027)	0.024 (.032)	-0.008 (.027)	0.052 (.042)	0.052 (.042)	0.053 (.043)	0.003 (.030)
Adult Median Age	-0.184 (.027)*	-0.185 (.028)*	---	-0.166 (.035)*	-0.176 (.032)*	-0.166 (.036)*	---
Adult Median Real Income	0.022 (.016)	0.023 (.017)	---	0.015 (.027)	0.026 (.022)	0.015 (.027)	---
Percent Adult Male Readers	0.011 (.008)	0.011 (.008)	---	0.009 (.008)	0.009 (.007)	0.009 (.008)	---
Real CPM Price of P4C Ad	-0.015 (.010)	-0.014 (.010)	---	-0.031 (.018)**	-0.036 (.018)*	-0.031 (.018)**	---
Percent Single- Copy Sales	0.028 (.013)*	0.027 (.013)*	---	0.023 (.014)**	0.017 (.010)**	0.023 (.014)**	---
Adult Readers per Copy	1.608 (.290)*	1.634 (.294)*	---	1.285 (.366)*	1.348 (.338)*	1.293 (.363)*	---
Square of Adult Readers per Copy	-0.115 (.017)*	-0.117 (.017)*	---	-0.087 (.017)*	-0.088 (.016)*	-0.087 (.016)*	---
Year 2002 Dummy	---	-0.067 (.115)	-0.162 (.065)*	---	---	0.023 (.122)	-0.145 (.103)
Year 2003 Dummy	---	-0.149 (.131)	-0.344 (.087)*	---	---	0.059 (.134)	-0.228 (.103)*
Auto Category Dummy	---	---	-0.816 (.501)	---	---	---	-0.914 (.467)*
Black Category Dummy	---	---	1.689 (.363)*	---	---	---	1.621 (.334)*
Men's Style Category Dummy	---	---	2.879 (.270)*	---	---	---	2.816 (.241)*
Women's Style Category Dummy	---	---	2.038 (.375)*	---	---	---	1.983 (.357)*
Entertainment & Music Dummy	---	---	2.198 (.422)*	---	---	---	2.108 (.391)*
Log of Annual No. of Issues	1.529 (.417)*	1.503 (.426)*	not incl.	1.175 (.326)*	1.000	1.178 (.333)*	not incl.
Log Likelihood	-818.8	-812.9	-863.2	-357.1	-357.2	-357.0	-347.9
Alpha Dispersion Parameter (s.e.)	---	---	---	0.917 (.263)*	0.921 (.268)*	0.917 (.262)*	0.700 (.299)*

Dependent variable is count of alcohol advertisements in each of 28 magazines for 2001, 2002, and 2003, including 11 zero observations. Estimates obtained using Stata 8.2. Robust standard errors in parentheses; one and two asterisks indicate that the z-statistic is equal to or greater than 1.96 and 1.64, respectively.

TABLE 5
Incidence Rate Ratios, Marginal Effects, and Elasticities

Variable	IRR (z-stat)	Ave. Marginal	Ave. Elasticity
Pct. Youth Readers	1.053 (1.24)	2.28	0.887
Adult Median Age	0.847 (4.77)	-7.27	-5.783
Adult Median Income	1.015 (0.53)	0.66	0.821
Pct. Adult Male Readers	1.009 (1.21)	0.39	0.448
CPM-P4C Price (real)	0.969 (1.70)	-1.36	-1.955
Pct. Single Copy Sales	1.024 (1.64)	1.01	0.538
Adult Readers per Copy	3.614 (3.51)	56.28	8.511
Sq. Readers per Copy	0.917 (5.24)	-3.81	-4.283
Annual No. of Issues	---	---	1.175

TABLE 6
Count Data Regressions for Beer and Spirits

Variable	Negative Binomial Model				Zero-Inflated Negative Binomial	
	Beer	Beer	Spirits	Spirits	Beer	Spirits
Constant	-2.383 (3.20)	-3.458 (3.22)	-0.266 (2.40)	-0.255 (2.49)	-6.387 (2.07)*	3.078 (1.72)
Percent Youth (ages 12-19)	0.028 (.054)	0.054 (.055)	0.067 (.043)	0.067 (.044)	-0.005 (.028)	0.031 (.029)
Adult Median Age	-0.274 (.047)*	-0.268 (.046)*	-0.147 (.038)*	-0.147 (.038)*	-0.156 (.026)*	-0.155 (.027)*
Adult Median Real Income	0.029 (.031)	0.033 (.031)	0.001 (.028)	0.001 (.028)	0.046 (.017)*	0.009 (.019)
Percent Adult Male Readers	0.021 (.009)*	0.023 (.008)*	0.013 (.006)*	0.013 (.006)*	0.015 (.005)*	0.009 (.004)*
Real CPM Price of P4C Ad	-0.011 (.019)	-0.016 (.018)	-0.030 (.015)*	-0.030 (.016)**	0.010 (.012)	-0.029 (.011)*
Percent Single- Copy Sales	0.030 (.017)**	0.031 (.016)**	0.033 (.016)*	0.033 (.016)*	0.012 (.010)	0.015 (.010)
Adult Readers per Copy	1.517 (.575)*	1.565 (.564)*	1.240 (.292)*	1.239 (.295)*	2.051 (.503)*	0.914 (.223)*
Square of Adult Readers per Copy	-0.118 (.035)*	-0.121 (.034)*	-0.087 (.015)*	-0.087 (.015)*	-0.149 (.034)*	-0.062 (.012)*
Year 2002 Dummy	---	0.328 (.357)	---	-0.002 (.296)	---	---
Year 2003 Dummy	---	0.465 (.366)	---	-0.007 (.302)	---	---
Log of Annual No. of Issues	1.859 (.416)*	1.862 (.413)*	1.318 (.314)*	1.318 (.315)*	1.024 (.273)*	0.889 (.217)*
Log Likelihood	-186.9	-186.1	-337.9	-337.9	-130.9	-288.3
Alpha Dispersion Parameter (s.e.)	1.017 (.303)*	0.960 (.296)*	1.073 (.198)*	1.073 (.198)*	0.135 (.054)*	0.391 (.073)*

Dependent variable is count of advertisements by beverage in each of 28 magazines for 2001, 2002, and 2003. Estimates obtained using Stata 8.2. Robust standard errors in parentheses; one and two asterisks indicate that the z-statistic is equal to or greater than 1.96 and 1.64, respectively. Zero counts are 38 for beer and 17 for spirits. Wine ads are excluded due to the large number of zero counts. For specification of the zero-inflated negative binomial model, see Winkelmann (2003).