Evaluating Econometric Studies of Alcohol Advertising

HENRY SAFFER, PH.D.*

National Bureau of Economic Research, Inc., New York, New York

ABSTRACT. **Objective:** This article provides a guide for the behavioral scientist to understand and judge econometric studies of alcohol advertising. **Method:** The requirements for causal evidence in an econometric study include an empirical scenario in which alcohol advertising is not affected by alcohol consumption and in which both consumption and advertising are not affected by a common third variable. The articles included in this review were a sampling of older studies to illustrate the problems with these studies and newer studies, not covered by existing reviews, which try to directly address causality. **Results:** The results from many prior studies are suspect by current econometric standards. However, a few newer econometric studies address causality and find a small positive effect of alcohol advertising on consumption. **Conclusions:** Many prior studies and some newer studies of alcohol advertising in the econometric literature have not addressed causality, and the results from these studies should be considered as descriptive only. (*J. Stud. Alcohol Drugs, Supplement 19,* 106–112, 2020)

THIS ARTICLE PROVIDES a review of econometric studies of the effects of alcohol advertising on drinking, heavy drinking, and negative outcomes associated with drinking. Because econometric methods have evolved considerably over the past several decades, this is not a historical review. Rather, it is a discussion of the approach and interpretation of causality as used by economists with reference to alcohol advertising. The discussion is illustrated by reference to older studies, which ignored causality, along with newer studies that attempt to address this issue.

Advertising includes the use of media to increase brand awareness and create positive associations with a brand with the goal of increasing its sales. The term *traditional media* refers to television, radio, print, outdoor, and point of purchase. New media are any form of advertising on the internet. According to *Business Insider* (Archer, 2016), about 89% of alcohol advertising dollars were spent on television, and only about 2% were spent on internet ads. Marketing is a broader concept that includes not only advertising but also the use of branded merchandise, sponsorships of events, and all other nonmedia activities designed to promote brand awareness and increase sales. Wilcox et al. (2015), Archer (2016), and Schonfeld and Associates (2017) estimated total traditional media spending on alcohol advertising in the United States to be about $500 million per year. The advertising to sales ratio (A/S) gives this dollar amount more intuitive meaning. Schonfeld and Associates (2017) reported the A/S for all three categories of alcoholic beverages. The average for all three was about 6.6%. Schonfeld and Associates (2018) reported that the average A/S for all industries was about 2.4%. That is, alcohol is advertised about three times as much as the average advertised product.

Alcohol, like most other products, is advertised at the brand level, which can result in brand switching. Brand switching is of little interest to public health unless it is accompanied by an increase in total alcohol consumption. The important public health question relating to alcohol advertising is whether the large amount of advertising increases drinking, heavy drinking, and the negative outcomes associated with heavy drinking. This article is written for researchers who are familiar with statistical methods such as regressions but less familiar with the specific approaches used in econometric studies.

This review explains the criteria needed to have a credible econometric study of alcohol advertising. Credibility in this area of research depends on an empirical approach, in which it is clear that the only line of causality is from alcohol advertising to alcohol consumption. The empirical approaches in prior studies were categorized based on the data used and the empirical approach. A number of articles, especially the older articles, used an empirical approach that provided no basis for causality. The articles chosen for inclusion in this review were weighted toward those that rely on an empirical approach that provides a plausible basis to test for an effect of alcohol advertising on alcohol consumption.

How does advertising affect behavior?

Advertising can affect behavior in different ways. These include objective information, image creation, and cues that stimulate consumption. Objective information announces that the brand exists and explains attributes such as what it does, how much it costs, and what it looks like. The most common type of objective information about an alcoholic beverage is how much it costs. Health claims and possible psychological or physical effects cannot be advertised. Image advertising is common in alcohol advertising. These ads are designed to associate the product with some variation of social or athletic success. By consuming the brand, individuals associate themselves with the favorable imagery. In this
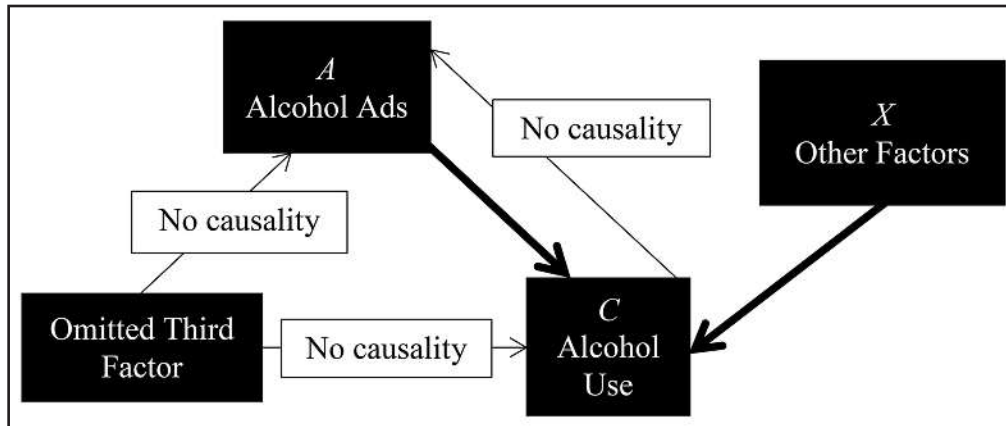
FIGURE 1.   Exogenous advertising effect (estimation of a causal effect of *A* on *C* requires that there is no causality from *C* to *A* and that there is no omitted third factor that affects both *C* and *A*)

case, advertising should be viewed as a cumulative or stock concept. New advertising messages add to the total stock and the impact of old messages fades with time, reducing the stock. Associations about the brand can also come from sources other than advertising, which affects the total stock. On the empirical level, a cumulative measure of advertising should be tested. Advertising as a cue stimulates the desire to consume the good. Bernheim and Rangel (2004) present a theory of how cues could affect consumption of addictive goods. They argue that the role of cues on consumption of addictive goods is a consequence of the anticipated positive effects of consumption. This is sometimes referred to as Pavlovian conditioning. The anticipated pleasure is separate from the actual pleasure from consumption. In a series of experiments with cues, subjects were presented with a cue followed by a reward. When the reward was increased but the cue remained constant, the anticipated positive effects of consumption increased in proportion to the new level of the reward. This suggests that heavy drinkers should be more responsive to alcohol advertising than moderate drinkers. Thus, measuring the effect of ads at different levels of consumption is important. In this case, the timing between exposure to the cue and consumption could be a concern.

What is an econometric study?

Econometric studies are typically regression studies, which rely on nonexperimental data, attempt to account for the distributional properties of the data, and attempt to account for individual differences. Because the data are real world rather than experimental, correlations with ambiguous causality are possible. Today, for a study to be considered econometric, the treatment of causality must be explained. This was not the case in years past. In an econometric study the hypothesized relationship is based on economic theory and can be represented for convenience with an equation. For example:

$$C = \beta_0 + \beta_1 A + \beta_2 X + u \qquad (1)$$

In Equation 1, alcohol consumption, *C*, is a function of alcohol advertising, *A*, and a set of other relevant variables, *X* and *u*, a random error term. The βs are coefficients to be estimated typically with regression. For economists to consider the estimate of the effect of *A* on *C* to be causal, *A* must be exogenous to *C*. Exogeneity requires that (a) *C* is not causal on *A* and (b) there is no omitted third factor that is causal on both *A* and *C*. *X* includes variables such as income, alcohol price, and demographics, which are believed to affect *C*. These relationships are illustrated in Figure 1.

An econometric study of alcohol advertising must be based on an empirical scenario in which alcohol advertising is not affected by alcohol consumption and in which both variables are not affected by a common third variable. This is referred to as *exogeneity*. If there are multiple lines of causality between variables, such as in the case of reverse causality, it is called *endogeneity*. We know from advertising research that companies often set their advertising budgets based on anticipated sales. We also know that there is a high degree of time correlation in sales and consumption of alcohol. Longitudinal data cannot eliminate this endogeneity because of the correlations over time in both consumption and advertising. This is reverse causality because consumption is causal on advertising. Also, we know that an interest in consuming an item such as alcohol leads to both consumption and a heightened awareness of advertising for that product. This is the omitted third factor type of endogeneity. Omitted third factor endogeneity is a problem in using self-reported advertising or ownership of branded merchandise. An econometric study of the effects of alcohol advertising must use an empirical strategy to overcome these problems.

These econometric requirements for causality are more difficult to satisfy than those generally relied on in epidemiology. Hill (2005) presented a list of seven conditions that provide evidence of causality for epidemiological studies.

These conditions included a relatively large effect size, a number of studies that showed the same results but controlled different measures of attitudes and other social influences, and a neurobiological basis for a causal effect. Hill described causality not as something that could be proven by any one study but rather as a consensus of scientific judgment. Causality in an econometric study is also an opinion, but it is an opinion regarding the credibility of the argument that the independent variable of interest is exogenous to the outcome. This view of causality by economists has become the standard since about the year 2000, but a number of the studies of alcohol advertising in the economics literature before this date did not address these requirements and might not be published today.

Eliminating endogeneity in alcohol advertising studies

Endogeneity from reverse causality in alcohol advertising occurs within targeting groups. Targeting is the practice of exposing a defined group to a disproportionally large percentage of the total advertising budget because the group is known to have disproportionally high consumption. Targeting can be exploited to control for endogeneity. In Equation 1, β_1 is the effect of advertising on consumption within the groups defined by the variables in *X.* For example, if gender is the *only* targeting criteria and gender is included in *X,* then β_1 is the effect of advertising on consumption *within* gender groups. There is no endogeneity within gender groups in this example because gender is the only targeting criteria. If variables for all targeting groups were included in *X,* then endogeneity from reverse causality is removed. One strategy to control this form of endogeneity is to use the same data used by advertisers to target alcohol advertising. These data can be also be used to construct detailed measures of advertising exposure that vary at the individual level to identify plausibly causal effects of this exposure. Molloy (2016), described below, used these methods to study the effect of alcohol advertising on youth alcohol consumption.

Another potential source of exogenous advertising in secondary data is pulsing. Pulsing refers to alternating between high and low levels of advertising rather than maintaining a steady level of advertising. Considerable research has investigated the effectiveness of alternative time patterns of advertising. Studies such as those by Dubé et al. (2005) and Freimer and Horsky (2012) have shown that pulsing is more effective per dollar spent on ads than a steady state. This is in part the result of the lingering effects of advertising. Lingering effects refers to the fact that it takes some length of time after exposure to advertising for its effects to totally dissipate. That is, advertising in a given period will have a lingering, although ever smaller, effect in subsequent periods. The frequency of the advertising pulse is shown to depend on the magnitude of the lingering effect. Pulsing can provide a valuable source of exogenous variation for an econometric study. But if all advertisers advertised out of sync with each other, total advertising would lose variation. Out of sync means that some companies stop advertising, whereas others engage in advertising. In sync means that most companies advertise, or do not advertise, at the same time. Because alcohol sales are seasonal and companies tend to advertise more when demand is high, alcohol advertising tends to be in sync. This provides the maximum exogenous variation across observational units, but the time pattern should be verified in each study. However, the ad pulses should not be perfectly related to seasonal demand.

Another approach to exogeneity is a natural experiment. In a natural experiment, exposure by some individuals to some type of treatment from an event occurs as the result of natural causes or for reasons having nothing to do with the outcome of interest. If the treatment is not randomly assigned then the natural experiment is called a quasi-natural experiment. An example comes from the 2016 presidential election. Total political ad spending during the campaign was $9.8 billion (Borrell, 2017), which was the highest on record. There is a law that allows campaigns to co-opt all the air time they want at fixed rates during a specific time window before an election. The political action committees also spend a great deal on advertising but cannot co-opt time and must pay commercial rates. In 2016 this situation was particularly acute in the battleground states. The intense political advertising reduced slots open for brand advertising and raised the price of available slots. Advertising rates for brands were estimated to increase considerably (Radelat, 2015). This represents a potentially exogenous decrease in alcohol advertising, which could be examined in an econometric study. The actual number of alcohol advertising messages aired in the battleground states and in a set of noncontested control states, before and during the political time window, would need to be examined to verify this possibility. If there were a measurable decline in alcohol advertising, then its effect on alcohol consumption could be estimated. Another approach is two-stage instrument variable regression. This statistical procedure requires an instrument variable that is causal on advertising but not on consumption and has the power to significantly change the level of advertising. These requirements are not easily achieved with available alcohol advertising data.

Measuring advertising

There are two basic approaches to measuring advertising. The first is to use a dichotomous indicator of a legal ban on ads. These bans are within some defined geographic/political area for a defined set of products and possibly with time-of-day restrictions. The second approach is to measure advertising by the level of exposure. Measuring exposure to advertising in the real world environment involves a set of specific issues. Two commonly used measures of advertising

are gross rating points (GRP) and advertising expenditures. In time-series studies, an aggregate measure of ad spending is used; in ban studies, a dichotomous ban indicator is used. GRPs are available from Nielsen (New York, NY), and expenditure data are available from Kantar Media (New York, NY). Both GRPs and expenditures are based on the concept of defining exposure as the number of people who see an ad times the number of times each person is exposed to an ad. Using the terminology of GRPs, this is referred to as reach multiplied by frequency. Reach is calculated by the percentage of the target market that is exposed and frequency is the number of ads run by an advertiser. Nielsen estimates the percentage of the television viewers who watched a particular network or television show at a particular time. They do this with electronic monitors or paper surveys of a selected random sample of individuals. They also collect data on the number of ads run. As an example, suppose Nielsen data show that 20% of television viewers watch a specific program every Wednesday night and suppose an advertiser ran a commercial four times in that time slot. The GRP would be calculated as 20% times four or ($.20 \times 4$). This is multiplied by 100 to equal 80 GRPs. TRPs are targeted rating points and are the same as GRPs except that they are defined for specific target groups such as White males.

Although alcohol advertisers use a great deal of television advertising, they are not limited to television. But the inclusion of separate measures for each media in a regression model is likely to cause statistical problems. Each media may be correlated, which can severely bias significance tests. GRPs from different media cannot be added together. However, expenditures are all in dollars and can be added if it is assumed that a dollar spent in one media has the same impact as a dollar spent in another media. This is actually a reasonable assumption because advertising prices are proportional to the impact on consumption.

Prior reviews

There are three relevant prior reviews of econometric alcohol advertising studies. A meta-analysis by Gallet (2007) on 322 estimated advertising elasticities found a very small (.03) and statistically insignificant median effect of alcohol advertising.

Many of the older studies presented in this review are not valid because they did not adequately address causality, which weakens the conclusions. Nelson (2010b) reviewed 20 studies of alcohol advertising and youth consumption. He considered endogeneity in each of these studies and concluded that a causal interpretation was not possible in any of these studies. The endogeneity problem is valid and must be addressed. Also, a review by Aspara and Tikkanen (2013) provided a marketing and consumer research perspective on this question. They concluded that the evidence presented in the studies reviewed was not rigorous enough to establish any effect of alcohol advertising on adolescent alcohol consumption.

Review of alcohol advertising econometric studies

Criteria for inclusion in this review. The articles included both a sampling of older studies to illustrate the problems with these studies as well as newer studies, not covered by existing reviews, which try to directly address causality. This review was organized by type of secondary data and by type of advertising data. The secondary data were either time-series or pooled data, and the advertising measure was either bans or expenditures. This created four categories, which are presented in the four panels of Table 1. The time-series studies included data on only one observational unit and thus had no control group. Also, these studies did not examine the effect of any event that could result in an independent change in advertising, and thus there is no possibility of conclusions regarding causality. Only a few studies representative of this approach are listed in Panels 1 and 2 because of the causality issue. The pooled data studies are presented in Panels 3 and 4 and include multiple observational units. These studies measured advertising either by bans or by expenditure. The studies listed in these sections are those that have the potential for controlling reverse causality.

Time-series studies. The first two panels of Table 1 present time-series studies with advertising bans and with advertising expenditures, respectively. Time-series data were data reported over time for a single observational aggregate unit such as the United States with an advertising measure included as an independent variable. A plausible time-series study would include an exogenous event that changed the level of advertising and a control group for comparison. The published studies of alcohol advertising do not address these requirements. One example is Nelson (1999). He studied broadcast advertising and alcoholic consumption and used quarterly time-series data for 1977–1994 on alcohol consumption and measures of advertising disaggregated by beer, wine, and distilled spirits. The model explains the growth rate of per capita consumption dependent on explanatory variables for prices, income, demographic changes, and advertising by media and beverage. He reported some positive effects of advertising by beverage type on consumption of that beverage and negative effects on consumption of the other two beverage types. He found that advertising could result in shifting between beer, wine, and distilled spirits but had little or no effect on total alcohol consumption. The most recent contribution to this line of research is Wilcox et al. (2015). They argued that, over the past 40 years, advertising expenditures rose 400%, whereas consumption was fairly stable, which they interpreted as advertising having no effect on consumption. There is no plausible causality in this approach, and both time series could have been driven by different underlying factors.

TABLE 1.   Econometric studies of alcohol advertising

Study authors	Year	Data sample	Conclusion
Panel 1: Time-series ban studies			
Smart & Cutler	1976	British Columbia	No effect of advertising
Ogborne & Smart	1980	Manitoba	No effect of advertising
Makowsky & Whitehead	1991	Saskatchewan	No effect of advertising
Panel 2: Time series advertising expenditures studies			
Nelson	1999	U.S. quarterly	No effect of advertising
Duffy	2001	U.K. 1964–1996 quarterly	No effect of advertising
Wilcox et al.	2015	U.S. 1971–2012	No effect of advertising
Panel 3: Pooled data ban studies			
Young	1993	OECD 1970–1990	Mixed
Miron	1999	U.S. 1900–1995	No effect of ban during prohibition
Milyo & Waldfogel	1999	Rhode Island 1995–1997	Indirect evidence of no effect of price advertising
Nelson & Young	2001	OECD 1970–1990	Positive effect of bans
Saffer & Dave	2002	OECD 1970–1995	Negative effect of bans
Nelson	2010a	OECD 1975–2000	No effect of ban
Panel 4: Pooled data advertising expenditures studies			
Goel & Morey	1995	U.S. 1959–1982	Mixed results
Gius	1996	Brand level data	No effect of ads
Saffer	1997	U.S. 1986–1989 quarterly	Small positive effect of ads on highway fatalities
Saffer & Dave	2006	U.S. 1996–1998	Small positive effect on youth consumption
Molloy	2016	U.S. 2000–2007	Small positive effect on youth consumption

Note: OECD = Organisation for Economic Co-Operation and Development.

Pooled data ban studies. A time series of a set of observational units is called a pooled data set. Pooled data sets can involve aggregated data or individual-level data. The third panel of Table 1 presents pooled data studies. Pooled data aggregated at the country level are useful to examine the effects of national advertising bans. An advertising ban is a case in which an entire class of advertising is prohibited. Partial alcohol advertising bans also exist. Bans will reduce the effectiveness of the remaining nonbanned media. A ban on one or more media will result in substitution into the remaining media. However, because each media is subject to diminishing marginal product, the increased use of the nonbanned media will result in a lower impact on consumption for a given advertising budget. Diminishing marginal product means that, as advertising increases, the resulting increases in sales get smaller and can eventually become zero. That is, the effect of ads on consumption is positive, but increments in ads have ever smaller positive effects on consumption. Advertisers may respond to this decrease in effectiveness of their advertising expenditures with more spending. Alternatively, they may try to compensate with the use of other marketing techniques such as promotional allowances. Also, the enactment of an alcohol advertising ban should be plausibly exogenous to alcohol consumption. Because this is doubtful, evidence of exogeneity or a treatment for endogeneity must be provided.

The ban studies could provide causal results, but an empirical strategy to produce this is generally not explained. If the advertising bans were enacted because of problems resulting from heavy alcohol consumption, then they are endogenous. Saffer and Dave (2002) examined the relationship between alcohol advertising bans and alcohol consumption in 20 countries over 26 years. The empirical model is a simultaneous equations system that treats both alcohol consumption and alcohol advertising bans as endogenous. The primary conclusions of this study were that alcohol advertising bans decreased alcohol consumption and that alcohol consumption had a positive effect on the legislation of advertising bans. The results indicate that an increase of one ban could reduce alcohol consumption by 5% to 8%. Milyo and Waldfogel (1999) used a difference-in-difference approach to study the effect of the elimination of the Rhode Island ban on price advertising. This approach provides plausibly causal effects, and they found that elimination of the ban did not influence the distribution of prices. This suggests that advertising does not affect alcohol consumption. Nelson (2010a) used cross-country panel data to study the effects of advertising bans and other control policies on alcohol demand. This study included data on other alcohol control policies, age of the population, tourism, and unemployment rates. His results showed that the Mediterranean wine-drinking countries were categorically distinct from the beer-drinking countries and Nordic spirits-drinking countries. He concluded that advertising had no effect.

Pooled data with advertising expenditures. The fourth panel of Table 1 presents studies that rely on pooled data and advertising expenditures. These studies used individual-level data. If a long period of time is involved, then an adjustment for inflation is needed. Controlling targeting is a plausible method for estimating causal effects. Demographic variables are a minimum to control for targeting.

The advertising data need to be merged to the individual record. There are no data sets that report individual exposure and consumption, but it is important to get as close a match as possible. The mismatch is a type of measurement error and creates biased results. It is usually assumed that measurement error results in an underestimate of the true effect. Pooled data sets typically match by location, usually a county or a designated market area (DMA). A DMA is a marketing concept, which defines one or more counties that receive the same local television advertising. The merged advertising data also need to vary over time and location. However, some advertising is national, which means that all DMAs receive the same ads. Spot advertising is a solution to this problem because these are ads shown only in specific local areas. Radio and newspapers are typically local and magazines can be either local or national. The regression equation needs to include both cross-sectional fixed effects and time-series fixed effects to control for cross-sectional and time-related unobserved variables. The only variation that remains in the dependent variable is the time variation within location. If the advertising is measured on a national basis only, then there is only time variation in the data, which is insufficient to identify a causal effect. The variation in advertising and the sample size must be sufficient to cause a detectable effect on consumption.

Saffer and Dave (2006) investigated the effects of alcohol advertising on adolescent alcohol consumption. Monitoring the Future (MTF) and National Longitudinal Survey of Youth 1997 (NLSY97) data were augmented with alcohol advertising, originating on the market level, for five media. The large sample of the MTF allows for estimation of race and gender-specific models. The longitudinal nature of the NLSY97 allows for controls for unobserved individual differences with state level and individual fixed effects. Advertising effects are generally larger for females relative to males. Controls for individual differences yield larger advertising effects, implying that the MTF results might understate the effects of alcohol advertising. The results from the NLSY97 suggest that a 28% reduction in alcohol advertising would reduce adolescent monthly alcohol participation by about 2%. For binge participation, the reduction would be from about 3%. The results show that reduction of alcohol advertising could produce a modest decline in adolescent alcohol consumption, although effects may vary by race and gender.

Molloy (2016) studied the effect of alcohol advertising on youth alcohol consumption with data from the National Consumer Survey (NCS) provided by Simmons (https://www.simmonsresearch.com). These data provide the best solution in secondary data to the problems of endogeneity and matching ads to individuals. The NCS allows the researcher to observe the same consumer information and characteristics as the advertiser, which minimizes the reverse causality bias that results from targeted ads. The NCS data on shows watched and data on advertising on those shows can be used to closely estimate an individual's exposure to alcohol advertising. It is not an exact match, but there is a high probability of exposure. This form of matching ads to viewers is far more accurate than the simple matching by DMA used in other pooled data studies. The alcohol consumption variable in the NCS is truncated at the top end, which is probably not that important for youth. The results showed that alcohol advertising has a small and positive effect on consumption for youth at least in some specifications. This study could be extended to adult alcohol consumption, but this has not been done. The truncation of the alcohol consumption variable could be a problem in estimating effects for heavy drinkers.

Summary and conclusion

This article provides a guide for the behavioral scientist to understand and judge all regression studies of alcohol advertising. The argument is made that the results from many studies are suspect by current econometric standards. However, a few newer econometric studies address endogeneity and have found a small effect on consumption. In particular, the study by Molloy (2016) addressed endogeneity and suggests a very small positive effect of alcohol advertising on total alcohol consumption for young adults. Economists expect the relationships estimated to exclude causality from consumption to advertising and to exclude any omitted third factor that affects both consumption and advertising. These conditions can be achieved only in carefully selected situations that simulate the conditions of an experiment.

References

Archer, S. (2016). Alcohol companies are placing a huge bet that cable TV isn't dead. *Business Insider*. Retrieved from http://www.businessinsider.com/alcohol-advertising-money-on-old-media-2016-6

Aspara, J., & Tikkanen, H. (2013). *A methodological critique of alcohol and addiction researchers' studies on the effect of advertising on adolescent alcohol consumption.* doi:10.2139/ssrn.2205112

Bernheim, B. D., & Rangel, A. (2004). Addiction and cue-triggered decision processes. *American Economic Review, 94,* 1558–1590. doi:10.1257/0002828043052222

Borrell Associates. (2017). *The final analysis: Political advertising in 2016.* Retrieved from https://www.borrellassociates.com/shop/the-final-analysis-political-advertising-in-2016-detail

Dubé, J.-P., Hitsch, G. J., & Manchanda, P. (2005). An empirical model of advertising dynamics. *Quantitative Marketing and Economics, 3,* 107–144. doi:10.1007/s11129-005-0334-2

Duffy, M. (2001). Advertising in consumer allocation models: Choice of functional form. *Journal of Applied Economics, 33,* 437–456. doi:10.1080/00036840121721

Freimer, M., & Horsky, D. (2012). Periodic advertising pulsing in a competitive market. *Marketing Science, 31,* 637–648. doi:10.1287/mksc.1120.0712

Gallet, C. A. (2007). The demand for alcohol: A meta-analysis of elasticities. *Australian Journal of Agricultural and Resource Economics, 51,* 121–135. doi:10.1111/j.1467-8489.2007.00365.x

Gius, M. P. (1996). Using panel data to determine the effect of advertising on brand-level distilled spirits sales. *Journal of Studies on Alcohol, 57,* 73–76. doi:10.15288/jsa.1996.57.73

Goel, R., & Morey, M. (1995). The interdependence of cigarette and liquor demand. *Southern Economic Journal, 62,* 451–459. doi:10.2307/1060696

Hill, A. B. (2005). The environment and disease: Association or causation? *Bulletin of the World Health Organization, 83,* 796–798.

Makowsky, C. R., & Whitehead, P. C. (1991). Advertising and alcohol sales: A legal impact study. *Journal of Studies on Alcohol, 52,* 555–567. doi:10.15288/jsa.1991.52.555

Milyo, J., & Waldfogel, J. (1999). The effect of price advertising on prices: Evidence in the wake of 44 Liquormart. *American Economic Review, 89,* 1081–1096. doi:10.1257/aer.89.5.1081

Miron, J. (1999). *The effects of alcohol prohibition on alcohol consumption. National Bureau of Economic Research Working Paper, no. 7130.* Cambridge, England: National Bureau of Economic Research.

Molloy, E. (2016). This ad is for you: Targeting and the effect of alcohol advertising on youth drinking. *Health Economics, 25,* 148–164. doi:10.1002/hec.3126

Nelson, J. (1999). Broadcast advertising and US demand for alcoholic beverages. *Southern Economic Journal, 65,* 774–790. doi:10.2307/1061275

Nelson, J. P. (2010a). Alcohol advertising bans, consumption and control policies in seventeen OECD countries, 1975–2000. *Applied Economics, 42,* 803–823. doi:10.1080/00036840701720952

Nelson, J. P. (2010b). What is learned from longitudinal studies of advertising and youth drinking and smoking? A critical assessment. *International Journal of Environmental Research and Public Health, 7,* 870–926. doi:10.3390/ijerph7030870

Nelson, J., & Young, D. J. (2001). Do advertising bans work? An international comparison. *International Journal of Advertising, 20,* 273–296. doi:10.1080/02650487.2001.11104894

Ogborne, A. C., & Smart, R. G. (1980). Will restrictions on alcohol advertising reduce alcohol consumption? *British Journal of Addiction, 75,* 293–296. doi:10.1111/j.1360-0443.1980.tb01382.x

Radelat, A. (2015, October 22). *Advertisers may suffer 'political crowd out' as 2016 elections near.* Retrieved from https://adage.com/article/campaign-trail/advertisers-suffer-political-crowd-2016-elections/301014

Saffer, H. (1997). Alcohol advertising and motor vehicle fatalities. *The Review of Economics and Statistics, 79,* 431–442. doi:10.1162/003465300556841

Saffer, H., & Dave, D. (2002). Alcohol consumption and alcohol advertising bans. *Applied Economics, 34,* 1325–1334. doi:10.1080/00036840110102743

Saffer, H., & Dave, D. (2006). Alcohol advertising and alcohol consumption by adolescents. *Health Economics, 15,* 617–637. doi:10.1002/hec.1091

Schonfeld & Associates. Inc. *Advertising ratios and budgets,* http://www.rab.com/research/10014.pdf 2017

Schonfeld & Associates. Inc. (2018). *Advertising sales ratios – SAI Books.* Retrieved from https://saibooks.com/index.php?option=com_content&view=article&id=60&Itemid=61 2018

Smart, R. G., & Cutler, R. E. (1976). The alcohol advertising ban in British Columbia: Problems and effects on beverage consumption. *British Journal of Addiction to Alcohol and Other Drugs, 71,* 13–21.

Wilcox, G. B., Kang, E. Y., & Chilek, L. A. (2015). Beer, wine, or spirits? Advertising's impact on four decades of category sales. *International Journal of Advertising, 34,* 641–657. doi:10.1080/02650487.2015.1019961

Young, D. J. (1993). Alcohol advertising bans and alcohol abuse. *Journal of Health Economics, 12,* 213–228. doi:10.1016/0167-6296(93)90032-A