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**Article**

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# The Effect of Advertising on Tobacco and Alcohol Consumption

Henry Saffer\*

Researchers study the effects of tobacco and alcohol advertising because the consumption of these substances is known to have potentially adverse health consequences. Tobacco use results in illness in proportion to its consumption, with about one-third of tobacco consumers dying as a result of these illnesses. Alcohol is different in that about nine out of 10 adults use alcohol in limited amounts with no adverse outcomes. The other one in ten abuses alcohol, which results in a range of negative health and social outcomes including an estimated 100,000 premature deaths per year.

There have been a number of empirical studies on the effects of tobacco and alcohol advertising. The bulk of these studies indicate that advertising does not increase tobacco and alcohol consumption. However, many public health advocacy organizations do not accept these results. An examination of the methods and data commonly used in empirical studies provides an explanation for these divergent opinions. The key to understanding the empirical problems lies in the advertising response function and the type of data used to measure advertising.

The advertising response function explains the relationship between consumption and advertising. A brand-level advertising response function shows that the consumption of a specific brand increases at a decreasing rate as advertising of that brand increases. That is, the response function illustrates a diminishing marginal product of advertising.<sup>1</sup> Ultimately,

consumption is completely unresponsive to additional advertising. The assumptions of the brand-level advertising response function also can be applied to industry-level advertising. The industry level includes all brands and products produced in an industry; for example, the industry level for alcohol would include all brands and variations of beer, wine, and spirits. The industry-level advertising response function is assumed to be subject to diminishing marginal product, as in the case of the brand-level function. The industry-level response function is different from the brand-level response function, though, in that advertising-induced sales must come at the expense of sales of products from other industries. Increases in consumption come from new consumers, often youths, or from increases by existing consumers.

The industry-level response function can be defined by measuring advertising with a time-series of national data. This function also can be defined by measuring advertising with cross-sectional data from local markets. The industry-level advertising response functions provide two simple predictions: first, if advertising is measured at a high enough level, there will be little or no consumption response; second, the greater the variance in the advertising data, the greater the probability of measuring the effect of advertising in the upward sloping section of the response function.

Most prior studies of tobacco and alcohol advertising use annual or quarterly national aggregate advertising expenditures as the measure of advertising, probably because this type of data was, at one time, the least expensive available. These time-series studies generally find that advertising has no effect. The oligopolistic nature of the tobacco and alcohol industries results in competition for market share

with advertising (and other marketing) rather than with price. Indeed, price competition may set off a price war in which all firms will lose revenue. Alternatively, the “share of voice” — that is, the percent of industry-level advertising undertaken by one firm — is directly proportional to the share of market. The advertising-to-sales ratios for tobacco and alcohol companies are about 6 to 9 percent while the average American firm has an advertising-to-sales ratio closer to 3 percent. Aggregate national advertising may well be in the range of near-zero marginal product. The advertising response function predicts that studies using national aggregate data are not likely to find much effect of advertising, and the empirical work supports this prediction.

Local advertising, known as spot advertising, is a function of local cost conditions, demographics, regulations, and other local factors. As a result, local advertising varies more than aggregate national advertising. Studies using cross-sectional measures of advertising generally find that it has positive effects; this is consistent with measurement in the upward sloping portion of the response function. A few prior studies used cross-sectional advertising data measured at the individual or local level. These studies generally found that advertising had positive effects. One possible explanation for the results from the time-series studies is that the national-level data, being more aggregated, has less variance and thus leads to insignificant effects.

The one other common type of research on advertising is the study of advertising bans. The effect of a ban on the use of one or more media is substitution into the remaining non-banned media and into other marketing techniques. This does not necessarily reduce advertising expenditures. Bans can, however, lower the average prod-

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uct of a given advertising budget. Advertising and other marketing expenditures may increase to compensate for the loss of sales attributable to the downward shift of the response function. If the bans are comprehensive enough, they may reduce consumption. The empirical work finds some evidence that bans do reduce consumption.

Counteradvertising, which is designed to reduce consumption, also fits into the framework of a response function. The counteradvertising response function slopes downward and is subject to diminishing marginal product. The levels of counteradvertising that have been undertaken are small in comparison to advertising. Thus it is likely that these expenditures are in the falling portion of the counteradvertising response function. The empirical work finds evidence that counteradvertising does reduce consumption.

To summarize, the response function predicts that using time-series aggregate national advertising data probably will lead to finding little or no effect of advertising. Cross-sectional data measuring local variations in advertising are more likely to fall in the upward sloping portion of the advertising response function, and are more likely to lead to finding a positive effect of advertising. Advertising bans, if comprehensive enough, may lead to finding effects of advertising on consumption too. With these predictions in mind I have completed seven studies which use either cross-sectional advertising data, advertising ban data, or cross-sectional counteradvertising data.

My most recent study, with Dhaval Dave, examines the effect of alcohol advertising on alcohol consumption by adolescents.<sup>2</sup> We use the Monitoring the Future (MTF) the National Longitudinal Survey of Youth 1997 (NLSY97) datasets for the empirical work. These datasets are augmented with alcohol advertising data, originating at the market level, for five media. Use of both the MTF and the NLSY97 datasets improves the empirical analysis because each has unique advantages. The large sample size of the MTF makes it possible to estimate regressions with race and gender-specific subsamples. The panel

nature of the NLSY97 makes it possible to estimate individual fixed-effects models. In addition, similar specifications can be estimated with both datasets. Since the datasets are independent, the basically consistent findings increase the confidence in all the results. These results indicate that blacks consume alcohol less than whites, and this cannot be explained with the included variables as well as it is for whites. A comparison of male and female regressions shows that price and advertising effects are generally larger for females. Models that control for individual heterogeneity result in larger advertising effects, implying that the MTF results may understate the effect of alcohol advertising. The results based on the NLSY97 suggest that a ban on all local alcohol advertising, which is about one third of all advertising, might reduce adolescent monthly drinking from about 25 percent to about 21 percent. For binge drinking, the reduction might be from about 12 percent to about 7 percent.

An earlier cross-sectional paper examined the effect of alcohol advertising on motor vehicle fatalities.<sup>3</sup> The data used were quarterly aggregates for the largest Metropolitan Statistical Areas for four years. The data indicate that the effect of a ban on broadcast alcohol advertising would be a reduction of about 2000 highway fatalities per year. The data also indicate that the elimination of the tax deductibility of alcohol advertising could reduce alcohol advertising by about 15 percent, reduce motor vehicle fatalities by about 1300 deaths per year, and raise about \$300 million a year in new tax revenue.

I also have published two studies on alcohol advertising bans. The first uses a pooled time series from 17 countries for the period 1970 to 1983.<sup>4</sup> The empirical measures of alcohol abuse are alcohol consumption, liver cirrhosis mortality rates, and highway fatality rates. The results show that countries with bans on alcohol advertising generally have lower levels of alcohol abuse. In particular, the results indicate that countries with bans on spirits advertising have about 16 percent lower alcohol consumption than

countries with no bans and that countries with bans on beer and wine advertising as well have about 11 percent lower alcohol consumption than countries with bans on spirits advertising only. A second study of alcohol advertising bans, with Dhaval Dave, followed up on the first by using a simultaneous equations system that treats both alcohol consumption and alcohol advertising bans as endogenous.<sup>5</sup> This study also updated the dataset with data from 20 countries over 26 years. The primary conclusions of this study are that alcohol advertising bans decrease alcohol consumption and that alcohol consumption has 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 percent. Furthermore, recent exogenous decreases in alcohol consumption will decrease the probability of enactment of new bans and undermine the continuance of existing bans. Canada, Denmark, New Zealand, and Finland recently have rescinded alcohol advertising bans. Alcohol consumption in these countries may increase, or decrease at a slower rate, than would have occurred had advertising bans remained in place.

I have conducted two studies of tobacco advertising bans as well. The first, with Frank Chaloupka, uses data from 22 OECD countries over 20 years.<sup>6</sup> We estimate the models with a full set of country and year fixed effects, along with other time-varying covariates including tobacco price, income, and the unemployment rate. The effects of the ban tend to be smaller in the models that include these additional independent variables. The primary conclusion of this research is that a comprehensive set of tobacco advertising bans can reduce tobacco consumption and that a limited set of advertising bans will have little or no effect. A second study of tobacco advertising bans used data from 102 countries.<sup>7</sup> Since no consistent price or income data are available for all of these countries, the models only use advertising bans, dichotomous country, and dichotomous year indicators as independent variables. Again, the conclusion is that a com-

prehensive set of tobacco advertising bans can reduce tobacco consumption and that a limited set of advertising bans will have little or no effect.

Finally, I am involved currently in a project with Melanie Wakefield, Chaloupka, and others to examine the effect of tobacco counteradvertising on youth smoking. This study uses data from Nielsen Media Research (NMR) on the 75 largest media markets in the United States between 1998 and 2002. These data were merged with the Monitoring the Future data. The results show that among eighth, tenth, and twelfth graders in the 1998-2000 MTF, exposure to tobacco industry-sponsored or pharmaceutical company advertising for cessation aids were either unrelated to, or increased, the probability of smoking. In contrast, higher exposure to advertisements that were part of a state-sponsored tobacco control media campaign

was significantly associated with lower levels of smoking.

In conclusion, the theory of an industry advertising response function is supported by the empirical results from my own prior studies and reconciles the contrary findings from other prior studies based on aggregated time-series data. Taken together, these empirical studies suggest that time-series advertising data for alcohol and tobacco are not appropriate for measuring the effect of advertising. However, further studies using cross-sectional data are also likely to find positive effects of advertising; studies of advertising bans will find effects if they are comprehensive bans; and studies of counteradvertising are likely to find that counteradvertising reduces consumption.

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<sup>1</sup> *At low levels of advertising, increasing marginal product is also possible.*

<sup>2</sup> H. Saffer and D. Dave, "Alcohol Advertising and Alcohol Consumption by Adolescents," NBER Working Paper No. 9676, May 2003.

<sup>3</sup> H. Saffer, "Alcohol Advertising and Motor Vehicle Fatalities," Review of Economics and Statistics, 79 (3) (August 1997).

<sup>4</sup> H. Saffer, "Alcohol Advertising Bans and Alcohol Abuse: An International Perspective," Journal of Health Economics, 10 (1991).

<sup>5</sup> H. Saffer and D. Dave, "Alcohol Consumption and Alcohol Advertising Bans," Applied Economics, 34 (11) (July 2002).

<sup>6</sup> H. Saffer and F. Chaloupka, "The Effect of Tobacco Advertising Bans On Tobacco Consumption," Journal of Health Economics, (19) (2000).

<sup>7</sup> H. Saffer, "The Control of Tobacco Advertising and Promotion" in Tobacco Control Policies in Developing Countries, P. Jha and F. Chaloupka, eds., New York: Oxford University Press, 2000.

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