

**ALCOHOL ADVERTISING AND ADVERTISING BANS:  
A SURVEY OF RESEARCH METHODS, RESULTS,  
AND POLICY IMPLICATIONS**

**Jon P. Nelson**

Department of Economics  
Pennsylvania State University  
University Park, PA 16802  
Tel.: (814)-865-8871  
Fax: (814)-863-4775  
jpn@psu.edu

**ABSTRACT**

This chapter surveys the literatures on advertising bans and alcohol consumption or abuse, and advertising expenditures and alcohol consumption. Studies of state-level bans of billboards are examined as well as studies of international bans that cover broadcasting media. For expenditures, the survey concentrates on econometric methods and the existence of an industry advertising-sales response function. Selected results from survey-research studies of advertising and youth alcohol behaviors also are discussed. The chapter concludes that advertising bans do not reduce alcohol consumption or abuse; advertising expenditures do not have a marketwide expansion effect; and survey-research studies of youth behaviors are seriously incomplete as a basis for public policy. Results of the survey are applied to the Supreme Court's *Central Hudson* test for constitutionality of restrictions on commercial speech.

**JEL Codes:** K2, L8, M3.

**Key Words:** Advertising; Alcohol; Regulation; First Amendment.

Forthcoming as Chapter 11 in *Advances in Applied Microeconomics, Volume 10: Advertising and Differentiated Products*, edited by M.R. Baye and J.P. Nelson (Amsterdam: JAI & Elsevier Science, 2001).

## I. INTRODUCTION

In recent years there has been a great deal of controversy over the role of advertising as a possible stimulus to alcohol consumption and as a contributor to alcohol abuse, including underage purchase and consumption of alcohol. Although the general issue is longstanding, the current controversy stems in part from four recent actions: first, a 1991 report on *Youth and Alcohol – Controlling Alcohol Advertising*, by the U.S. Department of Health and Human Services (DHHS, 1991) and the accompanying public statement by Surgeon General Novello. Second, the decision in 1996 by the Distilled Spirits Council to lift the industry's 48-year-old voluntary ban on liquor advertising on television and radio. Third, a federal appeals court decision in 1996 that upheld a constitutional challenge to a Baltimore City ordinance prohibiting outdoor advertising of alcoholic beverages in most areas of the City. Fourth, successful efforts at banning tobacco advertising, including the April 1999 ban of billboard advertising as part of the Master Settlement Agreement. The last two actions in particular sparked a number of local ordinances that severely restrict billboards and other publicly visible displays of alcohol advertising, including ordinances passed in Chicago, Cleveland, Detroit, Los Angeles, and Oakland.

The purpose of this chapter is to review critically the available studies that attempt to establish an econometric relationship between (1) advertising bans and alcohol consumption or abuse, and (2) advertising expenditures and alcohol consumption. Because the literature on expenditures has been previously reviewed, the survey concentrates on advertising bans as a possibly effective public policy.<sup>1</sup> The portion of the survey that deals with expenditure studies is focused on recent studies and advances in econometric techniques. Among previous surveys of alcohol advertising, the work by Saffer (1993, 1995, 1996, 1998) stands out for both the number of econometric issues raised and the number of surveys published in various outlets. Further, a recent encyclopedia entry by Saffer, Grossman, & Chaloupka (2000, 47) concluded that advertising bans can reduce alcohol consumption, which is a stronger statement than was contained in Saffer's earlier surveys. In sharp contrast, a selective survey by Cook & Moore (2000, 1645) concluded that available evidence “. . . precluded a confident conclusion about whether the regulation of commercial advertising is a potentially important policy instrument.” Further, a survey of recent econometric and related studies by the National Institute on Alcohol Abuse and Alcoholism (NIAAA, 2000, 422) found that “. . . the results of research on the effects of alcohol advertising are mixed and not conclusive.” Hence, an objective of the present survey is to determine which of these conclusions is warranted by a thorough examination of the evidence on advertising bans and expenditures. I also discuss several survey-research studies of youth alcohol behaviors and television advertising.

Section II provides a summary of commercial speech law as established by the Supreme Court. The *Central Hudson* four-part test of constitutionality is the legal framework necessary for policy evaluation of many advertising regulations. Section III examines econometric studies of advertising bans, alcohol consumption, and alcohol abuse. Both local bans of publicly visible displays (billboards and window displays) and broadcast advertising bans are discussed. Section IV examines recent studies of advertising expenditures, with an emphasis on advances in econometric methods. A number of econometric approaches are discussed, which involve issues

of specification and measurement of demand functions containing advertising as an explanatory variable. A review of several survey-research studies of television advertising and youth alcohol behaviors also is presented in this section, and I discuss the relationship between “adult” alcohol consumption and measures of youth alcohol behaviors. Section V addresses the issue of a market- or industry-wide advertising response function. New empirical evidence is presented for beer, wine, and spirits that raises important questions regarding advertising spillovers and the existence of a relationship between brand or category advertising and the marketwide demand for alcohol. Only a few previous alcohol studies have addressed this issue in a comprehensive manner, and the empirical work by Gius (1996) on liquor brand advertising is almost singular. The new evidence presented in Section V further demonstrates the difficulty of inferring an industry-wide (or beverage-wide) relationship from data on brand (or category) advertising and market shares. Section VI contains conclusions from the survey.

## **II. COMMERCIAL SPEECH LAW: THE FIRST AMENDMENT AND THE *CENTRAL HUDSON* “BALANCING” TEST**

Advertising of alcoholic beverages is a potential public health issue if it can be shown that advertising has a direct and material effect on alcohol consumption or that advertising has a direct and material effect on alcohol abuse outcomes (generally or for specific populations). With this in mind, the law on commercial speech provides the framework necessary for evaluation of public policies involving advertising bans or regulation of media and content. This section summarizes the law on commercial speech and, in particular, develops the Supreme Court’s four-part “balancing” test in its 1980 landmark *Central Hudson* decision. I first trace the history of the *Central Hudson* test, and then examine two recent court cases that take up the constitutionality of restrictions on advertising of alcoholic beverages. These cases provide the impetus for the remainder of the survey.

Among the Federal agencies, the Federal Trade Commission (FTC) regulates commercial speech that is deceptive or unfair, including ads that target youth for adult products (Starek, 1997). “Deceptive” advertising is defined by the FTC as advertising that would likely affect an individual’s conduct in a material way when the individual is acting reasonably under the circumstances (Beales & Muris, 1993, 25). “Unfair” advertising involves damages that are both likely and substantial, and which are not offset by countervailing benefits to consumers or competition. Although restrictive petitions on alcohol advertising have been received by the FTC (1985), the agency does not attempt to regulate advertising based solely on media or content, such as television advertisements based on emotional appeals or lifestyle themes. The Bureau of Alcohol, Tobacco and Firearms also regulates advertising claims that are deceptive, misleading, disparaging of a competitor’s product, obscene, or indecent. Lastly, the Federal Communications Commission (FCC) has the statutory authority to insure that broadcasters serve “the public interest” (O’Neil, 1997). FCC rules and regulations do not forbid advertising of alcoholic beverages in broadcasting, although the three major networks have self-imposed guidelines. At the state level, a number of individual states have restricted alcohol advertising, ranging from outright bans of print and outdoor advertising to prohibitions on off-premise advertising of alcohol prices. The Supreme Court’s decision in *44 Liquormart* in 1996 ended a number of these controls, especially bans of price advertising. Industry self-regulation also has

been an important part of the debate on alcohol advertising. While self-regulation is an interesting topic (Calfee, 1997; FTC, 1999), this section is only concerned with the limits on advertising permissible under the First Amendment to the Constitution, and provides a review of leading Supreme Court cases. Readers seeking more in-depth analysis should consult specialized treatises on commercial speech and advertising (Moore et al., 1998; Rome & Roberts, 1985).

#### A. *Early Constitutional Cases, 1942-1979*

In 1942, the Supreme Court decided the case of *Valentine v. Chrestensen*, 316 U.S. 52 (1942). Mr. Chrestensen owned a former Navy submarine, which he exhibited for profit at a pier in New York City. He had prepared a handbill advertising the boat, which solicited customers for a stated admission fee. A City sanitary ordinance forbade the distribution of commercial and business advertising in the streets, except for bills and newspapers devoted to information or public protest. Advised that he was violating the ordinance, Chrestensen produced a double-sided bill that included a protest against the City and that removed only the commercial information on the admission fee. The City advised that distribution of the revised bill would violate the law, and it arrested the respondent when he proceeded with its distribution. Asserting a violation of the First Amendment, Chrestensen was granted injunctive relief by the lower courts. Upon appeal, the Supreme Court considered whether the City's ordinance was an unconstitutional abridgement of the freedom of the press and speech. The Court disregarded the political protest, and held unanimously that "the Constitution imposes no . . . restraint on government as respects purely commercial advertising" (316 U.S. 54). The ruling left to the states all questions of promotion of "gainful occupation in the streets" (316 U.S. 52).

For the next 30 years the three-page *Valentine* decision, which was unsupported by any citations or historical reasoning, summarized the law on commercial speech. However, in the 1970s the value of constitutional protection for commercial speech was reconsidered. In *Bigelow v. Virginia*, 421 U.S. 809 (1975), the Court struck down a Virginia statute that prohibited advertising that encouraged or promoted abortions. A New York City abortion referral service had placed ads in an "underground weekly newspaper" that served the University of Virginia. In a 7-2 decision, the Court held that Virginia's legitimate interest in the quality of medical care did not outweigh its citizens' First Amendment right to receive information about lawful medical services. *Valentine* was repudiated, although the majority declined to decide the precise limits to which a state might legally regulate or prohibit advertising in order to advance a legitimate public interest (421 U.S. 825).

A year later in 1976, the value of commercial speech was revisited in *Virginia State Board of Pharmacy v. Virginia Citizens Consumer Council, Inc.*, 425 U.S. 748 (1976). The issue was a Virginia statute that made it unprofessional conduct for a pharmacist to advertise prices of prescription drugs. The case was brought by a Virginia consumer group asserting a right to receive the competitive benefits of price advertising. In a 7-1 decision, the Court held that: (1) First Amendment protection for information on drug prices was a protection enjoyed by both retailers (speakers) and consumers (hearers); (2) since speech was protected under the First Amendment, the advertising of prices was protected speech notwithstanding its commercial character; and (3) the pharmacists' justification for the ban as maintaining a high degree of

professionalism was insufficient. With regard to the last issue, the pharmacists claimed that advertising might raise prices due to added expenses, destroy stable pharmacist-customer relationships, and reduce the status of a pharmacist to a mere retailer (425 U.S. 768). Faced with these age-old claims of ruinous and destructive competition, Justice Blackman held that

People will perceive their own best interests if only they are well enough informed, and . . . the best means to that end is to open the channels of communication rather than close them. If they are truly open, nothing prevents the “professional” pharmacist from marketing his own assertedly superior product . . . It is precisely this kind of choice, between the dangers of suppressing information, and the dangers of its misuse if it is freely available that the First Amendment makes for us. Virginia is free to require whatever professional standards it wishes of its pharmacists . . . but it may not do so by keeping the public in ignorance of the entirely lawful terms that competing pharmacists are offering (425 U.S. 770).

The ruling in *Virginia Pharmacy* made clear that some speech regulations might survive constitutional challenges, such as “mere time, place, and manner” restrictions that could be justified without reference to content. Having accorded a limited degree of protection to commercial speech, the Court during the period 1976-1979 struck down restrictive regulations for contraceptive advertising, lawyer advertising, and posting of “For Sale” or “Sold” yard signs by real estate agents. In the latter case, *Linmark Associates, Inc. v. Township of Willingboro*, 431 U.S. 85 (1977), the ruling held that an ordinance designed to prevent “panic selling” in a racially-integrated community near Fort Dix could not be sustained. The Court held that the ordinance was not necessary to achieve the government’s objective and in any event, impermissibly impaired the flow of truthful information. Justice Marshall reasoned that

Willingboro has proscribed particular types of signs based on their content because it fears their ‘primary’ effect . . . That the proscription applies to only one mode of communication . . . does not transform it into a ‘time, place or manner’ case . . . If the ordinance is to be sustained, it must be on the basis of the township’s interest in regulating the content of communication, and not on any interest in regulating the form (431 U.S. 95-96).

The decision also noted that respondents had failed to prove that “For Sale” signs were in fact a major cause of panic selling or that the ban was effective in reducing sales (431 U.S. 95).

#### *B. Central Hudson: A Four-Prong Test of Constitutionality*

In 1980, the Court distilled earlier cases and worked out a four-prong test to be used in balancing governmental interests in regulation of advertising with the interests protected by the First Amendment. *Central Hudson Gas & Electric Corp. v. Public Service Commission of New York*, 447 U.S. 557 (1980), involved a ban of promotional advertising of electricity originally enacted during the energy crisis of the early 1970s, which was later extended in the interest of conservation. Purely institutional and informative advertising was allowed, but the Commission argued that promotional ads would stimulate electricity consumption, provide the public with misleading signals regarding energy conservation, and unfairly disrupt electricity rate structures.

The utility challenged the ban in New York state courts, claiming violation of the First and Fourteenth Amendments. However, the prohibition was upheld by the Court of Appeals of New York on the grounds that the governmental interests outweighed the value of the commercial speech. This outcome was reversed by the Supreme Court in an 8-1 decision, including three concurring judgments. The opinion by Justice Powell reasoned that

We have rejected the “highly paternalistic” view that the government has complete power to suppress or regulate commercial speech . . . Our decisions have recognized the “commonsense” distinction between speech proposing a commercial transaction, which occurs in an area traditionally subject to government regulation, and other varieties of speech . . . The Constitution . . . accords a lesser protection to commercial speech than to other constitutionally guaranteed expression . . . The protection available for particular commercial expression turns on the nature both of the expression and of the governmental interests served by its regulation (447 U.S. 562).

Given this difference, Justice Powell discerned a four-prong test for protection of commercial speech on constitutional grounds (447 U.S. 566):

1. The speech must concern lawful activity and not be misleading;
2. The government’s interest asserted to justify the regulation must be substantial;
3. The regulation must directly advance the governmental interest asserted; and,
4. The regulation must not be more extensive than is necessary to serve that interest.

The test can be divided into two parts. The first prong articulates a “strict scrutiny” standard or a sufficient condition for government regulation, while the remaining prongs provide the necessary protection from regulation. The third prong suggests an area where econometric and other statistical evidence is particularly of value, since this criterion can be framed in statistical terms as a null hypothesis. From the government censor’s viewpoint, the *null hypothesis* is that the regulation in question will *not* directly advance the asserted government’s interest. The positive evidence marshaled in support of an advertising ban or other regulation must be sufficiently strong that the null can be rejected with a high degree of confidence. Further, the restriction must have a material effect on the interest, or in the words of Justice Powell “. . . the regulation may not be sustained if it provides only ineffective or remote support for the government’s purpose” (447 U.S. 564). From the plaintiff’s viewpoint, the *null hypothesis* is that the proposed regulation is direct and material, and the negative evidence must be sufficiently strong that the null can be rejected with a high degree of confidence. The fourth prong also is capable of statistical testing and comparative policy analysis. Justice Powell noted that this criterion “. . . recognizes that the First Amendment mandates that speech restrictions be ‘narrowly drawn’ . . . [and] we review with special care regulations that entirely suppress commercial speech in order to pursue a nonspeech-related policy” (447 U.S. 565-566).

### *C. Further Constitutional Developments, 1981-1995*

During the 1980s, a number of cases tested the limits of the *Central Hudson* formula. In *Bolger v. Youngs Drug Products Corp.*, 463 U.S. 60 (1983), the Court considered a Postal

Service regulation that prohibited the unsolicited mailing of advertisements for contraceptives. The mailings in question also included informational materials. The government asserted an interest in protecting children from offensive materials. A unanimous ruling held that the party seeking to uphold a restriction on commercial speech carries the burden of justification. The Court noted that the regulation would provide only a marginal degree of protection because many magazines contained advertisements for contraceptives, and it held that “. . . the government may not reduce the adult population . . . to reading only what is fit for children” (463 U.S. 73). In *Zauderer v. Office of Disciplinary Counsel of the Supreme Court of Ohio*, 471 U.S. 626 (1985), the ruling again stressed the state’s evidentiary burden in a case involving a challenge to a lawyer advertising regulation. The Court reiterated that the state must show a substantial government interest justifying the restriction and must demonstrate that the restriction vindicated the interest through the least restrictive means available (471 U.S. 647). However, in *Posadas de Puerto Rico Associates v. Tourism Company of Puerto Rico*, 478 U.S. 328 (1986), the Court considered a law that legalized casino gambling and permitted advertising aimed at tourists, but banned casino advertising within Puerto Rico. The commonwealth asserted an interest in protecting the welfare of its citizens, despite (or because of) the availability of a commonwealth lottery and other local gambling events (478 U.S. 354; see also McChesney, 1997, 105). In a 5-4 decision, Justice Rehnquist held that “. . . it is permissible for the government to take the step of allowing the conduct, but reducing the demand through restrictions on advertising” (478 U.S. 346). Although Justice Rehnquist appeared to apply the *Central Hudson* test, he did not require the government to uphold the fourth prong. Moreover, the third prong, which might appear to justify the majority decision, was never seriously analyzed. The government was only required to show a “reasonable belief” that its restriction on speech would directly advance the asserted interest. In a sharply worded dissent, Justice Brennan citing *Virginia Pharmacy Board* argued that “. . . the First Amendment presupposes that people will perceive their own best interest if only they are well enough informed, [and] . . . the best means to that end is to open the channels of communication, rather than to close them” (478 U.S. 358).

As the Supreme Court has since recognized, the *Posadas* ruling made little sense. The confusion that followed led to a series of decisions during the 1990s demonstrating that a government censor must satisfy the third and fourth prongs. In 1993, the Court considered the case of *Edenfield v. Fane*, 507 U.S. 761 (1993), involving a Florida statute forbidding advertising by public accountants. Applying the third prong, the ruling in this case required that the government “. . . must demonstrate that the harms it recites are real and that its restriction will in fact alleviate them to a material degree” (507 U.S. 771). In *City of Cincinnati v. Discovery Network, Inc.*, 507 U.S. 410 (1993), the fourth prong was invoked. The issue was a City ordinance that revoked petitioners’ permits to use 62 newsracks placed on public property (out of 1,500-2,000 citywide racks used by other publications). The racks were used for the distribution of free magazines containing advertisements and other information on current events. The City alleged that the magazines were “commercial handbills,” and that the ordinance was designed to advance its interest in the safety and appearance of streets and sidewalks. However, the Court’s decision held that “. . . it was the city’s burden to establish a ‘reasonable fit’ between its legitimate interests in safety and esthetics and its choice of a limited and selective prohibition of newsracks . . . it has not ‘carefully calculated’ the costs and benefits associated with the burden on speech imposed by its prohibition” (507 U.S. 416). Finally, in *Rubin v. Coors*, 514 U.S. 476 (1995), the Court unanimously struck down a Federal law passed in 1935 that prohibited labels

on beer containers from displaying alcohol content, including words that suggested high content. The opinion by Justice Thomas reasoned that the government had provided only “anecdotal evidence and educated guesses” that the labeling ban inhibited “strength wars” among brewers, and he argued that the government’s interest could be advanced in a less intrusive manner. The decision also noted that wine and spirits producers were required to disclose alcohol content and that a brewer’s wish to disclose alcohol content did not prove a desire to compete on content.

*D. The 44 Liquormart Decision and Its Application in Anheuser-Busch v. Schmoke*

In 1996, the Supreme Court again took steps to reduce the confusion created by earlier decisions by invalidating a Rhode Island ban on price advertising of alcoholic beverages in *44 Liquormart, Inc. v. Rhode Island*, 517 U.S. 484 (1996). The state of Rhode Island had enacted statutory provisions that: (1) prohibited vendors licensed in Rhode Island – as well as out-of-state manufacturers, wholesalers, and shippers – from advertising the price of any alcoholic beverage offered for sale in Rhode Island; and (2) prohibited Rhode Island media from publishing or broadcasting any advertisements, even referring to sales in other states, that made reference to the price of any alcoholic beverage. In addition, a regulation of the state Liquor Control Administration (LCA) provided that no placard or sign visible from the exterior of a package store could make any reference to prices. The state asserted that the regulations advanced its interest in temperance among its citizens. The Rhode Island laws were enacted in 1956, but similar restrictions had existed for many years in a number of states. Many of these laws dated to the Great Depression era and the repeal of Prohibition, and were blatantly anti-competitive in origin (McGahan, 1995). Indeed, the Rhode Island Liquor Store Association joined with the state as a petitioner in this case, and a lower court decision noted that the laws were in fact designed to protect smaller retailers from price competition. In 1991, complaints from competitors were received by the LCA regarding an advertisement placed by Liquormart in a Rhode Island newspaper.<sup>2</sup> The advertisement did not mention liquor prices directly, and it also noted that state laws prohibited the package store from price advertising. However, the advertisement stated low prices for non-liquor items, and it included the word “WOW” in large letters next to pictures of vodka and rum bottles. The LCA assessed a fine of \$400. The operators of several liquor stores in Massachusetts also attempted to place price ads in Rhode Island newspapers, but these attempts were refused. The store operators joined together and filed a First Amendment action against the ban. The district court found that: (1) the state’s off-premise price ban had no significant impact on levels of alcohol consumption in Rhode Island; and (2) the price ban was unconstitutional because it did not directly advance the state’s asserted interest in reducing alcohol consumption and was more extensive than necessary to serve that interest (829 F. Supp 543, 1993). The court of appeals reversed, reasoning that: (1) there was merit in Rhode Island’s claim that competitive price advertising would lower prices and lower prices would ultimately produce more alcohol sales; and (2) the Twenty-First Amendment that repealed Prohibition gave the statutes an added presumption of validity (39 F.3d 5, 1994).

The Supreme Court unanimously reversed the appeals court, holding that the ban did not directly advance the state’s substantial interest in promoting temperance, and the ban was more extensive than necessary to serve that interest. With respect to the third prong, Justice Stevens noted that “. . . the State has presented no evidence to suggest that its speech prohibition will *significantly* reduce marketwide consumption” (517 U.S. 506; emphasis in the original). With

regard to the fourth prong, the decision determined that “. . . it is perfectly obvious that alternative forms of regulation that would not involve any restriction on speech would be likely to achieve the State’s goal of promoting temperance. As the State’s own expert conceded, higher prices can be maintained by direct regulation or by increased taxation” (517 U.S. 507). Finally, Justice Stevens clarified the reason for protecting commercial speech:

When a State entirely prohibits the dissemination of truthful, nonmisleading commercial messages for reasons unrelated to the *preservation of a fair bargaining process*, there is far less reason to depart from the rigorous review that the First Amendment generally demands (517 U.S. 501; emphasis added).

The Court’s application in *44 Liquormart* of a rigorous *Central Hudson* analysis suggests the minimum level of scrutiny for evaluating restrictions on the ability of speakers to provide, and their audiences to receive, messages about lawful products and services. The government censor must prove – and not merely assert or assume as part of a regulatory process – that a ban of commercial speech directly and materially advances a substantial government interest. The government also must demonstrate that the restriction is no more extensive than is necessary to promote that interest.<sup>3</sup> As noted above, these criteria can be formulated as statistical hypotheses and applied to relevant data for the market in question. Hence, a thorough application of the *Central Hudson* test necessarily involves an economic analysis of the market, especially examination of the empirical effects of advertising or advertising bans on marketwide demand and related outcomes.<sup>4</sup> Further, the balancing of interests required by *Central Hudson* is a familiar procedure to economists; indeed, it is nothing more than the principle of marginal evaluation of benefits and costs (and cost effectiveness) that underlies all of economic analysis. Moreover, benefits or costs may be weighted to advance certain objectives. For example, placing a heavy burden of proof on the government censor adds the necessary element of protection for the “free trade in ideas.” As noted by Justice Stevens, “The Constitution presumes that attempts to regulate speech are more dangerous than attempts to regulate conduct . . . speech restrictions cannot be treated as simply another means that the government may use to achieve its ends” (517 U.S. 512).

However, following the ruling in *44 Liquormart*, the Supreme Court vacated and remanded to the appeals court for further consideration the case of *Anheuser-Busch, Inc. v. Schموke, Mayor of Baltimore City*, 101 F.3d 325 (1996). *Schموke* involved a City ordinance banning most outdoor advertising of alcoholic beverages based on a concern for the “welfare and temperance of minors.” Upon reconsideration, the appeals court upheld the ordinance, reaffirmed the district court’s judgment, and concluded that *44 Liquormart* did not require it to alter these decisions. The appeals court agreed with the City’s assertion that: (1) there was a direct and material link between advertising and youth alcohol consumption; and (2) the ordinance expressly targeted persons who cannot be legal users of alcoholic beverages. The appeals court rejected plaintiffs’ argument that less restrictive means were available. A dissenting opinion by Judge Butzner noted the lack of an evidentiary hearing by the courts, and he reasoned that “. . . each party should be given the opportunity to present evidence on this issue and to test the strength of the opposing party’s evidence . . . the First Amendment requires careful evaluation . . . performed by a judge – not by a city council” (101 F.3d 332).

The *Central Hudson* formula and its application in recent decisions are background necessary for economic analysis of advertising bans and other government regulations that affect alcohol advertising. Using the third and fourth prongs, it is possible to correctly pose the analytical questions that courts seek to answer in deciding on the constitutionality of a restriction on commercial speech. As demonstrated in *44 Liquormart*, the Supreme Court requires something more than educated guesses for constitutional scrutiny of an advertising ban. Hence, Judge Butzner's statement and the decisions in the two alcohol cases provide the impetus for the remainder of this survey.<sup>5</sup> I now turn to the task of reviewing the empirical evidence with regard to (1) advertising bans and alcohol consumption, and (2) advertising expenditures and alcohol consumption. I also discuss the relationship between research findings in these two areas and youth alcohol consumption.

### III. STUDIES OF ALCOHOL ADVERTISING BANS

Communication with consumers is a difficult and costly process; hence, it is also an incomplete activity. Many advertisements are ineffective or reach individuals who have little or no interest in the message. Indeed, many consumers are highly skeptical of advertising claims (Beales & Muris, 1993; Calfee, 1997). However, it cannot be inferred from this outcome that the messages are without social value. As the Supreme Court recognized in *Virginia Pharmacy*, "... advertising, however tasteless and excessive it sometimes may seem, is nonetheless dissemination of information" (425 U.S. 765). Further, advertising is clearly an important part of the competitive process, and this is especially true in markets dominated by branded products that are familiar and well known. Each year the alcoholic beverage industry spends upwards of \$1 billion on advertising using conventional media and it is believed to spend an equal amount on other forms of promotion. Does this substantial expenditure affect only brand shares or does it also affect marketwide demand? Do bans of advertising reverse the marketwide effects of advertising and result in materially lower levels of alcohol consumption and abuse?

This section examines the second of these two questions. Expenditure studies are discussed in the next section. Two types of econometric studies are reviewed: first, studies that use state data containing cross-sectional or time-series cross-section (panel) variation; and second, studies that use panel data for a sample of countries. The advertising bans in the cross-national studies are wider and cover more media and beverages. Some countries, such as Sweden, restrict virtually all forms of alcohol advertising, including bans on broadcast and print advertising of all beverages. The bans in the state-level studies, however, occur at a lower level of aggregation and the evidence from these studies is applicable to local policy issues, such as bans of billboard advertising. In both cases, the bans are often longstanding, and behavior of individuals should reflect the duration of censorship. Hence, I argue below that past or lagged youth alcohol behaviors are captured by studies of advertising bans.

Saffer (1991, 1993, 1995) argued that advertising bans are "ideally suited" for examination of the effects of advertising on alcohol consumption and abuse. His view is that many data sets contain insufficient variation and measure the advertising-response function in the region of small marginal returns to sales. In order to increase the variation in the data, Saffer (1993, 134-138) proposed that studies examine state-level and international bans, data for

selected media such as billboards and broadcasting, and higher-frequency time series, such as monthly and quarterly data. This section examines fourteen studies of state-level and cross-national advertising bans. The studies are presented in chronological order by category.

### *A. Studies of State-Level Advertising Bans*

1. Schweitzer et al. (1983) studied advertising bans using a cross-section of 35 states for the year 1975 (excluded states reflect missing data or geographic size). The authors examined state-level per-capita consumption of beer and spirits as well as alcoholism and alcohol-related mortality. Both reduced form and structural models were estimated. The most important variables were income, beer prices, tourism, unemployment, and the minimum legal drinking age. The explanatory variable for advertising was BAN, which was a binary variable equal to one if advertising was prohibited, and zero if any was allowed. In a reduced-form model, BAN was statistically insignificant for spirits consumption; weakly significant and negative for beer consumption; and insignificant for the abuse outcomes. When the authors estimated the structural model, BAN was insignificant for both beer and spirits. Using the point estimates, their policy simulations found that “. . . a prohibition on advertising for alcoholic beverages leads *not* to a general reduction in alcoholic beverage consumption but rather a *shift* from beer consumption to spirits consumption” (Schweitzer et al., 1983, 123; emphasis in the original).

2. Hoadley et al. (1984) examined per-capita consumption of distilled spirits using a cross-section of 48 states for the years 1955, 1960, 1965, 1970, 1975, and 1980. The authors ran separate regressions for each of the six years and pooled models, and analyzed the effects of a host of state regulations and controls. The dummy variables for advertising controls included ADBILS (whether or not billboard advertising was prohibited); ADSIGNS (restrictions on exterior advertising); and ADPRICES (restrictions of price advertising of any kind). The pooled model also included dummy variables for regions and years. In the pooled model, ADBILS had the wrong sign, and ADSIGNS and ADPRICES were insignificant. The significant variables included prices, income, tourism, religion, and state monopoly control. The authors concluded that advertising bans “. . . have been almost totally ineffective as a deterrent on alcohol consumption . . . [and] the most anomalous result comes with restrictions on billboard advertising, where results showed a consistent and fairly large effect in the wrong direction” (Hoadley et al., 1984, 396).

3. Ornstein and Hanssens (1985) used a cross-section of 50 states and the District of Columbia for the period 1974-1978. The years and states were pooled together to form a panel of 255 observations. They estimated separate regressions for beer and distilled spirits. Wine was deleted because of the lack of price data. In addition to other alcohol control variables, three advertising dummy variables were included: BILLB (bans of billboard advertising); PPRINT (bans of print price advertising); and PBILLB (bans of billboard price advertising). Mixed results were obtained for these variables. For spirits demand, they found that allowing billboards decreased spirits consumption, while allowing price advertising increased consumption by a small amount. The latter finding is consistent with the view that price advertising leads to lower prices and higher consumption. The variables with the largest elasticities were price, income, tourism, and state monopoly control. For beer demand, BILLB and PPRINT were insignificant,

and the coefficient for PBILLB indicated that allowing beer price advertising on billboards had a small positive effect on consumption. The authors suggested that beer advertising primarily affects brand shares and not market demand (Ornstein & Hanssens, 1985, 210). The main determinates of beer consumption were the youth demographic variable and the minimum legal age, while the price, income, and tourism elasticities were smaller for beer compared to spirits. Further, beer consumption was not significantly different between monopoly and license states. The authors concluded that “. . . control laws affecting price have the greatest impact on consumption . . . [but] the influence of control measures is small relative to that of sociodemographic and economic variables that affect consumers’ overall attitudes toward drinking” (Ornstein & Hanssens, 1985, 210-211).

4. Wilkinson (1985) studied the relationships between total alcohol consumption, advertising, and highway fatalities using a sample of 48 states for 1976-1979. He included two measures of advertising restrictions: first, whether states prohibited all advertising in periodicals or on billboards (ADPRHBT); and, second, whether states prohibited price advertising in periodicals and on billboards (ADPRICE). He noted that advertising bans can increase or decrease consumption depending on the net effects of advertising on entry barriers and information flows (Wilkinson, 1985, 65). Using a recursive specification, the panel model was estimated using two-stage least squares with a random-effects error term. The regression results for alcohol consumption indicated that ADPRICE had a significantly negative effect on the per-capita quantity of ethanol consumed, while ADPRHBT was insignificant (Wilkinson, 1985, 113). In Wilkinson (1987), these results are extended to account for possible simultaneity among alcohol consumption, prices, and alcohol outlets. The sample was 45 states for the years 1976-1980. The significant determinates of total alcohol consumption were price, income, outlets, religion, state monopoly control, and the minimum legal age. For advertising regulations, he found that the price advertising coefficient was negative and significant. However, the additional restraint of forbidding all advertising had an insignificant effect on demand. The researcher concluded that “. . . the direct effects of regulation on alcohol sales are relatively small. Regulatory restrictions have their largest effect via their impact on the number of outlets” (Wilkinson, 1987, 17).

5. In Nelson (1990a, 1990b), I examined the effects of economic and regulatory variables on per-capita consumption of beer, wine, and spirits. The sample was a cross-section of 48 continental states and the District of Columbia for the year 1982. An important feature of these studies was the use of an improved set of price variables for alcoholic beverages, including wine prices. The advertising variable ADBAN was equal to one if the state banned price advertising in print media, including billboards. States that banned all advertising in print or on billboards also were included in this category. Hence, ADBAN combined the two categories used by Wilkinson (1985, 1987) and others. The results indicated that ADBAN was not a significant determinate of alcoholic beverage consumption. The significant variables were prices, income, tourism, number of outlets, and the minimum legal age (Nelson, 1990a, 94). Hence, I concluded that “. . . there is no effect on consumption of advertising bans” (Nelson, 1990b, 232).

6. In Nelson (2001), I examined a sample consisting of 45 states for the period 1982-1997. The sample size was 720, and the study improved on previous state-panel studies by examining per-capita total ethanol consumption as well as beverage demands. As a result, I was

able to demonstrate substitution among beverages as a response to restrictive alcohol laws and regulations. None of the previous studies had examined both the pattern of demand and the net effects of advertising bans. The study examined the effects of billboard bans; bans of price advertising in print and on billboards; state monopoly control of retail outlets; and minimum legal drinking ages for each of the beverages. The model specification also included variables for the own-price, cross-price, income, tourism, age distribution, unemployment rate, regional dummies, and state-specific exponential time trends. The results indicated that bans of billboards increased consumption of spirits and wine, and reduced consumption of beer. The results for spirits replicated earlier findings discussed above. More important, billboard bans did not have a negative effect on total alcohol consumption, and this result held across several different samples of states and time periods. When the data were divided into two time periods, billboard bans increased total alcohol demand during 1982-1988, but were insignificant thereafter. During both time periods, price advertising bans were associated with lower consumption of spirits, higher consumption of beer, and no significant effects on total alcohol consumption. This is consistent with price bans raising prices, and with positive spillovers for substitute beverages. The significant and material determinates of alcohol demand were prices, income, tourism, youth population, minimum legal age, and state monopoly control. The study concluded that “. . . billboards account for only 8 percent of total alcohol advertising. Hence, the elimination of this medium would not be expected to substantially or materially affect alcohol consumption” (Nelson, 2001, 17).

7. Markowitz and Grossman (1998, 2000) examined the relationship between alcohol consumption and domestic violence toward children. In their first study, a sample of 1,147 married or cohabiting individuals was drawn from the 1976 Physical Violence in American Families survey. The authors estimated a reduced-form model in which violent outcomes were affected by state excise tax rates on beer (a proxy for state-level beer price differences), illegal drug prices, and state-level regulatory variables, including outlet density, prohibitions of grocery sales, and laws that restrict alcohol advertising (billboard bans, window display bans, price advertising bans). The outcome variables were measures of the probability of violent acts against children in a family, regressed on the above variables and family characteristics, including income, age, race, etc. The authors found that increased beer taxes and restrictive availability laws would be effective in reducing domestic violence. However, they concluded that “. . . the advertising variables . . . are never statistically significant individually or as a set . . . [and] laws restricting advertising of beer are shown to be ineffective in reducing violence” (Markowitz & Grossman, 1998, 318-320). In an extension of this work, Markowitz & Grossman (2000) separated the data by gender and increased the sample size by employing data from a 1985 survey. When they pooled the data, there were no measurable effects of advertising on violence, including billboard bans and window display bans. Hence, they concluded that “. . . increasing the sample size does not result in measurable effects of the advertising . . . on violence” (Markowitz & Grossman, 2000, 280).

In summary, seven studies have examined the effects of state-level advertising bans on alcohol consumption and abuse, including billboard bans and bans of other visible displays. These studies are summarized in Table 1. In a few instances a significant effect was found, but these results are small in magnitude or statistically fragile (e.g., Markowitz & Grossman, 1998, 318). The policy issue is whether or not there is a robust negative relationship between bans and

drinking, but the evidence clearly speaks against this outcome. None of these studies produced results that support the null hypothesis that advertising bans will materially reduce alcohol consumption or alcohol abuse. Similar results have been found for bans on cigarette advertising on college campuses (Czart et al., 2001). Additional comments on the policy implications of these findings are contained in the concluding portion of this section. Cross-national studies of broadcast advertising bans are examined next.

### *B. Cross-National Studies of Broadcast Advertising Bans*

1. Smart and Cutler (1976) studied a 14-month ban of all alcohol advertising, which was instituted in British Columbia (B.C.) in 1971 by the Social Credit government. The law prohibited advertising in newspapers, radio, television, and outdoor advertising on billboards, notice-boards, and the like. Advertisements that originated outside of the province were not affected by the ban. The ban was not popular and it was ended in late 1972 when the NDP party won the provincial election. Smart & Cutler (1976, 16) used data on per-capita beverage consumption for the yearly period 1962-1972 and monthly from January 1970 to December 1973. For the annual data, they compared per-capita consumption by beverage for B.C. and Ontario. After detrending the monthly data, they examined before-and-after consumption levels in B.C. They concluded that “. . . both the yearly and monthly analysis of beer, wine or liquor consumption show no substantial effect of the ban” (Smart & Cutler, 1976, 20). Hence, there was no effect of a ban that included broadcast advertising of alcoholic beverages.

2. Ogorne and Smart (1980) examined a Manitoba law passed in 1974 that banned all beer advertising from the province’s electronic and print media. Wine and spirits producers continued to advertise in print media, and some wine advertising occurred on television. Using time-series methods applied to monthly beer sales for January 1970 to January 1978, the authors were unable to detect any effects of the ban. A comparison of Manitoba with Alberta over the same time period revealed that beer sales in the two provinces did not differ significantly during the four years covered by the advertising ban (Ogorne & Smart, 1980, 295). Hence, there was no effect on the beverage specifically targeted by the broadcast ban.

3. Makowsky and Whitehead (1991) studied the termination in 1983 of a 58-year-old advertising ban of alcoholic beverages in Saskatchewan. The termination affected provincial advertising on radio, television, newspapers, and magazines for beer and wine. Spirits advertising on radio and TV continued to be banned under regulations of the Canadian Radio and Television Commission. A similar comprehensive advertising ban existed in the province of New Brunswick, but it was not terminated at this time. Monthly sales of beer, wine, and spirits were examined for the years 1981-1987 using Box-Jenkins interrupted time-series analyses for Saskatchewan (treatment area) and New Brunswick (control area). Differential or beverage-specific effects were found. The termination of the ban increased beer sales in Saskatchewan, reduced sales of spirits, and left unaffected the consumption of wine and total ethanol. The authors concluded that there was “. . . evidence of an impact of the change in legislation regarding alcohol advertising in terms of a substitution effect of beer sales for spirits sales. Advertising does not, however, affect total consumption” (Makowsky & Whitehead, 1991, 566).

4. Saffer (1991) examined the cross-national effects of laws that ban broadcast advertising of alcoholic beverages. He used a panel of 17 countries over the period 1970-1983. The countries were members of the Organization of Economic Cooperation and Development (OECD), including the U.S. and Canada. Saffer regressed per-capita ethanol consumption on several explanatory variables, including advertising bans for all beverages; bans of broadcast advertising of spirits; real price; real income; alcohol sentiment (a binary variable for percent alcohol consumed as beer and wine); and tourism. Separate regressions also were estimated for motor vehicle fatality rates and liver cirrhosis mortality rates as alcohol abuse outcomes. Among the difficulties in this type of study are the substantial differences that exist in a cross-national data set. For example, cultural differences (“drinking sentiment”) are difficult to measure as are many other determinates of international drinking levels and patterns. This is especially the case for the Scandinavian countries, which operate state monopolies for production and retailing and which also have very strict laws on drunk driving. The author recognizes this problem; he states that “. . . the omission of these variables could result in biased estimates of the effects of advertising bans” (Saffer, 1991, 71). Using a yearly fixed-effects model, the significant variables for consumption were price, income, drinking sentiment, tourism, and advertising bans. The author concluded that “. . . advertising bans have a significant effect in reducing all three measures” (Saffer, 1991, 78). For the consumption measure, he reported that “. . . countries with bans on spirits advertising have about 16% lower alcohol consumption than countries with no bans and that countries with bans on beer and wine advertising have about 11% lower alcohol consumption than countries with bans only on spirits advertising” (Saffer, 1991, 77). These are large estimates, which is an indication of possible omitted variable bias. Further, three other cross-national studies have been unable to replicate these findings.

5. Young (1993) studied the same OECD data used by Saffer. However, Young (1993, 225) corrected for serial correlation in the data, and he also changed the model specification by using binary variables for each country and by directly entering binary variables for the type of advertising restrictions in place. His first set of estimates showed that “. . . the mix of signs and general lack of statistical significance implies that there is no convincing evidence to support the hypothesis that advertising bans are negatively associated with consumption or death rates” (Young, 1993, 222). Next, Young disaggregated the consumption data and estimated the demand for each beverage. He found that a ban of spirits advertising resulted in higher beer consumption and a ban of all advertising resulted in higher spirits consumption. Wine consumption was unaffected by a total ban and negatively affected by a ban of spirits advertising (Young, 1993, 224). This is an important finding since it showed that bans can lead to substitution among beverages. Young concluded that the “. . . the relationships between advertising bans and consumption of specific types of alcoholic beverages are largely inconsistent with the notion that bans reduce consumption” (Young, 1993, 227).

6. Calfee and Scheraga (1994) examined the alcoholic beverage markets in France, Germany, Netherlands, Sweden, and the U.K. The time period varied by country and was approximately 1970-1990. Sweden banned all alcohol advertising after 1979. Advertising expenditures were used as the explanatory variable for four countries, and Sweden was treated as a control case. This is the only study available that uses cross-national data on annual advertising expenditures. Further, advertising outlays varied substantially, so statistical inferences were

possible. As noted by the authors, in France, “. . . advertising more than tripled during the years under examination, and in two others [Netherlands and the U.K.], advertising approximately doubled” (Calfee & Scheraga, 1994, 303). The regression model included price, income, and a time trend. Advertising expenditures were insignificant for Germany, Netherlands, and the U.K., and significantly negative for France. Regression results for the four countries without bans were not appreciably different from Sweden, and alcohol consumption declined in all five countries during the study period. The study concluded that “. . . social forces other than prices and income were bringing about a strong reduction in demand for alcoholic beverages, and advertising did nothing to ward off this trend towards reduced consumption” (Calfee & Scheraga, 1994, 305).

7. Nelson and Young (2001) updated and expanded the earlier analyses of seventeen OECD countries. We argued that broadcast bans can lead to price reductions due to reduced product differentiation and lower costs, and might therefore increase price competition among producers of more homogeneous goods. Hence, banning advertising could have the perverse effect of increasing alcohol consumption. We also discussed how other alcohol control policies could affect the regression results, and how consumption levels in Scandinavian countries are underreported due to cross-border purchases, duty-free imports, and legal and illegal home production. The expanded consumption model included explanatory variables for real price, real income, drinking sentiment (percent consumption as wine), tourism, age distribution, and unemployment. Several of these variables were omitted by Saffer (1991). Using data for 1977-1995, we found that bans of broadcast advertising of spirits led to greater alcohol consumption and higher rates of motor vehicle fatalities. Moreover, wider bans of additional media and beverages were not consistently related to alcohol consumption or abuse. Real prices were shown to be an important determinant of alcohol consumption, and the youth variable was statistically significant as a determinate of highway fatalities. This study confirmed the earlier findings of Young (1993) and Calfee & Scheraga (1994), and all three studies refuted the findings of Saffer (1991) for advertising bans in OECD countries.

Table 2 summarizes the results in the seven international studies of alcohol advertising bans. Only the study by Saffer (1991) suggests that a ban of broadcast advertising will have a significant and material effect on alcohol consumption and abuse. The other six studies do not support this result, including three studies that used similar OECD data. Hence, it must be concluded that the available evidence does not convincingly support the hypothesis that broadcast (and wider) advertising bans reduce alcohol consumption or alcohol abuse.

In a related study, Saffer & Chaloupka (2000) examined the effects of tobacco advertising bans by using an international panel that covered 22 OECD countries for the period 1970-1992. An innovation in this study was the measurement of the number of media banned in each country, which ranged from zero-to-two media (“weak” bans); three-to-four media (“limited” bans); and five-to-seven media (“comprehensive” bans). The authors treated the “weak ban” category as the control group, which implies that bans of one or two media did not substantially affect tobacco use compared to zero bans. In this data set, the number of bans in many countries increased over time, so the authors were able to study both cross-national and time-series variation of advertising restrictions. They report that “. . . the Limited Ban variables are

generally not significant, while the Comprehensive Ban coefficients are almost all significant” (Saffer & Chaloupka, 2000, 1130). Further, they find that “. . . a limited set of advertising bans will not reduce the total level of advertising expenditures, but will simply result in substitution to the remaining non-banned media” (Saffer & Chaloupka, 2000, 1134). Finally, the authors conclude that “. . . the analysis in this paper suggests that the new ban on outdoor advertising, required by the 1999 US tobacco settlement, will have little effect on consumption . . . [and] will result in substitution to the remaining three forms of [non-banned] advertising and to increased use of tobacco promotion” (Saffer & Chaloupka, 2000, 1135).

### *C. Why Don't Alcohol Advertising Bans Work?*

The fourteen studies reviewed above do not support a statistically significant or material effect of alcohol advertising bans, including selective bans of outdoor media and comprehensive bans of broadcast media and other print media. Except for Saffer's (1991) study, the evidence is neither mixed nor inconclusive. There is evidence that some bans result in substitution between beverages or media, but there is no convincing evidence that selective or more comprehensive bans have significant effects on marketwide demand for all alcohol beverages. Additionally, some bans are designed to affect competitive conditions in the market, and favor one beverage over others as a form of rent-seeking behavior (Calfee, 1997; McGahan, 1995; Peltzman, 1971; Yandle, 1983). At the beverage level, the results are mixed and suggest that substitution among beverages is a possible effect of a ban. However, the null hypothesis that advertising bans reduce alcohol consumption (or abuse) must be rejected. Conceivably, a total ban of all alcohol advertising and promotion might have some effect on behavior, although anecdotal evidence for the Soviet Union and the U.S. Prohibition-era argue against even this extreme result.

However, two additional questions remain. First, if advertising bans do not affect alcohol demand, then what economic and social processes are possibly affected by such restrictions? I offer four responses to this question. Second, can the results in this section be applied to youth alcohol behaviors? None of the studies examined above is specifically concerned with youth alcohol consumption, although a large econometric literature exists on this general issue (Chaloupka et al., 2001; Cook & Moore, 2000; Grossman et al., 1994; Kenkel, 1993). I also discuss why the empirical studies in Tables 1 and 2 are relevant for policy analysis of youth alcohol consumption problems.

There are four reasons why advertising bans might not work in the ways imagined by policymakers. First, given a selective ban, substitution toward non-banned media is always possible. This issue has not been investigated thoroughly, although some evidence is available from expenditure studies. Also, a non-alcohol investigation by Seldon & Jung (1993) obtains empirical estimates of substitution elasticities among messages in broadcast, print, direct mail, and other media. Broadcast advertising is the most effective of the four media that they examine, yet bans of this media have not been shown to reduce alcohol consumption. Second, a ban of one media can stimulate innovations within the set of non-banned media and other means of promotion. Harrison & Godfrey (1989) discuss the difficulty of alcohol advertising controls in Europe given new media such as broadband cable, videotex, and satellite television. Third, advertising can have both a price effect and an output effect. Advertising that increases product

differentiation can reduce the price elasticity of demand or shift consumer expenditures toward higher-priced beverages (Ambler, 1996; Kaul & Wittick, 1995). Some evidence regarding this effect is offered in Section V. More generally, Motta (1997) develops a theoretical model of an advertising ban under conditions of monopoly and oligopoly. His basic point is that a ban of persuasive advertising could either increase or decrease consumption, since advertising affects both the level of demand at given prices and the level of prices that sellers find optimal. Hence, a ban of persuasive advertising could reduce prices enough that alcohol consumption increases, rather than decreases. This result is counterintuitive, but consistent with findings in some studies. Similar possibilities can be found in theoretical models due to Dixit & Norman (1978) and Milgrom & Roberts (1986). Fourth, as recognized by the Supreme Court, advertising in mature markets can affect only brand (or beverage) shares, and there is no important spillover to the market as a whole. Numerous studies of advertising expenditures support this conclusion. For example, a meta-analysis of 128 marketing studies of frequently-purchased consumer products found that “. . . advertising has a relatively minor impact on product class sales” (Assmus et al., 1984, 72).

The second important question is the possible effect of an advertising ban on youth alcohol behaviors. Does advertising cause or predispose youth to drink alcohol? No empirical studies have addressed this issue directly for billboard bans or broadcast bans. However, there are at least four reasons why the results in Tables 1 and 2 are applicable to youth. First, “adult” alcohol consumption and measures of youth alcohol consumption are highly correlated. For example, both adult consumption and youth bingeing have declined by more than 20 percent from the peak levels that occurred in 1981. Using time-series data for the period 1975-1997, I regressed per-capita ethanol consumption on data for binge drinking by 12th-graders (measured as percent of responses) from the Monitoring the Future surveys. The  $R^2$  for the regression was 0.884, and the residual never exceeded about 2% in absolute value (compared to a sample mean of 35%).<sup>6</sup> The close relationship between these measures also has been employed in a comprehensive model of youth drinking by Cook & Moore (2001), which is discussed along with survey-research studies in Section IV. Second, studies by social psychologists using survey-research data and “path analysis” show a significant and direct effect of parents’ drinking (and parents’ approval) on youth alcohol behaviors. In contrast, measures of alcohol advertising in these studies always have small indirect effects, and the results are not always statistically significant. This is consistent with the findings from studies of “adult” consumption and advertising bans and expenditures. Third, alcohol advertising bans are often longstanding as many of these restrictions date to the repeal of Prohibition. If advertising has a substantial influence on youth behaviors (as frequently claimed), then it is reasonable to expect that current “adult” behavior will reveal this influence through a negative effect of a ban on consumption. However, this result is not found across a wide variety of bans, time periods, and countries. Fourth, numerous econometric studies include variables for youth demographics and the minimum legal drinking age. These variables are almost always significant as determinates of per-capita alcohol demand, especially beer consumption. However, advertising bans have not been found to materially decrease per-capita beer consumption. This difference is striking, and cannot be explained away by the level of data aggregation.

#### IV. STUDIES OF ALCOHOL ADVERTISING EXPENDITURES

Virtually all econometric studies of alcohol advertising expenditures come to the conclusion that advertising has little or no effect on marketwide (or beverage) alcohol demand. Using coefficient point estimates, some studies using annual data obtain small advertising elasticities of about 0.1 or less. An advertising elasticity of 0.1 implies that a 50% increase (decrease) in advertising would increase (decrease) alcohol consumption by only 5%. It is doubtful that an effect of this magnitude would pass the third prong of the *Central Hudson* test. In 1998, the shares by media for alcohol advertising were broadcast advertising, 66%; print advertising, 26%; and outdoor advertising, 8%. The implication is that virtually a total ban of broadcast advertising would be required to reduce alcohol consumption by 5 percent, but international studies of broadcast bans fail to demonstrate that even this large change would have an effect on consumption. None of the studies reviewed in this section provides support for the null hypothesis that advertising expenditures increase marketwide alcohol consumption in a material way.

The literature surveys by Saffer (1993, 1995, 1996, 1998) are highly critical of this result. He argued that “. . . studies that use national data on *annual* alcohol advertising expenditures measure advertising at a high level [of aggregation] with little *yearly* change and are likely to find no effect on consumption” (Saffer, 1996, 266; emphasis added). This argument is based on the existence of a market- or industry-wide sales response function, which is flat in the region of observed levels of annual advertising (Saffer, 1995, 85; 1996, 268; 1997, 431; 1998, 783). I discuss the existence of an industry-response function in Section V. In addition to studies that examine advertising bans, Saffer argued that data sets with greater variation are required, such as higher-frequency monthly and quarterly data. He also discussed a number of potential econometric problems with time-series studies, including simultaneous equation bias; cumulative effects of advertising; temporal aggregation bias; and measurement of real advertising expenditures (Saffer, 1993). Recent studies of expenditures have dealt with all of these issues, but advertising has not been shown in these studies to significantly affect marketwide alcohol consumption. This section summarizes recent studies, with a focus on methodological issues and econometric procedures used in time-series expenditure studies.<sup>7</sup>

##### A. *Econometric Studies of Advertising Expenditures*

1. *Studies Using High-Frequency Quarterly and Monthly Data.* A number of recent studies use monthly or quarterly data on advertising expenditures and alcohol consumption. These data capture seasonal or other data variations (such as “flighting” or “pulsing” strategies by advertisers), which might conceivably influence consumption. U.S. studies using quarterly data are Coulson et al. (2001), Franke & Wilcox (1987), and Nelson (1997, 1999); U.K. studies using quarterly data include Duffy (1990, 1991a, 1991b, 1995, 2001); and Canadian and Australian studies using monthly data are Lariviere et al. (2000) and Smith (1990). The Canadian study is a thorough treatment of advertising dynamics within a demand system for alcoholic beverages and soft drinks. The researchers found only weak advertising effects on aggregate alcohol expenditures, and they concluded that “. . . advertising is not effective in enlarging markets” (Lariviere et al., 2000, 147).

2. *Studies Using Simultaneous-Equation Methods.* A number of studies of alcohol advertising use single-equation methods for one or more beverages, including studies by Goel & Morey (1995), Lee & Tremblay (1992), and Tegene (1990). However, other recent studies use multi-equation methods, and either provide coefficient estimates that account for simultaneity or include tests for endogeneity. U.S. studies that estimate structural models using system-wide methods are Nelson (1997, 1999) and Nelson & Moran (1995); U.K. studies include Duffy (1990, 1991a, 1991b, 1995, 2001); and a Canadian study is Lariviere et al. (2000). Cointegration analysis is another econometric method that accounts for simultaneous-equation bias (Stock & Watson, 1988, 166). Studies that apply cointegration methods include Blake & Nied (1997) and Duffy (1991a) for the U.K., and Coulson et al. (2001) for the U.S. Additional studies that test for endogeneity include Duffy (1991a, 1991b, 1995, 2001), Lee & Tremblay (1992), Nelson (1999), and Nelson & Moran (1995). A study by Duffy (2001) uses quarterly data and conducts a thorough investigation of functional forms for demand systems. The Hausman-Wu test is applied to the hypothesis that advertising is orthogonal to the equation disturbances, and the study found strong support for exogeneity of beer, wine, and spirits advertising (Duffy, 2001, 445). The researcher concluded that “. . . advertising is found to have no significant effect upon the ‘product composition’ or ‘level’ of total alcoholic drink composition in the UK” (Duffy, 2001, 437).

3. *Studies that Account for Advertising Dynamics.* A frequent claim is that advertising has a cumulative or “lingering” effect on demand. Hence, lagged values of advertising expenditures are possible determinates of consumption. However, economic and marketing studies of the depreciation rate on past advertising usually find that expenditures are almost fully depreciated in less than a year’s time. Clarke (1976) surveyed the literature on this issue for a broad sample of consumer products. He reported that “. . . 90% of the cumulative effect of advertising on sales of mature, frequently purchased, low-priced products occurs within 3 to 9 months of the advertisement. The conclusion that advertising’s effect on sales lasts for months rather than years is strongly supported” (Clarke, 1976, 355). Additional surveys by Assmus et al. (1984) and Leone (1995) reach the same general conclusion (see also Boyd & Seldon, 1990). Given a high rate of depreciation, it would be surprising if lagged advertising has a substantial effect on alcohol consumption. Studies that investigate advertising dynamics using quarterly and monthly data include Coulson et al. (2001), Duffy (1991a), and Lariviere et al. (2000). None of these studies found substantial effects of lagged (or current) advertising on alcohol demand.

4. *Temporal Aggregation Bias.* Theoretical work by Bass & Leone (1983) showed that the magnitude of the advertising coefficient should increase with the length of the data interval employed in the analysis. In order to examine this result, they estimated a distributed lag model using 16 years of bimonthly advertising data for five brands of a frequently purchased and heavily-advertised product category. The model was estimated using data aggregates for 2 months, 4 months, 6 months, and 12 months. The general result was that the estimate of the advertising coefficient increased gradually in size as the data interval was lengthened, and the overall increase was substantial (Bass & Leone, 1983, 6). Comparing quarterly with annual estimates for the five brands, the average increase in the five coefficients was about 83% (from 1.41 to 2.58). Leone (1995) surveyed other theoretical models of temporal aggregation and concluded that regardless of the model “. . . it is clear that . . . the advertising coefficient should

increase as the level of aggregation increases” (Leone, 1995, 149). This point was overlooked in the survey of alcohol advertising by Fisher & Cook (1995, 146), who concluded that the advertising elasticity was about 0.10. In fact, studies using quarterly data obtain considerably smaller point estimates of this elasticity. Duffy (1990, 9) used quarterly U.K. data for 1963-1983, and obtained advertising elasticities for total alcohol demand in the range from 0.020 to 0.039. Nelson (1999, 786) used quarterly U.S. data for 1977-1994, and obtained point estimates for total alcohol demand of about 0.001 or less. In other words, a 50% reduction in U.S. advertising would reduce per-capita alcohol consumption by only 0.05%. This is much smaller than the 5% reduction obtained from estimates based on annual data. Moreover, the advertising coefficient estimates in these studies are not statistically different from zero. It seems quite clear that elasticities of this size would not pass the *Central Hudson* test.

5. *Advertising Measurement Issues.* The issue of advertising measurement was first raised by Backman (1967). In path-breaking work, Schmalensee (1972, 245) showed that consistent aggregation of expenditures could be obtained by deflating by media-specific price indexes, where each price index accounts for a medium’s audience exposure and coverage. This effect is referred to as the medium’s “reach,” which is the percentage of the potential audience reached by an advertising campaign. The price indexes are expressed in cost per thousand (CPM), which measures the cost of reaching 1000 potential customers. Hence, deflated expenditures are measures of the number of real message “impressions” due to each medium, and the advertising coefficient in a demand function is an estimate of the marginal “response” or marginal productivity of messages on quantity of sales. Deflating advertising expenditures by broader price indexes (such as the implicit deflator for GDP) is generally satisfactory for ease of replication, but a better analytical procedure is to use the McCann-Erickson CPM indexes or comparable price indexes. Studies for the U.S. that use the McCann-Erickson indexes include Coulson et al. (2001), Franke & Wilcox (1987), Gius (1991, 1996), Lee & Tremblay (1992), Nelson (1999), and Nelson & Moran (1995). In Nelson (1999), real advertising expenditures also are disaggregated by media in order to explore possible differential effects on alcohol demand of broadcast, print, and outdoor media. The results for the three beverages and total alcohol indicate that, regardless of the medium, advertising has little or no effect on demand.

6. *Studies that Adjust for Serial Correlation and Data Stationarity.* Serial correlation and stationarity are relevant concerns for studies that use time-series data. Studies that include explicit adjustments for serial correlation include Calfee & Scheraga (1994), Duffy (1991a), Goel & Morey (1995), Lee & Tremblay (1992), and Nelson & Young (2001). Studies that adjust for serial correlation using first-order (or higher) differences of the data include Duffy (1990, 1991a, 1991b, 1995, 2001), and Nelson & Moran (1995). In Nelson (1997, 1999) the data are fourth-differenced to remove pure seasonal variation, and the intercept term captures any remaining exogenous trend in the transformed data. Using more recent techniques, studies that investigate stationarity of the data include Blake & Nied (1997), Coulson et al. (2001), Duffy (1991a), and Lariviere et al. (2000). None of these studies finds that advertising has a significant or material effect on alcohol consumption. The study by Lee & Tremblay (1992) is a thorough investigation of the demand for beer. The model included the real price of beer, real price of whiskey, real price of cola-drinks, real disposable income, real advertising, real stock of advertising, lagged consumption, and youth demographics. The advertising elasticities were never statistically significant, and the point estimates were very small (0.006 to 0.019). The empirically important

determinates of beer demand included the price of beer, prices of substitutes, and youth demographics. With respect to beer advertising, the study concluded that “. . . there is no support for the hypothesis that advertising has a significant positive effect on market demand” (Lee & Tremblay, 1992, 74).

In summary, despite numerous advances in data and econometric techniques, there is little or no evidence of a marketwide relationship between alcohol advertising and alcohol consumption. The whole notion of an industry-wide response function must be called into question. Only small effects at the beverage level have been reported, but these effects always disappear when consumption is aggregated across beverages. Further, I have argued above that these studies and their findings are applicable to issues of youth alcohol behaviors. I next turn to an alternative approach to the issue of youth drinking and advertising.

### *B. Survey-Research Studies: Path Analysis of Youth Alcohol Behaviors*

Survey research is designed to gather self-reports of drinking behaviors and of exposure and responses to advertising. Path analysis is a technique for estimating structural (causal) models that include hypothetical latent (unobservable) variables, and which encompasses and extends regression, econometric, and factor analysis procedures (Bollen, 1989). The observable determinates of a latent variable are referred to as indicator variables, which contain errors of measurement. A path diagram is a pictorial representation of a system of simultaneous equations. A particular feature of path analysis is the statistical isolation of direct effects and indirect (mediated) effects. For example, advertising has a possible direct effect on beer consumption, and possible direct and indirect effects on drunk driving.<sup>8</sup> The indirect effects of advertising are mediated through latent variables (for example, risk perception), and the total effect is the sum of direct and indirect effects (Bollen, 1989, 4, 36, 376). Single-equation regression models estimate the direct effects of observable variables, and might understate overall effects if indirect effects are substantial (Bollen, 1989, 38). Structural econometric models and reduced-form models typically deal with only observable (manifest) variables, although direct, indirect, and total effects are clearly possible within these models (see Kinnucan et al., 2001; Nelson, 1997; Nelson & Young, 2001). Modern path analysis models are estimated using maximum likelihood procedures or generalized least-squares, and are therefore subject to the full range of econometric problems, including specification bias, measurement errors, sample selection bias, missing data, outliers, multicollinearity, lack of replication, and the like (Bollen, 1989, 55-61).<sup>9</sup>

There are numerous studies of youth alcohol behaviors that apply path analysis or related techniques such as confirmatory factor analysis and hierarchical regression analysis. No attempt is made to survey all of this large and growing field of inquiry.<sup>10</sup> Rather, I examine only three representative studies in this area, and critically discuss the authors' methods, results, and policy implications. These studies attempt to measure the indirect effect of television advertising on youth alcohol behaviors. None of the studies establishes a statistically significant direct effect of advertising on youth drinking or, more important, has identified the magnitude of the indirect effect of advertising. Methodologically, this omission is surprising, since the measurement of indirect effects and their standard errors is well-known in the literature on structural modeling.<sup>11</sup> As a consequence, the application of path analysis to the debate on alcohol advertising is seriously incomplete and presently of limited usefulness for public policy evaluation.

1. Grube and Wallack (1994) studied the effects of television exposure in a cross-section sample of 468 fifth- and sixth-graders (10-13 years old). The children were asked to state their intention to drink as an adult for each of four beverages – beer, wine, wine coolers, and liquor – on a 4-point scale from “not at all” to “at least once per week.” However, only 5% (or 23) of the children had ever had more than a taste of an alcoholic beverage (Grube & Wallack, 1994, 255). The statistical implications of this sample feature are not discussed. The endogenous variable – “drinking intention as an adult” – is a latent variable, which is constructed by combining the four responses by beverage (as factor loading). The authors fail to report the mean value for the survey responses for each beverage, the mean of the latent variable (or its distribution), or other summary information about their sample and variables. In order to measure awareness of advertising, the students were shown five still photographs from currently televised beer commercials (with brand names removed), and they were asked to name the brand being advertised. They also were asked to recall beer brands and to match brands and slogans. This approach is used despite the fact that the intentions variable covers all forms of alcohol, and is not a brand-specific measure. Awareness of beer advertising, beliefs about positive aspects of drinking (sociability), and beliefs about the negative aspects of drinking (health problems) also are latent variables, which are influenced by multiple indicators in the authors’ measurement model (Grube & Wallack, 1994, 256). For example, “awareness of advertisements” depends significantly on five indicators: knowledge of slogans; knowledge of brands; respondents’ exposure to television sports; weekend PM television watching; and parents’ drinking (Grube & Wallack, 1994, 257). The number of television and other advertising messages viewed is not measured. Other statistically significant exogenous variables included in the structural model are gender, peer approval, peer drinking, parents’ education, parents’ approval, and parents’ drinking. The statistical results yield coefficient estimates that can be used to obtain both direct and indirect effects for relevant variables, but the authors fail to provide the latter estimates or their standard errors. For example, the standardized path coefficients for the direct effects on “intentions” for gender, peer approval, parents’ education, and parents’ drinking are 0.14, 0.26, 0.11, and 0.28, respectively (Grube & Wallack, 1994, 257). A surprising result is that peer drinking only indirectly affects “intentions” through the knowledge of brands. Parents’ approval and parents’ drinking also have indirect effects on “intentions” through positive beliefs and advertising awareness, respectively. “Positive beliefs” is a latent variable with a structural coefficient of 0.32, which can be decomposed into effects due to parents’ approval and advertising awareness. The coefficients are 0.22 and 0.47, respectively. Hence, the indirect path effect of “advertising awareness” (through positive beliefs) on drinking intentions is  $(0.47)(0.32) = 0.15$ , which is smaller than the direct effects of peer approval or parents’ drinking by a factor of two. Similarly, the mediated or indirect effect of TV sports on drinking intentions is given by  $(0.23)(0.47)(0.32) = 0.03$ , and that for weekend PM TV watching is  $(0.24)(0.47)(0.32) = 0.03$ , where 0.23 and 0.24 are the structural coefficients. For brand awareness, the indirect effect is  $(0.38)(0.47)(0.32) = 0.06$ , and that for slogans is given by  $(0.17)(0.47)(0.32) = 0.03$ . While television exposure would be affected by a broadcast advertising ban, the indirect effects of this medium are smaller by a factor of nine compared to the direct effects of peer approval or parents’ drinking. These results cannot be regarded as evidence of a material effect of advertising on youth drinking intentions. Furthermore, Grube & Wallack (1994) do not measure advertising exposure for media other than television. They do not report diagnostics for data outliers, tests for collinearity, or summary measures of goodness of fit. A large number of relevant variables are omitted, including parents’ income, occupation, religion, and the like. Finally, they fail to report the indirect coefficients and their standard errors.

2. In a longitudinal study, Connolly et al. (1994) investigated alcohol consumption at age 18 years and prior advertising exposure. The sample covered 667 teenagers in New Zealand, who were interviewed at ages 13, 15, and 18. Participants in the study underwent a full day's assessment, including personal recalls of alcohol-related advertising exposure (print, broadcast, entertainment images) collected in face-to-face interviews at ages 13 and 15. For self-reported alcohol use at age 18, the respondents completed a computer questionnaire (Connolly et al., 1994, 1257). Standard regression analysis is used to investigate the relationship between alcohol consumption and earlier recall of alcohol seen in the mass media. Alcohol consumption is measured by average quantity, maximum quantity, and frequency of drinking at different locations, summed over drinking locations (Connolly et al., 1994, 1258). The non-media variables include gender, socioeconomic status, living situation, respondents' occupation, and peer approval of drinking. This small number of explanatory variables is considered despite the fact that the same individuals had been followed in the study since birth (Connolly et al., 1994, 1257). No explanatory variables are included for market conditions (e.g., prices), parents' drinking, peers' drinking, religion, respondents' or parents' income, and the like. Despite the use of standard regression analysis, the authors do not report regression coefficients (only p-values for Student t-tests are reported). Hence, it is impossible to judge the magnitude of the reported effects. No relationship whatsoever is found between broadcast advertising (recalls at ages 13 and 15) for wine and spirits consumption by women or men. For women, only the number of hours of TV watched at age 13 (but not at age 15) has a weakly positive effect on the amount of beer, wine, and spirits consumption. For men, there are no significant relationships of any kind for wine and spirits. For men, the number of broadcast messages recalled at age 15 (but not at age 13) has a weakly positive effect on the average and maximum amount of beer consumption. However, for women, the number of alcohol promotions recalled at age 13 (but not at age 15) is *negatively* associated with the frequency of beer consumption (Connolly et al., 1994, 1260, 1262). This is the wrong coefficient sign. In summary, this study is deficient as a basis for informed public policy, despite the authors' contrary claim (Connolly et al., 1994, 1262). First, the magnitude of advertising effects cannot be judged, which is a common problem in many social learning studies. Second, the regression relationships fit the data very poorly ( $R^2$  values are all less than 0.17), and only about 10-17 percent of the total variance in the dependent variables is actually explained. This suggests that the results are subject to serious omitted variable bias. Third, the authors report 66 regression coefficients for advertising, and only five coefficient estimates have p-values less than 0.05, and one of these has the wrong sign. In any study with a large number of estimates for the same influence, random variation (and pre-testing bias) can easily result in three or four significant coefficients.

3. Austin and Knaus (2000) surveyed 273 children (third-, sixth-, and ninth-graders) in Washington state. The survey was a pencil-and-paper questionnaire designed to assess media (television) effects on "precursors to drinking" among children for whom alcohol consumption was not yet occurring (Austin & Knaus, 2000, 13). The authors hypothesize that children's attitudinal expectancies (drinking makes you happy) will be positively predicted by attitudinal responses to questions on alcohol desirability (women in beer ads are good looking) and identification (I wish I could be like TV people). All three measures are correlated with each other (correlations range from 0.35 to 0.48), which is a possible difficulty with this study. As an additional step, they measure "alcohol predrinking behavior" by third- and sixth-graders using

children's preferences for toys and other items with beer brand logos (e.g., beach towels, hats). A positive value was recorded if the respondent chose a beer-logo item and a negative value for a soda pop-logo item. The mean for this variable is -2.85, indicating that most children picked the soda items (Austin & Knaus, 2000, 18). Sixth- and ninth-graders also were asked to self-report risky behavior, including frequency of use of tobacco and alcohol (Austin & Knaus, 2000, 18). Frequency of use is reported on a six-point scale from never used (1) to use about every day (6), and the mean alcohol value is 1.58. This indicates that most respondents had infrequently used alcohol, and suggests that the risky behavior may include outliers or is a discrete variable that would be better examined in an ordered probit or logit model. Control variables in the analysis include gender, grade level, ethnic background, and parents' education. There are no observable measures of advertising exposure in this study, such as hours watched of TV or recall of slogans and brands. This hinders replication of results by other researchers and cross-study comparisons. The authors hypothesize that desirability should predict identification, which should predict expectancies, which should predict both risky and predrinking behaviors. Estimates of the standardized coefficients are 0.22, 0.18, 0.43, and 0.02, respectively (Austin & Knaus, 2000, 20). The last coefficient is not statistically significant, and only grade-level predicts predrinking behavior. Desirability also predicts expectancies, with a coefficient of 0.31. Given the path structure of the model, the indirect effect of desirability on risky behavior is given by  $(0.22)(0.18)(0.43) + (0.31)(0.43) = 0.15$ . In contrast, the sum of direct and indirect effects of grade-level are  $0.39 + (0.27)(0.18)(0.43) + (0.43)(0.43) = 0.60$ . Hence, exogenous variables with direct effects on behavior are far more important than the indirect effects of advertising-related variables, which repeats the results in Grube & Wallack (1994). Given the limited number of control variables in this study, the results also are suspect due to omitted variable bias and other econometric problems that largely go undiscussed by the authors. The authors' hypothesis regarding predrinking behavior is not supported, although they largely ignore this negative result. More important, since there are no measures of advertising exposure, the study cannot be used to determine the effects of removing specific types of advertising on youth behaviors. Finally, the authors do not report a coefficient that measures the magnitude of the relationship between risky behavior and predrinking behavior for the sixth-grade students. The basis for their strong policy conclusion is a simple statistical comparison of mean differences by grade-level, and a zero-order correlation of 0.20 (Austin & Knaus, 2000, 20, 22).

Path analysis models have not been utilized in a manner that is suitable for the questions that must be addressed by the courts (and must be considered by governments) under the *Central Hudson* formula. The empirical results in path analysis studies are biased and incomplete. None of the studies establishes the magnitude of the (indirect) effect of advertising messages on a well-defined measure of alcohol consumption. Stated in broad terms, the models and results in path analysis studies can be likened to a coin-flipping experiment. There are four or five possible steps to the actual youth behavior of interest, including advertising exposure, desirability, advertising awareness or identification, positive beliefs, and, lastly, actual drinking behavior or expectancies. The resulting outcome is analogous to the probability of flipping a fair coin, and getting a "heads" four times in a row. The joint probability of this event is  $(0.5)^4 = 0.0625$ . It is a serious question whether a probability this small can be used to support the third prong of the *Central Hudson* test. Furthermore, a comparison of the estimates for advertising and parents' behavior suggests that more cost-effective solutions exist under the fourth prong.

In contrast to these studies, a comprehensive econometric study of youthful drinking is found in Cook and Moore (2001). Unfortunately, there are no advertising variables in this study. The authors use data from the National Longitudinal Survey of Youth (NLSY) for 1982-1985 and 1988-1989 for youth aged 14 to 22. The sample size is about 50,000. They note that youthful drinking has declined over time, and that youth drinking in the U.S. is below that found in many other countries (Cook & Moore, 2001, 377; see also Smart & Ogborne, 2000b). They examine two binary dependent variables for alcohol consumption, including consumption in the past 30 days and binge drinking (6+ drinks on four or more occasions) in the past 30 days. Probit regressions are estimated for these two variables, including predetermined variables for sex, race, ethnicity, age, cognitive ability, parents' education, family composition (e.g., living with one parent), location of residence, and religion (Cook & Moore, 2001, 387). Many of these variables are not included in survey-research studies. In addition, the authors include a number of variables that might be endogenous, including parents' drinking, years of school completed, living arrangements, marital status, number of children in household, school and employment status, the respondent's weight, income, and educational aspiration. The alcohol control variables in Cook & Moore (2001, 388) are the beer excise tax and (lagged) minimum legal age. Further, per-capita consumption of ethanol by adults is introduced as a control for all other state-level factors that might influence drinking, including alcohol availability, outlet licensing, liability rules, social contagion, and the local drinking culture. The results show that the minimum legal age and the beer excise tax are effective deterrents to youthful drinking and bingeing, and "adult" consumption has an important and consistent effect on youth behaviors. The last result is consistent with results in path analysis studies, but Cook & Moore's results also illustrate the incompleteness of the model specifications in survey-research studies. Their results also demonstrate that studies of "adult" or aggregate alcohol consumption are applicable to issues of youth alcohol behaviors. The researchers conclude that ". . . youthful drinking decisions are closely linked to overall consumption" (Cook & Moore, 2001, 421).

## **V. BRAND ADVERTISING AND THE CHIMERA OF AN INDUSTRY-RESPONSE FUNCTION**

Saffer (1995, 1996, 1997, 1998) argued that the industry-wide response function is flat in the region measured by annual data on expenditures. This claim also has appeared in the policy literature (American Medical Association, 1986, 1487). As I have demonstrated above, empirical studies using higher-frequency data fail to show that alcohol advertising has an effect on marketwide sales. Furthermore, studies of advertising bans fail to demonstrate that billboard and broadcast bans reduce total alcohol consumption. I now turn to the evidence on the relationship between brand (or category) advertising and beverage consumption. Three examples of this relationship are developed: light beer and total beer demand; wine coolers and total wine demand; and vodka and total spirits demand. Each of these examples demonstrates the difficulty of making marketwide inferences based on the marketing success of a particular brand or beverage. Successful brand promotion produces increased sales of the brand, but it does not follow that this success spills over to the market (or category) as a whole. An obvious reason for this failure is that the primary effect of advertising is to redistribute brand shares. Hence, a movement along the advertising-sales function for Brand A causes a shift in the advertising-sales function for other brands, including brands produced by the firm selling Brand A. Marketwide sales can increase or decrease depending on the net effect. I argue below that examining market

segments with successful brand advertising campaigns reveals information about these net effects and the possible shape or existence of an industry advertising-sales response function.

Current notions about the shape of the industry-response function depend on studies of brand advertising and market shares of leading brands and firms. Simon (1970, 1980) provided thorough surveys of the early marketing literature on this topic. He was primarily interested in the possibility that there might be increasing returns to advertising over some range of experience. He concluded that marginal returns to advertising diminish throughout, but all of the data that Simon examined refer to specific brands. I am aware of only one study of brand advertising for alcoholic beverages that provides some direct evidence on the existence of an industry-response function for alcoholic beverages. Gius (1996) examined brand-level sales and advertising of distilled spirits. In his model, brand advertising has an own-brand effect (due to reduced sales of rival brands) and a spillover or marketwide effect on sales. Gius argued that the rival-brand advertising effect in the own-brand's demand function will be positive if the spillover effect is greater than the decrease of own-sales caused by rival-brand advertising (Gius, 1996, 73). As an empirical test, Gius studied a panel of sixteen leading liquor brands for the period 1976-1989. Advertising was measured by deflated (real) national brand-level messages obtained from Leading National Advertisers. Other variables included price, rival price, rival advertising, income, and a time trend. The regression results indicated that own-brand advertising had a significant positive effect on own-brand demand, but rival-brand advertising was insignificantly different from zero. Hence, he concluded that “. . . brand-level spirits advertising results in only brand switching and does not increase the size of the spirits market” (Gius, 1996, 75).

As a general model of this process, consider advertising under oligopoly conditions where sellers conform to Cournot-Nash assumptions, expecting rivals' advertising outlays to remain unchanged in response to their outlays (Scherer & Ross, 1990, 594). Brand A's advertising elasticity can be decomposed into three terms: (1) the elasticity of Brand A's output with respect to the spillover or market-expansion effect of Brand A's advertising; (2) the elasticity of Brand A's output with respect changes in its own market share or the rivalrous effect of Brand A's advertising; and (3) the negative elasticity of Brand A's output with respect to rivals' advertising induced by changes in Brand A's advertising. Successful brands are those for which the first two terms more than offset the negative effect of the third term. These brands should have both increasing market shares and increasing quantities of sales. Hence, studying brands and categories that exhibit rising sales due to successful advertising reveals information about the spillover effect of Brand A's advertising on marketwide demand. In this section, I examine three examples of successful brand advertising of alcoholic beverages – Miller Lite beer, Bartles & Jaymes wine cooler, and Absolut vodka. There is no convincing evidence of an industry-wide spillover effect associated with these successful brands. For light beer, the product category expands, but the beer market does not. For wine coolers, the category and the market expand, but this success is temporary. For vodka, both the vodka category and the spirits market decline steadily over time. These examples fail to support the notion of a long-run marketwide effect of successful brand-level advertising.<sup>12</sup> Brand advertising affects brand shares in the alcoholic beverage industry, but the examples fail to demonstrate a marketwide spillover. This is consistent with studies of advertising expenditures at various levels of aggregation.

### *A. Light Beer and the Market for Beer*

Light beer (“Lite”) was introduced to the national mass market by Miller Brewing in 1975. Under the direction of new management by its parent Philip Morris, Miller set out to segment the beer market by target marketing to consumer groups (Scherer & Ross, 1990, 583). Advertising for Miller Lite stressed its low calorie content, and the message “Taste’s Great, Less Filling” pushed by aging ex-athletes was an attraction for the weight-conscious consumer. Anheuser-Busch responded in 1977 to Lite’s success with its Natural Light brand, followed in 1978 and 1981 by Michelob Light and Bud Light brands (message: “Gimme a Light”). These brands were backed by substantial advertising campaigns (Greer, 1993, 107). The battle of the brands had been joined, and advertising budgets exploded to reflect this.<sup>13</sup>

Miller spent about \$14.8 million on Lite promotion in 1976, principally on television. By 1984, Miller’s spending had grown to \$67 million. Anheuser-Busch (A-B) spent \$10.7 million introducing Natural Light in 1977, with about 94% occurring on television and radio. A-B’s spending on Bud Light and Michelob Light was \$79 million in 1984. This was more than \$10 per barrel for each brand, compared to \$1.60 for A-B’s Budweiser brand and \$3.87 per barrel by Miller Lite. Nominal advertising expenditures for Lite peaked in 1986 at \$86 million (\$4.53 per barrel). Nominal advertising of Bud Light peaked in 1988 at \$70 million (\$7.32 per barrel), while spending on Michelob Light was \$18 million (\$7.05 per barrel). Advertising outlays on light beer began to drop off after 1988 as market shares stabilized and other brands and categories were introduced. In 1999, A-B spent \$105 million (\$3.66 per barrel) on Bud Light and \$23 million on Michelob Light (\$8.33 per barrel). For the two A-B brands, 98% of the total budget was spent on television advertising. Miller spent about \$83 million on advertising of Lite (\$5.20 per barrel), with 92% of the spending accounted for by television and 7% by magazine advertising. In constant 1999 dollars, Miller’s total budget for Lite was about \$117 million in 1986. Hence, Miller’s real advertising outlays fell by 29% as its market share shrank.

The consequence of all this spending was a marked shift over time in the market shares of brands and beer categories. Light beer sales were about 35.4 million barrels in 1984, or 20% of the beer market. By 1990, sales were 59.1 million barrels and the market share was 31%. In 1999, light beer sales were 83.2 million barrels, or 42% of the beer market. Hence, consumption of low-calorie beer has grown both in absolute terms and as a percent of market. Bud Light was the second leading brand in 1999, with 14.6% of the beer market (compared to 5.8% in 1990). Miller Lite was the third leading brand in 1999, with 8.1% of the market (compared to 10.0% in 1990). It seems likely that advertising played an important role in shifts of brand and category sales in the market for beer.

However, it does not follow that increased category advertising or brand success expanded the beer market as a whole. Table 3 and Figure 1a show per-capita consumption of light beer and all beer for the period 1980-1999. Although per-capita sales of low-calorie beer grew by 189% during this period, marketwide consumption of beer declined by about 11% from 33.7 gallons per capita in 1980 to 30.1 gallons per capita in 1999. Advertising in the light beer category might have had something to do with slowing the overall rate of decline, but this has not been demonstrated empirically. In any event, marketing successes at the brand and category

levels failed to expand the beer market. A noticeable spillover effect is not present in these data, except at the category level. Further, as noted by Elzinga (2001, 101), popular-priced beer declined from 60% of the market in 1970 to less than 15% in 1998 as consumers shifted to light beer, imports, craft beers, and other premium-priced categories. Hence, it is equally likely that market segmentation shifted consumer preferences toward higher-priced brands and categories, with resultant lighter wallets and movement up the market demand schedule. Advertising and product differentiation may have *reduced* the quantity of sales, although not necessarily the dollar value of sales.

### B. Wine Coolers and the Market for Wine

Wine coolers were introduced in 1981 by the original California Cooler. The first coolers were a mixture of white wine, fruit juices, and carbonated water. Coolers generally contained about 5-6% alcohol by volume, or about the same amount as most beer. Initially, coolers were identified with the California lifestyle and were regarded as more acceptable to women than beer. This theme was reflected in brand names such as “California Splash” and “Golden Wine.” By 1985, there were more than 100 wine cooler brands on the market produced by wineries and other leading beverage producers such as Brown-Forman Distillers, Schenley, and Seagram. Most of these brands would quietly disappear and some would be converted to malt-based products, which are taxed at lower rates than wine. In 1983, only 3.3 million cases of wine coolers were sold, but this amount increased to 14.1 million cases in 1984; 33.3 million in 1985; 52.7 million in 1986; and 53.6 million cases in 1987. It was all downhill after 1987, and only 3.0 million cases of wine coolers were sold in 1999 (Figure 1b). In the peak year, coolers accounted for more than 21% of all wine sales, but captured only 1.5% of the wine market in 1999.

Within the category, the leading marketing success story was E & J Gallo’s brand, sold under the trade-name “Bartles & Jaymes.” Frank Bartles and Ed Jaymes, the plain-looking older spokesmodels, were the creation of the Riney advertising agency. The tagline “We thank you for your support,” was repeated over and over during the seven years that the Frank & Ed campaign was aired on television. Gallo’s name was never mentioned in the ads (and Jaymes never spoke), so many people believed that Frank & Ed actually produced the brand. The connection between the avuncular duo and a California lifestyle is elusive, but the ad campaign is ranked among the Top 100 TV commercials of all time (Kanner, 1999, 134) and it won an *Advertising Age* award for effective use of humor. The ads also pushed Bartles & Jaymes to the top of the wine cooler market in 1986 – just one year after its national launch.

Total category spending on wine cooler ads peaked in 1986 at \$152.5 million (\$2.89 per case), which was a greater amount per case than any other alcoholic beverage, and 94% was spent on broadcast advertising. Since 1990, Bartles & Jaymes has shared the top spot in a shrinking category with Seagram’s Coolers. In the early years, both firms heavily promoted their products, and together dominated the category after 1989. In 1990, Gallo spent \$11.9 million on advertising, almost all on television ads, and Seagram spent \$7.3 million. However, faced with declining demand, Seagram in 1998 spent only \$952,000 on promotion, while Gallo dropped all advertising of its cooler brand in that year. Consumer support for Frank & Ed had come and gone. A few other low-alcohol refreshers remain on the market, but most products are now

categorized as malt coolers or malt liquors. Except for Coor's Zima brand, promotion of these products is minimal or nonexistent.

Table 3 and Figure 1b show per-capita consumption of wine coolers and all wine for the period 1984-1999. In contrast to light beer, increased sales of coolers played a temporary role in expanding the market for wine. Undoubtedly part of this increase came at the expense of sales of other alcoholic beverages, including beer. However, despite substantial initial success by two firms with considerable marketing skills, the category has not been a long-term success. Contrary to frequent claims, advertising did not create and sustain consumer demand. Some winemakers initially hoped that consumers would try wine coolers, and then move up to table wines and other premium products. Clearly, this did not happen. The wine cooler story illustrates the increase in advertising that usually accompanies new product introductions, but this heightened activity did not spillover to the broader market on a long-term basis. Indeed, causality appears to run from sales to advertising, rather than *visa versa* (Berndt, 1991, 398). Brand advertising alone is not sufficient to affect the long-run distribution of demand between product categories or sustain a long-term increase in marketwide demand.

### *C. Vodka and the Market for Distilled Spirits*

In 1980, vodka consumption in the U.S. was 0.53 gallons per capita and total spirits consumption was 2.75 gallons per capita. However, by 1999, these two amounts had declined to 0.41 gallons and 1.69 gallons per capita, respectively (Table 3 and Figure 1c). Although the vodka category declined in absolute terms, vodka's share of the spirits market rose from 19% in 1980 to 24% in 1999, making it the largest single category of spirits. In 1980, a new brand of vodka entered the crowded U.S. market for alcoholic beverages.

Absolut Vodka is an advertising icon (Hamilton, 2000; Lewis, 1996). A premium-priced brand, it is produced by Vin & Spirits, the Swedish government's alcohol monopoly (no alcohol advertising of any kind is allowed in Sweden). The brand's U.S. advertising campaign is known for its creative print ads, which feature the distinctive Absolut bottle and a two-word message that plays on its name, such as "Absolut Perfection" and "Absolut Joy." The campaign evolved over time to feature artists, cities and locations, objects, holidays, designer-name clothes, and other novel or upscale images. In 1989, Absolut was only the third best brand by sales among vodkas and the 12th leading spirits brand overall. In 1999, Absolut was the second best seller among vodkas (behind Smirnoff) and the third leading brand overall. Case sales rose from about 2.25 million cases in 1989 to 4.05 million in 1999, or an increase of 80 percent. Case sales of vodka during the same period remained stable at about 35 million cases per year. Success at the brand level did not translate into success for the category (or market) as a whole.

Absolut Vodka, and distilled spirits generally, are heavily promoted, but this has not translated into either increased category or market sales. In 1984, Absolut spent about \$9.65 per case on advertising, compared to \$1.52 per case for category leader Smirnoff. In 1989, Absolut spent \$10.6 million (\$4.71 per case) on advertising, principally in magazines, making it the third leading vodka brand by total advertising expenditure (behind Dewar's and Smirnoff). Total spending on spirits was \$272.8 million (\$1.75 per case). In 1999, Absolut – now distributed by

marketing giant Seagram – spent \$32.4 million (\$8.00 per case), and was the leading brand among all distilled spirits by total advertising expenditure. The second most advertised brand was Bacardi rum, which spent \$15.8 million (\$2.20 per case). Total spending on spirits in 1999 was about \$321.3 million (\$2.23 per case), with 79% of the ad dollars spent on magazines and newspapers.

Table 3 and Figure 1c display per-capita consumption of vodka and all distilled spirits for the period 1980-1999. Both vodka sales per capita and total consumption of spirits have declined steadily over time. With absolute clarity, this illustrates that brand-level success has not translated into expansion of either the vodka category or the market for distilled spirits. The remarkable success of Absolut as a brand has not had a noticeable spillover effect, which suggests that an industry-response function does not exist. Successive brand advertising translates into increased brand sales, but any marketwide (or cross-beverage) spillovers must be remarkably small in magnitude. This refutes Saffer's claims. The three examples presented in this section as well as the results in expenditure studies show that the brand success fails to translate into a statistical relationship between industry-level advertising and marketwide sales.

#### *D. Advertising in a Declining Market*

The alcoholic beverage market has been declining since the early 1980s, or earlier in the case of spirits (Nelson, 1999). Per-capita consumption of spirits peaked in 1975; beer in 1981; and wine in 1986. Total ethanol consumption per capita peaked in 1981, and declined by 21% between 1981 and 1997 (NIAAA, 1999, 15). It would not be expected that total advertising would increase in a declining market, although this does not rule out increased advertising at the brand or category level. Table 4 displays nominal and real advertising outlays for the industry, including a percentage breakdown by major advertising media. Real advertising has declined by over 35% since the peak year of 1986. Note that the 1980s reflect remarkable levels of advertising by a few brands, and not an industry-wide explosion. Alcohol consumption overall was declining. There is no evidence from the three examples that these changes can be represented as a movement along a well-defined industry-response function. Alcohol advertising affects brand shares, and virtually all studies of advertising expenditures at the beverage level support this conclusion. Alcohol advertising has not been shown to increase total alcohol (or beverage) consumption, regardless of the level of aggregation or time period.

## **VI. CONCLUSIONS**

My purpose in this chapter has been to provide an answer to a specific question. Is there a direct and material effect of advertising on the overall level of alcohol consumption or on alcohol abuse? The bulk of the scientific evidence presented in this survey indicates that the answer to this question is "No." Studies of state-level bans of billboards and publicly visible displays fail to demonstrate that selective bans reduce consumption. Studies of international bans that cover more media and beverages reach the same conclusion for more comprehensive bans. Studies of advertising expenditures fail to find statistically significant effects of advertising on alcohol consumption, despite numerous advances in econometric methods. Studies of brand advertising fail to establish a spillover effect of successful brand advertising on

the marketwide demand for alcoholic beverages. Under conditions of brand rivalry in a declining market, an industry-wide advertising-response function simply does not exist. Furthermore, survey-research studies have failed to measure the magnitude of the effect of advertising on youth intentions or behavior in a manner that is suitable for policy analysis. These studies do find a direct effect of parents' drinking on such behavior, which can be incorporated into future studies of youth alcohol behaviors (see Cook & Moore, 2001). This direct effect also means that results from aggregate studies of alcohol consumption are applicable to youth behaviors.

Policy analysis of regulation of alcohol advertising must begin with the *Central Hudson* formula. Commercial speech regulations that concern lawful activity must be shown to directly and materially advance a substantial government interest. What I have demonstrated in this chapter is that the third prong of the *Central Hudson* formula cannot be satisfied. Given these negative results, legislative bodies should abandon symbolic polices that restrict speech, and turn instead to remedies that have been demonstrated to be effective for youth drinking problems, such as rigorous enforcement of minimum legal age laws or increased penalties for illegal sale to minors. Cost-effective alcohol policies should be based on something other than widespread mis-beliefs about the nature or effectiveness of commercial speech.

#### **ACKNOWLEDGMENTS**

This paper reflects research begun in 1985 when I testified before the Pennsylvania Liquor Control Board on its ban of beer price advertising. Gene Waye was instrumental in my involvement at that time. I have benefitted greatly from collaboration, assistance, and discussions with Mike Baye, Jack Calfee, Lee Carpenter, Ed Coulson, Jim Donahue, Mark Gius, Don Kenkel, John Moran, Mark Roberts, Reg Smart, and Doug Young. I also want to acknowledge the excellent research assistance on earlier projects received from Sharon Bee, Mohit Behende, Sheng-Wen Chang, Tsui-Fang Lin, and Janice Stenger.

## REFERENCES

- Alwin, D.F., Hauser, R.M., 1975. The decomposition of effects in path analysis. *American Sociological Review* 40, 37-54.
- Ambler, T., 1996. Can alcohol misuse be reduced by banning advertising? *International Journal of Advertising* 15, 167-174.
- American Medical Association, Board of Trustees, 1986. Alcohol: Advertising, counter-advertising, and depiction in the public media. *Journal of the American Medical Association* 256, 1485-1488.
- Asher, H.B., 1983. *Causal Modeling*, 2nd edn. Sage, Newbury Park, CA.
- Assmus, G., Farley, J.U., Lehmann, D.R., 1984. How advertising affects sales: Meta-analysis of econometric results. *Journal of Marketing Research* 21, 65-74.
- Austin, E.W., Knaus, C., 2000. Predicting the potential for risky behavior among those 'too young' to drink as a result of appealing advertising. *Journal of Health Communications* 5, 13-27.
- Backman, J., 1967. *Advertising and Competition*. University of London Press, New York.
- Bass, F.M., Leone, R.P., 1983. Temporal aggregation, the data interval bias, and empirical estimation of bimonthly relations from annual data. *Management Science* 29, 1-11.
- Beales, J.H., Muris, T.J., 1993. *State and Federal Regulation of National Advertising*. AEI Press, Washington, DC.
- Berndt, E.R., 1991. *The Practice of Econometrics: Classic and Contemporary*. Addison-Wesley, Reading, MA.
- Blake, D., Nied, A., 1997. The demand for alcohol in the United Kingdom. *Applied Economics* 29, 1655-1672.
- Blalock, H.M., 1963. Correlated independent variables: The problem of multicollinearity. *American Journal of Sociology* 42, 233-237.
- Blalock, H.M. (Ed.), 1971. *Causal Models in the Social Sciences*. Aldine-Atherton, Chicago.
- Blue, T.D., 1996. Over the edge: The Fourth's Circuit commercial speech analysis in Penn Advertising & Anheuser-Busch. *North Carolina Law Review* 74, 2086-2107.
- Bollen, K.A., 1989. *Structural Equations with Latent Variables*. Wiley, New York.
- Boyd, R., Seldon, B.J., 1990. The fleeting effect of advertising: Empirical evidence from a case study. *Economics Letters* 34, 375-379.
- Bresnahan, T.F., 1984. The demand for advertising by medium: Implications for the economies of scale in advertising, in: Ippolito, P.M., Scheffman, D.T. (Eds.), *Empirical Approaches to Consumer Protection Economics*. Federal Trade Commission, Washington, DC, pp. 135-163.
- Calfee, J.E., 1997. *Fear of Persuasion: A New Perspective on Advertising and Regulation*. AEI Press, Washington, DC.

- Calfee, J.E., Scheraga, C., 1994. The influence of advertising on alcohol consumption: A literature review and an econometric analysis of four European nations. *International Journal of Advertising* 13, 287-310.
- Chaloupka, F.J., Grossman, M., Saffer, H., 2001. The effects of price on alcohol consumption. *Alcohol Research & Health*, forthcoming.
- Clarke, D.G., 1976. Econometric measurement of the duration of advertising effects on sales. *Journal of Marketing Research* 13, 345-357.
- Coase, R.H., 1974. The market for goods and the market for ideas. *American Economic Review* 64, 384-391.
- Coase, R.H., 1977. Advertising and free speech. *Journal of Legal Studies* 6, 1-34.
- Connolly, G.M., Casswell, S., Zhang, J-F., Silva, P.A., 1994. Alcohol in the mass media and drinking by adolescents: A longitudinal study. *Addiction* 89, 1255-1263.
- Cook, P.J., Moore, M.J., 2000. Alcohol, in: Culyer, A., Newhouse, J.P. (Eds.), *The Handbook of Health Economics*, Volume 1B. North-Holland, Amsterdam, pp. 1629-1673.
- Cook, P.J., Moore, M.J., 2001. Environment and persistence in youthful drinking patterns, in: Gruber, J. (Ed.), *Risky Behavior Among Youths: An Economic Analysis*. University of Chicago Press, Chicago, pp. 375-437.
- Costello, S.P., 1997. Strange brew: the state of commercial speech jurisprudence before and after 44 Liquormart, Inc. v. Rhode Island. *Case Western Law Review* 47, 681-749.
- Coulson, N.E., Moran, J.R., Nelson, J.P., 2001. The long-run demand for alcoholic beverages and the advertising debate: A cointegration approach, in: *Advances in Applied Microeconomics*. JAI Press, Amsterdam, this volume.
- Czart, C., Pacula, R.L., Chaloupka, F.J., Wechsler, H., 2001. The impact of prices and control policies on cigarette smoking among college students. *Contemporary Economic Policy* 19, 135-149.
- Dixit, A.K., Norman, V.D., 1978. Advertising and welfare. *Bell Journal of Economics* 9, 1-17.
- Duffy, M., 1990. Advertising and alcoholic drink demand in the UK: Some further Rotterdam model estimates. *International Journal of Advertising* 9, 247-257.
- Duffy, M., 1991a. Advertising in demand systems: Testing a Galbraithian hypothesis. *Applied Economics* 23, 485-496.
- Duffy, M., 1991b. Advertising and the consumption of tobacco and alcoholic drink: A system-wide analysis. *Scottish Journal of Political Economy* 38, 369-385.
- Duffy, M., 1995. Advertising in demand systems for alcoholic drinks and tobacco: A comparative study. *Journal of Policy Modeling* 17, 557-577.
- Duffy, M., 2001. Advertising in consumer allocation models: Choice of functional form. *Applied Economics* 33, 437-456.

- Duncan, O.D., 1966. Path analysis: sociological examples. *American Journal of Sociology* 72, 1-16.
- Elzinga, K.G., 2001. Beer, in: Adams, W., Brock, J. (Eds.), *The Structure of American Industry*, 10th edn. Prentice-Hall, Upper Saddle River, NJ, pp. 85-113.
- Färe, R., Grosskopf, S., Seldon, B.J., Tremblay, V.J., 2001. Advertising efficiency and the choice of media mix: A case of beer. Unpublished paper, Department of Economics, Oregon State University.
- Finney, J.M., 1972. Indirect effects in path analysis. *Sociological Methods and Research* 1, 175-186.
- Fisher, J.C., 1993. *Advertising, Alcohol Consumption, and Abuse: A Worldwide Survey*. Greenwood Press, Westport, CT.
- Fisher, J.C., Cook, P.A., 1995. *Advertising, Alcohol Consumption, and Mortality: An Empirical Investigation*. Greenwood Press, Westport, CT.
- Fox, J., 1980. Effect analysis in structural equation models: Extensions and simplified methods of computation. *Sociological Methods and Research* 9, 3-28.
- Fox, J., 1985. Effect analysis in structural equation models II: Calculation of specific indirect effects. *Sociological Methods and Research* 14, 81-95.
- Franke, G., Wilcox, G., 1987. Alcoholic beverage advertising and consumption in the United States, 1964-1984. *Journal of Advertising* 16, 22-30.
- Gius, M.P., 1991. *The Extent of the Market in the Liquor Industry: An Empirical Test of Localized Brand Rivalry, 1970-1988*. Unpublished Ph.D. dissertation, Department of Economics, Pennsylvania State University.
- 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.
- Goel, R., Morey, M., 1995. The interdependence of cigarette and liquor demand. *Southern Economic Journal* 62, 451-459.
- Goldberger, A.S., 1971. Econometrics and psychometrics: A survey of commonalities. *Psychometrika* 36, 83-107.
- Goldberger A.S., 1972. Structural equations models in the social sciences. *Econometrica* 40, 979-1001.
- Goldberger, A.S., Duncan, O.D. (Eds.), 1973. *Structural Equation Models in the Social Sciences*. Seminar Press, New York.
- Greer, D.F., 1993. Beer: Causes of structural change, in: Duetsch, L.L. (Ed.), *Industry Studies*. Prentice-Hall, Englewood Cliffs, NJ, pp. 85-115.
- Grossman, M., Chaloupka, F.J., Saffer, H., Laixuthai, A., 1994. Effects of alcohol price policy on youth: A summary of economic research. *Journal of Research on Adolescence* 4, 347-364.

- Grube, J.W., 1993. Alcohol portrayals and alcohol advertising on television: Content and effects on children and adolescents. *Alcohol Health & Research World* 17, 61-66.
- Grube, J.W., 1995. Television alcohol portrayals, alcohol advertising, and alcohol expectancies among children and adolescents, in: Martin, S.E. (Ed.), *The Effects of the Mass Media on the Use and Abuse of Alcohol*. NIAAA, Washington, DC, pp. 105-121.
- Grube, J.W., Wallack, L., 1994. Television beer advertising and drinking knowledge, beliefs, and intentions among schoolchildren. *American Journal of Public Health* 84, 254-259.
- Hamilton, C., 2000. *Absolut: Biography of a Bottle*. Texere, London.
- Harrison, L., Godfrey, C., 1989. Alcohol advertising controls in the 1990s. *International Journal of Advertising* 8, 167-180.
- Hoadley, J.F., Fuchs, B.C., Holder, H.D., 1984. The effect of alcohol beverage restrictions on consumption: A 25-year longitudinal analysis. *American Journal of Drug and Alcohol Abuse* 10, 375-401.
- Kanner, B.K., 1999. *The 100 Best TV Commercials . . . And Why They Worked*. Times Business, New York.
- Kaul, A., Wittick, D.R., 1995. Empirical generalizations about the impact of advertising on price sensitivity and price. *Marketing Science* 14, 151-160.
- Kenkel, D.S., 1993. Prohibition versus taxation: Reconsidering the minimum drinking age. *Contemporary Policy Issues* 12, 137-150.
- Kinnucan, H.W., Kaiser, H.M., Miao, Y., Xiao, H., 2001. Effects of advertising on U.S. non-alcoholic beverage demand: Evidence from a two-stage Rotterdam model, in: *Advances in Applied Microeconomics*. JAI Press, Amsterdam, this volume.
- Lariviere, E., Larue, B., Chalfant, J., 2000. Modeling the demand for alcoholic beverages and advertising specifications. *Agricultural Economics* 22, 147-162.
- Lee, B., Tremblay, V.J., 1992. Advertising and the US market demand for beer. *Applied Economics* 24, 69-76.
- Leffler, K.B., 1983. The prohibition of billboard advertising: An economic analysis of the Metromedia decision. *Supreme Court Economic Review* 1, 113-133.
- Leone, R.P., 1995. Generalizing what is known about temporal aggregation and advertising carryover. *Marketing Science* 14, 141-150.
- Lewis, R.W., 1996. *Absolut Book: The Absolut Vodka Advertising Story*. Journey Editions, Boston.
- Loehlin, J.C., 1998. *Latent Variable Models: An Introduction to Factor, Path, and Structural Analysis*, 3rd edn. Lawrence Erlbaum, Mahwah, NJ.
- Long, J.S., 1983. *Covariance Structure Models: An Introduction to LISREL*. Sage, Beverly Hills, CA.

- MacKinnon, D.P., Dwyer, J.H., 1993. Estimating mediated effects in prevention studies. *Evaluation Review* 17, 144-158.
- Makowsky, C.R., Whitehead, P.C., 1991. Advertising and alcohol sales: A legal impact study. *Journal of Studies on Alcohol* 52, 555-567.
- Markowitz, S., Grossman, M., 1998. Alcohol regulation and domestic violence towards children. *Contemporary Economic Policy* 16, 309-320.
- Markowitz, S., Grossman, M., 2000. The effects of beer taxes on physical child abuse. *Journal of Health Economics* 19, 271-282.
- Martin, S.E. (Ed.), 1995. *The Effects of the Mass Media on the Use and Abuse of Alcohol*. NIAAA, Washington, DC.
- McChesney, F.S., 1997. De-Bates and Re-Bates: The Supreme Court's latest commercial speech cases. *Supreme Court Economic Review* 5, 81-139.
- McGahan, A.M., 1995. Cooperation in prices and advertising: Trade associations in brewing after repeal. *Journal of Law and Economics* 38, 521-559.
- Milgrom, R., Roberts, J., 1986. Price and advertising signals of product quality. *Journal of Political Economy* 94, 796-821.
- 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.
- Moore, R.L., Farrar, R.T., Collins, E.L., 1998. *Advertising and Public Relations Law*. Lawrence Erlbaum, Mahwah, NJ.
- Motta, M., 1997. Advertising bans. Unpublished paper, Department of Economics, Universitat Pompeu Fabra.
- Nelson, J.P., 1990a. State monopolies and alcoholic beverage consumption. *Journal of Regulatory Economics* 2, 83-98.
- Nelson, J.P., 1990b. Effect of regulation on alcoholic beverage consumption: Regression diagnostics and influential data, in: Watson, R.R. (Ed.), *Drug and Alcohol Abuse Reviews: Prevention*. Humana Press, Clifton, NJ, pp. 223-243.
- Nelson, J.P., 1997. Economic and demographic factors in U.S. alcohol demand: A growth-accounting analysis. *Empirical Economics* 22, 83-102.
- Nelson, J.P., 1999. Broadcast advertising and U.S. demand for alcoholic beverages. *Southern Economic Journal* 66, 774-790.
- Nelson, J.P., 2001. Advertising bans, monopoly, and alcohol demand: Testing for substitution effects using panel data. Unpublished paper, Department of Economics, Pennsylvania State University.
- Nelson, J.P., Moran, J.R., 1995. Advertising and US alcoholic beverage demand: System-wide estimates. *Applied Economics* 27, 1225-1236.

- Nelson, J.P., Young, D.J., 2001. Do advertising bans work? An international comparison. *International Journal of Advertising* 20, 270-294.
- Ogborne, A.C., Smart, R.G., 1980. Will restrictions on alcohol advertising reduce alcohol consumption? *British Journal of Addiction* 75, 293-296.
- O'Neil, R.M., 1997. *Alcohol Advertising on the Air: Beyond the Reach of Government?* The Media Institute, Washington, DC.
- O'Neill, W.D., 1998. Governmental restrictions on beverage alcohol advertising after 44 Liquormart v. Rhode Island. *Saint Louis University Law Journal* 42, 267-300.
- Ornstein, S.O., Hanssens, D.M., 1985. Alcohol control laws and the consumption of distilled spirits and beer. *Journal of Consumer Research* 12, 200-213.
- Peltzman, S., 1971. Pricing in public and private enterprises. *Journal of Law and Economics* 14, 109-147.
- Post, R., 2000. The constitutional status of commercial speech. *UCLA Law Review* 48, 1-57.
- Ritter, D., 1997. The First Amendment, commercial speech, and the future of tobacco advertising after 44 Liquormart, Inc. v. Rhode Island. *Wayne Law Review* 43, 1505-1532.
- Rome, E.P., Roberts, W.H., 1985. *Corporate and Commercial Speech: First Amendment Protection of Expression in Business*. Quorum, Westport, CT.
- Sackett, J., 1983. Alcoholic beverage advertising and the First Amendment. *University of Cincinnati Law Journal* 52, 861-900.
- Saffer, H., 1991. Alcohol advertising bans and alcohol abuse: An international perspective. *Journal of Health Economics* 10, 65-79.
- Saffer, H., 1993. Advertising under the influence, in: Hilton, M.E., Bloss, G. (Eds.), *Economics and the Prevention of Alcohol-Related Problems*. NIAAA, Washington, DC, pp. 125-140.
- Saffer, H., 1995. Alcohol advertising and alcohol consumption: Econometric studies, in: Martin, S.E. (Ed.), *The Effects of the Mass Media on the Use and Abuse of Alcohol*. NIAAA, Washington, DC, pp. 277-295.
- Saffer, H., 1996. Studying the effects of alcohol advertising on consumption. *Alcohol Health & Research World* 20, 266-272.
- Saffer, H., 1997. Alcohol advertising and motor vehicle fatalities. *Review of Economics and Statistics* 79, 431-442.
- Saffer, H., 1998. Economic issues in cigarette and alcohol advertising. *Journal of Drug Issues* 28, 781-793.
- Saffer, H., Chaloupka, F., 2000. The effect of tobacco advertising bans on tobacco consumption. *Journal of Health Economics* 19, 1117-1137.

- Saffer, H., Grossman, M., Chaloupka, F., 2000. Alcohol control, in: Bouckaert, B., De Geest, G. (Eds.), *Encyclopedia of Law and Economics*. Elgar, Northampton, MA, pp. 44-48.
- Scherer, F.M., Ross, D., 1990. *Industrial Market Structure and Economic Performance*, 3rd edn. Houghton Mifflin, Boston.
- Schmalensee, R., 1972. *The Economics of Advertising*. North-Holland, Amsterdam.
- Schweitzer, S.O., Intriligator, M.D., Salehi, H., 1983. Alcoholism: An econometric model of its causes, its effect and its control, in: Grant, M., Plant, M., Williams, A. (Eds.), *Economics and Alcohol: Consumption and Controls*. Harwood, New York, pp. 107-127.
- Seldon, B.J., Jewell, R.T., O'Brien, D.M., 2000. Media substitution and economies of scale in advertising. *International Journal of Industrial Organization* 18, 1153-1180.
- Seldon, B.J., Jung, C., 1993. Derived demand for advertising messages and substitutability among the media. *Quarterly Review of Economics and Finance* 33, 71-86.
- Short, L.M., Hennessy, M., 1994. Using structural equations to estimate effects of behavioral intervention. *Structural Equation Modeling* 1, 68-81.
- Simon, J.L., 1970. *Issues in the Economics of Advertising*. University of Illinois Press, Urbana, IL.
- Simon, J.L., 1980. The shape of the advertising response function. *Journal of Advertising Research* 20, 11-28.
- Smart, R.G., 1988. Does alcohol advertising affect overall consumption? A review of empirical studies. *Journal of Studies on Alcohol* 49, 314-323.
- Smart, R.G., Cutler, R.E., 1976. The alcohol advertising ban in British Columbia: Problems and effects on beverage consumption. *British Journal of Addiction* 71, 13-21.
- Smart, R.G., Ogborne, A., 2000a. Drinking and heavy drinking by students in 18 countries. *Drug and Alcohol Dependence* 60, 315-318.
- Smart, R.G., Ogborne, A., 2000b. Drug use and drinking among students in 36 countries. *Addictive Behaviors* 25, 455-460.
- Smith, D.I., 1990. Consumption and advertising of alcoholic beverages in Australia, 1969-86. *Drug and Alcohol Review* 9, 33-43.
- Sobel, M.E., 1998. Direct and indirect effects in linear structural equation models, in: Long, J.S. (Ed.), *Common Problems/Proper Solutions: Avoiding Errors in Quantitative Research*. Sage, Newbury Park, CA, pp. 46-64.
- Starek, R.B. (Commissioner, FTC), 1997. Alcohol advertising and the First Amendment. Prepared remarks presented before the American Bar Association, August 4, 1997. Federal Trade Commission, Washington, DC.
- Stock, J., Watson, M., 1988. Variable trends in economic time series. *Journal of Economic Perspectives* 2, 147-174.

- Tegene, A., 1990. The Kalman filter approach for testing structural change in the demand for alcoholic beverages in the US. *Applied Economics* 22, 1407-1416.
- Troy, D.E., 1999. Advertising: Not 'low value' speech. *Yale Journal on Regulation* 16, 85-144.
- U.S. Department of Health and Human Services, Office of the Inspector General, 1991. *Youth and Alcohol: Controlling Alcohol Advertising that Appeals to Youth*. DHHS, Washington, DC.
- U.S. Federal Trade Commission, 1985. *Recommendations of the Staff of the Federal Trade Commission: Omnibus Petition for Regulation of Unfair and Deceptive Alcoholic Beverage Advertising and Marketing Practices*. FTC, Washington, DC.
- U.S. Federal Trade Commission, 1999. *Self-Regulation in the Alcohol Industry: A Review of Industry Efforts to Avoid Promoting Alcohol to Underage Consumers*. FTC, Washington, DC.
- U.S. National Institute on Alcohol Abuse and Alcoholism, 1985. *U.S. Apparent Consumption of Alcoholic Beverages based on State Sales, Taxation, or Receipt Data*, Alcohol Epidemiologic Data Reference Manual, Vol. 1. NIAAA, Washington, DC.
- U.S. National Institute on Alcohol Abuse and Alcoholism, 1999. *Apparent Per Capita Alcohol Consumption: National, State, and Regional Trends, 1977-97*, Surveillance Report No. 51. NIAAA, Washington, DC.
- U.S. National Institute on Alcohol Abuse and Alcoholism, 2000. Alcohol advertising: What are the effects? in: *10th Special Report to the U.S. Congress on Alcohol and Health*. NIAAA, Washington, DC, pp. 412-426.
- U.S. National Institutes of Health, 2000a. *Monitoring the Future: Overview of Key Findings, 1999*. NIH, Washington, DC.
- U.S. National Institutes of Health, 2000b. *Monitoring the Future: National Survey Results, 1975-1999*. NIH, Washington, DC.
- Wilkinson, J.T., 1985. *Alcohol and Accidents: An Economic Approach to Drunken Driving*. Unpublished Ph.D. dissertation, Department of Economics, Vanderbilt University.
- Wilkinson, J.T., 1987. The effects of regulation on the demand for alcohol. Unpublished paper, Department of Economics, University of Missouri.
- Yandle, B., 1983. Bootleggers and Baptists in the market for regulation, in: Shogren, J.F. (Ed.), *The Political Economy of Government Regulation*. Kluwer, Norwell, MA, pp. 29-53.
- Young, D.J., 1993. Alcohol advertising bans and alcohol abuse: Comment. *Journal of Health Economics* 12, 213-228.

**Table 1.** Summary of State-Level Studies of Advertising Bans: Print and Outdoor

Study	Sample & Years	Dependent Variables	Advertising Variables	Coefficient Estimates (st. error)	R-Sq
Schweitzer et al. (1983)	35 states: 1975	log per-capita beer; log per-capita spirits	binary variable: if ads banned = 1	-.110 (.06) .125 (.10)	.764 .790
Hoadley et al. (1984)	48 states: pooled sample for six yrs.	per-capita spirits	binary variable: if billboards <i>allowed</i>	-.099 (na)**	.890
Ornstein & Hanssens (1984)	51 states: pooled sample for five yrs.	log per-capita spirits log per-capita beer	binary variable: if billboards <i>allowed</i>	-.105 (.04)* .004 (.02)	.794 .748
Wilkinson (1985, 1987)	51 states: pooled sample for four yrs. and five yrs	log per-capita total ethanol, 1976-1979 & 1976-1980	binary variable: if ban of billboards & print ads	-.008 (.03) .089 (.06)	.653 n.a.
Nelson (1990a)	49 states: 1982	log per-capita beer; log per-capita wine; log per-capita spirits	binary variable: if price ad bans in print or billboards (incl. total bans)	.061 (.05) -.043 (.09) -.206 (.14)	.629 .567 .564
Nelson (2001)	45 states: pooled sample for 16 yrs. (1989-1997 results are reported)	log per-capita beer; log per-capita wine; log per-capita spirits; log per-capita ethanol	binary variable: if ban of liquor billboards	-.057 (.01)* .102 (.03)* .129 (.02)* .001 (.01)	.799 .890 .767 .803
Markowitz & Grossman (1998, 2000)	1998: 1,147 families 2000: 2,675 families (female results are reported)	severe child violence any child violence	binary variables: if beer price ads ban; billboard ban; window display ban	.122 (.10) -.097 (.16) -.059 (.11)	n.a.

*Notes:* \* indicates significant at 1% level or better; and \*\* for 5% or better. Page numbers for coefficient estimates are Schweitzer et al. (1983, 118); Hoadley et al. (1984, 118); Ornstein & Hanssens (1984, 207, 210); Wilkinson (1985, 113; 1987, 12); Nelson (1990a, 92); Nelson (2001, 23); and Markowitz & Grossman (2000, 279). n.a. = not available.

**Table 2.** Summary of Cross-National Studies of Broadcast Advertising Bans

Study	Sample & Years	Dependent Variables	Advertising Variables	Coefficient Estimates (std. error)	R-Sq
Smart & Cutler (1976)	British Columbia, 1962-1972 & 1970-1973; before-after	per-capita gallons beer, wine, spirits	comparison with Ontario and before-after ban	Mann-Whitney U-test; T-test (not significant)	n.a.
Ogborne & Smart (1980)	Manitoba, 1970-1978; before-after	per-capita beer	time-series analysis	no significant decrease	n.a.
Makowsky & Whitehead (1991)	Saskatchewan, 1981-1987; before-after <i>end</i> of ban	monthly sales of beer, wine, spirits and total ethanol	Box-Jenkins model for Saskatchewan and New Brunswick	beer increase; spirits decrease no impact for wine or total ethanol	n.a..
Saffer (1991)	17 OECD nations: 1970-1983; bans of broadcast ads	log ethanol per capita	binary var. bans of spirit ads; bans of all beverages	-.169 (.04)* -.313 (.09)*	0.590
Young (1993)	17 OECD nations: 1970-1983; bans of broadcast ads	log ethanol per capita	binary var. bans of broadcast ads; bans of all beverages	.013 (.03) .035 (.03)	0.990
Calfee & Scheraga (1994)	5 OECD nations: 1970-1990; expend. on advertising; Sweden as control	log ethanol per capita	advertising expend. for France, Germany, Netherlands, and UK Sweden bans all ads	-.090 (.04)** .018 (.09) .079 (.11) -.024 (.06)	0.980 0.880 0.970 0.840
Nelson & Young (2001)	17 OECD nations: 1977-1995; bans of broadcast ads	log ethanol per capita	binary var. bans of spirit ads; bans of all beverages	.139 (.02)* .049 (.03)	0.658

*Notes:* \* indicates significant at 1% level or better; and \*\* for 5% or better. Page numbers for coefficient estimates are Smart & Cutler (1976, 17, 20); Ogborne & Smart (1980, 294); Makowsky & Whitehead (1991, 562); Saffer (1991, 75); Young (1993, 226); Calfee & Scheraga (1994, 300); and Nelson & Young (2001, 286)

**Table 3.** Alcoholic Beverage Consumption, 1980-1999 (gallons per capita; ages 18+)

Year	Light Beer	All Beer	Percent Light	Wine Coolers	All Wine	Percent Coolers	Vodka	All Spirits	Percent Vodka
1980	4.37	33.71	13.0	---	2.93	---	0.53	2.75	19.3
1981	5.02	33.99	14.8	---	3.04	---	0.53	2.70	19.6
1982	6.00	33.48	17.9	---	3.04	---	0.50	2.59	19.3
1983	6.23	33.09	18.8	0.05	3.08	1.6	0.50	2.52	19.8
1984	6.45	32.63	19.8	0.19	3.20	5.9	0.48	2.46	19.5
1985	7.16	32.26	22.2	0.45	3.31	13.6	0.48	2.37	20.2
1986	7.71	32.61	23.6	0.71	3.37	21.1	0.47	2.22	21.2
1987	8.01	32.42	24.7	0.71	3.30	21.5	0.45	2.17	20.7
1988	8.48	32.10	26.4	0.62	3.10	20.0	0.46	2.09	22.0
1989	8.96	31.74	28.2	0.51	2.88	17.7	0.45	2.03	22.2
1990	9.88	32.22	30.7	0.50	2.77	18.0	0.45	2.02	22.3
1991	10.38	31.20	33.3	0.35	2.52	13.9	0.42	1.85	22.7
1992	10.58	30.81	34.3	0.24	2.53	9.5	0.41	1.88	22.8
1993	10.95	30.58	35.8	0.15	2.33	6.4	0.40	1.80	22.2
1994	10.66	30.48	35.0	0.12	2.39	5.0	0.39	1.74	22.4
1995	10.70	29.83	35.9	0.10	2.42	4.1	0.39	1.68	23.2
1996	11.14	29.84	37.3	0.10	2.53	4.0	0.40	1.66	24.1
1997	11.56	29.69	38.9	0.07	2.56	2.7	0.39	1.66	23.5
1998	12.03	29.96	40.2	0.05	2.57	2.0	0.40	1.67	24.0
1999	12.62	30.10	41.9	0.04	2.65	1.5	0.41	1.69	24.3

Sources: Beer data – *Beer Industry Update* (various years) and *Adams/Jobson Beer Handbook* (various years). Wine data – *Adams/Jobson Wine Handbook* (various issues). Spirits data – *Adams/Jobson Liquor Handbook* (various issues). Population – U.S. Bureau of the Census, Resident population estimates of the U.S. by age and sex.

**Table 4.** Long-Term Trends in Alcohol Advertising

Year	Total Alcohol Ads (million \$)	Real Alcohol Ads (1996 million \$)	Percent Broadcast	Percent Print	Percent Outdoor
1975	395.6	979.9	44.0	45.6	10.4
1976	456.8	1067.5	46.6	43.6	9.8
1977	534.0	1171.3	52.5	39.3	8.2
1978	703.0	1442.1	54.6	38.7	6.7
1979	865.2	1641.7	54.6	38.9	6.6
1980	906.9	1580.5	55.1	38.3	6.6
1981	1014.9	1618.7	56.6	36.3	7.1
1982	1108.7	1667.0	58.1	33.9	8.0
1983	1182.9	1708.4	62.0	31.2	6.9
1984	1284.4	1788.9	66.0	27.2	6.8
1985	1293.0	1746.1	68.2	25.6	6.2
1986	1400.2	1850.6	73.5	22.0	4.5
1987	1374.7	1766.1	73.5	21.4	5.1
1988	1319.4	1639.8	74.4	21.2	4.4
1989	1200.4	1436.6	68.2	26.9	4.8
1990	1050.4	1209.7	64.8	29.8	5.4
1991	1119.5	1247.2	66.4	28.1	5.5
1992	1074.7	1172.0	68.5	26.2	5.3
1993	970.7	1030.9	70.4	23.4	6.2
1994	1000.9	1041.1	69.4	22.6	8.0
1995	1027.5	1046.4	68.2	23.2	8.6
1996	1008.8	1008.8	68.5	24.3	7.3
1997	1087.0	1069.2	66.5	27.5	6.0
1998	1187.6	1154.6	66.3	25.8	7.9
1999 <sup>P</sup>	1242.2	1189.5	64.2	26.9	8.9
% Change, 1986-99	---	-35.7%	---	---	---

Notes: 1975-1991 data from *Impact* (various issues). 1992-1999 data from *LNA/Competitive Media* (various issues). Preliminary (P) data for 1999. Nominal data deflated by the GDP implicit price deflator (1996 = 100) from the *Economic Report of the President*.

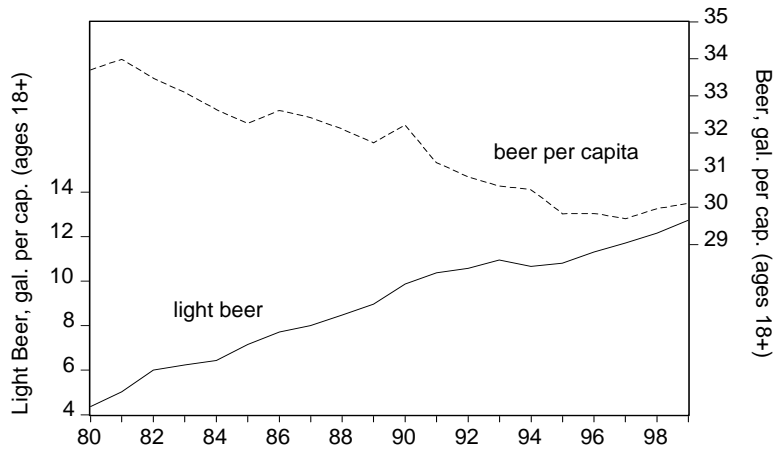


Fig. 1a. Light Beer and Beer per capita, 1980-1999.

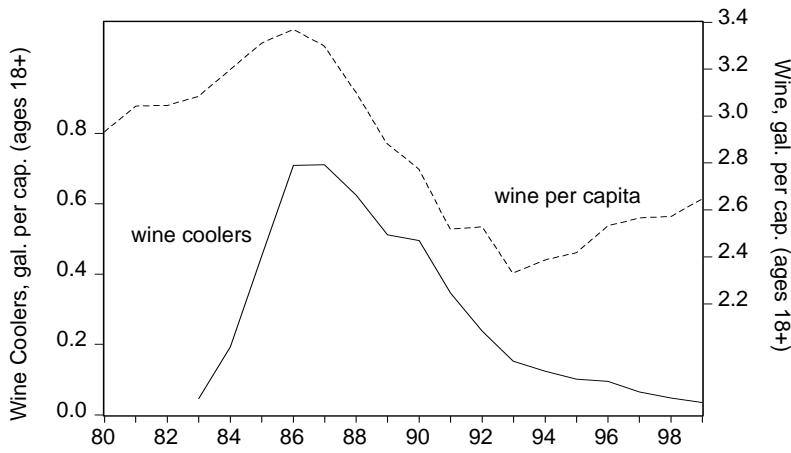


Fig. 1b. Wine Coolers and Wine per capita, 1980-1999.

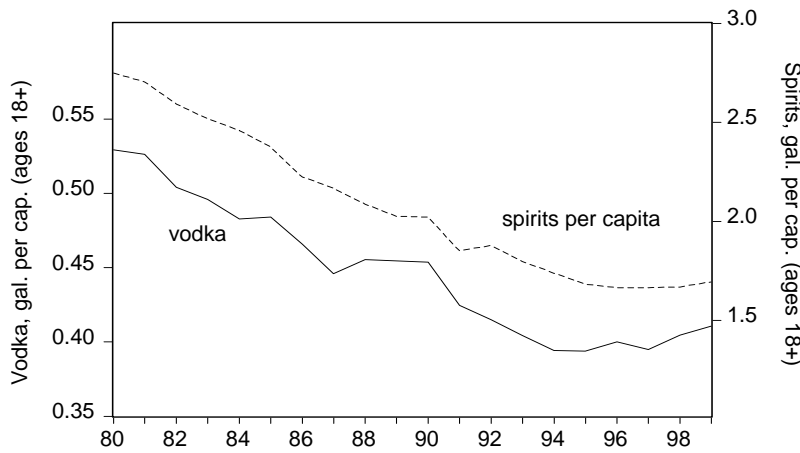


Fig. 1c. Vodka and Spirits per capita, 1980-1999.

## NOTES

1. Previous literature surveys include Calfee (1997), Calfee & Scheraga (1994), Fisher (1993), Fisher & Cook (1995), FTC (1985), NIAAA (2000), and Smart (1988).
2. Calfee (1997) demonstrates how government agencies use controls of commercial speech to achieve political ends, which may include the suppression of market competition. Meeting transcripts of the Liquor Control Administration showed that Rhode Island liquor retailers constantly monitored competitors' ads for price claims, with the aim of getting the offender's license revoked. In a remarkable parallel to *Valentine*, one retailer asked if it could run an ad that simply protested the Administration's price ban. The Administrator denied the request on grounds that this would signal low prices (Calfee, 1997, 111). Hence, political speech was construed as commercial speech, and regulated.
3. *Posadas* created the possibility of a "vice" or "harmful product" exception to First Amendment protection; see also *United States v. Edge Broadcasting Co.*, 509 U.S. 418 (1993), in which a split Court upheld a FCC regulation prohibiting advertising of state lotteries, except within the state where the lottery was authorized. However, in *44 Liquormart*, Justice Stevens dismissed the notion of a vice exception for alcohol, citing the Court's ruling in *Rubin v. Coors*, 514 U.S. 476 (1995). He argued that a vice exception would be "difficult, if not impossible, to define" (517 U.S. 514). In *Greater New Orleans Broadcasting Assoc., Inc. v. United States*, 527 U.S. 173 (1999), the Court unanimously ruled that the FCC could not prohibit the advertising of non-tribal casino gambling that might be heard in neighboring states where private casinos were unlawful. Justice Stevens reasoned that federal statutes presently accommodate both pro-gambling and anti-gambling policies, and that ". . . some form of gambling is legal in nearly every state" (527 U.S. 187). He also recognized that advertising may do little more than promote brand choice, since ". . . it is reasonable to assume that much of that advertising would merely channel gamblers to one casino rather than another" (527 U.S. 189).
4. For an economic analysis of the effects of *44 Liquormart*, see Milyo & Waldfogel (1999). Numerous law review articles discuss commercial speech and the decisions examined here; see Blue (1996), Costello (1997), O'Neill (1998), Post (2000), Ritter (1997), Sackett (1983), and Troy (1999). For a legal-economic analysis that takes issue with many of the Court's recent decisions, see McChesney (1997), arguing that the Court has failed to develop a consistent economic view of the value of commercial speech as originally stated in *Virginia Pharmacy* and *Bates v. State Bar of Arizona*, 433 U.S. 350 (1977). For an economic analysis of early cases, see Coase (1974, 1977), comparing protection of political and commercial speech and anticipating the *Central Hudson* doctrine. See Leffler (1983) for an economic analysis of a case involving a complete ban of billboard advertising in San Diego.
5. During the October 2000 term, the Supreme Court ruled on two cases involving advertising. In *United States v. United Foods, Inc.*, No. 00-276 (decided June 25, 2001), the issue was whether the federal government could compel an independent mushroom grower to pay a marketing-order assessment used primarily to fund generic advertisements, and which benefitted competitors of the respondent. In a 6-3 decision, the Court held that the First Amendment prevents the government from compelling individuals to express certain views. The government did not rely on *Central Hudson* to challenge the appeals court decision. In *Lorillard v. Reilly*, No. 00-596 (decided June 28, 2001), the Court considered a Massachusetts law (passed in 1999) that prohibited visible advertising of cigarettes and other tobacco products within a 1,000 feet of schools, parks, and playgrounds, effectively banning all outdoor signs and window displays. Point-of-sale signs also were banned if they were placed lower than five feet from the floor in stores accessible to minors. The issues in *Lorillard* were, first, preemption of state actions under the Federal Cigarette Labeling and Advertising Act (FCLAA) and, second, the constitutionality of

“location-based” restrictions of commercial speech under the *Central Hudson* formula. In a 5-4 decision, the majority held that the FCLAA preempted cigarette regulations with respect to outdoor and point-of-sale advertising. In order to avoid preemption, the state would have to uniformly ban outdoor displays for all products. On the second issue, the ruling found that the cigarette restrictions satisfied the third prong of the *Central Hudson* test, but failed to satisfy the fourth prong. Citing *Cincinnati v. Discovery Network*, the ruling held that the sale and use of tobacco by adults was a legal activity, and the state’s regulations unduly impinged on both the speaker’s ability to propose, and the hearer’s opportunity to consider, a legal commercial transaction. Justice O’Connor concluded that the state had failed to show that its regulations were “not more extensive than necessary to advance the State’s substantial interest in preventing underage tobacco use” (No. 00-596, 35). The in-store regulations for smokeless tobacco and cigars were held to violate both the third and fourth prongs. Other state restrictions affecting seller conduct, and not speech, were upheld by the decision. The dissenting opinion stressed preemption by the FCLAA.

6. Data for the regression are from NIAAA (1985, 1999) and NIH (2000a, 2000b) for total U.S. ethanol consumption per capita (ages 20+) and prevalence of binge drinking by 12th-graders, respectively. The bivariate regression was  $\text{Binge} = -9.38 + 15.75 (\text{Total U.S. ethanol})$ ;  $R\text{-sq} = 0.884$ . The t-statistic on the slope coefficient is 13.2. For similar evidence for other countries, see Smart & Ogborne (2000a, 2000b).

7. In addition to the issues discussed here, many other econometric issues have been investigated. Studies that adjust for cross-section heteroscedasticity include Nelson (2001) and Nelson & Young (2001). Studies that account for data outliers include Nelson (1990b) and Nelson & Young (2001). Studies that test for structural change or account for exogenous taste changes include Calfee & Scheraga (1994), Duffy (1991b, 1995), Lee & Tremblay (1992), Nelson (1990a, 2001), Nelson & Moran (1995), and Tegene (1990).

8. A study by Saffer (1997) failed to show that local alcohol advertising expenditures, including billboards, have a direct and material effect on proxies for youth drunk driving fatalities. Alcohol consumption is not measured in this study. Rather, the author substitutes for the possible (indirect) determinates of drinking prior to driving, which includes advertising. The two regressions with insignificant advertising coefficients were for 18-20-year olds, although coefficients for older drivers were significantly positive. Saffer (1997, 438) argued that this may be due to the cumulative effects of advertising, but the results in expenditure studies clearly speak against this relationship.

9. The path analysis approach to structural estimation was originally developed in the 1920s and 1930s by the biometrician Sewall Wright, but one of its early applications was the identification and estimation via instrumental variables of a structural supply-demand model for butter (Goldberger, 1972, 986). Wright’s estimation of causal relationships is a forerunner of other methods of simultaneous equations estimation, although most of his empirical work involved recursive models where the paths do not return on themselves (Goldberger, 1972, 988). Blalock (1963) and Duncan (1966) published early expositions of path analysis for sociologists, and Goldberger (1971) published a comparison of structural methods in econometrics with those used in psychology. Two edited collections that represent the multidisciplinary origins of modern path analysis are Blalock (1971) and Goldberger & Duncan (1973). Standard treatments of causal modeling for the practitioner include Asher (1983), Bollen (1989), Loehlin (1998), and Long (1983).

10. The three studies reviewed here are representative of the much larger literature with regard to methods, results, and policy implications. Brief literature reviews are found in Grube (1993, 1995). Grube (1995, 117) concluded that “. . . available studies indicate that alcohol advertising may have small

but significant effects on the beliefs, intentions, and possibly behaviors of young people.” See also Martin (1995, v), concluding that the evidence from survey-research studies provides only weak, limited, and inconclusive support for the belief that alcohol advertising affects the initiation and amount of youthful drinking. A more comprehensive review by the NIAAA (2000) also discusses econometric, experimental, and survey-research studies. With regard to survey studies, the NIAAA found that “the evidence . . . is far from conclusive (NIAAA, 2000, 423) . . . [and] the survey study designs employed thus far have not been able to establish whether, for example, the advertisements caused the beliefs and behaviors, or whether preexisting beliefs and behaviors led to an increased awareness of the advertisements” (NIAAA, 2000, 412). Each of these reviews casts considerable doubt on whether the results from survey-research studies can be applied to the policy issue of youth drinking.

11. Indirect effects are the products of the structural coefficients along the path (or paths) in question. Previous work that lays out the mathematical relationships between indirect and direct effects includes contributions by Alwin & Hauser (1975), Asher (1983, 35), Bollen (1989, 37), Finney (1972), Fox (1980, 1985), and Short & Hennessy (1994). Standard errors for indirect effects are discussed by MacKinnon & Dwyer (1993), Sobel (1988), and others.

12. Sources of information and data for the three examples include *Adams/Jobson Beer Handbook* (Adams Business Media, various editions); *Adams/Jobson Wine Handbook* (Adams Business Media, various editions); *Adams/Jobson Liquor Handbook* (Adams Business Media, various editions); *Beer Industry Update* (Beer Marketer’s Insights, various editions); *Beverage World* (Keller International, various issues); *Brewers Almanac* (Beer Institute, various editions); *Impact: US News and Research for the Wine, Spirits and Beer Executive* (Sanken Communications, various issues); *LNA/Mediawatch Multi-Media Service: Competitive Media Reporting* (Distilled Spirits Council of the U.S., various issues); *Marketing & Media Decisions* (Decisions Publications, various issues); and *Modern Brewery Age* (MBA, Inc., various issues).

13. Television advertising was the primary weapon for this battle. There is a limited body of research that focuses on substitution among advertising media. Bresnahan (1984) and Seldon et al. (2000) estimated the degree of substitutability between television, radio, and print advertising media in the U.S. beer industry, and found a high degree of substitutability between media. See also Färe et al. (2001) and Seldon & Jung (1993) for comparable results for brewing firms and all product advertising, respectively.