Alcohol Advertising Bans, Consumption, and Control Policies in Seventeen OECD Countries, 1975-2000

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RUNNING HEAD: Alcohol Advertising Bans and Control Policies in the OECD

This paper uses cross-country panel data to study the effects of advertising bans and other control policies on alcohol demand. The null hypothesis is that advertising bans do not decrease alcohol consumption. The study addresses several shortcomings in four previous cross-country studies. First, an explanatory variable is included for other alcohol control policies. Second, the study examines the history of advertising bans in OECD countries. Third, the study also examines differences in cross-country trends that characterize developed countries, including aging of the population, increased tourism, higher unemployment rates, and increased consumption of wine. The Mediterranean wine-drinking countries are shown to be categorically distinct from the beer-drinking countries and Nordic spirits-drinking countries. Fourth, the study examines the panel data for unit roots and employs model specifications that correct for non-stationary data. The empirical results indicate a significantly negative effect for the control index and the alcohol price. Using alternative model specifications and estimation methods, the results indicate that advertising bans do not reduce alcohol consumption.

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I. Introduction

During the past several decades, many developed countries either adopted or strengthened public policies that address social and economic problems associated with consumption of alcohol beverages. Control policies include state-ownership of production and retail facilities; licensing of private producers and retailers; limits on the number and location of retail outlets; restrictions on days and hours of retail operation; legal age limits for on- and off-premise purchase and consumption; beverage taxation; labeling laws; limits on blood alcohol content (BAC) of auto drivers; national alcohol prevention and education programs; and restrictions on alcohol marketing and advertising. Some policy interventions target the general population, while others are more concerned with high-risk drinkers (youth, pregnant women) or harmful drinking behaviors and outcomes (binge drinking, drunk driving, violence). A report sponsored by the World Health Organization (Babor et al., 2003a) ranks the cost-effectiveness of thirty-two different alcohol policy interventions. Based on the available evidence, the report concludes that a limited number of policy options are effective, including selected restrictions on physical availability, alcohol taxation, and enforcement of drunk driving laws (Babor et al., 2003a, p. 270). Notably missing from the list of "best practices" are alcohol advertising regulations, such as content codes, restrictions on marketing methods, and advertising bans. Indeed, advertising regulations and education campaigns, including counter-advertising, received the lowest ranking. This low ranking is particularly glaring given the negative attention directed by public health organizations and officials at alcohol advertising and marketing practices, especially the possible relationship with alcohol use by youth.[1] For example, the World Health Organization (WHO), European Charter on Alcohol, signed by all member states of the European Union, states that "all children and adolescents have a right to grow up in an environment protected . . . from the promotion of alcoholic beverages" (WHO, 1995). The WHO's technical meeting on alcohol promotion and young people concluded that "young people should not be exposed to promotional messages about alcohol in any medium" (WHO, 2002).

While comprehensive data are unavailable, worldwide advertising expenditures on alcohol are substantial. In 2000, alcohol producers in the United States spent $1.4 billion on advertising in broadcast and print media, which is about $6.30 per adult. This compares with an expenditure in 1990 of $1.5 billion (constant 2000 US$). In the United Kingdom, expenditures were $347 million in 1990 and $323 million in 2000, or $6.67 per adult (constant 2000 US$). According to Jernigan (2002), seven alcohol companies rank among the world's top 100 leading advertisers and their collective advertising expenditures exceeded $4.5 billion in 2000. Many observers argue that advertising expenditures initiate

[1] For reactions to the conclusions on advertising and promotion in the WHO report, see, e.g., Jernigan (2003) and the response by Babor et al. (2003b).

or enhance pro-drinking attitudes and awareness, especially among youth, which ultimately stimulate the overall demand for alcohol beverages. Further, Jernigan (2001) opines that advertising is at least partially responsible for the greater uniformity of beverage preferences across nations, a process referred to as "beverage homogenization." He argues that this process is focused on heavily marketed and less-costly products that might be favored by younger drinkers, especially beer and flavored low-alcohol products ("alcopops") produced by large multinational corporations. As a consequence, numerous public health reports on alcohol policy call for more comprehensive advertising bans or additional limits on advertising content and placement, marketing methods, and expenditures. The standard response from the alcohol industry has been that advertising affects brand and beverage shares, and content issues can be dealt with through industry self-regulation and voluntary content-placement codes (FTC, 1999, 2003; ICAP, 2001).

The present study examines the relationship between advertising bans and alcohol consumption in seventeen countries for the time period 1975-2000. All countries are members of the Organisation for Economic Co-Operation and Development (OECD). The study tests the null hypothesis that advertising bans do not decrease alcohol consumption and addresses several shortcomings in the four previous studies that used similar international data. First, the present study incorporates an explanatory variable for other formal control policies in each country, expressed as an index of the stringency of alcohol policies. The index is due to Karlsson and Osterberg (2001), and it accounts for fourteen distinct policies in six major areas (production, retail distribution, personal controls, content codes, BAC levels, education programs). The control index is a potentially endogenous variable. Second, the study carefully examines the history of advertising bans in the seventeen countries, including the ease of avoidance (e.g., brand advertising of low-alcohol beers, satellite TV, event sponsorship). The review indicates that two dummy variables for broadcast bans are best able to categorize the cross-country regulation of alcohol advertising. The study also considers, and rejects, the possible endogeneity of advertising bans. This result follows in part from advertising changes that have been imposed by the European Union (EU) as well as infrequent changes in advertising regulations in the face of beverage homogenization. Application of a Hausman test supports this specification. Third, the study also examines differences in cross-country trends that characterize most developed countries, including aging of the adult population, increased importance of international tourism, higher unemployment rates, and increased consumption of wine. Fourth, the study examines the cross-country panel data for unit roots and employs model specifications that correct for non-stationary data.

A reexamination of advertising bans for a panel of countries is important for two main reasons. First, as indicated above, there is disagreement about the cost-effectiveness of advertising bans as an alcohol regulation policy. A cross-country analysis using more recent data provides information on the long-term effectiveness of bans. Second, previous cross-country studies failed to control for the

stringency of other alcohol policies, which creates a specification error. Effective public policies in the alcohol area require empirical studies that account for other important variables affecting alcohol demand, including price, income, tourism, alcohol culture, demographics, unemployment, and other formal alcohol policies. The present study attempts to fill this gap in our empirical knowledge. The remainder of the paper is divided into six major sections. Section II provides a brief review of the alcohol demand literature, with emphasis on advertising bans and cross-country studies. Section III discusses alcohol consumption levels and trends in seventeen OECD countries, including the phenomenon of beverage homogenization. Section IV examines advertising bans and regulations in these countries, and discusses specification issues associated with endogeneity concerns. This section also discusses the implications of EU trade harmonization for alcohol advertising and marketing. Section V presents the panel model of alcohol demand, variables, and the data sources employed in the study. This section also presents econometric tests for panel-data unit roots. Section VI presents the empirical results for the panel of seventeen countries. Section VII contains the conclusions from the study.

II. Alcohol Demand Studies and Advertising Bans

Does advertising increase the overall demand for alcohol beverages? Do advertising bans work? There is a large literature on alcohol demand, but many studies do not include advertising or regulations affecting advertising and marketing of alcohol. The relationship between alcohol demand and advertising outlays has been investigated using annual time-series data for Australia, Canada, United Kingdom, and the United States, with null results found in most studies (Blake and Nied, 1997; Calfee and Scheraga, 1994; Duffy, 1995; Lariviere et al., 2000; Lee and Tremblay, 1992; Nelson and Moran, 1995; Selvanathan, 1988; Smith, 1990; Tegene, 1990). However, advertising expenditure data are missing for many developed and lesser-developed nations, which limits application of these results. More generally, annual data might contain too little variation to capture the full relationship between industry advertising and sales, or what has been referred to as the "advertising-sales response function" (Saffer, 1993). However, studies using quarterly data for the UK and US also have yielded null results (Coulson et al., 2001; Duffy, 1991, 2001; Nelson, 1999).

As a response to these well-known limitations, a number of alcohol demand studies have focused on the effects of advertising bans at the local or country level (Nelson, 2001, 2004). Studies that investigate the effects of local bans include Nelson (2003a), Markowitz and Grossman (1998), Ornstein and Hanssens (1985), and Schweitzer et al. (1983). None of these studies finds a noticeable effect of local advertising bans in the US on alcohol demand, but the bans are very limited in scope (e.g., billboard bans, window display bans). More important, four previous econometric studies investigate the cross-country relationship between alcohol demand and advertising bans at the country level. These studies

avoid the necessity to acquire expenditure data, but still focus the investigation on a policy-relevant variable. Further, country-level bans are more comprehensive, covering major media, such as TV, or banning most alcohol ads. An early study by Saffer (1991) examined seventeen OECD countries for the time period 1970-1983. He concluded that partial and comprehensive broadcast bans reduce alcohol consumption and abuse. However, Young (1993) pointed out several data and econometric limitations in Saffer's study, and his reexamination of these data reached the opposite conclusion. Explanatory variables in these studies included income, price, alcohol culture or sentiment, and tourism. Nelson and Young (2001) examined advertising bans in seventeen OECD countries for the period 1977-1995, and included several variables that were omitted in the earlier studies (age demographics, unemployment, wine sentiment). They concluded that advertising bans have not reduced alcohol consumption or abuse. Finally, Saffer and Dave (2002) studied twenty OECD countries for the period 1970-1995. Although the advertising coefficients were only marginally significant, they concluded that advertising bans decrease alcohol consumption. The authors also attempt to endogenize the bans, despite the long-standing nature of most bans and the significant cultural and economic differences between countries with partial bans and those with comprehensive bans (Finland, Norway, Sweden). Further, Saffer and Dave failed to include variables for tourism, demographics, unemployment, and wine sentiment. Finally, all of the above studies omit variables for other restrictive alcohol policies, which creates an important specification error. Negative coefficients for advertising bans in some studies may simply indicate that countries with bans also have adopted other unmeasured policies that reduce alcohol demand. For example, Nordic countries with more comprehensive bans also have more stringent policies in several other areas (e.g., lower BAC limits, state monopolies, limited retail outlets, higher taxes). While OECD countries vary by degree of control, the present study demonstrates below that all countries have converged over time in terms of the stringency of alcohol control polices.

III. Cross-Country Alcohol Consumption and Drinking Patterns

During the past forty years, there have been substantial changes in the quantities of alcohol consumed per capita. Historically, countries are divided into three groups according to the predominant beverage (beer, wine, or spirits), but beverage preferences also have changed in significant ways. An understanding of these trends is important for the empirical work presented below. Reliable data on per capita alcohol consumption are available as far back as 1950 for some developed countries, but the review in this section focuses on the period 1960-2000. Data on consumption for this time period are available from the World Health Organization's on-line *Global Alcohol Database*, which provides country-level data on mean per capita consumption (ages 15 and older). From a policy perspective, mean per capita consumption is important for two reasons. First, according to Ledermann's "single- distribution"

hypothesis, mean consumption is a proxy for prevalence of heavy drinking (Single and Leino, 1998). Second, adult consumption is positively correlated with levels of youth drinking (Cook and Moore, 2001). Hence, public policies that are effective in reducing the average level of consumption have the potential to reduce heavy drinking episodes and alcohol problems among youth.

Alcohol Consumption Levels and Trends

Table 1 displays selected data for seventeen countries on mean per capita consumption and beverage choice. Using the conventional categories, per capita consumption is highest in four wine-drinking countries (France, Italy, Portugal, Spain) and lowest in three Nordic spirits-drinking countries (Finland, Norway, Sweden). Further, in most countries, per capita consumption peaked in the late-1970s or early-1980s, and declined significantly thereafter. For example, Canadian consumption peaked at 11.07 litres per capita in 1977 and fell to 8.30 litres in 1995, which is a decline of 25%. Only two countries in Table 1 – Ireland and Finland – exhibit raising alcohol consumption over time due in part to cultural and economic changes (e.g., more women drinking, income growth, reduced prices, increased tourism, dismantling of state monopoly). However, the consumption trends are different in the four Mediterranean wine-drinking countries. First, alcohol consumption peaked earlier: France in 1955, Italy in 1969, Portugal in 1971, and Spain in 1975. Second, consumption declined substantially. For example, Italian consumption was 21.22 litres per capita in 1970 and fell to 17.86 litres in 1980, which is a decline of 16%. Between 1980 and 2000, Italian consumption decreased from 17.86 litres to 9.32 litres, or a 48% decline. Thus, an important cultural difference is that consumption levels in wine-drinking countries are higher historically, but also have declined more substantially over time. These consumption trends have been described in numerous public health reports and studies, although the factors behind the differences are not well understood (Babor et al., 2003a; Holder et al., 1998; Leifman, 2002; Simpura, 1995; Simpura and Karlsson, 2001; Smart, 1998).

Beverage Shares, Homogenization, and Cultural Variables

The last two columns in Table 1 show the percent of alcohol represented by each beverage, which can be used to illustrate the phenomenon of "beverage homogenization." Consumption shares of traditional beverages have declined, so the three groups of countries are more similar today than they were 30 or 40 years ago, especially the beer and spirits countries. Beer-drinking countries experienced a decline in beer's share or intensity, a rise in wine intensity, and a decline in spirits intensity. In the ten beer-drinking countries in Table 1, beer's average share of consumption declined from 66% in 1961 to 55% in 2000; wine's share rose from 10 to 26%; and spirits' share declined from 24 to 19%. In the three spirits-drinking countries, beer and wine intensities increased and spirits' intensity declined: on average,

beer's share rose from 42 to 51%; wine's share rose from seven to 29%; and spirits' share fell from 51 to 20%. Thus, beverage shares in the beer and spirits countries closely resemble each other, especially compared to beverage patterns in the 1960s and earlier. Indeed, the Nordic countries are now referred to as the "beer-spirits countries" or the "former spirits countries" (Leifman, 2001). Again, the pattern displayed by the Mediterranean wine-drinking countries is different. In the four wine countries, beer's share of consumption rose from five to 25%, but remains well below the levels exhibited in the beer and spirits countries. In contrast to the latter countries, wine's share of consumption *fell* from 84 to 59% and spirits' share *rose* from 11 to 16%.

In addition to beverage preferences, the spirits and wine countries also differ in other important aspects of their drinking patterns (Single and Leino, 1998). Historically, the "Nordic drinking pattern" is characterized by spirits as the beverage of choice, weekend binge drinking that often leads to intoxication, and low rates of overall consumption. Drinking problems are closely related to heavy drinking and public intoxication, although rates of abstinence in the general population are high. In contrast, the "Mediterranean drinking pattern" is characterized by wine as the beverage of choice, daily consumption of moderate amounts of alcohol at meals, and high rates of overall consumption. Public intoxication is not culturally acceptable, but longer-term drinking problems are common, such as liver cirrhosis. Abstinence rates are low. The historic pattern of alcohol consumption in the wine-drinking countries is described as "integrated" as opposed to the "episodic" pattern that occurs in the spirits-drinking countries and many beer-drinking countries (Sulkunen, 1976). Reflecting these broad differences in cultural drinking patterns, past econometric studies of advertising bans have incorporated a variable for alcohol culture or sentiment. Saffer (1991) used a dummy variable for the share of consumption in the form of beer and wine and Saffer and Dave (2001) used a continuous variable for beer and wine's share of total alcohol consumption. However, as Table 1 illustrates, the most pronounced differences are those that characterize the beer- and spirits-drinking countries versus the wine-drinking countries. Hence, a better cultural variable is the combined share of beer and spirits or, simply, the share of wine in total consumption. Nelson and Young (2001) used wine's share of total consumption as a cultural variable. The present study also adopts this specification for alcohol sentiment. Using this specification, the empirical results reported below capture the long-term shift toward beverage homogenization among all countries, a process that has both cultural and economic aspects (Aizenman and Brooks, 2005).

IV. Advertising Bans and Other Alcohol Control Policies

Regulation of alcohol advertising is a well-established policy in developed countries, dating to the 1960s or earlier. Some media advertising bans are partial, such as those that apply only to spirits, certain hours of television viewing, and state-owned broadcast media. These bans are typically used in

combination with content codes that govern permitted forms of alcohol advertising, especially in the broadcast media. Legislated and voluntary content codes now exist in all OECD countries and virtually all countries ban alcohol ads and marketing methods that target children and youth.[2] Other advertising bans are more comprehensive and apply to a broader range of beverages, to some forms of print media, such as domestic magazines, and to sponsorships and outside displays. However, comprehensive bans that cover broadcast and print advertising are limited to three Nordic countries – Finland, Norway, and Sweden – and until recently were used in combination with state production-retail monopolies to limit alcohol accessibility and private profit-making opportunities. Following their entry to the European Union (EU) in 1995, Finland and Sweden abolished their state monopolies on production, import, and export of alcohol beverages, thereby confining their monopoly operations to off-premise retail outlets. Norway followed suit in 1996, but retained a state monopoly on the production of distilled spirits. Following decisions in the European Court of Justice, these three countries also relaxed their restrictions on alcohol advertising. Other countries, notably France and Spain, expanded their restrictions on advertising in the mid-1980s. However, nine countries in the sample made no major change in their broadcast bans during the period 1979-2000. Thus, changes in advertising bans are infrequent, despite the important trends demonstrated above for consumption levels and beverage preferences.

Measuring Alcohol Advertising Bans and Endogeneity Issues

Previous cross-country studies focused on bans of broadcast advertising, either TV bans or TV and radio bans. This specification follows from the widespread use of broadcast bans and the importance of TV advertising as the medium of choice for alcohol ads. Saffer (1991), Young (1993), and Nelson and Young (2001) used two dichotomous dummy variables for partial bans of broadcast advertising of spirits and total bans of broadcast advertising of all alcohol beverages. The null outcomes apply to those countries with no restrictions on broadcast advertising, aside from time-of-day regulations and content codes. However, Saffer and Dave (2002) attempt to construct two variables that measure the number of partial bans and the number of total bans in "all media" (TV, radio, print). Further, they treat these variables as endogenous and argue that because "alcohol consumption has been trending downward in a number of countries since around 1988 . . . [this] could result in a decrease in the number of advertising bans" (Saffer and Dave, 2002, p. 1333). This statement ignores the fact that the important *downward* changes in advertising restrictions have been the result of EU trade liberalization, and are not necessarily the consequence of changes in public attitudes or changes in consumption. I demonstrate below that their

[2] Article 15 of the EU's *Television Without Frontiers Directive* of 1989 (89/552/EEC) requires that TV advertising of alcohol shall not be aimed specifically at minors; link alcohol to physical performance or driving; link alcohol to social or sexual success; claim that alcohol has therapeutic qualities; encourage immoderate consumption; or place emphasis on high alcohol content as a positive quality.

specification is flawed and should be replaced by exogenous dummy variables for partial and total broadcast bans. Incorporating print advertising bans simply identifies the three Nordic monopoly countries, which are unique in other respects.

Table 2 and the Appendix summarize the history of advertising bans in the sample of OECD countries. These tables and Table 3 also provide information on the alcohol control index that will be used to measure the stringency of other country-specific policies, such as state monopolies, retail accessability, legal drinking age, and BAC limits. Aside from time constraints and content codes, four countries have unrestricted broadcast and print advertising of alcohol: Australia, Italy, the Netherlands, and Portugal. Eight countries banned broadcast advertising of distilled spirits: Austria (TV only before 1993), Belgium (TV only after 1991), Canada (before 1995), France (before 1987), Ireland, Spain (TV only after 1989), United Kingdom (before 1995), and the United States. Aside from content codes, none of these countries have important restrictions on print media. Categorization of Belgium's ban is complicated by different restrictions for Francophone TV and Flemish TV. Categorization of France's ban is complicated by different regulations for grain- and fruit-based distilled spirits (e.g., brandy and cognac). A lawsuit filed by Scotch whisky producers is partially responsible for the changes in French law since 1980. Canada's legislative ban was ended by a court decision, while ad bans for spirits in the UK and US are voluntary. The UK ban ended in 1995. Although ads for spirits and wine now appear on cable TV in the US, the four major networks have refused to carry these ads due to opposition from public health groups, regulatory agencies, and politicians. Three countries selectively ban broadcast advertising of all alcohol beverages: Denmark (except weak beer), France (TV only since 1987), and New Zealand (before 1992). However, to an unknown extent, these controls are circumvented by satellite TV broadcasts. In summary, none of the fourteen countries in the first three categories in Table 1 impose important constraints on print advertising. Despite substantial changes in beverage preferences and consumption levels, only four countries changed categories before 1995 – Belgium, France, Spain, and New Zealand. It is difficult to see how a public choice model, such as that employed by Saffer and Dave (2002), explains the stability of advertising restrictions over time in light of the major changes in consumption levels and beverage preferences. Lastly, a number of countries ban or severely limit commercial advertising of any type on publically-owned TV and radio, including Denmark, France, Sweden, UK, and the US. Clearly, these bans are not endogenous to the alcohol market.

The fourth category in Table 2 for comprehensive bans contains the three Nordic monopoly countries – Finland, Norway, and Sweden. Until recently, these countries operated production, import, wholesale, and retail monopolies, and had more comprehensive bans for broadcast and print advertising. However, all three countries allow advertising of weak beer, which can be used to circumvent broadcast or print bans for strong beer. Indeed, in 1997, Norway moved to close this loophole by requiring weak

beers to have distinguishable brand names. In addition, alcohol ads appear in foreign magazines and are carried on satellite TV. While the extent of substitution toward permitted media or beverages is unknown, it is incorrect to claim that bans of "all media" exist in the Nordic countries. Further, in contrast to the other fourteen countries, the three Nordic countries operate government monopolies for production and retail distribution; impose restrictions on the number of retail outlets; and severely penalize drunk driving. Some of the monopoly controls and advertising restrictions were ended following the participation of these countries in the European Economic Area (EEA) and the EU. These important changes in regulations are not endogenous; rather the changes since 1995 are mostly due to trade liberalization that is the central focus of the EEA and EU.[3] As shown in the last column of Table 2, the Nordic countries also score much higher on the alcohol policy control index. Following EEA and EU participation, Finland's score fell from 18.5 to 14.5; Norway's score fell from 19 to 17; and Sweden's score declined from 18.5 to 16.5 (Karlsson and Osterberg, 2001, p. 124).

In summary, specification of a continuous variable for advertising regulations is difficult or impossible due to (a) complexity of the laws (e.g., Flemish TV in Belgium, French advertising of cognac); (b) opportunities for evasion (weak beer in the Nordic countries); (c) substitution toward permitted media (satellite TV, foreign magazines, sports teams); (d) event sponsorships such as the Football World Cup, World Hockey Championships, and Formula One auto racing; and (e) lack of enforcement. A binary specification based on partial and complete bans of broadcast advertising is warranted due to these measurement problems. Furthermore, recent changes in the Nordic monopoly countries are clearly exogenous, reflecting legal challenges and EU membership. Regulatory changes in Canada and France also are due to legal decisions. There are only a few examples in Table 2 where a change in a country's laws might reflect concerns for public welfare. The majority of the advertising regulations are long-standing and have not been altered as a consequence of changes in alcohol consumption or production, beverage preferences, public health expenditures, and other economic interests. For these reasons, an econometric model in which advertising regulations are treated as exogenous is preferred on a priori grounds. Finally, attempting to include print advertising restrictions simply identifies the three Nordic countries, which are unique in other respects. Hence, the model specification employs two dummy variables for partial bans of broadcast advertising of spirits and complete bans of broadcast advertising of all beverages, except weak beer. A Hausman specification test is presented for endogeneity of these dummy variable.

Alcohol Policy Control Index

Accurate measurement of the effects of advertising bans requires consideration of other formal control policies in each country. This is a complex task, but fortunately a summary index is available.

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[3] For more on EU trade and alcohol policies, see Holder et al. (1998) and Osterberg and Karlsson (2003).

Table 3 displays selected values for the alcohol control policy index. The index ranges from zero to 20 points, and higher values indicate greater control. The index excludes alcohol taxation policies and advertising bans (i.e., promotional controls include only content codes). In the empirical section, tests for endogeneity of the control index are presented and instrumental variable estimates are provided for a two-equation model of alcohol consumption and control. As pointed out by Karlsson and Osterberg (2001, p. 125), formal alcohol controls have become stricter over time and there is convergence across a broad set of countries. Not surprisingly, the Nordic monopoly countries, excluding Denmark, have the highest degree of alcohol control. While these countries have had high levels of control since the 1950s, their index scores fell significantly following participation in the EEA and EU in 1995. In the beer-drinking countries, the index values are mixed, with the highest scores recorded in the English-speaking countries. In these countries, index values rose due to such factors as higher legal ages, lower BAC limits, statutory content codes, and national prevention programs (Karlsson and Osterberg, 2001; Osterberg and Karlsson, 2002). Finally, index values also rose in the wine countries, although average values for the wine-drinking countries remain well below those of the other countries. These comparisons again emphasize the differences between the wine countries and other countries as well as the importance of the control index for accurate measurement of effects of advertising bans.

V. Panel Model, Variables, and Data Sources

The panel data model estimated in the present study follows previous investigations by Saffer (1991) and Nelson and Young (2001), except that I also estimate specifications that account for non-stationarity. Panel data tests for unit roots in the consumption data are presented below.

Panel Data Models

Let the subscripts i and t denote the country and year, respectively. The basic specification of the cross-country panel model for alcohol demand is given by

$$A_{it} = \alpha + R_{it}\beta + \eta C_{it} + X_{it}\gamma + \delta_t + \varepsilon_{it} \qquad (1)$$

where A is the natural log of mean alcohol consumption per capita, R is a vector of dummy variables for partial and total broadcast advertising bans, C is the alcohol control index, η is the control coefficient, X is a vector of regressors that control for other economic and demographic variables that affect consumption (price, income, aging, wine sentiment, etc.), α is the overall intercept term, δ is a period-specific effect, β and γ are coefficient vectors, and ϵ is a stochastic disturbance term. The year fixed-effects account for factors that vary uniformly across countries over time (e.g., health and lifestyle concerns, world energy prices). Because there are few changes in the advertising bans, it is not possible

to estimate a model that contains country fixed-effects and dummy variables for advertising restrictions.

Some models include a vector of country-specific linear time trends (N_i*T; T = 1, ..., 26) to control for factors that vary over time within each nation (e.g., level of education, local prices). This yields the following alternative model specification, where N_i is a country-specific dummy

$$A_{it} = \alpha + R_{it}\beta + \eta C_{it} + X_{it}\gamma + N_i T + \varepsilon_{it} \quad (2)$$

Most regressions are estimated by weighted least-squares using cross-sectional weights to account for heteroscedasticity. In order to test the sensitivity of the results from equation (1), I also estimate models that (a) use unweighted data; (b) include country-specific linear time trends; and (c) replace the log-levels data with log first-differences (i.e., growth rates) to account for trends and non-stationarity of the data. Tests are conducted for unit roots and for endogeneity of the control index and advertising bans. The key regression coefficients are those for partial and complete broadcast advertising bans, and the null hypothesis is that alcohol advertising bans do not decrease consumption. As discussed above, past studies have obtained mixed empirical results. The control index should carry a negative sign if non-advertising regulations affect demand. The expected coefficient signs on the other explanatory variables follow previous cross-country investigations: price should have a negative sign due to the law of demand; income should be positive if alcohol is a normal good; wine sentiment should be positive due to differences in alcohol culture (discussed above); unemployment's sign is uncertain, but prior alcohol studies for the US generally have found a negative sign; tourism is expected to have a positive sign, reflecting non-resident alcohol consumption; and aging should have a negative sign, reflecting well known age-related differences in alcohol consumption patterns.

Variables and Data Sources

The full panel contains seventeen countries for the time period 1975-2000 or 442 observations.[4] The latter number falls to 425 when the first-difference model is estimated. The start of the sample time period was determined by the availability of data on tourism activity and alcohol prices. Table 4 displays the variables and data sources used in the regression analysis. The dependent variable is mean alcohol consumption per capita (ages 15 years and older) from the World Health Organization's, *Global Alcohol Database*, which estimates the amount of pure ethanol derived from beer, wine, and spirits. As an improvement over prior studies, this measure adjusts for differences in the population age distribution across countries and over time. The overall sample mean is 11.44 litres per capita. The peak year for the

[4] Consumption data are available for Germany and Japan, but these countries are excluded due to lack of adequate price data. Luxembourg is excluded due to the importance of cross-border purchases and tourism.

overall mean occurs in 1975 (13.01 litres) and the low year is 1998 (10.25 litres), which is a decline of 21%. Country means that exceed the overall sample mean are Austria, Belgium, Denmark, France, Italy, New Zealand, Portugal, and Spain. Countries with means below the overall mean are Australia, Canada, Finland, Ireland, Netherlands, Norway, Sweden, United Kingdom, and the United States. For the sample period, the highest mean consumption level is recorded by France (17.38 litres) and the lowest by Norway (5.53 litres) and Sweden (7.56 litres).

Data were collected for eight explanatory variables: income, price, advertising bans, alcohol control index, wine sentiment (culture), tourism, unemployment, and an aging demographic. The income measure is real GDP per capita, which is a broad measure of income from the *Penn World Table 6.1* (Heston et al., 2002). This on-line source provides income estimates over time based on a uniform methodology. Income is expected to be positively related to alcohol consumption if alcohol is a normal good. The two advertising variables are dummy variables: (1) partial bans of distilled spirits ads in the broadcast media; and (2) complete bans of ads for all alcohol beverages in the broadcast media, except weak beer. The control index is a measure of the stringency of other alcohol policies, excluding beverage taxation and advertising bans. The index has an overall sample mean of 12.1, and rises from a low of 10.9 in 1975 to a high of 12.5 in 2000. Country means that are below the overall sample mean are Austria, Belgium, Denmark, France, Ireland, Italy, Portugal, and Spain. Country means that are above the overall mean are Australia, Canada, Finland, Netherlands, New Zealand, Norway, Sweden, United Kingdom, and the United States. The control index regression coefficient is expected to be negative if other alcohol policies substantially affect demand.

Four explanatory variables capture other social and economic factors that can affect cross-country alcohol consumption. As discussed above, alcohol culture or sentiment is captured by the share of consumption in the form of wine. A positive coefficient sign is expected. The yearly sample means for this variable rise from 30.2% in 1975 to a high of 35% in 2000. The measure of tourism activity adjusts for alcohol consumption and purchases by visitors, which has a positive impact on recorded per capita consumption of residents (i.e., resident consumption is overstated due to tourism). Reflecting differences in tourism measurement, a narrow definition is employed that excludes visits by residents, but includes other day-visitors. The mean number of visitors per capita is 0.53, and rises from 0.33 in 1975 to 0.81 in 2000. The highest country means are recorded by Ireland (0.93), France (0.81), and Spain (0.93), and the lowest by Australia (0.12), Sweden (0.14), and the US (0.13). The rate of unemployment adjusts for changes in economic conditions that might affect alcohol consumption. The overall sample mean is 7.4%, with a peak of 10% in 1993 and a low of 4.3% in 1975. Spain recorded the highest average unemployment rate (13.4%) and Austria had the lowest (3.3%). Several US studies report a negative relationship between unemployment rates and alcohol use (Freeman, 1999; Nelson, 2003a; Ruhm, 1995;

Ruhm and Black, 2002). However, the US experience might not apply universally. The demographic variable for aging is the percent of the population that is over the age of 65 years. A negative coefficient sign is expected. The overall sample mean is 13.4%. Country means that exceed this value are recorded by Austria, Belgium, Denmark, France, Italy, Norway, Sweden, and the UK. The lowest mean values for percent elderly are recorded by New Zealand (10.6%), Australia (10.7%), and Canada (10.7%).

Alcohol Price Measurement

Measurement of alcohol prices presents several problems for cross-country studies, reflecting a paucity of data and measurement problems due to differences in recording procedures. National alcohol price indexes are available for only a few countries, and empirical studies have instead relied on alcohol expenditure data (e.g., Selvanathan and Selvanathan, 2006). For eleven of the countries in my sample, I obtained expenditure data for 1975-2000 from various issues of the OECD, *National Accounts of OECD Countries: Detailed Tables, Vol. II* (OECD, 2005a). All nominal expenditure data were expressed in the country's currency using 1995 as the benchmark year for Eurodollar conversions. The expenditure series for each country was divided by total consumption of pure alcohol to obtain a measure of the cost of a litre of alcohol (total consumption equals per capita use multiplied by the population for each year). The nominal price series was deflated by the gross domestic product deflator (year 2000 = 100) for each country in order to obtain a measure of the real price of a liter of alcohol. Lastly, the real price was expressed as a real price index relative to the observed price in the year 2000. However, six countries were missing expenditure data for years prior to 1980 or 1985. Using the procedure described above, nominal prices were calculated as far back as possible. Price estimates for earlier years were obtained by benchmarking the nominal price to the similar series for an adjacent country (e.g., Norway's price series was benchmarked using Sweden for 1975-79). For all countries, the resulting price series capture relative price changes within each country, while the variation across countries reflects differences in inflation rates. During the sample time period, all countries experienced double-digit inflation during the mid-to-late 1970s and early 1980s. Hence, for most countries the real price index for alcohol declines until about 1985, and rises thereafter. The overall sample mean for the price index is 90.1, with a low value of 84.5 in 1985 and a high of 100 in 2000. However, this pattern is not experienced by all countries due to differences in inflation rates, taxes on alcohol beverages, and other local factors affecting prices. Following Saffer and Dave (2002, p. 1329), the price variable is assumed to be exogenous. Price elasticity values reported below are consistent with prior international studies.

Panel Data Unit Root Tests

Time-series data for alcohol consumption are potentially non-stationary. Over the past decade a

number of panel data unit root tests have been developed (Baltagi and Kao, 2000), and six of these tests are easily implemented using the *Eviews-5* econometric software package (QMS, 2004). Some tests assume a common data-generating process and autoregressive parameters among cross-sections, such as the test due to Levin, Lin, and Chu (2002). Other tests allow for individual unit root processes that vary among cross-sections, such as the IPS test due to Im, Pesaran, and Shin (2003). The latter test combines the individual unit root tests to derive a panel-specific result. Given the heterogenous sample of OECD countries, the latter test seems more appropriate, but both types of tests are conducted. None of the previous studies of alcohol advertising bans applied unit root tests, although the IPS test was used in a cross-country panel study of tobacco advertising bans (Nelson, 2003b). Using the natural log of per capita consumption, three different tests are conducted that assume a common unit root process. Similarly, three different tests are conducted that assume individual or country-specific unit root processes. Each test is conducted in log levels and then repeated using log first-differences. Each test also is conducted using individual intercepts only and then repeated using individual intercepts and linear time trends as exogenous variables. With only intercept terms, all six tests in log levels indicate the presence of unit roots at the 5% confidence level or better. For example, the IPS test statistic is 2.095 (p = 0.982 for an asymptotic standard normal test). When the tests are conducted using intercepts and trends, the IPS test rejects the null at the 5% confidence level with a test statistic of -1.671 (p = 0.047). Because the IPS test accommodates heterogeneity between cross-sections, this result provides a justification for model estimation in log levels. Using log first-differences, five tests reject the null based on specifications with only intercepts as exogenous variables. Hence, these results favor model estimation using log first-differences. The next section provides regression results using data in both log-levels and log first-differences. Estimation in log-levels allows comparisons with previous cross-country studies and avoids discarding any information contained in these data. Several of the log-level models also contain country-specific time trends. For sensitivity analysis, I also report estimates for model specifications using either a common AR(1) term or log first-differences (growth rates).

VI. Cross-Country Empirical Results

Three sets of regressions are estimated. First, weighted and unweighted regressions are estimated with specifications that parallel those used in previous cross-country studies, except the regressions include the alcohol policy control index. Several model specifications are presented. Second, a set of alternative estimates are provided that correct for non-stationarity data and serial correlation, which tests the sensitivity of the results to alternative specifications of the error term. Third, a set of regressions is estimated in which the control index is treated as endogenous. I also report results for a Hausman test of endogeneity for the two dummy variables for advertising bans. Overall, the null hypothesis for

advertising bans is not rejected, although other formal alcohol policies do reduce alcohol consumption. In the full specifications, the dummy variables for advertising bans have insignificant or statistically positive coefficients. This seemingly contradictory result can arise due to substitution toward permitted media and marketing methods, lack of enforcement and ease of evasion, or it might simply reflect the fact that advertising bans are symbolic, rather than a cost-effective policy instrument. The empirical results refute previous claims that advertising bans reduce the market demand for alcohol beverages and cast doubt on the existence of a market-wide advertising response function. Finally, in log-levels regressions, the control index coefficients are always significantly negative.

Weighted Regressions and Sensitivity Analysis

Table 5 shows the first set of results using weighted generalized least-squares (GLS) and unweighted ordinary least-squares (OLS). T-statistics are provided along with the coefficient estimates, where the robust standard error estimates are corrected for contemporaneous correlation. The regression standard errors (SEE) are always less than 10% of the mean of the dependent variable and decline to 5% or less in the full specifications. Regressions (1) and (4) provide model specifications that are similar to those estimated by Saffer (1991) and Saffer and Dave (2002). In these regressions, the dummy variable for complete bans of broadcast advertising is significantly negative, which would appear to support claims for the efficacy of a comprehensive policy. Regressions (2) and (5) show that this result is misleading and disappears when the control index variable is added to the model. This is an indication of specification errors in Saffer (1991) and Saffer and Dave (2002). Further, the SEE values decline substantially when the control index is included in the regressions. The control index variable is significantly negative in all of the expanded regressions, indicating that some types of alcohol policies do reduce consumption, excluding advertising bans. The full model specification in regressions (3) and (6) shows the effects of adding other explanatory variables for unemployment, tourism, and elderly population. Examining the explanatory variables, the income elasticities are insignificant in regressions (3) and (6). This result replicates findings in some previous studies (e.g., Saffer, 1991, p. 75), but this anomaly disappears in Table 6 and 7 where the income elasticity is significantly positive with values of about 0.2 to 0.4. The price variable is significantly negative in all reported regressions. Using the full specifications, the alcohol price elasticity is about -0.3 to -0.4. This result is consistent with the price elasticities obtained in a number of international studies, which have consistently produced alcohol price elasticities of about -0.4 to -0.6 (Nelson and Young, 2001; Selvanathan, 2006). As expected, the variable for wine sentiment is significantly positive. The unemployment rate is insignificant in the GLS regression, although positive in the OLS regression. The tourism variable has a positive sign in the GLS regression. The aging variable is significantly negative in both regressions, although its magnitude is

sensitive to the method of estimation.

In order to test the sensitivity of the results for advertising bans, the regressions were re-estimated using country-specific time trends and log-first differences. Table 6 displays the results. In regression (1), both advertising coefficients are significantly negative, but this result again vanishes when the control index is included in regression (2). Regression (3) is the preferred model specification. Significantly negative effects are found for the control index, alcohol price elasticity, unemployment rate, and percent elderly. Significantly positive effects are found for the income elasticity, wine sentiment, and tourism. The income elasticity is 0.23 and the price elasticity is -0.30. The results in regression (3) fail to support claims that advertising bans reduce the market demand for alcohol beverages. Regressions (4) - (6) show the estimates in log first-differences. In this model, the intercept term (multiplied by 100) is the exogenous growth rate of per capita alcohol consumption, which is about -2.5% per annum. In the log-difference regressions, the exogenous trend, income, and price variables provide most of the explanatory power. In regression (6), the income elasticity is 0.32 and the price elasticity is -0.28. The advertising ban coefficients are positive or insignificant. The control index is significantly positive, but very small in magnitude. The unemployment rate is significantly negative. Hence, panel data methods that correct for non-stationary data again fail to demonstrate that advertising bans reduce the growth rate or accelerate the decline of alcohol consumption. The results in Table 6 do not alter the conclusions from Table 5.[5]

Instrumental Variable Estimates

Advertising bans are unlikely to be endogenous in light of the changes mandated by EU trade laws and the infrequency of change in non-EU/EEA countries. I report results for a Hausman test of endogeneity for the bans, which partially supports this position. However, endogeneity between alcohol consumption and the alcohol policy control index is more likely because the level of control in many countries has changed frequently to address various social costs associated with alcohol consumption (e.g., lower BAC levels, higher minimum legal ages, education programs). The mean value for the control index increases from 10.9 in 1975 to 12.5 in 2000. In several countries, the change in the index is substantial: Belgium (8 to 11.5); Italy (8 to 13); Portugal (2 to 8); and Spain (0 to 10). The scores for a few countries do not change very much, including Canada, Ireland, and the UK. This suggests that the modeling of the control index must account for several possible economic influences. Following Nelson (2003b) and Saffer and Dave (2002), a public choice model is estimated in which alcohol control legislation in each country depends on public attitudes toward alcohol, private production interests, and

[5] I also estimated regressions (1) - (3) in Table 6 with a common AR(1) term, which provides a different control for serial correlation. Neither advertising variable was significant in these regressions. Estimating regressions (4) - (6) with the country-specific time trends, rather than the year fixed-effects, did not alter the results.

EU/EEA membership. Fitted values from the public choice model are used to obtain instrumental variable (IV) estimates of the control index, which are used in IV-GLS regressions for alcohol demand.

A public choice model of the control index was first estimated using GLS panel methods. The four instruments in the first-stage regression are the percent of GDP accounted for by expenditures on healthcare; number of tobacco advertising bans; an index of economic openness (real exports plus imports divided by real GDP); and a dummy variable for EU/EEA membership (= 1 after 1995). Alcohol control should be greater in countries with relatively high healthcare costs. Higher control also is expected in countries where public attitudes are receptive to tobacco advertising bans. The openness index captures a variety of influences due to the effects of international trade, such as emulation of alcohol policies adopted by trading partners. Several exogenous variables also capture health concerns, including income, unemployment rate, and elderly population. Producer interests are represented by prices, wine sentiment, tourism, and country fixed-effects. The public choice model was estimated with and without country fixed-effects, but the advertising results were not affected by this difference. Including the country fixed-effects raises the first-stage model R^2 from 0.829 to 0.977. Using the IV results with country fixed-effects, empirical results for alcohol demand are reported in Table 7. The preferred model is regression (4). Estimates are provided for two models with time fixed-effects; two models with country-specific time trends, and two models in log-differences. The advertising ban variables are either insignificant or incorrectly signed in all six regressions, whereas the instrument for the control index is always significantly negative in the log-level regressions. In four regressions, the income elasticity is significantly positive. The income elasticities range from 0.23 to 0.40. The price elasticities are always significantly negative, with values that range from -0.26 to -0.38. Wine sentiment is significantly positive in the log-level regressions. Elderly population is significantly negative in two regressions, while tourism is significantly positive in regression (2). The significant negative coefficient for unemployment are consistent with prior evidence for the United States. Treating the control index as an endogenous variable does not alter the basic finding that advertising bans do not reduce alcohol demand. This finding is robust across a variety of model specifications and estimation procedures.

Lastly, I tested for endogeneity of the two dummy variables for advertising bans. A first-stage IV logit regression was estimated for each of the advertising dummies. The instruments are the same as those used for the control index. Given the binary nature of the advertising dummies, inclusion of country-fixed effects is not possible. In order to account for the inertia associated with the status quo, I also included a time trend as an exogenous regressor. Using a success cutoff value of 0.25, the regressions successfully predicted 80% of the binary observations. France and New Zealand are clearly outliers. Using the model specification in regression (3), Table 6, a Hausman specification test suggested that the dummy for complete advertising bans is endogenous. However, reestimating the demand model did not yield a significant coefficient for complete advertising bans, although the coefficient was

negative. The econometric modeling of advertising legislation is clearly an interesting area for future research on the political economy of alcohol regulation.

VII. Conclusions

This study examined the effects of alcohol advertising bans and other control policies on alcohol consumption in seventeen OECD countries for the time period 1975-2000. Using a variety of econometric specifications and panel-data estimation procedures, the study fails to reject the null hypothesis that alcohol advertising bans do not decrease the market demand for alcohol. Empirical results for a control index variable demonstrate that other formal alcohol intervention policies do have a negative effect on alcohol consumption. Previous cross-country studies have reached conflicting conclusions on the effects of advertising bans, but all prior studies failed to include variables that account for other control policies and failed to test for unit roots. Hence, the empirical findings support the conclusion that prior studies are biased statistically toward a negative relationship between advertising bans and alcohol consumption. The control index used in the present study is a composite, but a cost-effectiveness study by Babor et al. (2003a) suggests that selected restrictions on physical availability, alcohol taxation, and enforcement of drunk driving laws are effective intervention policies. In addition to the control index, this study also provides a detailed history of advertising bans in OECD countries. Advertising bans concentrate on the broadcast media, and only the Nordic monopoly countries – Finland, Norway, and Sweden – have banned alcohol ads in the print media. Relatively few major changes in these laws have occurred, despite significant changes in alcohol consumption levels and beverage shares. Several recent changes in advertising regulations are due to trade liberalization arising from the formation of the European Economic Area and the European Union. These changes are not endogenous to the alcohol market in a particular country. Thus, the present study focuses on two binary variables for exogenous advertising bans in the broadcast media. The study treats the control index as endogenous. Instrumental variable models support the conclusion that advertising bans do not decrease alcohol demand. Further, the developed countries in the sample have experienced other significant social and economic trends that have an influence on alcohol use, including higher unemployment levels, increased tourism, and aging populations. The study provides empirical estimates for these variables. Income and price elasticity estimates are consistent with values reported in prior international studies, which is an internal validity check on the general model specification.

During the past forty years there have been major changes in alcohol consumption levels and beverage shares. These important changes have occurred despite the relatively stable nature of advertising regulations and bans. In many countries, consumption levels peaked in the early 1980s and then declined by 20% or more. The decline was most dramatic in the Mediterranean wine-drinking

countries, where average consumption fell by more than 30% between 1980 and 2000. Relative to other countries in the sample, especially the Nordic spirits-drinking countries, most wine countries have fewer restrictions on alcohol advertising, marketing, and distribution. Critics charge that alcohol advertising enlarges the market-wide demand for alcohol, but it is difficult to see this outcome in the consumption trends, especially the trends for the wine countries. Further, the empirical results in the study account for a broad range of other possible determinants of demand, including prices, income, unemployment, tourism, aging, and alcohol culture. Consideration of these variables is necessary for informed policy evaluation. Finally, it should be noted that bans of advertising have existed for many years in some countries, and vary across countries. Many individuals begin drinking alcohol at an early age. If advertising influences this participation decision, it is difficult to see why this behavior is not reflected in the empirical results for long-standing advertising bans.

References

Aizenman, J. and Brooks, E.L. (2005) Globalization and taste convergence: the case of wine and beer, Working paper No. 11228, National Bureau of Economic Research, New York.

Babor, T., et al. (2003a) *Alcohol: No Ordinary Commodity – Research and Public Policy*, Oxford University Press, Oxford.

Babor, T., et al. (2003b) No ordinary commentary: a response to our gentle critics, *Addiction*, **98**, 1367-70.

Baltagi, B.H. and Kao, C. (2000) Nonstationary panels, cointegration in panels and dynamic panels: a survey, in *Advances in Econometrics*, B. Baltagi, T.B. Fomby, and R.C. Hill (Eds.), Elsevier Science, Oxford, pp. 7-51.

Blake, D. and Nied, A. (1997) The demand for alcohol in the United Kingdom, *Applied Economics*, **29**, 1655-72.

Calfee J.E. and 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.

Cook, P.J. and Moore, M.J. (2001) Environment and persistence in youthful drinking, in *Risky Behavior Among Youths: An Economic Analysis*, J. Gruber (Ed.), University of Chicago Press, Chicago, pp. 375-437.

Coulson, N.E., Moran, J.R., and Nelson, J.P. (2001) The long-run demand for alcoholic beverages and the advertising debate: a cointegration analysis, in *Advertising and Differentiated Products: Advances in Applied Microeconomics*, M.E. Baye and J.P. Nelson (Eds.), JAI Press, Amsterdam, pp. 31-54.

Duffy, M.H. (1991) Advertising in demand systems: testing a Galbrathian hypothesis, *Applied Economics*, **23**, 485-96.

Duffy, M.H. (1995) Advertising in demand systems for alcoholic drinks and tobacco: a comparative study, *Journal of Policy Modeling*, **17**, 557-77.

Duffy, M.H. (2001) Advertising in consumer allocation models: choice of functional form, *Applied Economics*, **33**, 437-56.

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.

Federal Trade Commission (2003) *Alcohol Marketing and Advertising: A Report to Congress*, FTC, Washington, DC.

Freeman, D.G. (1999) A note on economic conditions and alcohol problems, *Journal of Health Economics*, **18**, 661-70.

Health New Zealand (2005) *International Tobacco Control Database: Advertising Restrictions and Health Warnings*, HNZ, Auckland, NZ, available at http://www.health.co.nz

Heston, A., Summers, R., and Aten, B. (2002) *Penn World Table Version 6.1*, Center for International Comparisons, University of Pennsylvania, Philadelphia, available at http://pwt.econ.upenn.edu

Holder, H.D., et al. (1998) *European Integration and Nordic Alcohol Policies*, Ashgate, Aldershot, UK.

Im, K.S., Pesaran, M.H., and Shin, Y. (2003) Testing for unit roots in heterogeneous panels, *Journal of Econometrics*, **115**, 53-74.

International Center for Alcohol Policies (2001) *Self-Regulation of Beverage Alcohol Advertising*, ICAP, Washington, DC, available at http://www.icap.org

Jernigan, D.H. (2001) *Global Status Report: Alcohol and Young People*, World Health Organization, Geneva.

Jernigan, D.H. (2002) Marketing alcohol to young people: effects, responses, evaluations and prospects, Paper presented at the WHO meeting on Marketing and Promotion of Alcohol to Young People, Valencia, Spain, available at http://www.eurocare.org

Jernigan, D.H. (2003) Messages on alcohol matter – comment on chapter 10: regulating alcohol promotion, and chapter 11: education and persuasion strategies, *Addiction*, **98**, 1360-61.

Karlsson, T. and Osterberg, E. (2001) A scale of formal alcohol control policy in 15 European countries, *Nordic Studies on Alcohol & Drug*, **18**, 117-34 (English supplement).

Lariviere, E., Larue, B., and Chalfant, J. (2000) Modeling the demand for alcoholic beverages and advertising specifications, *Agricultural Economics*, **22**, 147-62.

Lee, B. and Tremblay, V.J. (1992) Advertising and US market demand for beer, *Applied Economics*, **24**, 69-76.

Leifman, H. (2001) Homogenisation in alcohol consumption in the European Union, *Nordic Studies on Alcohol and Drugs*, **18**, 15-30 (English supplement).

Leifman, H. (2022) Trends in population drinking, in *Alcohol in Postwar Europe: Consumption, Drinking Patterns, Consequences and Policy Responses in 15 European Countries*, T. Norstrom (Ed.), National Institute of Public Health, Stockholm, pp. 49-82.

Levin, A., Lin, C.F., and Chu, C. (2002) Unit root tests in panel data: asymptotic and finite-sample properties, *Journal of Econometrics*, **108**, 1-24.

Markowitz, S. and Grossman, M. (1998) Alcohol regulation and domestic violence towards children, *Contemporary Economic Policy*, **16**, 309-20.

Nelson, J.P. (1999) Broadcast advertising and US demand for alcoholic beverages, *Southern Economic Journal*, **66**, 774-90.

Nelson, J.P. (2001) Alcohol advertising and advertising bans: a survey of research methods, results, and policy implications, in *Advertising and Differentiated Products: Advances in Applied Microeconomics*, M.E. Baye and J.P. Nelson (Eds.), JAI Press, Amsterdam, pp. 239-95.

Nelson, J.P. (2003a) Advertising bans, monopoly, and alcohol demand: testing for substitution effects

using panel data, *Review of Industrial Organization*, **22**, 1-25.

Nelson, J.P. (2003b) Cigarette demand, structural change, and advertising bans: international evidence, 1970-1995, *Contributions to Economic Analysis & Policy*, **2** (article 10), 1-27.

Nelson, J.P. (2004) Advertising bans in the United States, in *EH.Net Encyclopedia*, R. Whaples (Ed.), 1-29, available at http://www.eh.net/encyclopedia/contents/Nelson.AdBans.php

Nelson, J.P. and Moran, J.R. (1995) Advertising and US alcoholic beverage demand: system-wide estimates, *Applied Economics*, **27**, 1225-36.

Nelson, J.P. and Young, D.J. (2001) Do advertising bans work? An international comparison, *International Journal of Advertising*, **20**, 273-96.

New Zealand Alcohol Advisory Council (2004) *The History of Alcohol Advertising on Radio and Television*, NZAAC, Wellington, NZ, available at http://www.alac.org.nz

Organisation for Economic Co-Operation and Development (2005a) *National Accounts of OECD Countries: Detailed Tables*, Vol. II, OECD, Paris (CD-ROM version for 1970-2003).

Organisation for Economic Co-Operation and Development (2005b) *OECD Health Data 2005*, OECD, Paris (On-line version of October 10, 2005), available at http://titania.sourceoecd.org

Ornstein, S.O. and Hanssens, D.M. (1983) Alcohol control laws and the consumption of distilled spirits and beer, *Journal of Consumer Research*, **12**, 200-13.

Osterberg, E. and Karlsson, T. (2002) Alcohol policies in the ECAS countries, 1950-2000, in *Alcohol in Postwar Europe: Consumption, Drinking Patterns, Consequences and Policy Responses in 15 European Countries*, T. Norstrom (Ed.), National Institute of Public Health, Stockholm, pp. 11-48.

Osterberg, E. and Karlsson, T. (2003) *Alcohol Policies in EU Member States and Norway*, European Commission, Health and Consumer Protection Directorate, Brussels.

Quantitative Micro Software (2004) *EViews 5 User's Guide*, QMS, Irvine, CA.

Ruhm, C.J. (1995) Economic conditions and alcohol problems, *Journal of Health Economics*, **14**, 583-603.

Ruhm, C.J. and Black, W.E. (2002) Does drinking really decrease in bad times? *Journal of Health Economics*, **21**, 659-78.

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 *Economics and the Prevention of Alcohol-Related Problems*, M.E. Hilton and G. Bloss (Eds.), U.S. Department of Health and Human Services, Washington, DC, pp. 125-40.

Saffer, H. and Dave, D. (2002) Alcohol consumption and alcohol advertising bans, *Applied Economics*, **34**, 1325-34.

Schweitzer, S.O., Intriligator, M.D., and Salehi, H. (1983) Alcoholism: an econometric model of its causes, its effect and its control, in *Economics and Alcohol*, M. Grant, et al. (Eds.), Gardner, New York, pp. 107-27.

Selvanathan, E.A. (1988) Alcohol consumption in the UK, 1955-85: a system-wide approach, *Applied Economics*, **20**, 1071-86.

Selvanathan, S. (2006) How similar are alcohol drinkers? International evidence, *Applied Economics*, **38**, 1353-62.

Selvanathan, S. and Selvanathan, E.A. (2006) Consumption patterns of food, tobacco and beverages: a cross-country analysis, *Applied Economics*, **38**, 1567-84.

Simpura, J. (1995) Trends in alcohol consumption and drinking patterns: lessons from world-wide development, in *Alcohol and Public Policy: Evidence and Issues*, H.D. Holder and G. Edwards (Eds.), Oxford University Press, Oxford, pp. 9-37.

Simpura, J. and Karlsson, T. (2001) Trends in drinking patterns among adult population in 15 European countries, 1950 to 2000: a review, *Nordic Studies on Alcohol and Drugs*, **18**, 31-53 (English supplement).

Single, E. and Leino, V.E. (1998) The levels, patterns, and consequences of drinking, in *Drinking Patterns and Their Consequences*, M. Grant and J. Litvak (Eds.), Taylor & Francis, Washington, DC, pp. 7-24.

Smart, R.G. (1998) Trends in drinking and patterns of drinking, in *Drinking Patterns and Their Consequences*, M. Grant and J. Litvak (Eds.), Taylor & Francis, Washington, DC, pp. 25-41.

Smith, D.I. (1990) Consumption and advertising of alcoholic beverages in Australia, 1969-86, *Drug and Alcohol Review*, **9**, 33-43.

Sulkunen, P. (1976) Drinking patterns and the level of alcohol consumption: an international overview, in *Research Advances in Alcohol and Drug Problems*, R.J. Gibbins, et al. (Eds.), Wiley, New York, pp. 223-81.

Tegene, A. (1990) The Kalman filter approach for testing structural change in the demand for alcoholic beverages in the US, *Applied Economics*, **22**, 1407-16.

World Advertising Research Center (2005) *World Drink Trends 2005*, WARC, Henley-on-Thames, UK.

World Health Organization (2002) *Declaration of the WHO Technical Consultation on the Marketing of Alcohol to Young People*, WHO Valencia Conference, WHO, Geneva (reprinted in *The Globe Magazine*, **2** (n.s.), no. 2, 2002, 5).

World Health Organization, Europe (1995) *European Charter on Alcohol, 1995*, available at http://www.euro.who.int

Young, D.J. (1993) Alcohol advertising bans and alcohol abuse: comment, *Journal of Health Economics*, **12**, 213-28.

Table 1. Mean per capita consumption of liters of pure alcohol and beverage shares, 1961-2000

Beer countries	2000	1990	1980	1975	1970	1961	% beer, wine, & spirits in 2000	% beer, wine, & spirits in 1961
Australia	9.19	10.50	12.98	12.98	11.52	9.16	54, 31, 15	75, 10, 14
Austria	12.92	14.22	13.80	14.40	13.87	10.95	51, 36, 13	45, 29, 25
Belgium	10.21	12.46	14.25	13.69	12.62	9.86	58, 28, 14	77, 14, 9
Canada	8.26	8.60	10.91	11.00	9.13	7.39	49, 19, 31	60, 6, 34
Denmark	11.98	12.25	11.91	11.62	9.65	6.54	51, 38, 12	77, 8, 15
Ireland	14.21	11.19	9.58	9.21	7.03	na	65, 13, 21	67, 5, 28
Netherlands	9.84	9.92	11.68	11.54	7.60	3.97	51, 28, 21	47, 10, 43
New Zealand	9.95	11.49	13.10	13.00	11.14	9.40	52, 29, 19	77, 4, 18
UK	10.23	10.81	10.82	10.46	8.50	7.41	57, 24, 19	81, 4, 15
USA	8.41	9.45	10.71	10.16	9.35	7.38	57, 14, 29	51, 8, 41
Spirits countries (former)								
Finland	10.03	9.86	8.06	8.14	6.04	3.77	48, 27, 25	41, 6, 53
Norway	5.89	5.42	6.24	5.92	4.87	3.74	55, 28, 18	47, 6, 48
Sweden	6.97	7.53	7.77	8.79	7.93	6.04	50, 32, 18	39, 9, 52
Wine countries								
France	13.41	16.66	20.14	22.48	23.23	26.03	17, 61, 22	10, 79, 11
Italy	9.32	11.66	17.86	19.68	21.22	19.24	18, 76, 6	2, 90, 8
Portugal	12.80	15.93	14.91	18.47	14.43	na	29, 57, 14	2, 94, 4
Spain	11.92	13.37	18.57	19.57	16.11	14.64	35, 42, 23	7, 72, 21
Averages								
Beer countries	10.52	11.09	11.97	11.81	10.04	8.01	55, 26, 19	66, 10, 24
Spirits countries	7.63	7.60	7.36	7.62	6.28	4.52	51, 29, 20	42, 7, 51
Wine countries	11.86	14.40	17.87	20.05	18.75	19.97	25, 59, 16	5, 84, 11
Overall mean	10.32	11.25	12.55	13.01	11.43	9.70	47, 34, 19	47, 27, 26

Sources: World Health Organization, *Global Alcohol Database 2006*,http://www.who.int/topics/alcohol_drinking/en, and *World Drink Trends 2005* (WARC, 2005). The country categories are conventional, except that the Netherlands and Canada are sometimes listed as (former) spirits-drinking countries. Alcohol data do not include estimates of unrecorded consumption.

Table 2. Advertising ban categories and control index scores, 1975-2000

Advertising ban type	OECD countries and ad ban changes	Mean alcohol control index, 1975 & 2000
No bans of broadcast or print media	Australia, Belgium (before 1991), Italy, Netherlands, Portugal, Spain (ended 1989)	7, 11
Spirits broadcast bans; no print bans	Austria (TV only before 1990), Belgium (TV after 1991), Canada (ended 1995), France (ended 1987), Ireland, Spain (TV since 1989), United Kingdom (ended 1995), United States	12, 12
Total broadcast bans; no print bans	Denmark (except weak beer), France (TV since 1987), New Zealand (ended 1992)	9, 11
Bans of most domestic broadcast & print ads; government monopoly	Finland (except weak beer, since 1977, ended 1994), Norway (except weak beer, since 1977), Sweden (except weak beer in print, since 1979)	18, 16

Notes: See the Appendix for details by country and data sources. The alcohol control index is from Karlsson and Osterberg (2001), with additions by the author. The index covers six major policy categories and 14 subcategories, including control of production and wholesale; control of distribution, personal controls, control of marketing (statutory code vs. voluntary code); social and environmental controls, and national education and prevention programs. Higher values indicate stronger controls. The definition of weak beer varies, but is about 2.5% alcohol by volume (abv) compared to 4-5% abv for most beers. Several countries have publically-owned TV and radio stations that do not (or did not) carry commercial advertisements of any kind, including Belgium, Denmark, France, Sweden, UK, and the US.

Table 3. Alcohol policy control index values for OECD countries, 1960-2000

Beer countries	2000	1990	1980	1975	1970	1960	Alcohol control level
Australia	14	13	13	13	13	13.5	High level since 1960
Austria	7	7	6	7	7	7	Average level since 1960
Belgium	11.5	10.5	8.5	8	8	7	Average level since 1960
Canada	15	16	16	16	16	16	High level since 1960
Denmark	8.5	7	7	6	6	4	Average level after 1980
Ireland	12	12	12	12	12	8	Average level since 1950
Netherlands	13	13	11	11	6	6	High level after 1990
New Zealand	13	13.5	13.5	12.5	12.5	13	High level since 1960
UK	13	14	14	14	14	9	High level since 1970
USA	13.5	13.5	13	12.5	13	13	High level since 1960
Spirits countries (former)							
Finland	14.5	18.5	18.5	15.5	15.5	17	High level since 1950
Norway	17	19	19	19	17	17	High level since 1950
Sweden	16.5	18.5	18.5	18.5	18.5	18.5	High level since 1950
Wine countries							
France	12.5	10.5	9.5	9.5	9.5	6.5	Average level since 1970
Italy	13	12	12	8	8	7	Average level since 1950
Portugal	8	6	4	2	2	2	Average level after 2000
Spain	10	10	4.5	0	0	0	Average level after 1990
Averages							
Beer countries	12.0	11.9	11.4	11.2	10.8	9.6	Average level since 1960
Spirits countries	16.0	18.7	18.7	17.7	17.0	17.5	High level since 1950
Wine countries	10.9	9.6	7.5	4.9	4.9	3.9	Average level after 1980
Overall mean	12.5	12.6	11.8	10.9	10.5	9.7	Average level since 1960

Sources: Karlsson and Osterberg (2001) and Osterberg and Karlsson (2002) for European countries. Index values for Australia, New Zealand, and the US were constructed by the author. The possible range of the index is 0 to 20 points, with higher values indicting greater control. Following Karlsson and Osterberg (2001, p. 125), a high level of control corresponds to 13-20 points; average level is 7-13 points; and low level is 0-7 points.

Table 4. Variables, data sources, and descriptive statistics

Variable	Definition (source) and averages	Notes
Alcohol	Annual per capita litres of pure alcohol, population ages 15 years and older (WHO, *Global Alcohol Database*, 2006, http://www3.who.int). Sample mean (s.d.) is 11.44 (3.26); median, 11.04.	Only recorded consumption
Income	Real GDP per capita in 1996 US dollars (Heston et al., 2002); updated on-line version for variable rgdpl. Sample mean (s.d.) is $18,041 (4315) and median is $17,887.	*Penn World Table Version 6.1*; rgdpl variable
Price	Real price index of a litre of alcohol. Country nominal price divided by country GDP deflator (year 2000 = 100); expressed relative to 2000 price. Sample mean (s.d.) is 90.09 (16.6); median, 89.44. Expenditure data from OECD, *National Accounts: Detailed Tables, Vol. II* (OECD, 2005a).	See text for construction details
Spirits ad ban	Binary variable equals one for bans of broadcast advertising of distilled spirits. See Table 2 and Appendix for sources. Author constructed.	0-1 dummy; see text for details
All beverage ad ban	Binary variable equals one for bans of broadcast advertising of all alcohol beverages, except weak beer. See Table 2 and Appendix for sources.	0-1 dummy; see text for details
Control index	Index for stringency of other formal alcohol control policies (excluding taxation and advertising bans). See Table 3 for sources. Sample mean (s.d.) is 12.1 (4.14); median, 13.0. Range is 0 to 20 points.	See text for details
Wine sentiment	Percent alcohol consumption as wine (WHO, 2006) and *World Drink Trends* (WARC, 2005) which measures alcohol culture or sentiment. Sample mean (s.d.) is 31.8 (21.3); median, 24.4.	Percent; see text for details
Unemployed rate	Standardized unemployment rate as a percent from OECD, *Labour Force Statistics* (various issues); OECD (2005a, b); and U.S. Bureau of Labor Statistics, http://www.bls.gov/fls/flscomparelf.htm. Sample (s.d.) is 7.4 (3.6); median, 7.0. Standardized rates are used.	Percent
Tourism rate	Per capita number of non-resident visitor arrivals from World Tourism, *Yearbook* (various years). Sample mean (s.d.) is 0.53 (0.50); median, 0.38.	Visitors per capita residents
Percent 65 yrs & older	Percent of population ages 65 years and older (OECD, 2005b). Sample mean (s.d.) is 13.4 (2.2); median, 13.5.	Percent
Tobacco ad bans	Count of the number of banned media for cigarette advertising from Health New Zealand (2005). Sample mean (s.d.) is 3.6 (2.0); median, 3.5.	Details in Nelson (2003b)
Healthcare expenditure	Total healthcare expenditures as a percent of GDP (OECD, 2005b). Sample mean (s.d.) is 7.61 (1.41); median, 7.50.	Percent
Openness index	Real imports plus exports divided by real GDP, expressed as a percent (Heston et al., 2002); updated 2004 on-line version for constant dollar GDP. Sample mean (s.d.) is 57.2 (29.2); median, 51.4.	Percent; details in Heston et al. (2002)

Notes: All data for 1975-2000 for seventeen OECD countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Ireland, Italy, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, UK, and US.

Table 5. Preliminary panel data regressions for alcohol consumption

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Constant	3.520 (9.38)*	4.454 (11.5)*	4.683 (12.9)*	3.522 (5.52)*	4.179 (8.00)*	4.260 (8.69)*
Spirits ad ban	0.084 (9.80)*	0.030 (4.18)*	0.060 (5.94)*	0.104 (6.67)*	0.062 (8.66)*	0.114 (9.74)*
All beverage ad ban	-0.039 (2.72)*	0.045 (4.91)*	0.107 (14.0)*	-0.110 (5.50)*	0.020 (1.72)	0.087 (6.68)*
Control index	---	-0.038 (19.8)*	-0.037 (27.9)*	---	-0.046 (22.8)*	-0.043 (27.4)*
Income	-0.080 (2.72)*	-0.032 (0.86)	0.011 (0.33)	-0.161 (3.43)*	0.001 (0.03)	0.038 (0.96)
Price	-0.280 (8.19)*	-0.378 (15.6)*	-0.384 (16.6)*	-0.115 (2.91)*	-0.386 (16.0)*	-0.308 (14.4)*
Wine sentiment	0.317 (29.2)*	0.143 (8.10)*	0.178 (11.3)*	0.292 (23.5)*	0.143 (8.76)*	0.207 (14.1)*
Unemployed rate	---	---	0.004 (0.42)	---	---	0.027 (2.17)*
Tourism rate	---	---	0.014 (3.12)*	---	---	-0.015 (2.33)*
Percent 65 yrs & over	---	---	-0.287 (13.1)*	---	---	-0.441 (31.1)*
Unwt. R-sq	0.819	0.815	0.833	0.582	0.786	0.829
SEE	0.182	0.129	0.113	0.196	0.140	0.126
Time fix effect?	Yes	Yes	Yes	Yes	Yes	Yes
Est. method	GLS	GLS	GLS	OLS	OLS	OLS

Notes: Dependent variable is natural log of per capita consumption of litres of pure alcohol for seventeen OECD countries for 1975-2000. All regressions include 442 observations. All variables in natural logs, except two advertising ban dummies and the control index score. The constant term is for 1975. T-statistics reported in parentheses; asterisks indicate statistically significant at the 95% confidence level, two-tailed test. All standard error estimates obtained using White's robust cross-section standard errors and covariance (d.f. corrected). GLS regressions use cross-sectional weights to correct for contemporaneous correlations and heteroscedasticity. SEE is the standard error of the regression. Mean of the dependent variable (in logs) is 2.396.

Table 6. Sensitivity analysis regressions for alcohol consumption

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Constant	1.154 (5.63)*	1.831 (8.13)*	2.004 (6.81)*	-0.019 (7.24)*	-0.028 (4.83)*	-0.025 (4.13)*
Spirits ad ban	-0.031 (4.20)*	0.007 (0.86)	0.027 (2.55)*	0.002 (1.02)	0.002 (1.19)	0.002 (0.69)
All beverage ad ban	-0.043 (2.89)*	0.047 (4.01)*	0.071 (6.32)*	0.007 (1.95)	0.006 (1.75)	0.006 (1.69)
Control index	---	-0.027 (15.2)*	-0.026 (16.5)*	---	0.001 (1.93)	0.001 (2.25)*
Income	0.145 (6.29)*	0.183 (6.09)*	0.231 (7.03)*	0.396 (7.36)*	0.395 (7.53)*	0.315 (5.23)*
Price	-0.231 (10.7)*	-0.353 (14.8)*	-0.297 (13.7)*	-0.250 (7.80)*	-0.267 (8.77)*	-0.281 (9.98)*
Wine sentiment	0.343 (43.1)*	0.263 (25.7)*	0.256 (20.7)*	0.035 (1.19)	0.025 (0.85)	0.026 (0.90)
Unemployed rate	---	---	-0.017 (3.09)*	---	---	-0.020 (2.29)*
Tourism rate	---	---	0.011 (2.35)*	---	---	-0.018 (1.31)
Percent 65 yrs & over	---	---	-0.337 (20.7)*	---	---	-0.201 (1.52)
Unwt. R-sq	0.946	0.948	0.942	0.220	0.235	0.247
SEE	0.095	0.077	0.069	0.033	0.033	0.033
Cntry time trend?	Yes	Yes	Yes	No	No	No
Time fixed-effect?	No	No	No	No	No	No
Log first-differ?	No	No	No	Yes	Yes	Yes
Est. method	GLS	GLS	GLS	GLS	GLS	GLS

Notes: For regressions (1) - (3), dependent variable is natural log of per capita consumption of litres of pure alcohol for seventeen OECD countries for 1975-2000. For regressions (4) - (6), the log first-difference is used. All regressions are estimated by GLS using cross-sectional weights to correct for heteroscedasticity. T-statistics reported in parentheses; asterisks indicate statistically significant at the 95% confidence level, two-tailed test. All standard error estimates obtained using White's robust cross-section standard errors and covariance (d.f. corrected). SEE is the standard error of the regression. Mean of the log of alcohol consumption is 2.396 for regressions (1) - (3). Mean of the log first-difference (growth rate) of alcohol consumption is -0.008 for regressions (4) - (6). Sample size is 442 in regressions (1) - (3) and 425 in regressions (4) - (6).

Table 7. Instrumental variable regressions for alcohol consumption

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Constant	4.350 (11.6)*	4.510 (12.1)*	1.754 (6.59)*	2.103 (6.96)*	-0.029 (5.08)*	-0.026 (4.39)*
Spirits ad ban	0.023 (3.38)*	0.048 (5.15)*	0.021 (2.86)*	0.048 (5.04)*	0.003 (1.22)	0.002 (0.73)
All beverage ad ban	0.014 (0.99)	0.089 (8.57)*	0.052 (4.01)*	0.086 (7.37)*	0.006 (1.83)	0.006 (1.80)
Control index IV	-0.043 (34.4)*	-0.040 (36.1)*	-0.039 (13.0)*	-0.041 (13.8)*	0.001 (2.19)*	0.001 (2.52)*
Income	-0.004 (0.12)	0.034 (0.97)	0.226 (6.23)*	0.272 (7.67)*	0.399 (7.63)*	0.317 (5.25)*
Price	-0.382 (12.9)*	-0.380 (15.7)*	-0.379 (14.4)*	-0.361 (15.8)*	-0.265 (8.55)*	-0.279 (9.68)*
Wine sentiment	0.127 (7.06)*	0.167 (10.2)*	0.232 (14.9)*	0.214 (12.3)*	0.023 (0.81)	0.026 (0.88)
Unemployed rate	---	0.007 (0.70)	---	-0.030 (5.73)*	---	-0.021 (2.35)*
Tourism rate	---	0.012 (2.19)*	---	-0.005 (0.80)	---	-0.018 (1.31)
Percent 65 yrs & over	---	-0.284 (12.5)*	---	-0.305 (18.2)*	---	-0.199 (1.49)
Unwt. R-sq	0.881	0.889	0.950	0.948	0.236	0.249
SEE	0.127	0.110	0.075	0.068	0.033	0.033
Time fixed-effect?	Yes	Yes	No	No	No	No
Cntry time trend?	No	No	Yes	Yes	No	No
Log first-differ?	No	No	No	No	Yes	Yes
Est. method	IV-GLS	IV-GLS	IV-GLS	IV-GLS	IV-GLS	IV-GLS

Notes: For regressions (1) - (4), dependent variable is natural log of per capita consumption of litres of pure alcohol for seventeen OECD countries for 1975-2000. For regressions (5) and (6), the log first-difference is used. All regressions are estimated by GLS using cross-sectional weights to correct for heteroscedasticity. In regressions (1) and (2), the constant term if for 1975. T-statistics reported in parentheses; asterisks indicate statistically significant at the 95% confidence level, two-tailed test. All standard error estimates obtained using White's robust cross-section standard errors and covariance (d.f. corrected). SEE is the standard error of the regression. Mean of the log of alcohol consumption is 2.396 for regressions (1) - (4). Mean of the log first-difference (growth rate) of alcohol consumption is -0.008 for regressions (5) and (6). Sample size is 442 in regressions (1) - (4) and 425 in regressions (5) and (6).

Appendix. Information by country on advertising bans, control index, legal age, and BAC levels, 1975-2000

Country	Ctr index (1975, 00)	MDA (2000)	BAC (2000)	Alcohol advertising bans & restrictions in seventeen OECD countries
Australia	13, 14	18	.05 after 1992	There are no legal bans on media. The Australian Broadcast Authority bans broadcast ads before 8:30 pm and all day on Sunday. Ads are not permitted in cinemas during children's movies.
Austria	7, 7	16	.05 after 1998	Spirits ads are banned on TV & radio (radio not restricted before 1990). Wine and beer ads are permitted from 6:45pm to 12 am on weekdays. Ad content is regulated by statute and ads are not permitted in connection with sports or driving.
Belgium	8, 11.5	16	.05 after 1994	Since 1991, a broadcast ad ban exists on Francophone TV for products with more than 10% abv. This ban has been challenged by the EU. Flemish TV only broadcasts alcohol ads after 7 pm. Radio ads are permitted after 6pm, but are subject to a counter-advertising requirement. Advertising codes were adopted in 1993.
Canada	16, 15	18-19	.08	Prior to June 1995, broadcast ads for spirits were prohibited. Following a court decision, this law was rescinded in 1995. Provincial laws limit some ads and define MDAs. Until recently, pre-clearance for TV & radio ads was required.
Denmark	6, 8.5	16	.05 after 1998	Domestic broadcast ads are banned for all products with more than 2.8% abv. However, ads are carried on satellite TV and print ads are allowed. Broadcast ads are permitted for weak beer, but are subject to content regulations adopted in 1994. (On January 1, 2004, the TV ban for stronger beverages was rescinded due to EU restrictions.)
Finland	15.5, 14.5	18	.05 after 1977	Prior to 1977, restricted advertising was allowed. Effective March 1977, all ads were banned for products with more than 2.8% abv, except in business and foreign magazines and on satellite TV. Advertising of weak beer is substantial. In order to comply with EU orders, the ban ended in 1994 and was replaced by a ban for products with more than 22% abv.
France	9.5, 12.5	16	.05 after 1995	Until 1987, there were few restrictions on beer, wine, and cognac advertising, except that state-owned TV did not carry alcohol ads. Advertising of grain spirits was banned in all media. In 1980, this law was successfully challenged by Scotch whisky producers. A July 1987 law prohibited private TV ads for products with more than 1.2% abv, in publications intended for young people, on all sports facilities and grounds, and at all places for culture or entertainment of young people. Effective January 1993, the *Loi Evin* bans TV and cinema ads for products with more than 1.2% abv, restricts ad content and bans most sports sponsorships. Radio ads are prohibited from 5 pm to 12 am and all day on Wednesday. Advertising is permitted in domestic magazines targeting adults and on outdoors displays.
Ireland	12, 12	18	.08	Spirits ads on TV & radio are banned. A number of voluntary and self-regulatory codes exist for various media and are overseen by the Advertising Standards Authority. Alcohol ads not permitted on or before sports programs.
Italy	8, 13	16	.08	There are no legal bans on media. State-owned TV ads may not appear before 7 pm and private TV ads for products with more than 21% abv may not appear before 8:30 pm. A content code was established in 1991. (Under the 2001 Alcohol Act, ads are restricted during broadcasts, magazines, and cinemas addressed to minors.) BAC reduced to .05 in 2001.
Netherlands	11, 13	16	.05 after 1975	There are no legal bans on media. An advertising code was established in 1977 and revised in 1987 and 1990. The code provides that ads are not allowed if 25% or more of the audience is underage. Educational messages are required.
New Zealand	12.5, 13	18 after 1999	.08	Although a ban existed for state-owned broadcast advertising, it had fallen into disuse (NZAAC, 2004). In 1981, advertising for bottle stores was permitted on radio and television. In 1987, the first private TV channel began broadcasting corporate and sports sponsorship ads and the state-owned network followed in 1989. In February 1992, the ban of brand advertising was lifted for a two-year period on a trial basis, and dropped effective April 1, 1995. TV ads are not permitted from 6 to 9 pm. Broadcasters donate free time for health promotions. A pre-vetting system for alcohol ads was introduced in late 1993. The MDA was reduced from 20 to 18 years in 1999. (In 2003, the time restraint was changed to 6-8:30 pm.)

Appendix – Continued

Norway	19, 17	18	.05 since 1936	Prior to 1975, only beer ads were permitted. Effective April 1975, all print ads were banned for products with more than 2.5% abv. In 1977, a comprehensive ban restricted broadcast and outdoor ads, and ads on restaurant fixtures. Sponsorship of sports teams and events is banned. Ads are permitted in foreign-printed publications and domestic trade journals, on satellite TV, and at retail establishments. The Alcohol Act of 1997 requires low-alcohol products to have distinguishable brand names. (Norway's laws were challenged in 2002 as contrary to the EEA Agreement.) BAC reduced to .02 in 2001.
Portugal	2, 8	16 after 2000	.05 after 1998	Effective July 1983, broadcast ads for all beverages were prohibited between 6-10 pm. This was revised to 7-9:30 pm in 1995. Advertising of beer and spirits is not permitted in cinemas and on billboards. Alcohol advertising is not permitted in magazines aimed at minors. There was no MDA prior to 2000. BAC reduced to .02 in 2002.
Spain	0, 10	16-18	.05 after 1999	Effective May 1978, a code for state-owned TV and radio was adopted that prohibited ads before 9:30 pm. Effective January 1981, brand ads for products with more than 20% abv were banned on state TV and radio. This ban was extended to private TV in November 1988. No alcohol ads are permitted on sports programs, on programs addressed to minors, and at cinemas showings for minors. Radio ads are permitted for all products, but autonomous regional governments have imposed their own rules and MDAs.
Sweden	18.5, 16.5	18	.02 after 1994	Prior to 1979, no state-owned TV & radio ads were permitted due to bans on commercial advertising of any type. Effective July 1979, all advertising was prohibited for strong beer (above 3.5% abv), wine, and spirits. Ads are allowed at points of sale, in trade and foreign magazines, and on satellite TV. Medium beer can be advertised in print and light beer can be advertised without restrictions (Holder et al., 1998, p. 83). Because weak beers have the same brands and similar containers as strong beer, there is de facto advertising of beer. (Swedish laws were challenged by *Gourmet* magazine and, effective 2002, print ads for products with less than 15% abv are permitted.) BAC was reduced to .05 in 1957.
United Kingdom	14, 13	16-18	.08	Prior to June 1995, a voluntary ban existed for private TV advertising of distilled spirits (the BBC does not carry any ads). Broadcast ads are banned from 4-6 pm and during and following children's programs, with more than 25% of audience under 18 years. The Code of Advertising Practice provides that ads should not be directed at minors through the selection of media, style of presentation, content or context.
United States	12.5, 13.5	21 after 1988	.08 - .10 (.08 in 2003)	Prior to 1996, a voluntary ban existed for broadcast advertising of spirits. Some individual states restricted outdoor ads. After 1996, some cable TV stations accepted spirits ads, but the amount of these ads is small. Network TV ads are still banned. Each beverage has a self-regulatory code of practice. Prior to 2003, voluntary codes provided that ads should not address audiences where more than 50% are below the legal age. (In 2003, these codes were amended to establish a youth cap of 30%.) Advertising content and brand labels are regulated by the Alcohol & Tobacco Tax and Trade Bureau.

Notes: Ctr Index is a measure of the severity of alcohol control policies for 1970 and 2000; see Karlsson and Osterberg (2001). Control index values for Australia, Canada, New Zealand, and US were constructed by the author. MDA is the minimum legal drinking age for beer consumption. BAC is the legal blood alcohol content for auto drivers. The notation "abv" stands for "alcohol by volume." Alcohol proof of a beverage is twice the abv.

Sources: The principal sources are Brewers Association of Canada, *Alcohol Taxation and Control Policies: International Survey*, 3rd, 4th, 5th, 6th, 7th, 8th, and 9th ed. (BAC, 1978, 1980, 1982, 1986, 1989, 1992, 1997); and E. Osterberg and T. Karlsson (eds.), *Alcohol Policies in EU Member States and Norway: A Collection of Country Reports* (EC, 2003). Other sources consulted include B. Cooper, *Drinks Advertising in the European Union* (Aroq, 2004); Nordic Council of Ministers of Health and Social Affairs, *Alcohol Policy in the Nordic Countries* (2004); Institute of Alcohol Studies, *IAS Fact Sheet: Alcohol and Advertising* (IAS, 2005); U.S. National Highway Traffic Safety Administration, *On DWI Laws in Other Countries*, DOT HS 809 037 (NHTSA, 2000); and WHO, *Global Status Report on Alcohol Policy* (WHO, 2004). Control index is from Karlsson and Osterberg (2001).