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Beer, wine, or spirits? Advertising's impact on four decades of category sales

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This article provides an analysis of the relationship between annual advertising expenditures and sales, using a time series regression procedure, for beer, wine, and liquor sold in the United States from 1971 to 2012. Information from these four decades provides a comprehensive analysis of the relationships of numerous variables with aggregate alcohol category sales. Even though per capita alcohol consumption has not changed much throughout this period, alcohol advertising media expenditures for all alcohol beverages have increased almost 400% since 1971. This study has provided evidence of consumption changes across categories of alcohol beverages over the past 40-plus years with the preponderance of those changes significantly correlated to fluctuations in demography, taxation and income levels − not advertising. Despite other macro-level studies with consistent findings, the perception that advertising increases consumption exists. The findings here indicate that there is either no relationship or a weak one between advertising and aggregate category sales. Therefore, advertising restrictions or bans with the purpose of reducing consumption may not have the desired effect. Implications on policy decisions regarding advertising controls are addressed.

Keywords: alcohol advertising; alcohol consumption; economics; public policy

Alcohol advertising is once again coming under increasing regulatory pressure around the world, with an official evaluation in the United Kingdom, an outright ban in Turkey and Russia and, in the United States, a limited ban on outdoor advertising proposed in Los Angeles, California. Recently, at the request of Ofcom, United Kingdom regulators were asked to examine rules for alcohol ads that air on television programs that appealed to youth audiences. The request was made following an Ofcom report indicating adolescents were exposed to more alcohol ads because they were viewing more adult programming (Darby 2013).

In Turkey, restrictions were recently enacted prohibiting not only the advertising, but also the sale of alcohol beverages in certain situations. Promotions, sponsored activities, festivals and free giveaways have been banned, and the use of alcohol logos was restricted to only locations that were licensed to sell alcohol. In addition, health warnings were added to liquor bottles and images of alcohol products appearing in television ads must be altered in a manner similar to cigarettes (Hurriyet Daily News 2013). In 2012, in an attempt to impact the country's high level of consumption of liquor, Russia banned alcohol advertising on television, radio, the Internet, public transportation and billboards, and in all print media beginning in 2013 (BBC News 2012).

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In the US, the Los Angeles city council is considering a ban on alcohol advertising on municipal property, substantially reducing the number of outdoor advertising locations available to alcohol advertisers. Philadelphia already has in place a similar ban, and in San Francisco alcohol advertising is not permitted on any public transportation (Sass 2013).

All of this activity restricting or banning alcohol advertising comes at a time when total per capita consumption of alcohol in the US has remained fairly constant over the last 40 years (see Figure 1), and worldwide consumption has been stable since 1990 (Global Health Observatory n.d.).

Research investigating the impact of alcohol advertising bans on the reduction of alcohol consumption has provided conflicting results. For example, in a comprehensive study of the effects of advertising bans on alcohol consumption in 17 Organisation for Economic Co-operation and Development (OECD) countries for the years 1977−1995, J.P. Nelson and Young (2001) indicated that advertising bans did not decrease alcohol consumption or abuse. However, in an earlier study examining 17 countries for the period 1970−1983, Saffer (1991) found that countries with a ban on alcohol advertising generally had lower levels of alcohol abuse. In an updated study that examined data from 20 countries over 26 years, Saffer and Dave (2002) concluded that alcohol advertising bans decreased alcohol consumption during the period they examined. It appears that ad bans are a potential solution for public policy officials interested in reducing alcohol consumption, although the evidence shows inconsistent results attributed to the advertising bans.

According to the US Department of Health and Human Services (2012), over half of the US population 18 years and older are currently regular drinkers (at least 12 drinks in the past year). Amid all of the information about the negative aspects of alcohol advertising, the health benefits of moderate alcohol use point to better health and longer life than those who either abstain or are heavy drinkers. In addition to having fewer heart attacks and strokes, moderate alcohol consumers are generally less likely to suffer strokes, diabetes, arthritis, and several other major illnesses (Hansen 2014).

In light of the recent alcohol advertising criticisms, it has been almost two decades since a comprehensive study of the effects of alcohol advertising on consumption in the US has been published (Fisher and Cook 1995; Franke and Wilcox 1987; J.P. Nelson and Moran 1995). This manuscript will update and examine the relationships of beer, wine
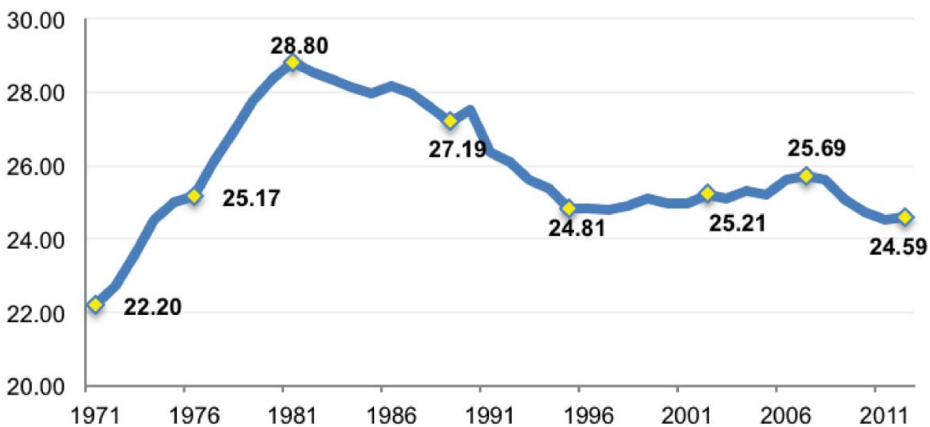

Figure 1.   US alcohol consumption per capita (gallons).
Source: Beer Institute Brewers Almanac (2013); Wine Institute (2013); Beverage Information Group (2012).
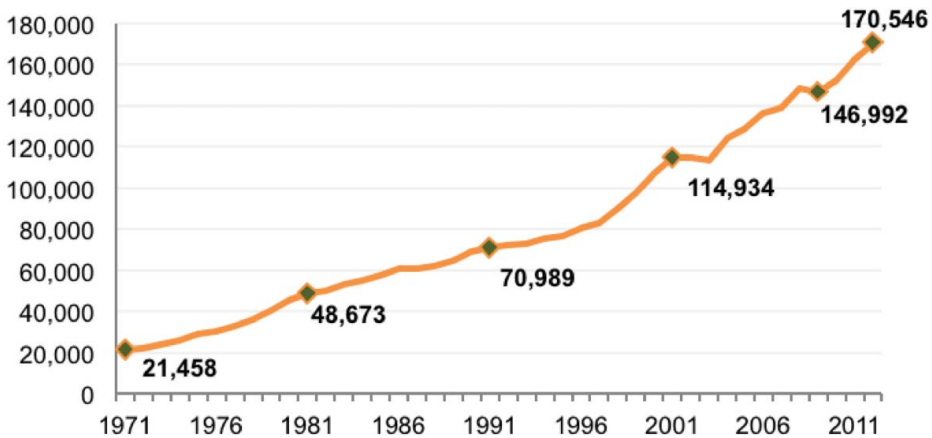
Figure 2.   US consumer spending on alcohol (US$ millions).
Source: United Statement Department of Agriculture, Economic Research Service (2013).

and liquor advertising on consumption of alcohol products in the US for a 40-plus-year period from 1971−2012.

Alcohol consumption and advertising in the US since 1971

While alcohol prices and taxes have shown consistent increases since 1971, overall consumer spending on alcohol has shown a more dramatic increase to total more than US$170 billion in 2012 (see Figure 2).

However, total US alcohol per capita consumption has declined since 1982 when it peaked at 28.8 gallons per person, to 24.50 gallons per person in 2012 (see Figure 1).

US beer consumption peaked in 1981 and has shown a slow decline since (see Figure 3).

US wine consumption peaked in 1985−1986, fell to a low in 1995−1996 and has recently reached the highest per capita consumption levels since 1971 at 2.73 gallons per person (see Figure 4).
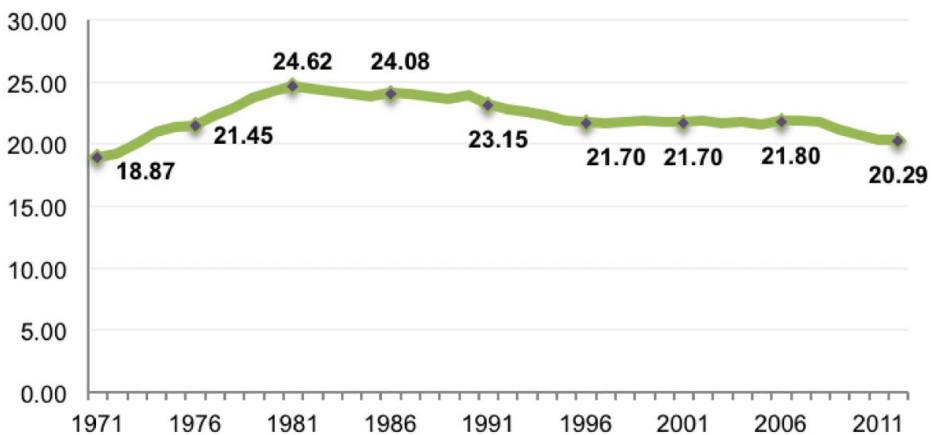

Figure 3.   US beer consumption per capita (gallons).
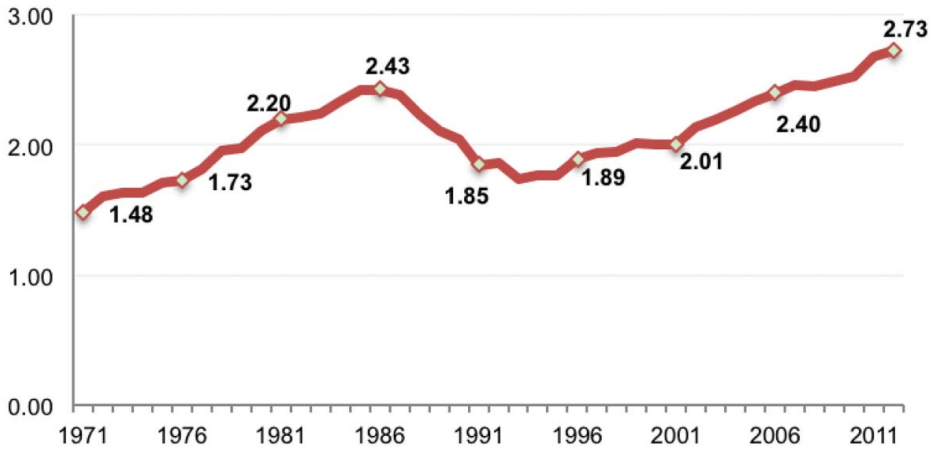*Source*: Beer Institute Brewers Almanac (2013).

Figure 4.   US wine consumption per capita (gallons).
Source: Wine Institute (2013).

Comparably, US distilled spirit consumption peaked in 1978−1979, fell to a low of 1.22 in 1996 and has increased steadily since to 1.57 gallons per person (see Figure 5).

While total US alcohol per capita consumption has remained fairly constant since 1971, the shares that beer, wine and liquor have held over that time period have changed more dramatically. For example, the share of beer has shown a downward trend since 1993 (88.1%) to a low in 2012 of 82.9%. Wine, on the other hand, has shown an increase over the time period from 6.7% to 10.9%. Liquor exhibited a steady decline in alcohol share from 1971 to 1996 and has continued to increase to 7.5% since 1997. In total, since 1971, beer has lost 3% share, wine has gained 62% share, and liquor has lost about 25% share.

Confirming this trend, a Gallup poll in 2011 reported that beer declined as American's favourite drink over the past two decades, driven largely by a change in preference among younger adults. As might be expected, beer's loss corresponds with increases in
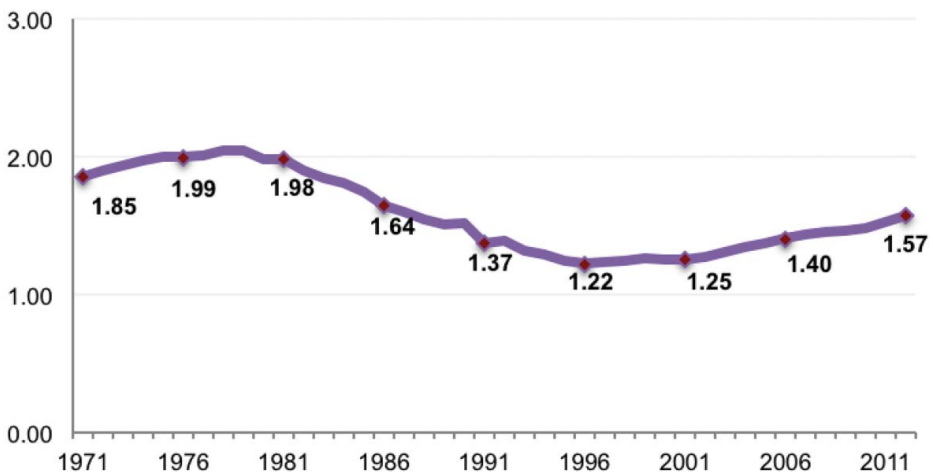

Figure 5.   US consumption of spirits per capita (gallons).
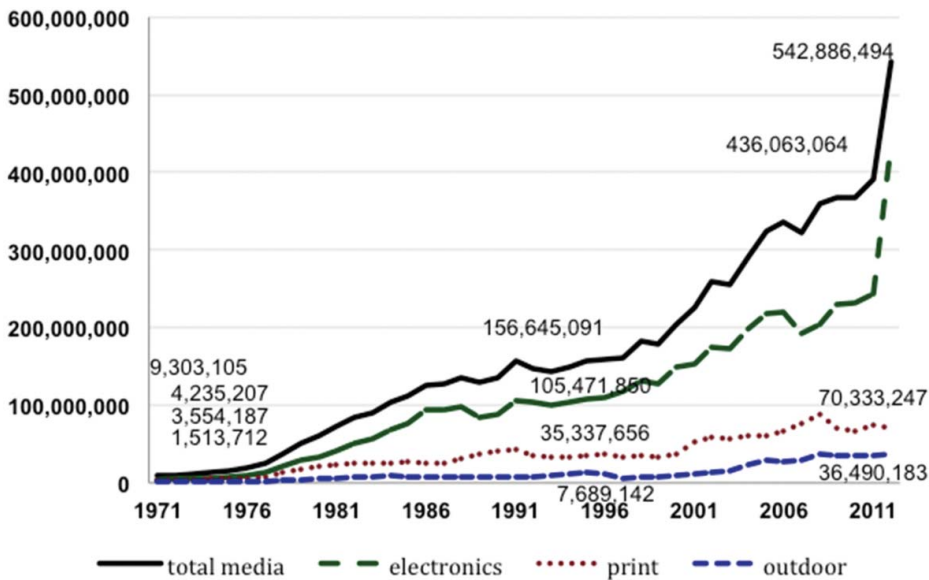*Source*: Beverage Information Group (2012).

Figure 6. Alcohol ad spending (US$ thousands).
Source: Leading National Advertisers, Inc. & Nielsen AdViews deflated using Consumer Price Index (2013).

preferences for wine and liquor (Gallup Economy 2011). Even though per capita alcohol consumption hasn't changed much, alcohol advertising media expenditures for all alcohol beverages have increased almost 400% since 1971 (adjusted for inflation). Figure 6 shows the trends of advertising spending on alcohol products over the years by advertising types.

In 1971, electronic advertising accounted for 46%, print 38%, and outdoor 16%. In 2012, electronic advertising accounted for 69%, print 21%, and outdoor 10%. Over the past 40 years, electronic advertising has increased its share by over 20%, mostly at the expense of print media.

Since 1971, overall beer advertising expenditures have increased 570% (adjusted for inflation). For beer in 1971, electronic advertising accounted for 84%, print 9%, and outdoor 7%. In 2012, beer electronic advertising accounted for 87%, print 5%, and outdoor 8%. As can be noted from these data, not much change in the media categories has occurred since 1971 for beer advertising.

Since 1971, overall wine advertising expenditures have increased over 600% (adjusted for inflation). For wine in 1971, electronic advertising accounted for 1%, print 94%, and outdoor 5%. In 2012, wine electronic advertising rose to 32%, print declined to 66%, and outdoor declined to 2%. Wine advertising media expenditures have experienced a major shift since 1971 with electronic advertising increasing over 30% mostly at the expense of print media.

Since 1971, overall liquor advertising expenditures have increased 265% (adjusted for inflation). For liquor in 1971, there were no electronic advertising, print accounted for 71%, and outdoor 29%. In 2012, liquor electronic advertising rose to 38%, print declined to 46%, and outdoor 16%. In the liquor category, electronic advertising has increased dramatically while print and outdoor have decreased.

Finally, in 1971, beer advertising accounted for 47%, wine 3%, and liquor 50% of all alcohol advertising expenditures. In 2012, beer advertising increased to 64%, wine 4.5%,

and liquor declined to 31.5% of all alcohol advertising. The past 40 years have seen an increase in the amount of beer advertising while wine has remained about the same, with liquor decreasing its share of alcohol spending.

Research background

As the heated debate on alcohol advertising's effects on society persists over the years, many scholars in the academic field have examined the results of alcohol consumption in regards to various population groups. Parry, Burnhams, and London (2012) report in the *South African Medical Journal* that studies in several countries concluded that alcohol advertising impacts young people's behaviour, normalizes drinking, encourages positive attitudes about alcohol, and persuades young people to consume alcohol earlier and in larger amounts. For the past several years, there has been a strong movement in South Africa and Kenya toward a ban on alcohol advertising and sponsorships in addition to restrictions on sales. In order to limit the perceived negative effects of alcohol advertising in the US, the American Academy of Family Physicians (AAFP 2010) has recommended a reduction in the total amount of alcohol advertising.

At the same time, researchers have explored what factors have had the most impact on alcohol consumption. Among these, advertising has drawn much attention as being overly persuasive as well as reaching younger audiences than intended (Center on Alcohol Marketing and Youth [CAMY] 2002). In Sweden, in the 1970s, a ban on alcohol advertising resulted in a 20% decrease in the consumption of alcohol (Romelsjo 1987). However, this finding may be somewhat tempered by the fact that other influences such as higher prices and attitude shifts towards a healthier lifestyle may have contributed to the decline as well.

Expenditures on alcohol advertising have also been shown to parallel alcohol consumption in the United States (Strasburger 1992). During the mid-1990s, some research concluded that alcohol advertising increased consumption, though the actual importance of advertising was (and remains) in question (Atkin 1995; Lastovicka 1995). Most recently, Grenard, Dent, and Stacy (2013) suggested that mere exposure to alcohol ads and/or liking of those ads as early as seventh grade leads to alcohol-related problems, as the youth grow older.

Contrary to those findings when examined from a macro perspective, several studies reported a minimal or no relationship between alcohol advertising and total consumption (e.g., Fisher and Cook 1995; Franke and Wilcox 1987; Nelson 2001; Nelson and Young 2001; Wilcox 2001). However, even though advertising appeared to not influence new consumers to drink alcohol, it has influenced existing consumers to switch brands or alcohol categories. Advertising has been a competitive marketing tool in the ongoing market share battles between individual brands to obtain increased sales at the expense of their competitors (Eagle, Rose, and Kitchen 2005; Wilcox 2001; Wilcox, Kim, and Schulz 2012).

Such advertising effects in the alcohol market may be understood by reviewing Albion and Farris' theoretical framework (Albion and Farris 1981; Farris and Albion 1980) − the Market Power and the Advertising as Information models. As has been discussed in previous literature, the Market Power viewpoint suggests that advertising is used to persuade consumers to choose a certain brand over competitors, build brand loyalty, and use advertising to reduce consumers' sensitivity to price, thereby increasing the company's marketplace power (Bain 1956; Comanor and Wilson 1974; Taylor, Zou, and Ozsomer 1996). In the Advertising as Information perspective, advertising is considered an information source providing consumers knowledge of the existence of a product and the product's attributes, and it argues that advertising in fact increases consumers' price sensitivity by encouraging

competition between companies in the marketplace (Graham and Franenberger 2011; Nelson 1974, 1975; Taylor 2013; Taylor, Zou, and Ozsomer 1996).

Advertising can yield varying effects at the aggregate, category, and/or brand consumption levels dependent on the nature of the market and maturity of the product category.

For example, in expanding markets advertising expenditures may have a positive effect on aggregate consumption, while in declining or established markets advertising will likely only impact category or brand consumption (Kamal and Wilcox 2014; Wilcox 1985, 2001; Wilcox, Kim, and Schulz 2012). In a market that is not expanding or is more mature, any sales gains by one brand will be at the expense of a competitor's, thereby impacting a competing brand's or category's market share. Furthermore, advertising may be related to increases in consumption at the aggregate level, but only within a favourable social and economic climate such a expanding or growing market.

Alcohol market

In reviewing a broad range of previous alcohol consumption literature, it can be noted that researchers also took alcohol market conditions and product life cycle theory into consideration when examining the relationship between advertising expenditures and demand. Returns in accordance with advertising expenditures can depend on the market situation, whether it is a growing market or mature (Bain 1956; Eagle, Rose, and Kitchen 2005). The advertising role of delivering information about the brands or products to future consumers, or convincing current customers to purchase a larger amount of products, was not observed in mature markets like alcohol or cigarettes.

In mature markets, advertising is likely to impact existing brands' market shares, but has little or no influence on the total market size (Ambler 1996; Bain 1956; Eagle, Rose, and Kitchen 2005). Simon (1969) noted that this competitive role was the primary reason that alcohol companies continue advertising, because it had an influence on consumers' brand choices and the variation in brands' market shares.

Categories of alcohol beverages

On the basis of the previous studies and theoretical perspectives, evidence is provided that total alcohol advertising does not affect overall alcohol consumption. However, the outcome is not so conclusive when a relationship is considered between the categories of alcohol beverages: beer, wine, and liquor (e.g., Bourgeois and Barnes 1979; Franke and Wilcox 1987; Selvanathan 1989). As each category can be an alternative choice for consumers, several studies found that the demands of these categories have crossover effects with each other (e.g., Blake and Nied 1997; Fisher and Cook 1995; Nelson and Moran 1995).

Interestingly, with respect to the cross-effect of beer, wine, and spirits, Selvanathan's research (1989) showed that beer advertising impacts consumption levels of all three alcohol categories, but wine and liquor advertising has a significant influence on solely beer demand. In addition, Fisher and Cook (1995) note that there is a trade-off relationship for beer and liquor share of consumption, meaning that beer demand increases when there is minimal advertising for wine and distilled spirits and, comparably, liquor demand increases when beer and wine advertising is low. However, wine consumption is not affected by any advertising expenditures, and varies independently. Further, a positive relationship was found between the overall alcohol demand and wine and distilled spirit advertising, whereas a negative relationship existed between the total consumption and beer advertising.

Despite the fact that a number of research studies on alcohol advertising and its effects on consumption have been conducted, recently, studies tend to focus on health issues caused by alcohol, underage audiences, or the effects of advertising bans (Anderson et al. 2009; Nelson 2004; Smith and Roxcroft 2009). This study contributes to this ongoing alcohol advertising/consumption debate by examining sales data that include beer, wine, and liquor as well as advertising expenditures from six media (TV, radio, the Internet, magazines, newspapers, and outdoor). In addition, by including other relevant socioeconomic variables like price, income, and taxation, the present study provides an updated and comprehensive examination of alcohol sales in the US from 1971 to 2012.

Research methodology

Database generation

The major objective in developing the database was to choose variables with reasonably frequent observations over a period of time that reflected advertising and sales levels as well as other factors that might be expected to impact beer, wine, and liquor sales. A variety of sources were used to obtain yearly data from 1971 to 2012 for as many variables as possible (see Table 1).

The database for the analysis included one liquor sales variable; one beer sales variable; one wine sales variable; three advertising variables each for beer, wine and liquor; four socioeconomic variables (alcohol Consumer Price Index (CPI); per capita disposable

Table 1. Variables and sources.

Variables	Time period
Per capita beer sales in gallons (Beer Institute Brewers Almanac 2013)	1971−2012
Per capita wine sales in gallons (Wine Institute 2013)	1971−2012
Per capita distilled spirit sales in gallons (Beverage Information Group 2012)	1971−2012
US population (US Census Bureau 2013)	1971−2012
Advertising expenditures (Leading National Advertisers 2014; Nielsen AdViews 2013)	1971−2012
Socioeconomic variables	
Consumer price index for alcohol (Economagic 2013)	1971−2012
Beer price (Beer Institute Brewers Almanac 2013)	1971−2012
Taxes (calculated by adding federal and state excised taxes)	1971−2012
Beer tax source	
- Federal: Beer Institute Brewers Almanac (2013)	
- State: Beer Institute Brewers Almanac (2013)	
Wine tax source	
- Federal: US Department of the Treasury, Alcohol and Tobacco Tax and Trade Bureau (2013)	
- State: Wine Institute (2013)	
Distilled spirits tax source	
- Federal: US Department of the Treasury, Alcohol and Tobacco Tax and Trade Bureau (2013)	
- State: Federation of Tax Administrators (2011); Tax Foundation (2013)	
Disposable **personal income** (Bureau of Economic Analysis 2014)	1971−2012

income, beer, wine, and liquor taxes; and beer price); population age groups 15−19 and 20−24 expressed as fractions of total US population; and a linear trend variable. Since the effect of alcohol advertising on youth consumption has been a subject of several research studies, as noted earlier, the age groups 15−19 and 20−24 were included in the analysis. The Federal Excise tax and the average state tax for each category of alcohol beverage were combined to produce one taxation variable each for beer, wine, and liquor.

The sales variable consisted of the total yearly sales reported in millions of gallons divided by population. This per capita sales variable was believed to be the most reliable sales activity currently available. The advertising variables for each category of alcohol consisted of media totals for electronic (TV, radio, cable, Internet), print, and outdoor reported on an annual basis.

All advertising series were deflated using the consumer price index to obtain a consistent aggregation of expenditures reported in constant dollars. The Federal Excise tax and the state tax were adjusted by the consumer price index as well to reflect a constant dollar taxation rate. As noted earlier, previous research has shown the above variables to be important determinants of alcohol sales. For a complete list of the variables and sources, please refer to Table 1.

Empirical model

Based on previous consumption demand studies (Grabowski 1976; Gius 1996; Wilcox and Gangadharbatla 2006; Wilcox, Kim, and Schulz 2012), the concept of the consumption for aggregate levels of beer, wine, and liquor may be represented by the following form:

$$C = f(A, P, Y, T, S) \tag{1}$$

where C is a representative variable of real consumption or expenditure, A is total advertising, P is price, Y is a representative variable of consumers' income, T is a representative variable of alcohol tax, and S is a representative variable of linear trend.

In order to transform these models into equation forms:

$$C_t = b_0 + b_1 A_t + b_2 P_t + b_3 Y_t + b_4 T_t + b_5 S_t \tag{2}$$

where C_t is beer, wine, or liquor sales in period t; A_t is electronic, print, and outdoor advertising expenditures in period t; P_t is alcohol CPI in period t; Y_t is per capita disposable income; T_t is tax rate in period t; and S is the trend variable.

Data analysis procedures

A stepwise regression analysis with backwards elimination of non-significant predictors was used in determining which variables were significant predictors of the sales series. The variables described above were used in three generalized least-squares regression equations with per capita beer, wine, and liquor sales as the dependent variables. The least significant predictors were dropped and additional regression analyses were performed until a final model was obtained with all variables significant ($p < 0.05$). Prior to the analysis, all variables underwent a log-transformation to aid with interpretation. The R-square values, mean absolute percent error (MAPE) values, and root mean squared error (RMSE) values of the sequential models were compared to ensure that there was not a

significant drop in explained variance, and to determine the accuracy of the trend estimation.

A frequent claim is that advertising has a cumulative effect on demand over time. Because of the serious problems autocorrelation can present in analysis of time-series data, a generalized least-squares regression approach that uses estimates of autocorrelation in the model's residuals in estimating structural parameters and significance levels was used. The SAS AUTOREG procedure (SAS Institute 2012) was used, taking into account significant autocorrelation at lags of 1 and 2 years.

Results

The full and final regression models for beer, wine, and liquor are presented in Tables 2, 3, and 4, respectively. Because interpretation focuses on the final model with the non-significant predictors dropped, the full model with all predictors is not discussed. The intercept represents the baseline sales when all independent variables used in the analysis assume the value of zero. Since population parameters can never assume the value of zero in the current study, interpretation of the intercept has no substantial relevance to understanding the advertising−sales relationship and is thus not discussed.

Beer

Taking into account significant autocorrelation at a lag of 1 year, per capita beer sales exhibited a significant, positive relationship with the population age 15−19, the population age 20−24, beer tax, and per capita disposable income. The trend variable exhibited a significant but negative relationship with per capita sales. None of the three advertising variables was a significant predictor in the final model (see Table 2). The final model explained over 98% of the variance and had a MAPE value of 0.22%.

Table 2. Full and final models − beer sales.

Predictor	Full model (R-square $= 0.98$, Mean absolute percentage error (MAPE) $= 0.24$, Root mean square error (RMSE) $= 0.00505$)			Final model (R-square $= 0.98$, Mean absolute percentage error (MAPE) $= 0.22$, Root mean square error (RMSE) $= 0.00470$)		
	B value	t-ratio	p-value	B value	t-ratio	p-value
Intercept	21.34	12.00	0.0001	23.46	11.92	0.0001
Population age 15−19	0.18	2.43	0.0209	0.21	2.41	0.0213
Population age 20−24	0.24	4.62	0.0001	0.23	4.94	0.0001
Trend	−0.01	−11.22	0.0001	−0.01	−11.18	0.0001
Consumer Price Index (CPI) alcohol	0.05	0.53	0.6027			
Beer tax	0.01	2.90	0.0067	0.01	2.21	0.0336
Income	0.32	4.81	0.0001	0.42	9.40	0.0001
Electronic	0.00	0.13	0.8954			
Print	0.02	2.77	0.0092			
Outdoor	−0.01	−0.83	0.4152			

Table 3.   Full and final models − wine sales.

Predictor	Full model (R-square = 0.94, Mean absolute percentage error (MAPE) = 4.28, Root mean square error (RMSE) = 0.01795)			Final model (R-square = 0.95, Mean absolute percentage error (MAPE) = 3.58, Root mean square error (RMSE) = 0.01493)		
	B value	t-ratio	p-value	B value	t-ratio	p-value
Intercept	−2.72	−0.32	0.7478	−0.68	−3.69	0.0007
Population Age 15−19	0.20	0.75	0.4578			
Population Age 20−24	0.58	3.64	0.0009			
Trend	−0.00	−0.16	0.8723			
Consumer Price Index (CPI) alcohol	0.59	1.13	0.2657			
Wine tax	−0.14	−5.58	0.0001	−0.06	−3.22	0.0026
Income	0.10	0.38	0.7068	0.34	5.51	0.0001
Electronic	−0.00	−0.12	0.9079			
Print	0.02	0.75	0.4587			
Outdoor	0.02	2.62	0.0133			

Wine

Taking into account significant autocorrelation at a lag of 1 year, per capita wine sales exhibited a significant, positive relationship with per capita disposable income. The wine tax variable exhibited a significant but negative relationship with per capita sales. None of the three advertising variables was a significant predictor in the final model (see Table 3). The final model explained over 95% of the variance and had a MAPE value of 3.58%.

Liquor

Table 4 presents the full and final sales models for liquor. Per capita liquor sales exhibited a significant, positive relationship with the population age 20−24, per capita disposable income, and outdoor advertising expenditures. The liquor tax variable exhibited significant but negative relationships with per capita sales. The final model explained over 98% of the variance and had a MAPE value of 4.93%.

Discussion

The major finding in this study is that even though per capita consumption has remained reasonably constant, changes have occurred among the three categories of alcohol beverages for the period 1971−2012, with the majority of those changes being related to fluctuations in demographics and price − not advertising.

   Even though the analysis clearly indicated that outdoor advertising exhibited a significant positive association with liquor sales, the regression coefficient (0.08) indicated the relationship was weak. For example, a 1% increase in liquor outdoor advertising would be associated with a 0.08% increase in liquor sales or, in other words, a US $3.73-million increase in outdoor advertising would be associated with a 0.16-ounce increase in liquor sales per capita.

   Among the socioeconomic variables examined, only per capita disposable income was positively associated with all three categories of alcohol sales, indicating that

Table 4. Full and final models − liquor sales.

Predictor	Full model (R-square = 0.98, Mean absolute percentage error (MAPE) = 5.12, Root mean square error (RMSE) = 0.01112)			Final model (R-square = 0.98, Mean absolute percentage error (MAPE) = 4.93, Root mean square error (RMSE) = 0.01105)		
	B value	t-ratio	p-value	B value	t-ratio	p-value
Intercept	−5.74	−1.08	0.2908	−2.17	−8.04	0.0001
Population Age 15−19	−0.02	−0.08	0.9341			
Population Age 20−24	0.56	4.63	0.0001	0.6372	8.76	0.0001
Trend	0.00	0.74	0.4643			
Consumer Price Index (CPI) alcohol	−0.64	−1.70	0.1025			
Liquor tax	−0.27	−1.93	0.0654	−0.4621	−12.30	0.0001
Income	0.44	1.88	0.0726	0.4945	8.21	0.0001
Electronic	0.01	2.23	0.0354			
Print	−0.01	−0.25	0.8063			
Outdoor	0.08	5.22	0.0001	0.0766	7.08	0.0001

increases in disposable income were associated with increases in sales. It is interesting to note that this variable exhibited the strongest relationship with sales of all of the predictor variables. For example, a 1% increase in per capita disposable income was associated with a 0.44% increase in liquor sales per capita.

Other socioeconomic variables such as the tax rate and the alcohol consumer price index exhibited negative relationships with liquor sales. This finding indicates that increases in prices for liquor and the taxation rate are associated with decreases in liquor sales. For wine, the taxation rate also exhibited a negative relationship to sales, indicating that increases in the tax rate were associated with decreases in wine sales.

Regarding the two population groups, beer sales were positively associated with both groups aged 15 to 19 and 20 to 24, while liquor sales were positively related to only the group aged 20 to 24. This finding supports research that has found that demography, specifically the younger adult population, is positively related to alcohol sales (Fisher and Cook 1995; Levy and Sheflin 1985; Weinberg 1984). It should also be noted that among these age groups, a common reason for not only first-time but also continued alcohol use is peer pressure and socialization. Peer pressure, and/or socialization from similar age groups, is a well-documented factor in the initiation and development of alcohol and tobacco consumption behaviours (Lewis and Lewis 1984; Santor, Messervey, and Kusumakar 2000). Peers act as an influence by introducing, providing, or pressuring new behaviours (i.e., alcohol/tobacco consumption) to other peers (Kinard and Webster 2010).

Reported changes in consumer preferences over this time period by the younger population in the US may also have helped bring about a market shift from beer to wine and liquor (Kuczynski 2012; Nielsen 2007). Peltz (2005) noted, "the shift reflects stepped-up and innovative marketing by the wine and liquor makers, as well as Americans' increasing yen for variety in all consumer products". Kuczynski (2012) agreed: "spirits are generally taking share from beer…and that a trend toward premiumization is also benefiting spirits companies".

Relating these findings to previous research reveals a consistency in that there is either no relationship or a weak one between advertising and aggregate sales. Over this time period, beer sales have exhibited a downward trend since the early 1990s, while wine and liquor have increased their share of total alcohol sales. This is despite large increases in advertising expenditures across all three categories of alcohol.

From a theoretical perspective, the findings are generally consistent with those of Albion and Farris (1981) in that within expanding markets, advertising expenditures may have a positive effect on consumption, while in declining or established markets advertising will likely only impact brand or category consumption. In the analysis presented here, advertising expenditures were not significantly related to aggregate beer sales − a declining market. It is interesting to note, however, that advertising expenditures also were not significantly related to wine sales in a market whose sales have been both up and down during the period examined. Wine sales increased slowly until the mid 1980s, followed by a decline for the next 10 years. Since the late 1990s, consumption has risen to an all-time high per capita level in 2012. Spirits sales followed a similar pattern to wine sales, increasing slowly for the first 8 years, followed by a decline until the mid 1990s. In the late 1990s, sales peaked in 2012 to levels slightly below those of the early 1970s.

Another important media event that took place in the late 1990s, that may have contributed to the growth of the spirits segment, was the removal of the voluntary broadcast advertising ban that the liquor industry had in place since 1936 for radio and 1948 for television. Wilcox, Kim, and Schulz (2012) reported that following the removal of the ban, gains in individual liquor brand sales were positively associated with those brand's electronic advertising expenditures. The brands that were consistently the top spenders in the electronic media showed the most increases. It is also important to note that these category variations between beer, wine, and liquor have occurred during a 40-year period in which overall alcohol per capita consumption rose rapidly until the early 1980s, and was then followed by a slow decline to a level in 2012 that was slightly above that of the early 1970s.

The advertising expenditure data used in this analysis also revealed a sharp increase in liquor outdoor advertising toward the end of the period examined, that coincided with the increase in electronic advertising. It is interesting to note that Kamal and Wilcox (2014) also found a positive, significant relationship with outdoor advertising and fast food sales, suggesting that tactically, outdoor appeared to play an important reminder role in the fast food category. This explanation is certainly possible as spirits advertisers outspent both wine and beer advertisers proportionally in this medium throughout the period examined.

Implications

In the established, mature market for alcohol, competition for a greater share of sales is intense and constant, with advertising being the most visible part of the overall marketing strategy. Companies try to increase their revenue through stronger, more innovative marketing efforts, allowing them to increase their market share at the expense of competitors. Permitting the market to operate freely encourages competition not only among brands but among categories of alcohol beverages as well. This study has provided evidence of consumption changes across categories of alcohol beverages over the past 40-plus years, with the preponderance of those changes significantly correlated to fluctuations in demography, taxation, and income levels − not advertising.

The outcomes of this study can be used to inform relevant public policy discussions regarding alcohol beverage advertising. Proposals to restrict or curtail truthful,

commercial messages about a legal product work against rational public policy. By limiting restrictions and allowing the market to function freely, companies can compete using advertising and media strategies while not impacting the total amount of alcohol consumed. Consumers are given the choice of what products to buy and the ability to decide based on competitive product offerings. While criticisms of alcohol advertising and promotional methods abound, implementation of only remedies that would restrict or overly regulate such communication activities may not have the desired effect of reducing consumption. Instead, such restrictions would only serve to limit a company's ability to employ marketing communication strategies as a means to gain market share.

Finally, in relating advertising expenditures to sales, it is problematic to suggest that advertising alone is responsible for sales. Although the advertising variables used in this study may not reflect total advertising expenditures, they were the best measures of expenditures currently available. Other factors not included in the analysis such as changing societal attitudes towards drinking, personal preference shifts in category choice, or the creative appeals used by the brands may no doubt have had an impact on sales of these products. It is also important to note that the relationships observed in this study are correlational, not necessarily causal. It may even be, in many cases, that sales in turn are used to allocate future advertising expenditures, a relationship that needs further investigation.

Disclosure statement

No potential conflict of interest was reported by the authors.

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