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Alcohol Outlet Densities and Alcohol Price: The British Columbia Experiment in the Partial Privatization of Alcohol Sales Off-Premise

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Abstract

Background—Alcohol beverage prices or taxes have been shown to be related to alcohol sales and use and related problems. What is not clear are the mechanisms underlying these relationships.

Methods—This study examines the relationship between alcohol outlet density under conditions of the partial privatization of off-premise consumption in British Columbia (BC) occurring over the past decade. Two hypotheses are tested. First, reflecting basic supply–demand principles, greater geographic densities of alcohol outlets will be directly related to reductions in beverage prices in response to greater competition. Second, reflecting the effects of niche marketing and resulting market stratification, increased densities of private liquor stores will be especially related to reductions in beverage prices within this outlet category. Data were collected from: (i) a survey of BC private store prices and practices, (ii) alcohol outlet location information, and (iii) data on demographic characteristics. Multilevel models examine the relationships between prices at individual private liquor stores and the densities of government liquor stores, private liquor stores, bars, and restaurants, controlling for background demographics and geographic unit level effects. Spatial dependencies were also examined.

Results—Increased densities of private liquor stores were associated with lower mean prices of beer and all alcohol aggregated across brands at the store level. There appeared to be no outlet level effect on discounting patterns, however, with the mean price differences apparently reflecting differences in the quality of brands carried rather than unequal prices for any given brand.

Conclusions—Increased densities of private off-sale alcohol outlets appear to result in lower prices charged at said establishments independently of other types of alcohol outlets suggesting that they represent an emerging marketing niche in the context of off-sale outlet privatization.

Keywords

Alcohol Outlet Privatization; Alcohol Price; Alcohol Outlet Densities; Alcohol Policy

A Growing number of studies provide strong empirical support for the notion that increased alcohol availability is associated with increases in both drinking levels and related social problems. Increases in economic availability in the form of reduced beverage prices or taxes have been shown to increase alcohol sales and use (Cook and Tauchen, 1982; Grossman et al., 1987) and related problems (Chaloupka et al., 1998; Markowitz, 2000). Increases in physical availability in the form of greater numbers of alcohol outlets per geographic area or population have also been shown to be related to greater alcohol sales (Gruenewald et al., 1993), survey measures of alcohol use (Gruenewald et al., 2002), drinking and driving (Gruenewald et al., 1996; Treno et al., 2008), and problems such as violence (Gruenewald and Remer, 2006; Gruenewald et al., 2006a,b; Scribner et al., 1995), alcohol-related traffic crashes (Scribner et al., 1994; Treno et al., 2007), and childhood abuse and neglect (Freisthler and Weiss, 2008; Freisthler et al., 2007). Thus, the costs of alcohol in terms of price and convenience are viewed by most researchers to be related to use and problems and on this basis general policy recommendations regarding beverage taxes and availability can be made (Babor et al., 2003). What is not clear are the mechanisms underlying these relationships. Specifically, how is it that the venues through which alcohol is distributed structure these relationships?

One possible mechanism is that alcohol outlet densities operate via marketing systems with higher densities linked to lower prices and subsequently increased levels of consumption and resulting public health outcomes. Moreover, it may be that certain types of outlets may be more problematic than others due to their differential policy implementation. For example, it has been clearly established in the research literature on availability effects that privately owned and operated outlets are more likely to sell alcohol to minors, stay open late at night, and sell to individuals who may be intoxicated than those that operated under governmental control. And it may be that private alcohol retailers compete through lower prices which may fuel consumption either to unsafe levels or in unsafe environments. This is, of course, consistent with a line of research linking alcohol outlet privatization to increased consumption and related problems (Holder et al., 2007; Macdonald, 1986; Macdonald et al., in press; Markowitz, 2000; Stockwell et al., 2009a, b, 2011; Trolldal, 2005a,b; Wagenaar and Holder, 1995, 1996; Wagenaar and Langley, 1995).

The purpose of this study is to examine the relationship between alcohol outlet density under conditions of the partial privatization of off-premise consumption in British Columbia (BC) occurring over the past decade and alcohol price. This particular form of privatization in BC provides a unique opportunity to examine associations between alcohol price, outlet densities, and resulting drinking and problem outcomes.

The Background of Partial Privatization in BC

Introduced early in the 20th century, alcohol control policies were implemented to minimize problems associated with alcohol and, in the form of taxes and fees, secure reliable sources of government revenue (Cook, 2007). However, government control of alcohol production, distribution, and sales has been declining globally over the past 60 years such that alcohol monopolies have been dismantled entirely in some countries and partially in others. In the United States, for example, following the conclusion of prohibition in 1933, state governments elected to establish either licensing or monopoly systems for the distribution of alcohol. Under licensing systems, wholesalers and retailers were licensed to sell alcoholic beverages. Under monopoly or partial monopoly systems, the state chose to monopolize either the wholesale or retail distribution of these beverages, often regulating sales through state stores. In general, monopoly states have restricted retail sales through various pricing restrictions, and they provide fewer alcohol outlets than license states; conditions of sale, alcohol advertising, and other state store operations are often rigorously controlled. Over the past several decades, the dismantling of state monopolies in the United States has proceeded in a piecemeal fashion, permitting independent evaluations of the impacts of these privatization steps on alcohol sales and problems. Somewhat surprising, despite the many different ways in which privatization has been implemented across states, these natural experiments have demonstrated lasting increases in sales and problems (Holder and Edwards, 1995). Privatization of government monopolies has also typically led to increases in the overall number of outlets, longer opening hours, and increased promotions of alcoholic beverages (Macdonald, 1986; Smart, 1986). These effects of privatization are of particular concern in light of their established links with higher rates of acute and chronic problems related to drinking (Babor et al., 2003; Holder and Edwards, 1995).

In recent years, BC, Canada, a province with a long-standing monopoly on retail alcohol sales, has begun to privatize aspects of its own alcohol monopoly. In Canada, each of the 13 provincial or territorial governments has jurisdiction over the control of sales for alcoholic beverages, and considerable regulatory diversity exists ranging from government monopolies for off-premise sales of alcohol (i.e., take-out) to complete privatization with differential effects on public health outcomes (Trollid, 2005a,b). In 2002, BC permitted the rapid expansion of private liquor stores and by 2010, the number of private outlets increased from 543 to 1,045, and government outlets decreased from 212 to 197. The private liquor stores obtain most of their alcohol directly from the government distribution network at a wholesale cost of 16% below the retail prices of the government stores. Therefore, average prices overall are expected to be higher in the private stores because mark-ups for alcohol are typically in the range of 17 to 32% of wholesale costs. Private liquor stores are also permitted to buy and sell beverages from local breweries and wineries and therefore potentially could offer a wider choice of beverages to consumers. The private stores set their own prices, may sell their beverages either cold or at room temperature and can include free items for customers, such as popcorn or ice. This may be contrasted with government stores which offer a mostly fixed inventory of products at the same prices across the province. Previous research of the BC situation has provided detailed descriptions of sales for different beverage types across 89 geographic jurisdictions finding that privatization of the liquor

market in BC has increased per capita consumption of ethanol (EtOH) (Stockwell et al., 2009a,b) and had adverse effects on alcohol-related mortality (Stockwell et al., 2011). Still, despite these findings, the mechanisms underlying these empirical relationships have not been examined. It is that task which is the focus of this study. Specifically, we consider the relationship between changes in alcohol outlet densities on the private store price of alcohol.

Research Strategy

Our analysis of relationships between alcohol price and outlet densities examines 2 hypotheses.

1. Reflecting basic supply–demand principles, greater densities of alcohol outlets will be directly related to reductions in beverage prices in response to greater geographic competition.
2. Reflecting the effects of niche marketing and resulting market stratification, increased densities of private liquor stores will be especially related to reductions in beverage prices within this outlet category.

The hypothesized price effects may take the form of either charging a different price for the same beverage or the substitution of relatively inferior (cheaper in price terms) for relatively superior (more expensive in price terms) beverages.

MATERIALS AND METHODS

Data were collected from 3 sources: (i) alcohol outlet location information, (ii) data on demographic characteristics, and (iii) a survey of BC private store prices and practices.

1. Data on outlet Local Health Area (LHA)-level densities of restaurants, bars, government liquor stores, and private liquor stores were obtained from the BC Liquor Distribution Branch.
2. Statistical information on the population density, median income, the percent aboriginal population for each LHA was obtained from BC Statistics. These variables were chosen because they represent local community characteristics whose exclusion would likely bias estimates of both model coefficients and standard errors.
3. A survey was conducted of private liquor stores between June and October of 2010 to collect price data for a group of popular alcoholic beverages. The sampling strategy involved selecting at random 2 private liquor stores from each of the 89 LHAs in BC. Representatives from these stores were mailed a short self-administered questionnaire about the prices of various beverages and some characteristics of the stores. Included was a self-addressed stamped envelope for return of the questionnaire. Nonrespondents were telephoned, requesting the information by interview. Unfortunately, we could only complete 26 interviews by phone because often the store clerk was too busy to complete the interview or check prices. Therefore, we conducted interviews in person and checked prices on site to maximize the response rate. Because of large distances between stores for

some geographic regions, to keep costs manageable, we visited the stores only once across southern and central BC. For those stores that were too busy, closed, or needed the store manager's permission to give pricing information, questionnaires were mailed with a \$10.00 incentive and return paid postage. Of the 178 eligible stores, we obtained the required information from 84%(150/178). To determine whether the specific mode of data collection could potentially confound our analysis, mean price indices discussed below were compared by data collection procedure using chi-square tests. These analyses indicated no significant differences by data collection protocol. Significance levels for mean beverage types by collection protocol interactions ranged from 0.220 to 0.658.

Prices were requested for a "basket" of 33 popular brands of alcoholic beverages, including 9 beers, 10 spirits, 12 wines, and 2 coolers. Items in the basket were chosen based on their popularity and likelihood of being sold in the private stores to capture an adequate sample of prices in each store which could be compared with government store prices. Items in the basket also reflected higher and lower priced items, larger and smaller volumes of beverages, as well as high and low alcohol content. In order to adjust for differences in alcohol strength and bottle size, all prices were converted to price per EtOH unit. Thus, a 750-ml bottle of spirits at 40% alcohol content selling for \$30.00 would be priced at \$30.00 divided by 300 (the number of milliliter of EtOH in the bottle) or \$0.10 per milliliter. Comparative prices for the specific products used in the basket of goods as well as details of store characteristics were obtained for government stores from the BC Liquor Distribution Branch website www.bcliquorstores.com on August 15, 2010, approximately halfway through the private store survey.

The Problem of Nested Effects and Spatial Dependencies

One potential issue that needs to be addressed in our analytic approach concerns the fact that the stores in our sample are nested within LHAs. Thus, they are not independent observations and violate the standard independence assumption of ordinary least squares regression. This may be partially corrected by the inclusion of demographic covariates. However, this leaves the possibility that some unmeasured higher level (e.g., LHA) variable may be responsible for demonstrated associations. To account for that possibility, our analysis models include a random effect for unmeasured LHA effects with store as the unit of analysis.

An additional problem concerns the possibility that there may be spatial autocorrelation of model errors, meaning that prices in geographically close LHA's are likely to be more similar to each other than spatially distant LHA's. Moran's I coefficient was used to test for spatial autocorrelation of model residuals (Moran, 1950).

RESULTS

Table 1 presents basic descriptive information on our data at the LHA level. These statistics are based on the 80 LHAs with at least 1 surveyed private liquor store. Overall LHAs without government-operated liquor stores had small populations ranging from 683 to 1,989.

Of the remaining LHAs, the range in terms of both numbers of outlets and demographic background variables is substantial.

Table 2 presents our analysis of Hypotheses 1 and 2, which proposes that greater densities of alcohol outlets will be directly related to reductions in beverage prices in response to greater geographic competition both in terms of private store densities and densities of outlets overall. As indicated in Table 2, increased densities of private liquor stores were associated with lower mean prices of beer and all alcohol aggregated across brands at the store level. However, increased numbers of bars, restaurants, and government liquor stores were not associated with such lower prices similarly indexed. Thus, Hypothesis 2 appears supported while Hypothesis 1 (i.e., suggesting an overall effect across outlet types) is not. To estimate the magnitude of this relationship, one may consider the following. A doubling of the private liquor stores' density in an average LHA would be an increase of 0.013, which multiplied by the coefficient of -0.377 implies a drop in the expected private liquor store price per ml EtOH of \$0.0049; this represents a decline of 3.7% from the mean EtOH price of 0.1327 per ml.

Table 3 presents our analysis examining whether pricing effects occur through the substitution of lower quality goods rather than through discounting. To examine these 2 alternative explanations, we re-estimate our models by regressing prices relative to the government store prices on our exogenous measures. This thus reflects the average price discount or premium for those brands carried by that specific store and is conceptually similar to controlling for within store brand selection effects. As indicated in Table 2, there appears to be no outlet level effect on discounting patterns. Thus, the quality hypothesis is supported. As noted earlier, residuals were examined for remaining spatial autocorrelation. The Moran coefficients were always small and borderline significant at best indicating that inter-unit spatial dependencies were not found.

DISCUSSION

Consistent with niche theory, we note that prices do tend to decline in response to competition for similar products. Notably, greater physical availability of alcohol as indexed by private store outlet density is associated with increased economic availability as indexed by lower average price per EtOH unit across brands carried by a given store. Moreover, this effect appeared to operate by increasing the supply of relatively cheaper goods rather than through discount pricing for any given brand. It is notable that this effect was only found when considering private store densities, and not densities of other outlet types including government stores. One question that may be raised concerns why our results appear to be restricted to beer. Although difficult to answer this question with certitude, our post hoc speculation is that this is due to the fact that beer is the alcoholic beverage of choice for younger more price conscious persons in BC. And here, it should be noted that demand among younger people has been determined by prior research to be responsive to price (Grossman et al., 1987). Hence, the argument may be made that the observed lower prices in LHAs with high private store density may reflect outlet responses to increased competition to a price sensitive collection of consumers of alcoholic beverages. This observation, given

our understanding of the problem of youth drinking is, of course, particularly problematic from a public health perspective.

A number of limitations are present in the current analyses. Perhaps, the most obvious limitation of the present study concerns the cross-sectional nature of the data. Clearly, this represents a problem because causal influence generally requires longitudinal study designs. To some degree, this is less a problem because price effects are expected to be relatively immediate. Moreover, the proposed hypotheses are less based on causal arguments than about price and density equilibria. Additionally, it should be that the privatization as implemented in BC was partial. Private stores purchased primarily from the government at discount, were regulated in terms of permissible discounts, and ultimately had to compete with government stores. This likely had 2 consequences. First, private stores were required to compete with government stores even subsequent to privatization. One can assume that that likely had a dampening effect on how high private store prices were likely to go. Second, the government remained the primary wholesale distributor of alcoholic beverages, and there remained statutory requirement that prices not fall below government store prices. Thus, our hypotheses tests were conducted in a less than “perfect” market setting. One would conjecture that, under an even more market driven setting, prices would have varied more greatly. For example, distance from primary population settings would have likely been associated with higher prices (Treno et al., 2006). In the current circumstance, private sellers in remote areas were competing with government stores which were “subsidized” in terms of price by less remote regions of BC. One would further conjecture that the effects found in this study would have been even stronger under pure market driven conditions. The extent to which such limitations on the development of a “pure market model” have implications for the generalizability of our findings beyond BC is difficult to determine, but certainly worthy of note. Finally, the study with 150 effective observational units (stores) nested within 89 higher level geographic units (LHAs) may be argued to have low statistical power. Generally, such a situation however would tend to bias against the determination of effects and thus provides additional confirmation of observed effects. A final concern should be expressed concerning the rather unique circumstances characterizing BC.

Clearly, much more work needs to be carried out to examine the full effects of alcohol outlet privatization. Each such natural experiment in outlet privatization occurs within a specific geographic, social, and cultural setting. A number of important issues thus remain to be addressed. Perhaps, the most important is whether specific cultural factors (e.g., drinking patterns), other interventions in place (e.g., enforcement of laws prohibiting drinking and driving), or the spatial geography of local communities (e.g., placement of roads) mediate or moderate the overall effects noted in the literature in this area. Additionally, one might consider how store characteristics (aside from issues of ownership and control) operate to alter marketing strategies (Harwood et al., 2003). What we have examined here is merely one process linking privatization and increased alcohol outlet densities to lower alcohol prices as suggested by market niche theory. However, it must be acknowledged that more complex dynamics may be at work. Certainly, more sophisticated analyses with larger data sets representing multiple domains of theoretical interest collected over larger spans of time are indicated to fully elucidate the issue of alcohol outlet effects as regards privatization, alcohol outlet density, alcohol price, and resulting alcohol-related problems.

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Table 1

Local Health Area-Level Descriptive Statistics

	Mean	SD	Minimum	Maximum
Mean beer price (\$/ml EtOH)	0.133	0.010	0.110	0.167
Mean wine price (\$/ml EtOH)	0.148	0.016	0.117	0.207
Mean spirits price (\$/ml EtOH)	0.132	0.009	0.116	0.170
Mean alcohol price (\$/ml EtOH)	0.133	0.010	0.116	0.175
Mean restaurants per km roadway	0.100	0.352	0.001	2.974
Government liquor stores per km roadway	0.003	0.006	0.000	0.049
Bars per km roadway	0.032	0.094	0.001	0.736
Private liquor stores per km roadway	0.013	0.021	0.001	0.174
Percent aboriginal population in 2006 (percent $\times$ 1,000)	0.009	0.011	0.000	0.069
Median household income in 2006 ($\times$ \$100,000)	0.731	0.187	0.438	1.804
Population density in 2006 (100,000 per km ²)	0.006	0.017	0.000	0.096

EtOH, ethanol.

Table 2

Price Per Ethanol Unit by Outlet Types and Exogenous Measures

	Beer	Wine	Spirits	All alcohol
Intercept	0.133 *** (0.005)	0.136 *** (0.008)	0.131 *** (0.005)	0.129 *** (0.005)
Restaurants	0.006 (0.022)	0.030 (0.033)	0.017 (0.021)	0.021 (0.022)
Government liquor stores	1.216 (1.098)	0.512 (1.642)	−0.108 (1.039)	0.275 (1.100)
Bars	0.029 (0.061)	−0.020 (0.091)	0.029 (0.057)	−0.009 (0.060)
Private liquor stores	−0.454 * (0.189)	−0.439 (0.284)	−0.211 (0.179)	−0.377 * (0.188)
Percent aboriginal population	0.039 (0.112)	−0.032 (0.173)	0.026 (0.109)	−0.002 (0.109)
Median household income	0.001 (0.007)	0.018 (0.01)	0.003 (0.007)	0.008 (0.007)
Population density	0.006 (0.134)	0.132 (0.201)	0.120 (0.127)	0.102 (0.134)

*
 $p < 0.05$,***
 $p < 0.001$.

Table 3

Price Per Ethanol Unit by Outlet Types and Exogenous Measures (as a Ratio to Government Store Price)

	Beer	Wine	Spirits	All alcohol
Intercept	1.144 *** (0.039)	1.206 *** (0.063)	1.173 *** (0.041)	1.175 *** (0.040)
Restaurants	0.078 (0.164)	0.151 (0.261)	0.138 (0.171)	0.099 (0.165)
Government liquor stores	3.392 (8.131)	5.372 (12.942)	0.266 (8.506)	2.702 (8.184)
Bars	−0.074 (0.443)	−0.086 (0.705)	−0.367 (0.466)	−0.177 (0.445)
Private liquor stores	−2.020 (1.389)	−3.434 (2.211)	−1.020 (1.459)	−1.787 (1.400)
Percent aboriginal population	0.643 (0.803)	0.569 (1.319)	0.485 (0.878)	0.510 (0.808)
Median household income	0.006 (0.051)	0.009 (0.082)	−0.012 (0.054)	−0.001 (0.052)
Population density	0.790 (0.994)	0.072 (1.583)	0.451 (1.040)	0.518 (1.001)

 $p < 0.001$.