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Differences in liquor prices between control state-operated and license-state retail outlets in the U.S.

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Abstract

Aims—This study aims to compare the average price of liquor in the United States between retail alcohol outlets in states that have a monopoly ('control' states) with those that do not ('license' states).

Design—A cross-sectional study of brand-specific alcohol prices in the United States.

Setting—We determined the average prices in February 2012 of 74 brands of liquor among the 13 control states that maintain a monopoly on liquor sales at the retail level and among a sample of 50 license-state liquor stores, using their online-available prices.

Measurements—We calculated average prices for 74 brands of liquor by control vs. license state. We used a random effects regression model to estimate differences between control and license state prices – overall and by alcoholic beverage type. We also compared prices between the 13 control states.

Findings—The overall mean price for the 74 brands was \$27.79 in the license states (95% confidence interval [CI], \$25.26–\$30.32) and \$29.82 in the control states (95% CI, \$26.98–\$32.66). Based on the random effects linear regression model, the average liquor price was approximately two dollars lower (6.9% lower) in license states.

Conclusions—In the United States monopoly of alcohol retail outlets appears to be associated with slightly higher liquor prices.

Keywords

alcohol; brand; control states; license states; price

INTRODUCTION

Underage drinking remains a substantial public health problem in the United States. More than 72% of high school students have drunk alcohol, and nearly one-quarter engage in

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Declarations of interest

None.

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heavy episodic drinking [1,2]. The annual cost associated with the consequences of underage drinking is \$27 billion [3]. Partly in an effort to limit alcohol consumption, as well as to prevent access to alcohol by underage persons, 18 states have a monopoly over liquor sales: 13 at the retail level, and all 18 at the wholesale level. These “control” states set either a uniform price or a minimum shelf price for liquor sold within the state [4]. In the other 32 states and the District of Columbia, known as “license” states, private retailers are issued licenses to sell alcohol. These retailers can establish their own prices, resulting in wide variation between different stores.

There is strong evidence that per-capita liquor consumption is lower in control states [5,6]. Moreover, moving to privatized sales of certain alcoholic beverage types leads to a median 44% increase in their consumption, with minimal changes in the consumption of beverage types that remain non-privatized [7]. Importantly, there is also evidence that retail monopoly states have significantly lower rates of heavy drinking and alcohol-related fatalities among underage youth [8]. Research is needed to explore whether this is due to reduced access to popular alcohol brands, less frequent advertising, lower outlet density, higher alcohol prices, or increased enforcement by alcohol beverage control agencies [8].

To better understand the impact of alcohol sales jurisdiction on underage alcohol use, the present investigation examines differences in alcohol prices between control and license states. We are aware of no recent study that has systematically compared alcohol prices between control and license states among a wide range of alcohol brands.

In 1961, Simon published the first comparison of prices in control and license states, reporting higher prices in license states based on listed prices for a single alcohol brand [9]. A 1992 study reported that Nordic countries with state-run monopolies over alcohol sales had higher prices, although the observed differences may have been due to varying tax policies [10].

Only two other published studies examined alcohol price differences between control and license states [11,12]. Using data from the American Chamber of Commerce Research Association (ACCRA, now the Council for Community and Economic Research), Benson et al. found that average liquor prices were slightly higher in the control states during the period 1982 to 1997 [11]. Confidence in this finding is tempered because of a severe limitation of the ACCRA database: it includes the prices of only one brand each of beer, spirits, and wine. In addition, ACCRA surveyors are discouraged from including discount liquor stores [13], so the store sample is not representative. Nelson reported little difference in alcohol prices between license and control states, but his analysis also used the ACCRA database [12]. An updated comparison of prices, examining a much larger sample of alcohol brands, is needed.

Examining the differences in alcohol prices between license and control states is particularly important because of recent moves by control states to privatize part of their alcohol sales operations [5]. For example, Washington voters approved a ballot initiative to privatize the state’s liquor stores by June 1, 2012 [14].

Privatization of alcohol sales may result in increased alcohol outlet density and greater liquor consumption [7,15–24]. The effects of privatization on alcohol prices are less clear, however, with conflicting results in the existing studies [5,7,17,25,26]. Limited comparative information on price and alcohol brand availability in license and control states hinders a more thorough understanding of the likely effects of privatization.

In this paper, we systematically compare average alcohol prices among control states and between control and license states for 74 different alcohol brands that encompass 10

different types of spirits. We examined prices current in February 2012 using data from all 13 control states that maintain a retail monopoly and from a sample of 50 license-state liquor stores, using their online-available prices. We focused on spirits because each of these control states sets uniform spirits prices, while only a few control sales of beer or wine.

METHODS

Design overview

To compare alcohol prices, in February 2012, we determined the average prices of 74 specific liquor brands among the 13 control states that set liquor prices at the retail level (Alabama, Idaho, Maine, Montana, New Hampshire, North Carolina, Ohio, Oregon, Pennsylvania, Utah, Vermont, Virginia, and Washington) and the same 74 brands among a sample of 50 license-state liquor stores, using their online-available prices.

2011 alcohol brands database

In 2011, we determined the prices of 898 brands of alcohol using online databases provided by 15 of the control states, including the 13 with retail-level monopolies on spirits, and from 136 online liquor stores based in 23 different license states. We identified the online liquor stores through several mechanisms, including internet searches for popular online stores, lists of online stores registered with control states, and internet searches for specific alcohol brands. A detailed description of our methodology is reported elsewhere [27].

The database included all of the available brands (e.g., Bacardi Gold) for each of 16 different alcoholic beverage types (e.g., rum). The brand list included: (1) all alcohol brands advertised in national issues of magazines or on national television (network or cable) during the years 2006 through 2010, based on data licensed from Nielsen (New York, 2011); (2) all alcohol brands cited by Impact Databank (New York, 2011) as among the top 200 distilled spirit brands, top 50 beer brands, top 100 wines, and top 10 flavored alcoholic beverage brands, as defined by overall 2009 U.S. market share; (3) an extensive list of alcoholic energy drinks compiled by the National Association of Attorneys General; and (4) all alcohol brands reported by participants in two preliminary studies of youth alcohol brand preference [28,29].

The completed database included the following numbers of brands in each of these categories, with a total of 898 alcohol brands: table wine (306), beer (132), vodka (86), cordials/liqueurs (77), flavored alcoholic beverages (62), rum (54), tequila (33), whiskey (29), gin (27), scotch (25), bourbon (23), brandy (15), alcoholic energy drinks (10), cognac (9), low-end fortified wine (5), and grain alcohol (5). There were 388 spirits brands.

Determination of 2012 alcohol prices

Working from the 2011 database, we established a panel of brands for which a specific product (e.g., Johnnie Walker Red Label scotch) and product size (e.g., 750 mL) was available in all 13 control states with a monopoly on retail liquor sales. We identified 74 such brands, and these became the brands for which we compared license-state and control-state prices listed online in February 2012. The brands, specific products, and container sizes are shown in Table 1.

Next, we determined the availability of the 74 products in each of the 136 online liquor stores based in license states. We chose the 50 stores with the greatest percentage of available products among these 74 items. All 50 of these were retail stores with physical locations where alcohol is sold; none was an online-only business. Of the 50 stores, 47 were

alcohol-only businesses (liquor stores) and three were grocery stores that also sold liquor. Six of the stores were chains with multiple locations.

These 50 stores were located in 17 of the 32 license states and in the District of Columbia. The population of these states represents 80.7% of the total population of the license states plus the District of Columbia. Of the 15 license states not represented, nine are among the 10 least populated license states in the nation. The distribution of stores by state was as follows: Arkansas (1); California (10); Colorado (4); Connecticut (1); Delaware (1); District of Columbia (1); Florida (3); Georgia (1); Illinois (2); Indiana (1); Kentucky (1); Louisiana (1); Massachusetts (3); Minnesota (3); New Jersey (9); New York (4); South Carolina (1); Texas (3).

We determined the February 2012 price for each of the 74 products in each of the 13 control states and each of the 50 license-state liquor stores. Prices for all 74 products were available in all 13 control states as this was the criterion used to select the brands. The percentage of brands available in the license-state liquor stores ranged from 50% to 100%, with an average of 82% and a median of 85%; 36 of the 50 stores had at least 75% of the products available. The total number of price observations was 4,002 (962 for control states and 3,040 for license states). The prices we recorded were retail prices, which include state alcohol excise taxes but not state sales tax. If a product was being discounted at that time, then we used the sales price.

Confirmation of online prices

Because of the possibility that online prices might differ from in-store prices, we checked in-store prices for one product (1800 Silver Tequila, 750 mL) at 25 randomly selected license state stores (half of the total sample) by calling each store. For 23 of the 25 stores (92%), the in-store price was identical to the online price. For the other two stores, the online price was either 5.0% or 9.7% higher than the in-store price. The average product price obtained from the 25 online price quotes differed from the average of the actual in-store prices by 0.48%.

Data analysis

First, we computed the average price for each of the 74 brands in the license compared to the control states. For each individual brand, we compared the difference in average price between license and control states using an unpaired, two-sample t-test.

For analyses of mean price differences between license and control states across brands (i.e., overall price differences and differences by alcoholic beverage type), we used methods that account for store-level variation in prices, since the 74 sampled products were clustered within stores [30]. We modeled the data using a hierarchical, random effects linear regression with price as the dependent variable and store as the level-2 unit. Using SAS Proc Mixed, we modeled a random effect for store at level 2. Because our desire was to infer differences between control and license states for all liquor brands from which the chosen brands were sampled, we specified brands as random effects at level 1. The independent variable of interest was a dichotomous variable indicating whether or not the store was located in a license or control state. The regression coefficient for this variable and its 95% confidence interval were used to assess the magnitude and significance of price differences between license and control states. There were 4,002 observations in the overall analysis. For analyses of mean prices in license vs. control states across alcoholic beverage types, we used a similar model but restricted the analysis to the alcoholic beverage types of interest. As a check on the robustness of our results, we also ran a mixed regression model with a random effect for store and fixed effects for each brand.

We also examined price differences between the 13 control states. Because there was no store-level variation (prices were uniform in each state) and there were no missing data (every brand was priced once in each state), there was no store-level variation or brand compositional effect, so we simply computed the mean price of the 74 products within each state. The significance of differences in average prices between control states was assessed using a paired t-test.

RESULTS

Based on the random effects linear regression model, the overall mean price for the 74 brands in the license states was \$27.79 (95% confidence interval [CI], \$25.26–\$30.32) and in the control states was \$29.82 (95% CI, \$26.98–\$32.66) (Table 1). Although the difference in mean prices was small, the regression coefficient for the variable indicating a price observation being in a license versus a control state was negative and statistically significant (–2.03, 95% CI, –3.74 to –0.31, $p=0.02$), indicating that average prices in license states were approximately two dollars lower (6.9% lower) than in control states (Table 2).

The mean price was higher in the license states for 21 brands and higher in the control states for 53 brands (Table 1). A series of unpaired, two-sample t-tests indicated that 39 of the observed differences in mean prices by brand between the license and control states were statistically significant. Of these, the mean price was higher in the control states for 32 brands, while the mean price was higher in the license states for seven brands. The most consistent price differences between license and control states were for whiskey: all seven brands had higher average prices in the control states, and five of the seven price differences were statistically significant.

Looking at each alcoholic beverage type, the mean prices were similar in license and control states for bourbon, cognac, cordials/liqueurs, rum, and tequila, but prices in the control states were significantly higher for brandy, gin, scotch, vodka, and whiskey (Table 2).

An examination of overall mean prices by state shows considerable variation in prices among the control states themselves, with the lowest mean price in New Hampshire (\$26.15) and the highest in Washington (\$34.67) (Table 3).

DISCUSSION

To the best of our knowledge, this is the first comparison of alcohol prices between license and control states that uses data for a large sample of liquor brands. We found that overall prices across 74 spirits brands are slightly, but significantly, higher in control state-operated retail outlets than in license-state stores, with mean prices approximately seven percent higher for products sold in common.

Although the overall magnitude of price differences is small, there are some brands for which the price differences are substantial. For example, Dewar's scotch is 26% more expensive in control states, Johnnie Walker scotch is 24% more expensive, and Canadian Club whiskey is 19% more expensive. Only five brands were at least 10% more expensive in license states, while 27 brands were at least 10% more expensive in control states. These price differences appear to be significant enough to affect the purchase of specific brands, and may also affect the overall consumption of alcohol.

Our finding of lower prices in licensed outlets could partly account for the increased levels of alcohol consumption associated with the privatization of alcohol sales. In addition, however, the privatization of alcohol sales is generally associated with a higher number and greater diversity of alcohol outlets, more permissive hours of alcohol sales, increased

expenditures on marketing, and possibly reduced adherence to laws forbidding the sale of alcohol to underage or intoxicated persons [17,31–33]. All of these additional factors would also contribute to the adverse public health effects associated with privatization of alcohol sales. Importantly, one previous paper documented that the finding of decreased consumption in control states persisted even after controlling for differences in alcohol prices [33].

Our finding that alcohol prices are modestly, but significantly more expensive in control states accords with the findings of two previous studies [11,12], while contrasting with those of a third [9]. Our study adds to the existing literature in two ways. First, we rely on data from 74 liquor brands, rather than just one, to draw inferences regarding differences in prices between license and control states.

Second, we directly compare alcohol prices among the control states. Of particular importance is our finding that there were substantial price differences between some of the 13 control states. For example, the mean price among the 74 liquor brands was 26% higher in Washington than in New Hampshire. All but five brands were priced higher in Washington than in New Hampshire, and 42 brands were priced at least 30% higher. The two states' operational costs might differ, but it is difficult to imagine that they differ by a similar order of magnitude. This substantial variability suggests that control states do have flexibility in their pricing, and that increasing the price of alcohol is a feasible intervention for substantially reducing alcohol consumption and its associated costs in the control states. Not only is it feasible for control states to raise their overall prices, but it may also be important for them to consider increasing the prices of specific brands that are unusually inexpensive or establishing a minimum price per standard drink for the alcohol they sell [35].

There are several possible reasons for the lower prices observed in license states. First, liquor store outlet density is substantially higher in license states [36]. The combination of high outlet density in license states and state-owned monopolies in control states translates into much higher competition between liquor stores in license states, which would be expected to drive down prices. Second, there is evidence that the implicit taxes in control states are relatively high compared to explicit taxes in license states [37]. Factors influencing the higher implicit taxes in control states include the fact that these taxes are hidden, that control states need to make up for the inability to collect revenues from license fees, and that control states may need to make up for the higher costs associated with less efficient production [37]. Each of these factors could lead to higher price markups. Government revenues from liquor sales in control states are much higher than in license states [37], despite our finding that there is only a small difference in price.

The primary limitation of this paper is the potential for sampling bias as a result of our use of liquor stores with online prices. Stores that sell liquor online or which have an online database of prices for every product tend to be larger stores located in urban areas. Eight of the stores in our sample self-identified as liquor “superstores,” or “discount warehouses.” In addition, our method for selecting internet stores favored larger stores, which carry more brands. There is evidence that alcohol prices decrease as store size increases [38] and that prices are lower in urban areas [38]. Thus, our internet sampling strategy could have led to our underestimating alcohol prices in the license states.

There are three reasons why we do not believe this sampling bias invalidates our study results. First, we are not necessarily interested in reporting an average of alcohol prices among all liquor stores in each state. Of greater interest is a sales-weighted average of prices. One would want prices in larger stores to carry more weight in such an average

because these stores sell greater quantities of liquor. Second, large stores located in urban areas are available to a large proportion of the population. Hence, the prices in these stores do represent the prices of alcohol that are available to most residents of a state. Third, even if our reported averages are lower than the true average prices in a state, the results still indicate that lower alcohol prices are available in these states. This is not the case in the control states, where prices are uniform. Therefore, while our results do not necessarily document that average prices are lower in license states, they do suggest that products are available at lower prices in these states.

A second limitation of the study is that our sample of stores only encompassed 17 of the 32 license states. It is not clear whether this sample of stores generated price estimates that are representative of all of the license states. However, the states that are represented account for 80.7% of the license-states' total population, so these data may reasonably reflect a population-weighted average of license-state prices.

Recall that in confirming internet prices, we found that average prices were overestimated by about 0.5%. This is a third limitation of the paper. It would attenuate, though not completely offset the overestimation of prices due to our internet sampling strategy.

Despite these limitations, this paper provides novel evidence that liquor is available in license states at prices that are slightly lower than those in control states, and that policy changes in control states are necessary to address the substantial discrepancies in prices among these states. Additionally, all license states should consider increasing alcohol excise taxes, not only to bring their prices in line with those in the control states, but to further reduce alcohol consumption and its associated harms.

Finally, this work calls attention to the need for a comprehensive surveillance system to track brand-specific alcohol prices, to compare those prices across states, and to monitor trends, including changes in response to alcohol excise tax initiatives or other pricing policies. We hope that the methods developed here could play a role in helping to design such a surveillance system.

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Table 1

Average price for 74 alcohol brands – by jurisdiction, 2012.

Brand	License states			Control states		
	Mean (SD) ^b	Median	N	Mean (SD) ^b	Median	N
All alcohol brands (N=74)^a	\$27.79* (\$1.29)	N/A	962	\$29.82* (\$1.45)	N/A	3,042
Bourbon						
Basil Haydens, 750 ml	\$39.53 (\$5.20)	\$39.97	48	\$38.96 (\$3.08)	\$37.99	13
Bulleit, 750 ml	\$26.76 (\$4.76)	\$25.39	40	\$26.14 (\$2.37)	\$24.99	13
Early Times, 1750 ml	\$21.17 (\$3.59)	\$19.99	39	\$22.45 (\$3.07)	\$21.99	13
Evan Williams Black Label, 1750 ml	\$21.77** (\$3.28)	\$21.99	36	\$24.40** (\$2.61)	\$24.50	13
Ezra Brooks 90 Proof, 750 ml	\$14.64** (\$2.26)	\$13.58	16	\$11.62** (\$1.43)	\$11.49	13
Gentleman Jack, 750 ml	\$29.87 (\$4.56)	\$29.99	49	\$28.90 (\$1.50)	\$28.99	13
Jack Daniel's Black Label, 1750 ml	\$40.78** (\$5.11)	\$40.09	47	\$44.88** (\$3.25)	\$43.99	13
Jim Beam, 1750 ml	\$27.91** (\$4.36)	\$27.99	44	\$32.35** (\$3.93)	\$31.99	13
Knob Creek, 750 ml	\$32.30 (\$5.08)	\$31.99	46	\$33.73 (\$2.28)	\$32.99	13
Makers Mark, 1750 ml	\$46.78** (\$6.37)	\$46.99	43	\$54.27** (\$3.85)	\$53.99	13
Old Crow, 1750 ml	\$18.35 (\$2.76)	\$17.99	33	\$18.31 (\$3.14)	\$17.99	13
Wild Turkey 101, 750 ml	\$21.88 (\$2.38)	\$21.99	41	\$22.48 (\$1.83)	\$21.99	13
Woodford Reserve, 750 ml	\$32.74 (\$4.05)	\$32.44	43	\$33.63 (\$1.59)	\$33.50	13
Brandy						
Christian Brothers, 1750 ml	\$19.24** (\$3.23)	\$18.99	31	\$22.92** (\$3.34)	\$22.95	13
Cognac						
Courvoisier VS, 750 ml	\$29.61 (\$4.85)	\$29.83	47	\$28.66 (\$1.53)	\$28.99	13
Hennessy VS, 750 ml	\$31.52 (\$3.96)	\$30.95	47	\$32.63 (\$1.92)	\$32.99	13
Cordials/Liqueurs						
99 Liqueurs, 750 ml	\$17.84 (\$2.34)	\$17.90	34	\$17.52 (\$1.43)	\$16.99	13
Caravella Limoncello, 750 ml	\$20.43** (\$2.15)	\$19.99	36	\$22.02** (\$1.75)	\$21.99	13
Chambord, 750 ml	\$31.14** (\$3.13)	\$30.99	47	\$33.19** (\$2.41)	\$32.99	13

Brand	License states			Control states		
	Mean (SD) ^b	Median	N	Mean (SD) ^b	Median	N
Cointreau, 750 ml	\$35.59 (\$3.69)	\$35.99	43	\$37.62 (\$2.57)	\$37.99	13
Dekuyper Peachtree Schnapps, 750 ml	\$10.77 (\$1.40)	\$10.29	32	\$10.87 (\$1.75)	\$10.95	13
Di Saronno Amaretto, 750 ml	\$23.96 (\$3.43)	\$23.99	49	\$24.16 (\$2.66)	\$23.99	13
Drambuie, 750 ml	\$33.67 (\$3.44)	\$33.99	47	\$35.63 (\$3.57)	\$34.99	13
Goldschlager, 750 ml	\$24.38** (\$3.35)	\$23.99	41	\$22.37** (\$2.21)	\$22.95	13
Grand Marnier, 750 ml	\$35.80** (\$3.70)	\$35.99	48	\$38.46** (\$2.22)	\$39.40	13
Jagermeister, 750 ml	\$20.20 (\$2.63)	\$19.99	47	\$21.71 (\$2.30)	\$21.95	13
Kahlua, 750 ml	\$19.43 (\$2.88)	\$18.99	48	\$19.76 (\$1.06)	\$19.95	13
Kamora, 750 ml	\$12.06 (\$1.41)	\$11.99	29	\$11.93 (\$1.74)	\$11.95	13
Rumple Minze Peppermint Schnapps, 750 ml	\$24.31** (\$3.25)	\$23.99	41	\$22.29** (\$2.27)	\$22.95	13
Southern Comfort 100, 750 ml	\$21.90** (\$2.88)	\$21.14	38	\$19.06** (\$1.36)	\$19.10	13
Gin						
Beefeater, 1750 ml	\$32.23** (\$5.23)	\$30.99	43	\$38.60** (\$3.81)	\$39.90	13
Bombay Sapphire, 1750 ml	\$39.80** (\$6.99)	\$39.99	48	\$45.80** (\$4.74)	\$45.99	13
Gilbey's London Dry Gin, 1750 ml	\$17.48 (\$2.71)	\$16.99	33	\$18.74 (\$3.56)	\$18.95	13
Gordon's London Dry Gin, 1750 ml	\$18.90** (\$2.71)	\$18.99	42	\$20.86** (\$3.33)	\$20.00	13
Hendricks, 750 ml	\$32.33 (\$3.65)	\$32.98	43	\$34.28 (\$2.27)	\$33.99	13
Seagram's Extra Dry Gin, 1750 ml	\$19.76** (\$3.15)	\$18.99	37	\$22.01** (\$2.83)	\$21.99	13
Tanqueray, 1750 ml	\$36.71** (\$5.71)	\$37.49	46	\$42.76** (\$4.34)	\$43.15	13
Rum						
Admiral Nelson Spiced Rum, 1750 ml	\$18.86 (\$4.18)	\$17.95	27	\$19.93 (\$2.46)	\$19.95	13
Bacardi Gold, 1750 ml	\$22.26** (\$3.41)	\$21.99	43	\$25.32** (\$2.51)	\$25.99	13
Captain Morgan Spiced Rum, 1750 ml	\$26.85** (\$5.68)	\$24.99	45	\$30.73** (\$3.34)	\$29.99	13
Mount Gay Eclipse, 750 ml	\$19.88 (\$2.99)	\$19.99	41	\$18.76 (\$1.93)	\$17.99	13
Myers Original Dark, 750 ml	\$20.89** (\$3.20)	\$19.99	41	\$17.65** (\$2.01)	\$17.75	13
Sailor Jerry Navy Spiced Rum, 1750 ml	\$27.28** (\$5.34)	\$27.98	39	\$31.98** (\$4.06)	\$31.95	13

Brand	License states			Control states		
	Mean (SD ^b)	Median	N	Mean (SD ^b)	Median	N
Scotch						
Chivas Regal 12 Year, 1750 ml	\$60.36 ^{**} (\$9.37)	\$61.99	45	\$68.92 ^{**} (\$3.62)	\$67.99	13
Dewar's White Label, 1750 ml	\$34.82 ^{**} (\$5.14)	\$34.98	45	\$46.88 ^{**} (\$4.14)	\$45.99	13
Famous Grouse, 750 ml	\$23.43 (\$3.05)	\$22.99	38	\$24.09 (\$2.44)	\$23.99	13
Glenlivet 12 Year Single Malt, 750 ml	\$36.29 ^{**} (\$6.17)	\$36.89	50	\$40.51 ^{**} (\$2.34)	\$39.95	13
Glennorange 10 Year, 750 ml	\$40.19 (\$6.23)	\$39.99	47	\$39.81 (\$0.39)	\$39.95	13
Highland Park 12 Year, 750 ml	\$45.86 (\$6.59)	\$44.99	38	\$44.96 (\$3.41)	\$45.90	13
Johnnie Walker Red, 1750 ml	\$35.78 ^{**} (\$4.61)	\$35.49	46	\$47.36 ^{**} (\$4.10)	\$47.95	13
Tequila						
1800 Silver, 750 ml	\$26.84 (\$3.64)	\$26.99	45	\$28.19 (\$2.89)	\$28.95	13
Cabo Wabo Blanco, 750 ml	\$35.52 (\$6.31)	\$36.24	36	\$34.66 (\$1.32)	\$34.95	13
Milagro Silver, 750 ml	\$28.20 (\$4.74)	\$27.99	44	\$29.66 (\$2.41)	\$28.99	13
Vodka						
Absolut, 1750 ml	\$33.13 ^{**} (\$5.15)	\$31.99	49	\$39.46 ^{**} (\$4.79)	\$39.95	13
Belvedere, 750 ml	\$31.04 (\$4.22)	\$29.99	46	\$29.90 (\$1.93)	\$29.95	13
Burnett's, 1750 ml	\$15.19 ^{**} (\$2.38)	\$14.24	32	\$16.98 ^{**} (\$2.87)	\$16.00	13
Chopin Potato Vodka, 750 ml	\$34.58 ^{**} (\$5.45)	\$34.42	42	\$30.47 ^{**} (\$1.84)	\$29.99	13
Grey Goose, 1750 ml	\$57.31 (\$6.69)	\$56.99	48	\$60.94 (\$3.80)	\$59.99	13
Ketel One, 1750 ml	\$40.78 ^{**} (\$5.37)	\$39.99	49	\$47.07 ^{**} (\$4.89)	\$48.95	13
Pinnacle, 750 ml	\$13.44 (\$2.08)	\$13.99	31	\$13.01 (\$1.09)	\$12.99	13
Popov, 1750 ml	\$15.40 (\$2.61)	\$14.98	27	\$15.39 (\$3.14)	\$14.95	13
Skyy, 1750 ml	\$25.57 ^{**} (\$4.56)	\$24.99	47	\$29.28 ^{**} (\$3.41)	\$27.99	13
Smirnoff, 1750 ml	\$21.35 ^{**} (\$2.95)	\$20.44	46	\$24.27 ^{**} (\$3.18)	\$24.95	13
Stolichnaya, 1750 ml	\$32.54 ^{**} (\$5.62)	\$29.99	48	\$39.94 ^{**} (\$4.97)	\$41.99	13
Svedka, 1750 ml	\$20.83 ^{**} (\$2.25)	\$19.99	44	\$24.80 ^{**} (\$2.86)	\$24.99	13
Three Olives, 750 ml	\$22.51 ^{**} (\$4.95)	\$21.99	34	\$19.23 ^{**} (\$1.33)	\$19.95	13

Brand	License states			Control states		
	Mean (SD) ^b	Median	N	Mean (SD) ^b	Median	N
Tito's Handmade Vodka, 750 ml	\$19.72 (\$2.04)	\$19.97	38	\$20.65 (\$2.13)	\$19.99	13
Whiskey						
Black Velvet, 1750 ml	\$17.57** (\$3.26)	\$16.99	38	\$19.78** (\$2.32)	\$19.49	13
Canadian Club, 1750 ml	\$21.33** (\$4.94)	\$19.99	40	\$26.38** (\$4.06)	\$25.95	13
Canadian LTD, 1750 ml	\$15.57 (\$3.55)	\$14.54	24	\$17.12 (\$2.44)	\$16.95	13
Canadian Mist, 1750 ml	\$18.80** (\$2.64)	\$18.98	41	\$21.27** (\$2.48)	\$20.99	13
Crown Royal, 1750 ml	\$46.71** (\$8.13)	\$46.99	40	\$52.21** (\$4.16)	\$50.95	13
Jameson Irish, 1750 ml	\$44.35** (\$5.58)	\$43.99	42	\$50.86** (\$3.73)	\$49.99	13
Seagram's 7 Crown, 1750 ml	\$20.68 (\$3.43)	\$19.99	42	\$22.10 (\$3.06)	\$21.99	13

^a Average price for all brands combined in license and control states determined from two-level, random effects linear regression analysis accounting for store-level variation and including random effects for brand.

^b SD: standard deviation. For all brands combined, standard error of the mean is shown. N = number of stores in which product was priced;

* Differences in mean price statistically significant at P<0.05 based on significance of regression coefficient for variable indicating status as license or control state in random effects linear regression model;

** P<0.05 for unpaired, two-sample t-test (number of observations are as shown in the table);

N/A: Not applicable. Median was not computed for all alcohol brands combined because some brands were not available at every license state store so median would not be comparable between license and control states.

Table 2

Average price for 74 alcohol brands – by alcoholic beverage type and jurisdiction, 2012.

Jurisdiction and beverage type	Observations	Regression coefficient for variable indicating license compared to control state ^a (95% CI)	Mean (SE) ^a
All alcohol brands (N=74)			
License states	3,042	-2.03 (-3.74, -0.31)	\$27.79* (\$1.29)
Control states	962		\$29.82* (\$1.45)
Bourbon (N=13)			
License states	525	-1.32 (-3.22, 0.58)	\$28.85 (\$2.70)
Control states	169		\$30.16 (\$2.80)
Brandy (N=1)			
License states	31	-3.68 (-5.75, -1.62)	\$19.24* (\$0.57)
Control states	13		\$22.92* (\$0.88)
Cognac (N=2)			
License states	94	0.10 (-2.32, 2.52)	\$30.74 (\$1.07)
Control states	26		\$30.65 (\$1.41)
Cordials/Liqueurs (N=14)			
License states	580	-0.37 (-1.46, 0.72)	\$23.67 (\$2.11)
Control states	182		\$24.04 (\$2.16)
Gin (N=7)			
License states	292	-3.72 (-5.91, -1.53)	\$28.15* (\$3.46)
Control states	91		\$31.86* (\$3.56)
Rum (N=6)			
License states	236	-1.33 (-3.23, 0.57)	\$22.73 (\$1.60)
Control states	78		\$24.06 (\$1.75)
Scotch (N=7)			
License states	309	-5.09 (-7.48, -2.71)	\$39.55* (\$4.09)
Control states	91		\$44.65* (\$4.19)
Tequila (N=3)			
License states	125	-0.59 (-2.67, 1.49)	\$30.24 (\$2.10)
Control states	39		\$30.83 (\$2.24)
Vodka (N=14)			
License states	581	-2.06 (-3.90, -0.23)	\$27.32* (\$3.18)
Control states	182		\$29.38* (\$3.25)
Whiskey (N=7)			
License states	267	-3.44 (-5.69, -1.19)	\$26.52* (\$4.82)
Control states	91		\$29.96* (\$4.90)

^aRegression coefficient represents difference in dollars between average price in license states and control states. Average price across brands in license and control states determined from two-level, random effects linear regression analysis accounting for store-level variation and including random effects for brand. CI: confidence interval; SD: standard deviation.

*Differences in mean price statistically significant at $P < 0.05$ based on significance of regression coefficient for variable indicating status as license or control state in random effects linear regression model.

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Table 3

Differences in average price for 74 alcohol brands among 13 control states, 2012.

State	Number of observations	Average price Mean (SD)	Median price
Northeast			
Maine	74	\$29.13* (\$11.21)	\$26.49
New Hampshire	74	\$26.15 (\$10.95)	\$24.74
Pennsylvania	74	\$28.50* (\$11.68)	\$25.99
Vermont	74	\$29.95* (\$12.29)	\$28.49
South			
Alabama	74	\$30.60* (\$12.77)	\$26.99
North Carolina	74	\$29.39* (\$12.58)	\$27.45
Virginia	74	\$31.15* (\$13.25)	\$29.95
Midwest			
Ohio	74	\$29.11* (\$12.51)	\$25.13
West			
Idaho	74	\$29.65* (\$11.21)	\$27.45
Montana	74	\$28.61* (\$12.05)	\$25.95
Oregon	74	\$30.59* (\$12.25)	\$27.95
Utah	74	\$30.12* (\$12.66)	\$27.99
Washington	74	\$34.67* (\$12.82)	\$29.95

SD: standard deviation;

*P<0.05 for paired, two-sample t-test comparing average price to that in New Hampshire.