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Paul Byrne
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Washburn University
School of Business
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785-670-1308
www.washburn.edu/sobu

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* Paul Byrne is associate professor of economics at the School of Business at Washburn University. Dmitri Nizovtsev is associate professor of economics at the School of Business at Washburn University. Comments should be directed to Paul Byrne, School of Business, Washburn University, 1700 SW College Ave. Topeka, Kansas 66621, 785-670-1597, paul.byrne@washburn.edu.

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Paul Byrne
School of Business
Washburn University
1700 SW College Ave., Topeka, KS 66621
Phone: (785) 670-1597
Fax: (785) 670-1063
E-mail: paul.byrne@washburn.edu

Dmitri Nizovtsev(corresponding author)
School of Business
Washburn University
1700 SW College Ave., Topeka, KS 66621
Phone: (785) 670-1599
Fax: (785) 670-1063
E-mail: dmitri.nizovtsev@washburn.edu

Abstract

Laws regulating the retail sale of alcoholic beverages vary greatly by state. Whereas some states allow the sale of beer, wine and hard liquor at grocery stores and other retail establishments, others restrict the sale of one or more of the beverage categories to private or state-owned liquor stores. Increasingly states have considered the liberalization of alcoholic beverage sales. Although Washington is the only state to significantly liberalizetheir regulation of alcohol in recent years, several states across the country havealso considered loosening existing restrictions.This paper examines the impact of retail restrictions on alcohol consumption as well as retail sector structure and employment using panel data from the fifty US states from 2001 to 2010. Preliminary results suggest that prohibiting wine and hard liquor sales at grocery and convenience stores reduces alcohol consumption and increases liquor store employment, but does not affect employment in grocery stores or other retail establishments. However, states that only prohibit hard liquor sales at grocery and convenience stores and states that prohibit all alcohol sales at such storesare not significantly different than unrestricted states in terms of overall alcohol consumption or liquor store employment. These results may contribute to the policy debate surrounding the liberalization of state alcohol retail laws.

*JEL:*D78, H70, L51, L81

1. Alcohol laws in the United States: an overview

The sale and consumption of alcoholic beverages in the United States is heavily regulated through state laws. The degree and form of state alcohol policies vary greatly across states, with some regulations dating as far back as the Prohibition era. The existing laws and policies vary with respect to regulation of the sale and distribution of alcohol, excise taxation of various alcoholic beverages, legal limits on blood alcohol concentration levels and penalties for associated violations, open container laws, beer keg registration and alcohol server training laws, or open container laws.

The last four decades have seen have seen a more restrictive regulatory environment along some dimensions and a liberalization of regulations along other dimensions with stricter blood alcohol concentration limits and keg registration rulesalong with a lowering of effective excise taxes and other restrictions. The push towards a liberalization of alcohol-related laws has gotten especially strong in recent years. Example of that trend abound. In 2011 a number of Georgia municipalities eliminated their prohibition of Sunday sales of packaged liquor. In 2011 and 2012 Tennessee and Kansas, respectively, eliminated their prohibition of the distribution of free beverage samples in restaurants and bars. Most prominently, in 2012 Washington ended the state monopoly on alcohol sales, allowing the sale of alcohol at privately owned liquor stores, grocery stores and other retail establishments. Oregon and Pennsylvania legislatures are considering similar measures.

The majority of arguments in the alcohol liberalization debate revolve around four topics: consumer choice and convenience, the effect on alcohol consumption volume, wealth distribution effects, and the overall effect on local economies. This last argument usually focuses on job creation, tax revenue, and overall economic efficiency. Our study focuses on how state restrictions on retail alcohol sales impact alcohol consumption and retail sector employment.

The next section provides a more detailed overview of existing alcohol retail restrictions and states the research questions. Section 3 reviews prior literature relevant to the question at hand. Section 4 describes the data sources and provides the descriptive analysis of the data. The following two sections present the statistical procedures and results. Section 7 concludes and outlines directions for further research.

2. Types and forms of restrictions in sale and distribution of alcohol

States currently regulate the sale of alcoholic beverages under two general systems: a control system or a licensure system. Generally, when a state directly controls the pricing of some types of alcoholic beverages – through operating state stores, regulating agency stores, or directly setting the retail price – these types of beverages are considered to be under direct state control and the state is considered a "control" or "monopoly" state. When a state government indirectly controls the sale and distribution of alcohol through licensing of privately owned establishments, it is considered a "licensure" or "privatized" state.

Currently in the U.S., most states operate under a license system. However, 18 states maintain some direct control over certain sectors of the alcoholic beverage market. The following table summarizes the specifics of retail provisions for those eighteen "alcoholic beverage control states".

Table 1.The list of alcoholic beverage control (ABC) states.

State	Degree of state ownership in alcohol distribution
Alabama	State-owned stores for all beverages
Idaho	State owned stores for beverages with VAC>16%
Iowa	Wholesale only
Maine	Private stores, contracted by state for commission
Maryland	State-owned stores in 4 out of 24 counties
Michigan	Wholesale only
Mississippi	State-contracted stores
Montana	State-contracted stores
New Hampshire	State owned stores for beverages with VAC>16%
North Carolina	State owned stores for beverages with VAC>16%
Ohio	State-contracted stores for beverages with VAC> 21.5%
Oregon	State-contracted stores for hard liquor
Pennsylvania	State-owned stores for all beverages
Utah	State-owned stores for all beverages
Vermont	State-contracted stores
Virginia	State owned stores for beverages with VAC>14%
Washington (prior to 2012)	A mix of state-owned and contracted stores
West Virginia	Wholesale only
Wyoming	Wholesale only

Among the licensure states, retail restrictions also vary significantly. Some states have few restrictions whereas others have restrictions on the days and hours of alcohol sales on the type of establishments through which alcohol can be sold to consumers. Several states still have dry counties where sales of alcohol by the drink are banned. Kansas has 19 such counties and Arkansas has 22. See Figure 1.

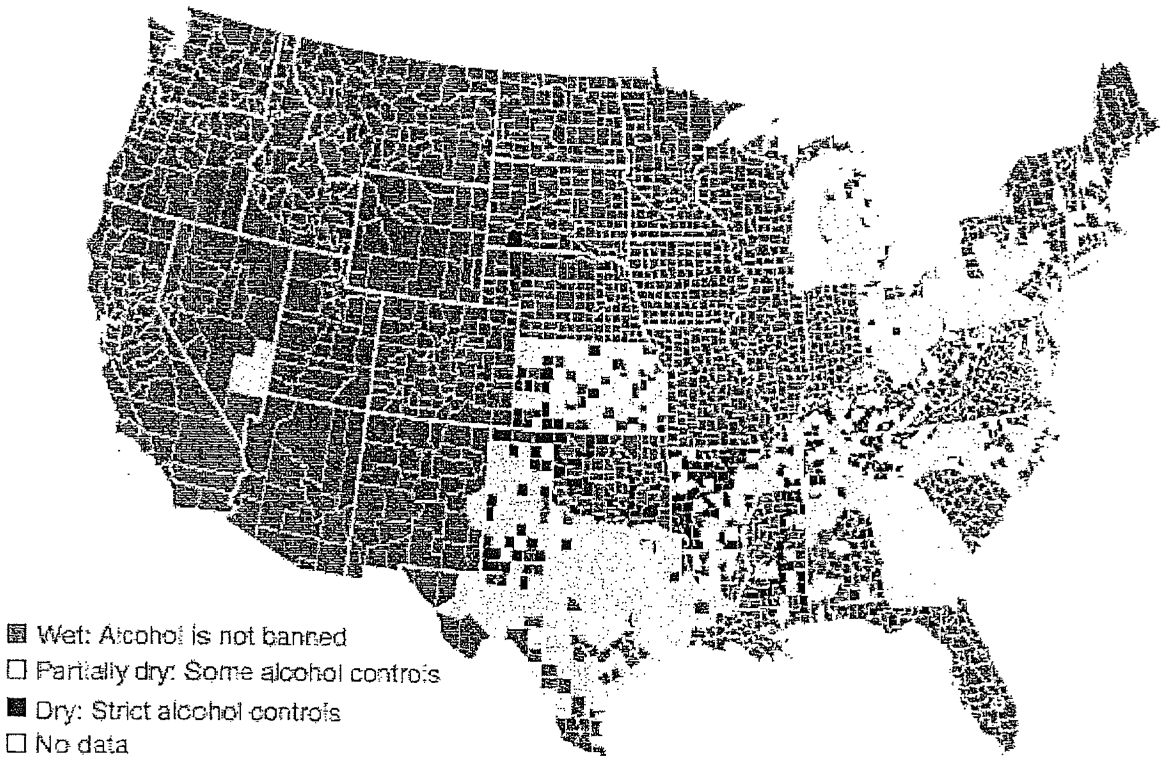

Figure 1. The map of "dry" and "partially dry" counties in the United States (Wheeler, 2012).Counties are classified as "partially dry" where wet communities exist within dry counties, or where dry communities exist within wet counties. The exact definition of wet and dry differs between states.

Individual state alcoholic beverage control boards establish several categories of alcoholic beverages. Aside from some exceptions, they are usually "hard liquor", "wine", "regular strength beer" or simply "beer", and "cereal malt beverages", or CMB. Generally, the category of 'hard liquor' includes spirits and fortified wine. The minimum alcohol contents threshold qualifying a beverage as "hard liquor" ranges between 16 and 22 percent by volume and differs across states. The "regular strength" term is used to describe beer with alcohol contents greater than 3.2% (in some cases 3.5%) by volume. Beer and wine coolers with lower alcohol content fall into the CMB category.

In the most restrictive states, all alcoholic beverages must be sold at state or licensed retail liquor stores. There are also states in which such limitations apply to stronger alcoholic beverages whereas beverages with lower alcohol content can be sold at a wide range of establishments. At different states, the line between the two beverage groups is drawn at different levels but in all cases restrictions (or absence thereof) are tied to the alcohol content. The following table summarizes the nature of alcohol retail restrictions in 32 licensure states.

Table 2. Variations in alcohol retail restrictions among the 32 licensure states.

Sales restricted to specialized liquor stores?				States	State count
Hard Liquor	Wine	Beer	CMB		
No	No	No	No	AK, AZ, CA, HI, IL, IN, LA, MA, MO, NE, NM, NV, SD, WI	14
Yes	No	No	No	AR, FL, GA, SC, TX	5
Yes	Yes	No	No	CT, KY, NY, TN,	4
Yes	Yes	Yes	No	CO, KS, MN, OK	4
Yes	Yes	Yes	Yes	DE, MD, ND, NJ, RI	5

Just like in the case of liquor laws in general, there has been a push for liberalization of retail restriction rules. The state of Kansas is one such example. It is currently among the most restrictive among the licensure states, with sales of packaged alcohol with greater than 3.2% alcohol content allowed exclusively at licensed retail liquor stores. Two virtually identical bills seeking to remove that restriction and allow wide sales of alcohol at various retail establishments were introduced to state legislative committees one year apart from each other.

The arguments that were put forth in favor of changing the existing alcohol retail laws can be summarized as follows:

- The proposed change would promote competition in the retail sector, increase sector efficiency and lower the prices of alcoholic beverages;
- Liquor stores would benefit from diversifying their product offerings;
- The proposed changes would provide greater convenience for consumers;
- New higher paying jobs would be created in the retail sector;

- Construction of new buildings would occur, further contributing to job creation;
- State tax revenue would increase.

The quantitative estimates of the possible effects of deregulation varied. For example, one study presented to a Kansas Senate Committee in 2011 stated that "statewide retail transformation and expansion will add more than 15,000 jobs, more than $340 million in workers' wages, and more than $70 million in annual state and local tax revenues"(Kansas Legislature, 2011).

Thearguments in favor of keeping the status quo of restricting liquor sales only to specialized stores include:

- Negative impact on small local businesses which will be crowded out by large grocery chains;
- Consequently, the state budget may lose parts of its tax revenue to other states where those grocery chains are headquartered;
- Lack of support for some of the claims made by the opposite camp (Note the conflicting goals, such as efficiency and job creation);
- The increase in the number of licenses issued would require a larger regulatory body thus increasing state regulation costs;
- The changes would result in greater availability of alcohol, including to minors, as liquor stores are prohibited from hiring workers under 21 years of age;
- Lower prices would increase alcohol consumption.

The composition of interest groups on each side of the debate can be easily explained to the welfare effects of the possible change. The bills calling for restrictions removal received strong support from the Kansas Chamber of Commerce, the Topeka Chambers of Commerce, and the Petroleum Marketers and the Convenience Store Association of Kansas. Opposition to the bills came from the Coalition of Liquor Store Owners as well as religious groups and anti-alcoholism groups. Liquor stores funded studies contending that eliminating the restrictions would adversely affect employment as liquor stores lost sales to retailers, whereas proponents of the law funded studies contending that eliminating the restrictions would result in job growth in grocery stores that would more than offset any losses in the liquor store sector.

This paper attempts tocontribute to the understanding of the role played by alcohol retail restrictions by providing an objective economic analysis of the issues at hand. More specifically, we are interested in establishing a correlation between the degree of alcohol retail restrictions on one hand and alcohol consumption and the viability of the retail sector and its specific segments on the other.

3. Prior literature

There is a vast body of research on alcohol and alcohol-related policies, some of which has relevance for the present study.

A large literature establishes that beverage alcohol prices and taxes are related inversely to drinking. Wagenaar et al. (2009) conducted a meta-analysis of 1003 estimates of the tax/price–consumption relationship compiled from 112 studies and produced mean price elasticities of −0.46 for demand for beer, −0.69 for wine and −0.80 for spirits, concluding that public policies that raise prices of alcohol are effective means to reduce drinking.

Prior studies on other factors affecting demand for alcohol (Manning et al., 1995, Nelson, 1999, Chaloupka et al., 2002, and others) that alcohol consumption is driven primarily by demographics and income. Published estimates of price elasticity of demand for alcohol vary widely due to the variety of approaches used and the statistical challenges associated with such analysis, summarized most notably in Ruhm et al. (2012). The most frequently quoted income elasticity estimates are 0.14 for beer, 0.20 for wine, and 0.31 for spirits (Ornstein and Levi, 1983, Leung and Phelps, 1993), indicating that consumption of alcoholic beverages increases when consumer income increases.

There is also evidence of a relationship between alcohol consumption and market structure. According to Babor et al. (2005), restrictions on the physical availability of alcohol, including retail availability, can contribute to the reduction of consumption and through that – of alcohol-related problems, especially for underage persons. Specific effective policies include reductions in the hours and days of sale and the number of alcohol outlets, as well as restrictions on access to alcohol.

A similar finding stems from other prior studies on alcohol distribution systems, which focus primarily on the effects of changing from a control system to a licensure system. Several studies demonstrate that when a state or country switches from allowing certain alcoholic beverages to be sold only in state-owned stores to allowing sales in privately owned stores, overall sales of such beverages increase significantly (Toomey &Wagenaar, 1999; Toomey et al., 1993). Possible reasons for increased sales naturally follow from economic incentives to maximize profits when private sales are allowed. They include longer sale hours, lower prices, a greater number of stores, and increased marketing and promotion.

Gruenewald et al. (1993) conducted a time-series cross-sectional analysis of alcohol consumption and density of alcohol outlets across 50 U.S. states. The results suggested that a 10% reduction in the density of alcohol outlets would reduce consumption of spirits 1-3% and consumption of wine by 4%. However, the factors affecting the structure of the market and the outlet density are not well understood.

Therefore it is interesting to see whether the restrictions imposed on the type of establishments allowed to sell a specific alcohol product affect the number of outlets and through that, consumption.

Research on the role of retail restrictions is limited. A recent study by Baker and Nizovtsev (2013) explores how the cross-state differences in retail restrictions translate into the number of retail establishments, jobs, and earnings. That study, however, is limited in its scope in terms of the number of states included in the sample and the number of explanatory variables used. The goal of the present study is to improve the understanding of alcohol retail restriction and their effects.

4. Sample and variable selection

In this study, we are interested in whether and how the consumption, the retail market structure, and wages in that sector correlate with the form of retail restrictions. Obviously, the best way to address these questions would be through a longitudinal event study of states that implemented a change the same change as the one discussed. Unfortunately, no such "natural experiment" has occurred in the last 25 years. For that reason, our best choice remains performing cross-state analysis of the relationship between restrictions on alcohol retail sector and variables of our interest (alcohol consumption, number of retail establishments, and wages).

As mentioned previously, within the sample of fifty states there are eighteen "alcoholic beverage control (ABC) states", see Table 1.For our purposes, those states pose several problems. In the most extreme case, prices in those states are set by the government, which distorts the consumption statistics and makes the cross-state comparison of excise taxes unreliable. Furthermore, in some control states the government makes the decisions on the number of liquor stores, which makes at least one of our research questions meaningless. Even in those states in which the state owns only the wholesale sector, the peculiarities of the distribution system often affect retail prices therefore consumption. For all the aforementioned reasons, we exclude ABC states from the sample.

The information about the variable of immediate interest to us, the specific form of retail restriction, was collected from individual state alcoholic beverage control authorities.The data on state population and demographic characteristicswas obtained from the Bureau of the Census' American Community Survey.The data on alcohol consumption comes from the most recent and comprehensive study by LaVallee and Yi (2012).The data on the number of retail establishments, employment, and wages for various store categories was obtained from the Bureau of Labor Statistics' Quarterly Census of Employment &Wages. Table 3 presents the full set of establishment categories for which data was collected and used in this study. That information was only available for years 2001-2010, which determined the time horizon for our study. Table 4 presents descriptive statistics for variables used in the analysis.

Table 3. Store categories examined in the present study and their North American Industry Classification System (NAICS) codes.

NAICS code	Store category description
4451	Supermarkets and other grocery stores, which included
44511	- Supermarkets and other grocery stores
44512	- Convenience stores
4453	Liquor stores
44611	Pharmacies and drug stores
44711	Gas stations with convenience stores
45291	Warehouse clubs and supercenters
45299	General merchandise stores, other

Naturally, when it comes to studying the retail market structure, our primary focus is on the (dis)incentives the restrictions or their removal create for private businesses. This is mainly because in the case of state- or federal-owned stores factors other than efficiency and profit seeking may play a role. That, along with some missing observations in the federal store category, made us focus on private stores only.

One shortcoming of our study is the absence of consistent information about alcohol prices, which have been shown to be one of the factors affecting consumption (Ruhm et al., 2012, and others). We do, however, have information on state excise tax rates, obtained from the Tax Foundation (2010). Those taxes correlate with prices for alcoholic beverages. Prior studies found that the difference in tax treatment across states has strong effect on consumption patterns and business relocation (Coats, 1995, Chiou and Muehlegger, 2008, Hoyt et al., 2008, and others).

Table 4.Summary Statistics.

Variable	Variable Description	Mean	Standard Deviation
ln (LiqEmploy)	ln (Employment in Liquor Stores)	7.68	1.07
ln (LiqFirms)	ln (Number of Liquor Stores)	5.95	1.12
ln (LiqWages)	ln (Total Weekly Wages of Liquor Store Workers)	10.63	1.21
ln (GrocEmploy)	ln (Employment in Grocery Stores)	10.41	1.04
ln (GrocFirms)	ln (Number of Grocery Stores)	6.98	1.08
ln (GrocWages)	ln (Total Weekly Wages of Grocery Store Workers)	13.38	1.10
Alcohol Per Capita	Per capita ethanol consumption	2.56	0.42
Beer Per Capita	Per capita ethanol consumption from beer	1.34	0.22
Wine Per Capita	Per capita ethanol consumption from wine	0.37	0.16
Liquor Per Capita	Per capita ethanol consumption from liquor	0.84	0.20
Restrict_Liquor	=1 if state restricts liquor only	0.16	0.36
Restrict_Wine&Liq	=1 if state restricts liquor and wine only	0.13	0.33
Restrict_All	=1 if state restricts liquor, wine and beer	0.28	0.45
Population Density	Population per square mile	239.19	302.26
ln (Median Income)	ln (median household income)	10.75	0.16
ln (Alcohol Consumption)	ln (total ethanol consumption in state)	15.87	0.97
% aged 18 to 24	% of population aged 18 to 24	10.10	0.93
% aged 25 to 44	% of population aged 25 to 44	27.73	1.66
% aged 45 to 64	% of population aged 45 to 64	24.76	1.51
% with Bach. Degree	% of population with a bachelor's degree or higher	26.72	4.79
State Liquor Tax	State tax on liquor ($ per gallon)	4.03	2.01
State Wine Tax	State tax on wine ($ per gallon)	0.76	0.55
State Beer Tax	State tax on beer ($ per gallon)	0.26	0.24
State Sales Tax Rate	State sales (%)	5.05	1.62

5. Empirical model and methodology

This paper estimates the impact of retail restrictions on retail sector employment, wages and number of establishments, as well as alcohol consumption using panel data of the 32 non-alcohol beverage control states from 2001 to 2010. The panel data model is

$$y_{it} = \alpha + \beta X_{it} + \theta_1 Restrict\_Liquor_i + \theta_2 Restrict\_Wine\&Liq_i + \theta_3 Restrict\_All_i + \gamma Z_i + \varepsilon_{it}$$

Here, $X_{it}$is the vector ofstate time-varying covariates. For the retail sector regressions these include population density, ln(median household income), ln(total liquor consumption), percentage of the population in the 18 to 24, 25 to 44 and 45 to 65 age groups, percentage of the population with a bachelor degree or higher, liquor taxes, and sales tax rates. The variables *Restrict_Liquor*, *Restrict_Wine&Liq*, and *Restrict_All* are dummy variables for the type of restrictions in a state. No state had changed their alcohol restrictions over the time period in our sample making these variables time-invariant. Z_i are unobserved time-invariant state effects, andε_{it} are idiosyncratic errors. The alcohol consumption model is similar, except that ln(total liquor consumption) is excluded from the right hand side of the equation.

Estimating equation (1) using a pooled-OLS or random-effects (RE) approach leads to consistent estimates under the assumption that the unobserved state effects, Z_i, are uncorrelated with the observed explanatory variables. However, if this assumption is violated both estimations will yield biased estimates. On the other hand, a fixed-effects (FE) estimation of the model can yield unbiased estimates even in the presence of an unobserved state effect that is correlated with other explanatory variables. The standard fixed-effect estimator transforms equation (1) by subtracting the state mean value from each variable as follows:

$$y_{it} - \overline{y}_i = \alpha + \beta(X_{it} - \overline{X}_i) + \theta_1(Restrict\_Liquor_i - \overline{Restrict\_Liquor}_i) + \theta_2\left(Restrict\_Wine\&Liq_i - \overline{Restrict\_Wine\&Liq}_i\right) + \theta_3\left(Restrict\_All_i - \overline{Restrict\_All_i}\right) + \gamma\left(Z_i - \overline{Z}_i\right) + (\varepsilon_{it} - \overline{\varepsilon}_i)(2).$$

Since the unobserved Z_i is time-invariant, its value in each time period is equal to the jurisdictional mean and drops out of equation (2). So whereas OLS and RE require that there is no unobserved variable that impacts both the dependent variable and one of the independent variables (such as the alcohol taxes or the manner in which states restrict alcohol sales), the only requirement for consistent FE estimates is that the independent variables are uncorrelated with deviations of ε_{it} from the average over the time period thus eliminating any bias from time invariant omitted variables (Wooldridge 2001).The fact that the primary variables of interest, alcohol restrictions, are constant across timemakes them also drop out of the equation, meaning the FE approach cannot produce estimates of θ_1- θ_3. Although the FE model is not useful in directly answering the primary research questions (the impact of restrictions on the retail sector and consumption), it can be used to test the validity of the RE model's assumptions using the Hausman test. Because the FE model is consistent in the presence of time-invariant omitted variables and the RE model is biased under such assumptions, the Hausman test can be used to test whether the differences in the coefficients from the FE and RE models are systematic. If the time-varying coefficients from the two models are not significantly different from one another, this would suggest that the RE model, which does produce coefficient estimates for the time-invariant alcohol restriction variables, is not biased by an omitted variable.

6. Empirical Results and Discussion

Table 5 shows the results of the RE model with alcohol consumption as the dependent variable. The first specification measures alcohol consumption as gallons of ethanol consumed per capita from all types of alcohol. The next three specifications break consumption down into gallons of ethanol consumed per capita from beer, wine and hard liquor, respectively.In the first specification, the coefficients for ln(median income), percent of the population in the 18 to 24, 25 to 44 and 45 to 65 age groups are all statistically significant at the 1% level. Results indicate that alcohol consumption in a normal good with a one-percent change in income causing a 0.343 gallon change in total ethanol consumption (average per capita consumption for the sample is 2.6 gallons).The percent of the population aged 25 to 44 is the age group with the largest impact on alcohol consumption with a one percentage point change in the age group increasing per capita ethanol consumption by 0.148 gallons. A percentage point increase in the 45 to 64 category increases per capita ethanol consumption by 0.133 gallons and a percentage point increase in the 18 to 24 category increases per capital ethanol consumption by 0.083 gallons.

In regards to the impact of state restrictions of alcohol sales on overall alcohol consumption, the coefficients for *Restrict_Liquor* and *Restrict_All* are not statistically significant suggesting that states that only restrict the sale of hard liquor to liquor stores and states that restrict the sale of hard liquor, wine and beer to liquor stores exhibit similar consumption patterns as the omitted category: states that do not place any restrictions on the sale of hard liquor, wine and beer. The sole case when a restriction on sales significantly impacts per capita alcohol consumption is found in states that restrict the sale of hard liquor and wine to liquor stores but allow the sale of beer in other retail establishments. The coefficient for *Restrict_Wine&Liq* is significant at the 1% level and suggests that such a restriction on wine and hard liquor decreases per capita ethanol consumption in the state by 0.656 gallons, a significant increase given the sample mean of 2.56 gallons per capita. The p-value for the Hausman test that the coefficients from the RE and FE models do not differ from each other is 0.4012 indicating that the assumptions of the RE model are not violated.

The second specification shows the impact of sale restrictions, demographic variables and taxes on per capita ethanol consumption from beer. Income is again statistically significant with a 1% increase in income increasing ethanol consumption from beer by 0.146 gallons. The age profile of a state's population also impacts per capita beer consumption with a one-percentage point increase in the 18 to 24 age group increasing ethanol consumption from beer by 0.043 gallons and a one-percentage point increase in the 25 to 44 age group increasing ethanol consumption from beer by 0.055 gallons. However, the percentage of the population in the 45 to 64 age group does not have a statistically significant impact on beer consumption. In contrast to total alcohol consumption, per capita beer consumption is impacted by the population density of a state with a 100 person per square mile increase in population density decreasing ethanol consumption from beer by 0.04 gallons.

Similar to the first specification, the only state restriction on the sale of alcohol that impacts beer consumption is found in states that restrict the sale of hard liquor and wine to liquor stores but allow the sale of beer in other retail establishments. The coefficient for *Restrict_Wine&Liq* is again significant at the 1% level and suggests that such a restriction on wine and hard liquor decreases per capita ethanol consumption from beer in the state by 0.305 gallons. The finding of a significant negative coefficient of *Restrict_Wine&Liq* in the first specification could be explained by the restriction causing a decrease in ethanol consumption by consumers switching alcohol purchases from the more potent wine and hard liquor to less potent beer or to other non-alcohol goods. However, the finding that states that restrict wine and liquor purchases to liquor stores but do not restrict the sale of beer exhibit lower beer consumption than states that place no restrictions on alcohol purchases suggest that any causal impact that the legal restriction have on alcohol consumption is overwhelmed by the political economy explanation that states whose population does not have a strong preference for alcohol consumption are more likely to pass legislation restricting the sale of alcohol. As was the case in the first specification, the p-value of the Hausman test supports the validity of the RE model.

Results from the third specification examining per capita consumption of wine are similar to the first two specifications with a one-percent increase in income causing a statistically significant, but smaller, increase in ethanol consumption from wine of 0.08 gallons. In contrast to total alcohol and beer consumption, wine consumption is most impacted by the 45 to 64 age group with a one percentage point increase in the age group increasing ethanol consumption from wine by 0.026 gallons. Statistically significant but smaller impacts are found for the younger age groups. Population density also impacts wine consumption, but in the opposite direction as beer consumption, with a 100 people per square mile increase in population density increasing ethanol consumption from wine by 0.04 gallons. This is consistent with the notion that more urban areas prefer wine and more rural areas prefer beer. The education level of a population also has a statistically significant impact on wine consumption with a one percentage point increase in the percent of the population with a bachelor's degree or higher increasing ethanol consumption from wine by 0.003 gallons. In regards to the impact of restrictions on wine consumption, the coefficient of *Restrict_Liquor* is insignificant indicating that wine consumption in these states is similar to wine consumption in states without any restrictions. The coefficients of *Restrict_Wine&Liq* and *Restrict_All* are negative, although the coefficient of *Restrict_Wine&Liq* has a p-value of only 0.061. The coefficients of *Restrict_Wine&Liq* and *Restrict_All* indicate that these groups of states exhibit per capita ethanol consumption from wine that is 0.117 gallons and 0.109 gallons less than unrestricted states, respectively. These results could be consistent with consumers in restricted states responding to the restrictions by substituting consumption away from wine. Or, they could be a result of the political economy outcome described above. A political economy hypothesis could also explain the positive and significant coefficient of the state wine tax and the negative and significant coefficient of the state beer tax. We would expect that, all else equal, a higher wine tax would decrease consumption of wine and that a higher beer tax would increase wine consumption, if beer and wine were substitutes. However, the findings in specification 3 could be a result of states seeking out tax bases that will yield the greatest tax revenues. Again the p-value of the Hausman test supports the use of the RE model.

For the final specification modeling per capita ethanol consumption from hard liquor the Hausman test rejects the hypothesis that the RE and FE models coefficients are not systematically different which would be indicating of an omitted variable biasing the RE coefficients. Nonetheless, the impact of restrictions on hard liquor consumption again points to a political economy hypothesis as states that restrict only hard liquor to liquor stores are not significantly different than unrestricted states, whereas states that restrict both wine and liquor to liquor stores have per capita ethanol consumption from hard liquor that is 0.235 gallons less than unrestricted states.

Table 5: Random Effects Model of Per Capita Ethanol Consumption
(t-statistics in parentheses)

	Total Per Capita Consumption	Per Capita Consumption from Beer	Per Capita Consumption from Wine	Per Capita Consumption from Hard Liquor
Restrict_Liquor	-0.180	-0.036	-0.079	-0.078
	(0.88)	(0.37)	(1.40)	(0.98)
Restrict_Wine&Liq	-0.656	-0.305	-0.117	-0.235
	(2.89)**	(2.87)**	(1.87)	(2.64)**
Restrict_All	-0.175	-0.086	-0.109	0.019
	(0.99)	(1.05)	(2.24)*	(0.27)
Population Density	-0.0002	-0.0004	0.0004	-0.0003
	(1.01)	(3.02)**	(4.61)**	(1.23)
Ln (Median Income)	0.343	0.146	0.079	0.117
	(3.79)**	(2.43)*	(3.57)**	(2.42)*
% aged 18 to 24	0.083	0.043	0.009	0.024
	(4.92)**	(3.88)**	(2.22)*	(2.76)**
% aged 25 to 44	0.148	0.055	0.016	0.061
	(6.73)**	(4.00)**	(3.03)**	(5.46)**
% aged 45 to 64	0.133	0.018	0.026	0.079
	(7.25)**	(1.58)	(5.88)**	(8.39)**
% with Bach. Degree	0.006	-0.005	0.003	0.004
	(0.90)	(1.18)	(2.02)*	(1.16)
State Liquor Tax	0.004	0.003	-0.002	-0.001
	(0.41)	(0.54)	(0.94)	(0.11)
State Wine Tax	-0.054	-0.040	0.038	-0.018
	(0.86)	(1.00)	(2.45)*	(0.58)
State Beer Tax	-0.146	-0.070	-0.059	-0.061
	(1.48)	(1.10)	(2.46)*	(1.19)
State Sales Tax Rate	-0.024	-0.007	-0.008	-0.013
	(1.76)	(0.81)	(2.41)*	(1.84)
Constant	-9.124	-2.272	-1.754	-4.244
	(6.97)**	(2.75)**	(5.44)**	(6.34)**
N	320	320	320	320
Hausman Test (p-value)	0.4012	0.1322	0.1681	0.0351*

* $p<0.05$; ** $p<0.01$

When it comes to economic outcomes, we report on liquor stores and grocery stores as the twodirect and the most immediate competitors. Results for all other store types are not significant.

It is self-evident that state restrictions on the sale of certain types of alcoholic beverages to liquor stores will shift purchases of alcoholic beverages from grocery stores into liquor stores. This result holds regardless of whether impact of restrictions on alcohol consumption is being driven by the consumer substitution or the political economy hypothesis. The shifting of consumer purchases has the potential to impact employment, the number of firms and total wages in both the liquor and grocery store sectors. Table 6 shows the results modeling the impact of restrictions on the liquor store sector. For the first specification the dependent variable is the natural log of liquor store employment. States that restrict only hard liquor sales to liquor stores do not have significantly different levels of liquor store employment as unrestricted states. However states that restrict hard liquor and wine sales and states that restrict the sale of all alcoholic beverages have liquor store employment that is higher than unrestricted states with the coefficient of *Restrict_Wine&Liq* having a p-value of 0.062 and the coefficient of *Restrict_All* being significant at the 1% level. Since the restriction variables in this semi-logarithmic regression are dichotomous, the presence of the restrictions can be interpreted as having a $(e^{\theta} - 1) * 100\%$ change in employment. As such, states that restrict both hard liquor and wine have 67% greater employment in the liquor store sector than unrestricted states and states that restrict the sale of all alcoholic beverages to liquor stores have 81% greater employment than unrestricted states.

Total ethanol consumption also impacts liquor store employment as its statistically significant coefficient suggests that a 1% increase in a state's total ethanol consumption increases liquor store employment by 0.935%. States will a greater percentage of its population in the 25 to 44 and 45 to 64 age groups had lower liquor store employment with a one-percentage point increase in the percentage of a state's population in each age group resulting in a 6.5% and 10.3% decline in liquor store employment, respectively. This finding is consistent with drinkers in these age groups being less likely to purchase alcohol at liquor stores than older drinkers. A one percentage point increase in the percentage of a state's population with a bachelor's degree or higher results in a statistically significant 2.1% increase in a liquor store employment.Finally, a 100 person per square mile increase in population density increases liquor store employment by 10%. The p-value of 0.1872 for the Hausman test supports the use of the RE model.

Specifications two and three show an impact of restrictions on liquor store establishments and total wages that is similar to its impact on liquor store employment. In the second specification *Restrict_Wine&Liq* and *Restrict_All*'s coefficients are significant at the 5% and 1% level, respectively.

Table 6.Random Effects Model of the Liquor Store Retail Sector.
(t-statistics in parentheses)

	ln(Employment)	ln(Firms)	ln(Total Wages)
Restrict_Liquor	0.159	0.438	0.222
	(0.62)	(1.61)	(0.81)
Restrict_Wine&Liq	0.511	0.738	0.491
	(1.87)	(2.51)*	(1.69)
Restrict_All	0.594	0.607	0.485
	(2.74)**	(2.62)**	(2.10)*
PopDens	0.001	0.001	0.001
	(2.04)*	(3.60)**	(2.28)*
ln (Median Income)	0.141	-0.024	0.282
	(1.34)	(0.27)	(1.65)
Ln (Alcohol Consumption)	0.935	0.768	1.033
	(11.04)**	(9.17)**	(10.42)**
% aged 18 to 24	-0.022	-0.017	0.000
	(1.15)	(1.03)	(0.00)
% aged 25 to 44	-0.065	-0.088	0.015
	(2.58)**	(4.14)**	(0.40)
% aged 45 to 64	-0.103	-0.090	-0.028
	(4.89)**	(5.05)**	(0.84)
% with Bach. Degree	0.021	0.021	0.011
	(2.62)**	(3.10)**	(0.89)
State Liquor Tax	-0.005	-0.014	0.012
	(0.51)	(1.63)	(0.76)
State Wine Tax	0.135	0.147	0.129
	(1.89)	(2.46)*	(1.16)
State Beer Tax	-0.154	-0.064	-0.189
	(1.37)	(0.69)	(1.06)
State Sales Tax Rate	-0.004	-0.028	0.023
	(0.28)	(2.16)*	(0.92)
Constant	-5.059	-2.189	-9.448
	(2.94)**	(1.42)	(3.83)**
N	320	320	320
Hausman p-value	0.1872	0.0027	0.0408

* $p<0.05$; ** $p<0.01$

Table 7:Random Effects Model of the Grocery Store Retail Sector.
(t-statistics in parentheses)

	ln(Employment)	ln(Firms)	ln(Total Wages)
Restrict_Liquor	0.113 (1.21)	0.222 (1.38)	0.033 (0.45)
Restrict_Wine&Liq	0.288 (2.94)**	0.409 (2.39)*	0.170 (2.27)*
Restrict_All	-0.036 (0.46)	-0.163 (1.20)	-0.069 (1.16)
PopDens	0.000 (1.73)	0.001 (5.10)**	0.000 (1.62)
ln (Median Income)	-0.141 (1.65)	-0.336 (3.99)**	-0.032 (0.38)
Ln (Alcohol Consumption)	0.960 (26.92)**	0.843 (14.97)**	1.024 (36.01)**
% aged 18 to 24	0.020 (1.33)	0.066 (4.31)**	-0.010 (0.72)
% aged 25 to 44	-0.025 (1.42)	-0.009 (0.47)	-0.002 (0.12)
% aged 45 to 64	-0.062 (3.98)**	-0.030 (1.79)	-0.007 (0.46)
% with Bach. Degree	0.016 (2.89)**	0.004 (0.65)	0.026 (5.29)**
State Liquor Tax	-0.010 (1.21)	-0.019 (2.40)*	-0.009 (1.17)
State Wine Tax	0.037 (0.71)	0.085 (1.52)	0.008 (0.16)
State Beer Tax	0.064 (0.75)	-0.005 (0.06)	0.154 (1.90)
State Sales Tax Rate	0.016 (1.37)	0.004 (0.35)	0.014 (1.26)
Constant	-1.891 (1.71)	-2.842 (2.22)*	-3.045 (2.99)**
N	320	320	320
Hausman p-value	0.0000	0.0000	0.0000

* $p<0.05$; ** $p<0.01$

The estimates suggest that restricting the sale of wine and liquor to liquor stores increases the number of liquor store establishments by 109%. Restricting the sale of wine, liquor and beer to liquor stores increases the number of liquor store establishments by 83%. In the third specification, *Restrict_Wine&Liq* and *Restrict_All*'s coefficients are significant at the 10% and 5% level, respectively. The estimates suggest that restricting the sale of wine and liquor to liquor stores increases the total weekly wages of liquor store employees by 63%. Restricting the sale of wine, liquor and beer to liquor stores increases the total weekly wages of liquor store employees by 62%. However, in both specification 2 and 3, the Hausman test rejects the hypothesis that the RE and FE coefficient estimates are similar. This would suggest that the RE coefficient estimates are biased calling into question the validity of the model's estimates. A similar problem exists when estimating the impact of alcohol sale restrictions on the grocery store sector. As shown in Table 7, the Hausman test strongly rejects the hypothesis that the RE and FE coefficients are not systematically different. Possible solutions to these problems are to either try to control for the omitted variable problem by adding the appropriate variable to the model, or to estimate the model using an appropriate instrumental variable.

7. Conclusions and directions for future research

As more states consider the liberalization of liquor laws, empirical questions arise as to how such changes would impact the economy. Laws restricting the sale of alcohol were created with the purpose of limiting its consumption and the accompanying adverse social ills. There is some evidence that such restrictions may be effective as states that restrict the sale of liquor and wine to liquor stores have lower per capita alcohol consumption. However, there is also some evidence that this pattern may be explained by the political economy of states with weak preferences for alcohol consumption supporting restrictions on alcohol sales, as states that restrict the sale of liquor and wine (but not beer) show significantly lower levels of per capita beer consumption. Liberalization also establishes some clear potential winners and losers as restrictions protect liquor stores from competition from grocery stores and other general retailers and simultaneously deny those potential competitors access to a lucrative market. The gains to rent seeking on both sides have led to estimates of the restrictions' economic impact based on questionable empirical methodologies. This paper finds that restrictions have both an economically and statistically significant impact on liquor store employment, but specification tests make it difficult to have confidence in the estimated impact on other economic variables. Future research will aim to control for the potential political economy explanation in the consumption model and for the omitted variable problem in the economic outcome models.

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