The Fiscal and Social Effects of State Alcohol Control Systems

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Executive Summary

The objective of this research is to examine, from the perspective of the state, the costs and benefits of state-owned alcohol distribution and sales systems. In the 1970s, about one-third of U.S. states controlled alcohol distribution and sales through direct ownership of wholesale and through a full or partial ownership of retail. Since the 1980s, states have gradually divested from alcohol monopolies, beginning with wine and later, retail stores. More recently, the state of Washington fully privatized its public warehouses and stores, and other states may follow.

Our longitudinal analyses cover the three decades of divestment from the late 1970s to 2010. We define the strength of the state alcohol monopoly along two dimensions: product and organization. All monopoly systems control spirits, while a subset control wine; all monopoly systems control wholesale, with a subset controlling retail. A weak monopoly would thus have wholesale spirits only, and a strong monopoly would market spirits and wine exclusively through a state wholesale and retail system. Four topics are addressed in relation to the strength of state alcohol monopoly: (1) alcohol consumption, (2) alcohol-related revenues, (3) alcohol-related vehicular fatalities, and (4) crime. Other regulatory policy designed to curb irresponsible consumption are tested and compared with alcohol monopoly, such as hours and days of retail operation, advertising restrictions, and penalties for drinking and driving.

Key findings are as follows:

1. State ownership equates with lower wine and spirits consumption. In monopoly states, spirits consumption is 11.9 to 15.1 percent less than in license states, and wine varies from 61.0 percent less to 9.9 percent less, depending on the control model.

2. Days and hours of retail operation did not appear to affect wine and spirits consumption. States that give municipalities a local option for retail hours, however, had a 1.7 percent higher spirits and 9.7 percent higher wine consumption than states without local options.

3. Restrictions on billboard advertising were associated with 8.1 percent lower spirit consumption, but the effect was cumulative over five years. Restrictions on other forms of advertisement, such as magazines and radio, were associated with a drop in spirits consumption of 2.0 percent after five years. A dram shop law was associated with a per capita consumption increase of 3.7 and 9.4 for spirits and wine, respectively.

4. Alcohol monopolies generate substantial alcohol-related revenues. States that own wholesale receive about 82.4 percent higher alcohol-related revenue than license states. When states own retail as well, the per capita revenue is approximately 90 percent higher than license states. In general, as the strength of the state alcohol monopoly system increased, so did alcohol-related revenues for state coffers.

5. The most lucrative organizational arrangement was where the state owned wholesale, and relied on a network of state-owned and agency retail outlets, with the state stores located in high traffic regions, and the agency stores in less-populated areas. These optimal monopoly models generated an average of $71.00 in alcohol-related revenues per capita, compared with an average of $24.91 for license states.

6. Monopoly states that did divest from retail stores from the 1980s through the 1990s did not gain financially, and may have suffered a loss. States that divested and managed to retain alcohol-related income did so by controlling wholesale and instituting new sales taxes. Even with theses policy changes, however, it does appear that strong monopoly states (states that did not divest from retail) recovered faster from the 1980s recession than weak monopoly states.

7. Revenues from alcohol sales, taxes and licenses in monopoly states are often earmarked for specific uses, such as law enforcement or substance abuse treatment programs. Otherwise, these funds become contributions to state or local general accounts and are used to finance other public services.

8. Weak alcohol monopolies (wholesale only) were associated with the highest percent of alcohol-related vehicular fatalities. When the effect of retail is isolated, the findings imply that state ownership of retail reduces alcohol-related vehicular fatalities. State ownership of retail was associated with 7.3 to 9.2 percent lower alcohol-related vehicular fatalities per capita and 6.5 to 7.5 percent lower alcohol-related vehicular fatalities per vehicle traffic mile. These findings held even after adjusting for per capita alcohol consumption. A third metric, the ratio of alcohol-related fatalities to total fatalities was statistically insignificant.

9. Having a dram shop law was associated with a 5.1 to 7.9 percent decline in alcohol-related vehicular fatalities. Stiffer penalties for DWI convictions were not associated with lower vehicular fatality rates. The findings underscore the importance of regulating transactions at the point of sale in order to encourage responsible alcohol consumption.

10. Of the twenty-three crime categories tested, state control over retail is associated with lower per capita rates of crime for aggravated assaults, fraud, domestic abuse, and vandalism. Results from a less stringent statistical test also suggest that vehicle theft, arson, and vagrancy are lower when the state owns retail stores.

11. Restrictions on non-Sunday off-premise retail sales hours are generally associated with lower crime in the following categories: aggravated assault, drunkenness, and vagrancy, but higher for disorderly conduct. Sunday hours restrictions are associated with lower rates of theft and curfew violations, but higher fraud and embezzlement.

12. For on-premise retail (e.g. restaurants, bars, etc.), a dram shop law was associated with lower rates of vehicle theft and drunkenness, and with higher rates of rape, theft (non-vehicle), burglary, liquor law violations, DWI, sex offences and vandalism. Restrictions on non-Sunday hours are associated with reduced rates of murder, aggravated assault, robbery, vagrancy, fraud, and embezzlement. However, several crime rates are higher with more restricted Sunday hours, including murder, aggravated assault, arson, embezzlement, and disorderly conduct.

In sum, state alcohol monopolies have the potential to generate two to three times the alcohol-related revenue as states with a private license system. Most of this gain is through state ownership of wholesale spirits distribution. Judged by finances alone, state ownership of retail provides an incremental gain to the states. The more valuable advantage in state ownership of retail is a reduction in alcohol-related social harm, especially alcohol-related vehicular fatalities and some types of crime. States that divested from ownership of the alcohol retail sector since the late 1970s did not improve their financial performance. Moreover, the privatization of retail alcohol outlets likely exacerbated alcohol-related harm.

Section 1: Background

Following the repeal of Prohibition in 1933, much of the burden to regulate alcohol sales and distribution shifted from the federal government to the states. Roughly two-thirds of the states opted for a license system, whereby private firms purchase the right to sell alcohol products, and the state had the role of enacting liquor laws and enforcing compliance. A second regulatory model, chosen by the remaining states, was for a state-owned monopoly system, whereby the state became the seller of alcohol products. Eighty years ago, the critical factor that determined whether a state adopted a monopoly model was the intensity of political pressure brought by temperance groups and corporate elites, who argued that state-owned systems were superior at promoting responsible alcohol consumption.[1] Hence, the present-day public alcohol monopolies were a product of political efforts by latter-day social conservatives to reduce the negative social consequences of alcohol abuse.

Vestiges of a responsible-consumption mission remain. For instance, the 2011 Annual Reports by the Utah Department of Alcoholic Beverage Control and the Montana Department of Revenue mention "moderation" as an advantage to a publicly owned system. Numerous states, moreover, have laws that enable local governments to restrict alcohol sales, giving rise to "dry" counties that ban alcohol sales, or "moist" counties that impose sales restrictions.[2] For states that operate retail stores, the mission of responsible consumption is frequently carried out by enforcing liquor laws at the point of sale, or eliminating the incentive to market alcohol products illegally to minors or to anyone who is visibly intoxicated.[3]

But temperance-grounded arguments for alcohol monopolies appear to be waning. The alcohol-enforcement rationale for state ownership is certainly less compelling in cases where a state controls the wholesale operations but not retail, and the trend over the past decades is for

[1]See: Levine (1985); Rumbarger (1989); Goff and Anderson (1994).

[2]More common is a partial restriction on alcoholic beverage sales, which is referred to as "moist" policy. Completely dry counties, i.e., where the sale of any alcohol product is prohibited, are clustered primarily in the southern United States.

[3]For instance, the Montana Department of Revenue FY 2011 Spirits Enterprise Fund Report of Operations states: "The purpose of control is to make distilled spirits available to those adults who choose to drink responsibly, but not to promote the sale of distilled spirits." For similar statements see: Washington State Spirits Control Board, FY 2011 Annual Report; the Virginia Department of Alcoholic Beverage Control Mission in Review 2011; the State of Alabama Alcoholic Beverage Control Board Annual Report, 2010–2009.

states to divest from retail: Iowa in 1987, West Virginia in 1990, Montana in 1995 and 1996, and Maine over the 1992 to 2002 period. The original concern about alcohol's ill effects on public health and social welfare is being challenged by a neoconservative movement for limited government; an ideology underwritten by actors that stand to gain by privatizing this industry.[4] Virginia and Pennsylvania monopoly systems were threatened with privatization in 2011, and both proposals questioned whether the government should be involved in alcohol sales while downplaying public health concerns.

As a consequence, arguments for retaining alcohol monopolies for curbing substance abuse are being supplemented with discussions about the economic contribution of state-owned systems to state budgets. For instance, the Utah Department of Alcoholic Beverage Control, which markets spirits, wine, and most beer at the wholesale and retail levels, defend this exceptional degree of public ownership with a succinct statement on the economic benefits to Utah citizens:

> "Utah's spirits control system offers definite advantages to Utah's citizens. Spirits sales provide a significant source of income to the state's general fund which serves to relieve the individual tax burden of Utah citizens. In addition, the school lunch program receives substantial funding from spirits sales."[5]

Utah's justification touches not only the popular topic of tax restraint, but also a specific use for alcohol monopoly revenues to support a popular public service, education. Legislatures in states with monopoly alcohol systems frequently earmark funds for alcohol-related public services. Two popular earmarks are for law enforcement and substance abuse services.

Thus, the roles of alcohol monopoly systems have evolved. Originally, state control was engineered to protect public health and well-being by providing a stricter institutional system for regulation. At the time, advocates believed that removing the profit motive to sell alcohol was important to safeguard against irresponsible marketing. Presently, alcohol monopolies are

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[4]The 2011 ballot initiative in the State of Washington to privatize wholesale and retail alcohol sales was reportedly financed by big-box retailer Costco, at over $20 million, and supported to a lesser extent by retailers Safeway, Trader Joe's, and representatives from the restaurant industry. See: http://seattletimes.nwsource.com/html/localnews/2016720231_elexspirits09m.html http://www.beverageworld.com/articles/full/14853/washington-state-to-privatize-spirits-sales.

[5]76th Annual Report, Utah Department of Alcoholic Beverage Control.

defensively responding to the aggravated threat of system divestment and privatization by emphasizing their role as revenue-generating functions that contribute to state general fund accounts. With this response comes pressure to mimic the practices of private industry in order to increase financial contributions to state budgets. Since the most direct method for raising revenue is to sell more alcohol products, there is growing tension between the historical alcohol monopoly mission of promoting responsible consumption and contemporary demands to maximize revenue for the state.

Section 2: Scope of Study

This research tests for several theorized effects of alcohol monopoly systems on the states. We examine four topics: (1) alcohol product consumption, (2) state finances, (3) alcohol-related automobile fatalities, and (4) crime. The consumption analysis investigates a broad range of policies that might affect the per capita consumption of spirits and wine, including hours of operation and advertising restrictions. The analysis on finances examines the effect of state control on direct revenues from alcohol store operations, taxes, and licenses. In addition, we test for whether there is any association between monopoly systems and the per capita state expenses for health, police, and the judiciary. In a third analysis we explore the effect of state control over alcohol on alcohol-related traffic fatalities. Our final analysis tests for whether state control over retail sales and other alcohol-related policy is associated with a wide array of crimes.

In a sense, the first two topics, alcohol sales and revenue generation, are more relevant to contemporary debates on alcohol monopolies, while the second two topics speak instead to the original mission of state control: public health and safety. Our intent is to provide an assessment of the differences between license and monopoly systems along these dimensions and in doing so offer a limited cost-benefit analysis. "Limited" because not all social effects can be quantified (e.g., traffic fatalities and crimes) and we approach this from a state perspective (e.g., responsible consumers of alcohol products incur a cost if alcohol purchasing is inconvenient).

Our hope is to shine empirical light on policies that foster responsible product access in order to provide guidance for states seeking to balance consumer desires with the social goal of minimizing alcohol-related harm. In addition to analyzing state monopoly systems, we explore the effect of other alcohol policies on consumption, finances, and public safety. In this way, we broadly investigate industry deregulation and its effect on society.

Section 3: Data and Measures

Each analysis is a state-level, longitudinal study that covers approximately three decades, varying with data availability. Nearly all of the data were compiled from public sources. We use a common set of measures across the four topics; the data and measures are explained and enumerated in this section. Source information and other measurement notes are provided in the appendix.

3.1 Alcohol Monopoly

Alcohol monopoly systems defy neat classification. Each state has a historical trajectory shaped by influential events and persons, resulting in a diverse mix of policies and practices that can be fully appreciated only by painting each state's unique portrait. A careful review shows that not only does the scope of government control over alcohol distribution and sales vary, but important financial and regulatory policies, such as licensing, taxes, hours of operation, level of local control, and so forth, lack uniformity as well. Even the term "monopoly" is imprecise, because all states allow for the off-premise sale of alcohol products by licensed retailers.[6] Any empirical analysis seeking to compare license versus monopoly states will inevitably have to settle for generalities that sacrifice this rich mosaic of state and local policy.

Working within that limitation, the degree of state ownership was operationalized using two dimensions: first, by type of product under state control (i.e., spirits only or spirits plus wine); and second, by level of organizational ownership. With this definition, there are eighteen monopoly states in the United States during the time period of our analysis, 1977 to 2010.

Product type: Consistent with the temperance legacy, in the years of the study period, all monopoly states controlled the most potent class of alcohol product, spirits. Some of them were relinquishing control of wine, but as of 2010, five of the monopoly states still controlled wine, and one of them controlled spirits, wine, and beer. Our first measure captures product ownership, where we assign indicator variables to states that control spirits and wine. State variation exists over the classification of alcohol products; often it is by alcohol content, which,

[6]The word "control" is often used synonymously with "monopoly." Unfortunately, this term also lacks precision, because all the states have laws and agencies that control alcohol traffic. Throughout we use the term "monopoly" to identify states that have a direct role in the management of alcohol beverage sales and distribution.

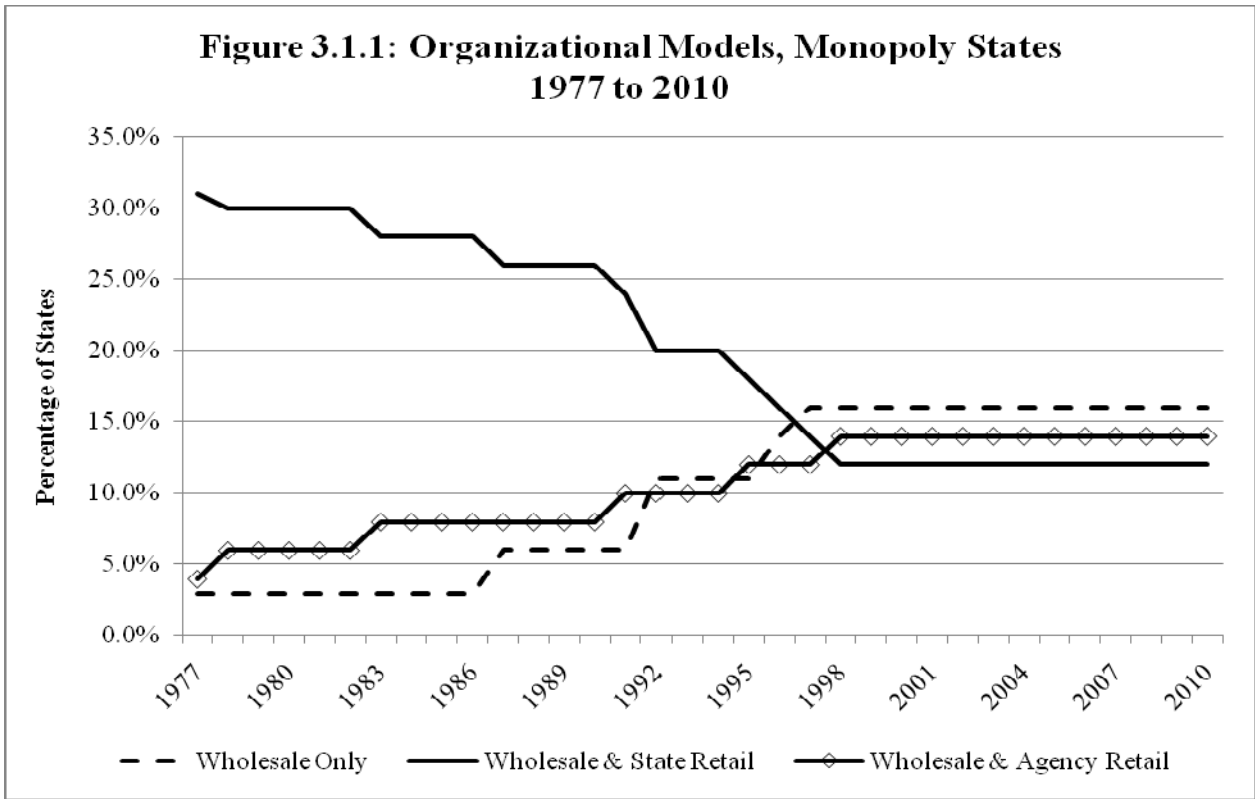
depending on the statutory level, may group fortified wine with distilled spirits. In this study, where the statutory alcohol percentage cutoff was greater than 14%, we assumed this was meant to include fortified wine, and so fortified wine was coded as a distilled spirit.

Another variable coding issue, exclusive to wine, was instances where a state divested from the product gradually over time. For instance, Idaho switched to a license wine model in 1978, yet continued to carry popular wine products afterward in state stores as a courtesy to customers. For the most part, wine sales in Idaho shifted over to licensed private outlets. But the drawdown in wine from the shelves of Idaho state stores occurred over decades until 2002, when Idaho divested from all wine products except for Idaho-produced wine. Idaho and Virginia presently sell locally-produced wine in state stores to support domestic growth in this industry. In both cases, the variable was coded as a full divestment from wine from the point beginning in the year when the state shifted to retail licenses for wine, because the sale of wine in state stores has more to do with marketing than with state control.

Organizational ownership: A key operational distinction within monopoly states is whether control extends to the retail sector, and further still, whether the retail operations are state stores or privately managed agency stores.[7] All monopoly states control at the wholesale level, and twelve states exert control over retail, either by directly owning the stores or through contracts with private agents. With an agency model, the state rids itself of store operational expenses (e.g., labor, management, lease payments, and so forth), but pays a price by forgoing a share of gross revenue. In this study, an agency operation is defined as one that is managed by a private concern, yet where the state either owns the inventory or sets the product price.[8] We create indicator variables for wholesale control, retail control, and retail agency. Figure 3.1.1 below plots the organizational trends for the state monopoly systems from 1997 to 2010.

[7]In retail agency arrangements, the state often sets the price of the product and owns the inventory, while private agents incur most overhead expenses. Similarly, at the wholesale level, some states own and operate the enterprise, while others outsource operations to private agents.

[8]Price-setting is another area where there is variation across the states. Some states fix prices, while others set mark-up or price minimums for products. We considered only the fixed-price policies as agency, thereby excluding from the definition of agency those states that constrain only the price, for instance, by setting a minimum mark-up level.



The figure illustrates that state ownership of wholesale and retail was the dominant monopoly model in the late 1970s. This model has undergone dramatic change since then, dropping from 30 percent to 12 percent of states from 1977 to 2000. Movement away from the wholesale and retail ownership model was roughly split between states that fully divested from retail and states that opted for retail agents. Note also that much of the change happened during the early 1980s, when the recession led states to search for ways to fill budget gaps. Selling off the state stores or creating agency stores was adopted as a method of raising revenue or reducing direct state expenses. We test the effect of this development on state revenues and other social outcomes.

Monopoly strength: A composite measure was created to assess the effect of the strength of the alcohol monopoly on alcohol-related revenues economic based on ownership of organization. For both spirits and wine, wholesale control is classified into three types: State Only, Agent, and License, while retail is classified into four types: State Only, State and

Agency,[9] Agency Only, and License. The composite measures, Spirits Monopoly and Wine Monopoly, each have six possible values, from 0 to 5, where 0 is a license state and 5 represents state-owned wholesale and retail. Values for these variables were assigned based on the matrix in Table 3.3.1. Evident from the counts in the table is the variation in retail arrangements, which in recent history has been the main area of state divestment.

Table 3.1.1: Monopoly Strength Measure

		Wholesale Ownership and Control		
		State Only	Private Agent	Private License
Retail Ownership and Control	State Only	5 (303) [50]	4 (N/O) [N/O]	3 (N/O) [8]
	State and Private Agent	4 (116) [35]	3 (N/O) [N/O]	2 (N/O) [N/O]
	Private Agent Only	3 (63)[1] [N/O]	2 (7) [N/O]	1 (N/O) [37][3]
	Private License	2 (142) [120][2]	1 (N/O) [N/O]	0 (1,120) [1,501]

For each cell: the top number is the assigned variable score for monopoly strength, the second number (in parentheses) is the number of observations for spirits, and the third number [in brackets] is the number of observations for wine. N/O indicates no observations.

[1]Includes 5 observations where a state was transitioning from public to private license, and therefore had both types of retail stores.

[2]Includes 45 observations where the state stores carried a limited number of wine products as they phased out wine inventory.

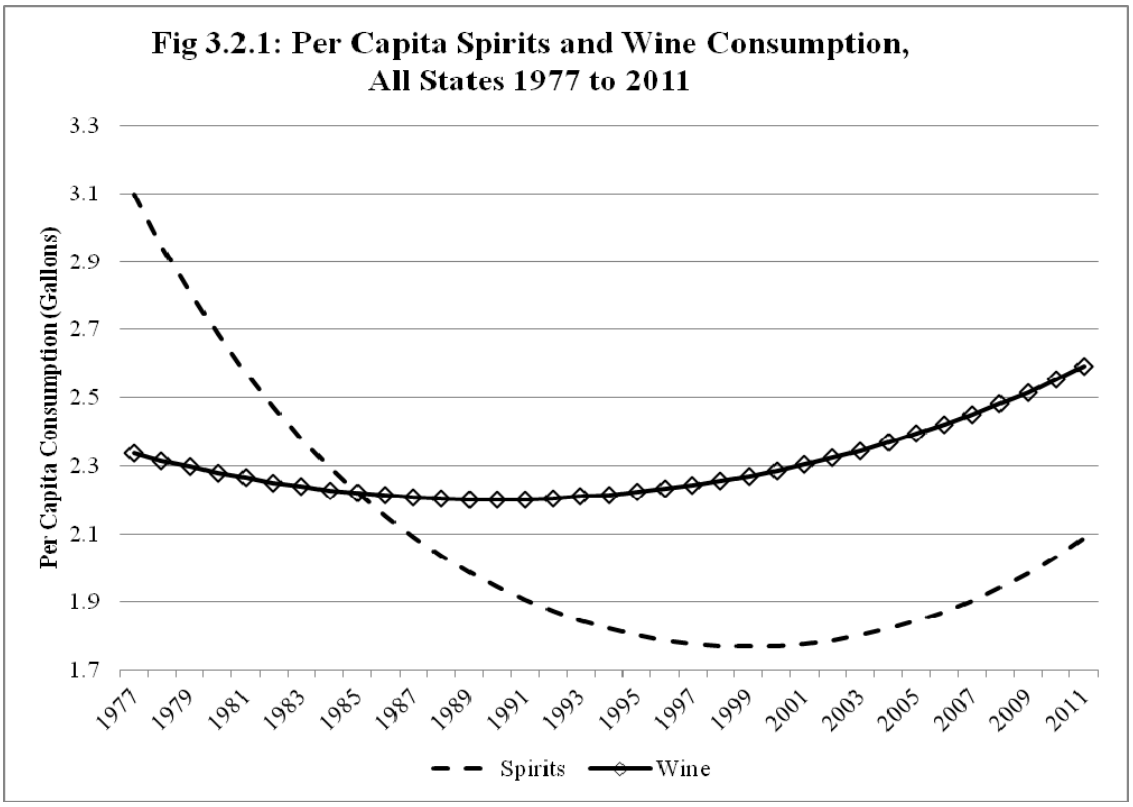
[3]All 37 observations are where the state retail stores held wine inventory during a transition to private license.

[9] States with both types of stores usually place state-owned stores in high traffic areas and agency stores in less populated regions.

3.2 Alcohol Consumption

Alcohol consumption data for spirits, wine, and beer were obtained from the Alcohol Policy Information System (APIS)[10] for years dating from 1977 to 2004. Data for years 2004 to 2010 were provided by the Beverage Information Group and appended to the APIS data to complete the 1977 to 2010 data range. Measures for spirits, wine, and beer consumption are standardized as gallons per capita for each combination of state and year, and expressed in natural log form. Please note that while we use the term "consumption" throughout, the data from APIS and the Beverage Information Group are sales volumes by state, which may not precisely capture the consumption of state residents because a small proportion of alcohol sales are made to non-residents, for instance, in the case of tourists.

Figure 3.2.1 below provides the per capita (over 18 years) consumption rate for spirits and wine for the nation.



[10] http://www.alcoholpolicy.niaaa.nih.gov/. The original source for annual spirits consumption is the Distilled Spirits Council of the United States (DISCUS); for annual wine consumption, the Wine Institute; and for annual beer consumption, the Beer Institute and Brewers' Almanac.

Annual spirit consumption declined steadily from late 1970s and into the late 1990s, from a high of approximately 3.0 to a low of about 1.8 gallons per adult. Since 2000, the industry has rebounded to slightly over 2.0 gallons per adult in 2011. Annual wine consumption exhibits a less dramatic convex pattern, declining in the late 1970s and into the recession years of the early 1980s. However, the wine consumption trend is more stable than for spirits. The inflection point for wine is a decade earlier (around 1990), and wine consumption per capita surpasses spirits at about 1985. Wine consumption is presently at around 2.6 gallons per adult, as of 2011. Not graphed is beer consumption, which has dropped steadily from 33 to 29 gallons per capita over the same time period.

There are several non-exclusive explanations for these trends. First, demographic changes in the United States might be affecting demand. The average age of U.S. citizens is climbing, which partially explains a preference shift away from beer, which tends to be consumed more frequently by young adults, and toward wine and spirits. Second, economic conditions affect demand. Alcohol consumption in general rises with income, which partially explains the declining consumption rates for spirits and wine during the severe recession of the 1980s, the resurgence for wine in 1990s, and the partial recovery for spirits beginning around 2000. Third, demand for alcohol products is affected by new product and marketing strategies. Wineries have proliferated, and spirits producers have developed new products, such as flavored vodkas, to broaden their appeal. While the spirits industry maintains a self-imposed restriction on advertising in certain mediums, new marketing strategies, such as product placement in television and movies, as well as the Internet, have expanded the messaging capacity of producers. Finally, the comparatively rapid increase in the consumption rate of wine (and perhaps to a lesser extent spirits) is likely related to the research suggesting positive health attributes for the moderate consumption of this product.

3.3 Alcohol-Related State Income

Alcohol-related income comes primarily from three sources: (1) the sale of alcohol products, (2) alcohol taxes, and (3) alcohol beverage licenses.[11] Monopoly states earn income

[11]A fourth, much smaller source is the fines levied on retail establishments for violating liquor laws. For example, the 2010–11 fiscal year revenues for fine enforcement in Pennsylvania was $1.8 million, which was approximately 15.7 percent of the revenue from licensing ($11.7 million) and less than half a percent of the nearly $400 million in tax revenue. Our data source, the Census of Governments, does not provide statistics on fines from spirits law enforcement.

from all three sources; license states earn income from the second and third. Our source for finance data is the annual Census of Governments (COG), state-level data, years 1977 through 2010. The COG keeps records of revenues and expenses for alcoholic beverage distribution facilities and retail outlets owned and operated by state governments using standard definitions across states and over time. The COG also collects information on state income from alcohol sales taxes and alcohol licensing. Altogether these data provide a reasonably comprehensive measure of state income derived from the alcohol industry. Income from the state operations, alcohol taxes, and alcohol licenses were combined into one measure to compare total alcohol-related income across monopoly and license states.

Net income per capita measures income earned through the distribution and sales of alcohol products through state-controlled wholesale and retail outlets. Net income[12] is defined as: *gross profit on sales*[13] minus *operating expenses*[14] plus *other income* minus *nonoperating expenses.*[15] Standardization within a state is achieved by dividing net income by the population of adults who are greater than 18 years of age. All figures are adjusted for inflation in 2010 dollars.

It is important to note that the COG figures are computed based on store operations only; excluded from the revenue side are sales and license taxes on alcoholic beverages collected through state stores, and any state store profits that are earmarked for local governments. On the expense side, the COG excludes liquor law enforcement, the regulation of private on-premise and off-premise retail establishments, the collection of alcohol taxes and licenses, and any distribution of earnings to local governments. States with monopoly systems often include these revenues and expenses in financial statements in order to account for the wide range of roles performed by alcohol control boards. For our purposes, their removal from the calculation of store net income improves the accuracy of the measure, and allows for a comparison with license

[12]COG exhibit codes and formula are: Z41–Z42–Z43+Z44.

[13]Gross profit is net sales of goods minus cost of goods sold.

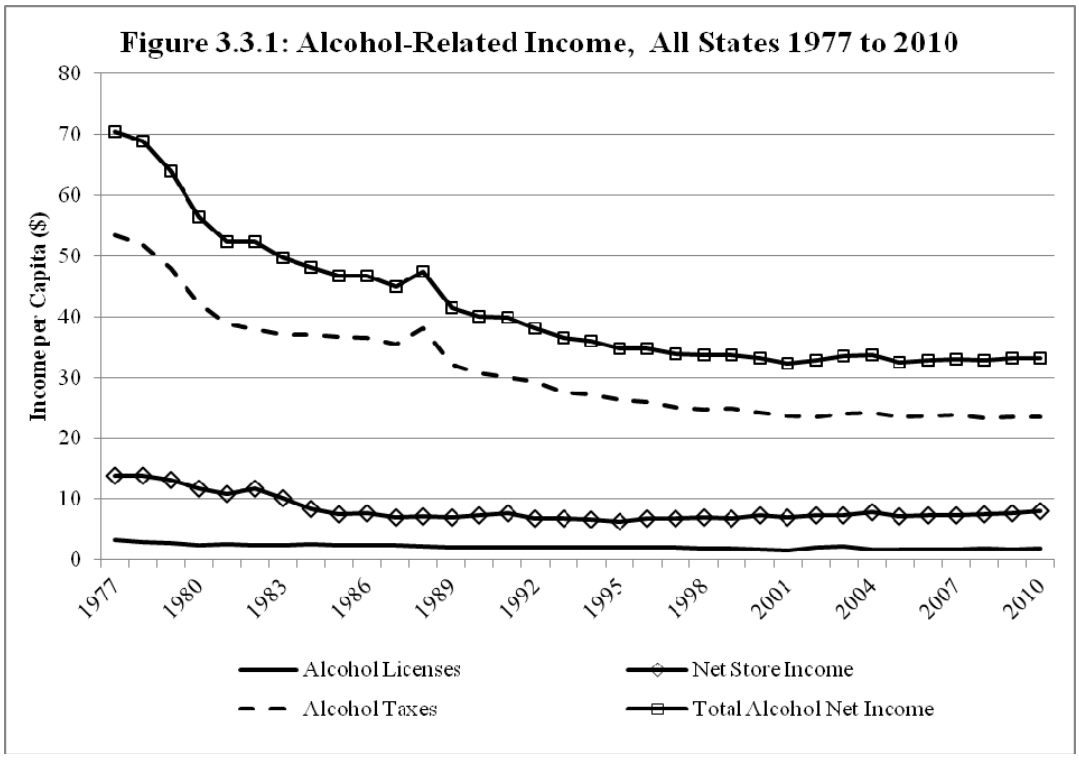
[14]Operating expenses include administration, advertising, purchasing, handling, storage, and sale of merchandise (other than cost of goods sold), and other related costs of the spirits stores system.

[15]Other income and non-operating expenses are comparably small, and include items such as interest income or investment loss.

states that must administer tax collection, licensing, and law enforcement through other state departments.

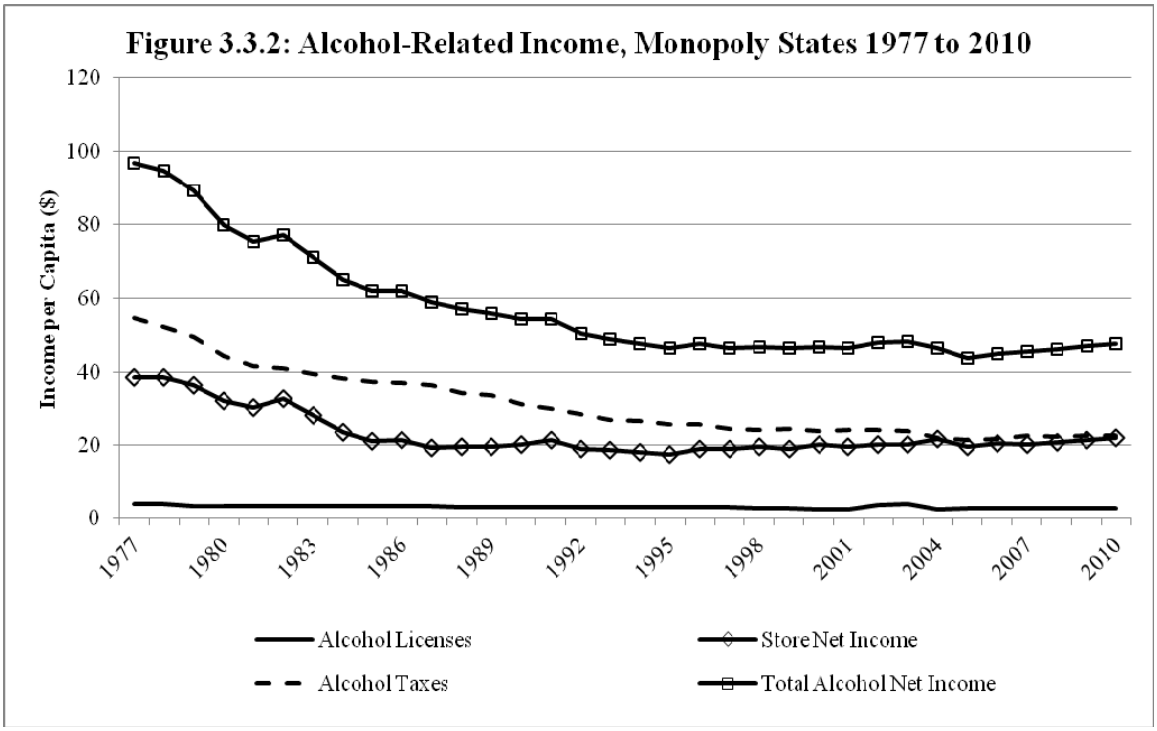
The two other major alcohol-related sources of revenue from the COG statistics are alcohol taxes and alcohol beverage licensing.[16] To standardize the statistics across large and small states, alcohol tax and license revenue are expressed as per capita statistics: alcohol taxes per capita, and license fees per capita, where per capita standardization is again the population of adults above 18 years of age. All figures were adjusted for inflation in 2010 dollars.

We combine the three measures—net income per capita, alcohol taxes per capita, and license fees per capita—to produce a composite statistic for comparing the income-generating capacity of license and monopoly systems. This composite measure, alcohol income per capita, overcomes the problem of having to distinguish between product mark-up and alcohol tax for monopoly systems, because net income encompasses product mark-up. Similarly, an aggregate measure neutralizes differences in tax rates and license fees, as well as the potential inverse relationship between these two revenue sources. Figure 3.3.1 provides trends for the inflation-adjusted (2010 dollars) averages for the four measures across the states.



[16]COG codes T10 and T20, respectively.

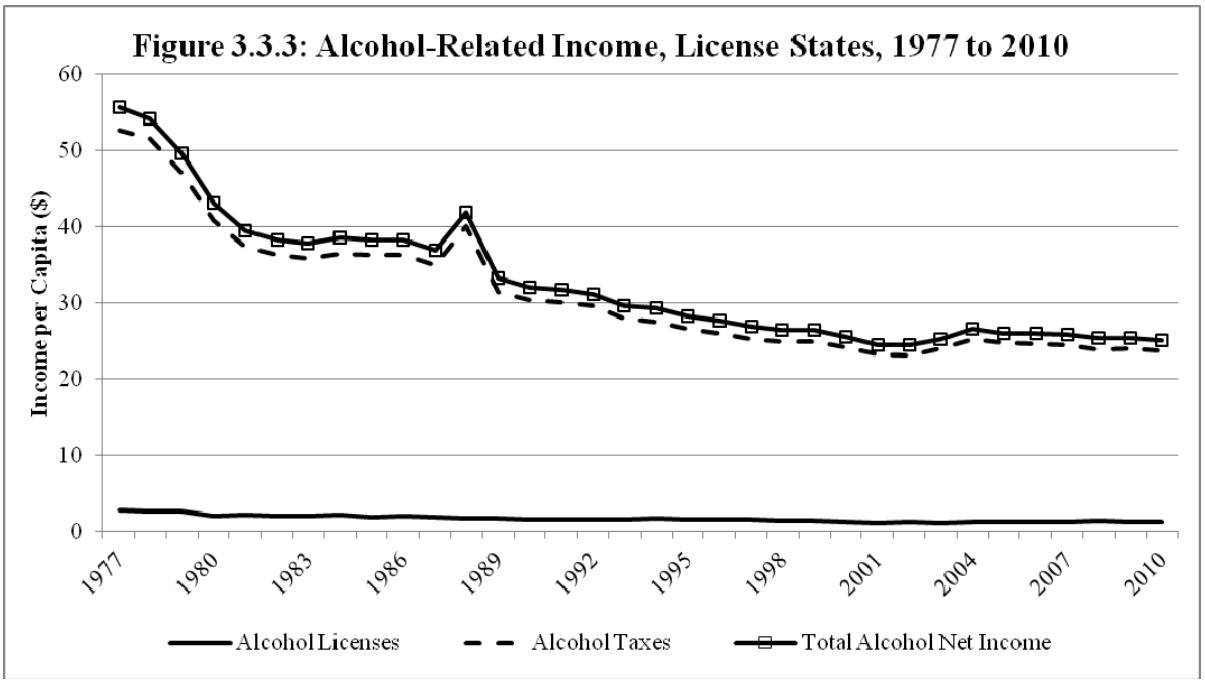
The top line in Figure 3.3.1, total alcohol net income per capita, is the sum of alcohol licenses, store net income, and alcohol taxes. In adjusted terms, total alcohol net income per capita declined from $70.49 to $33.26 over the 1977 to 2010 period, with much of the decline due to the inflationary era of the late 1970s. Alcohol income per capita stabilized around year 2000. As illustrated, alcohol taxes constitute the largest share of total alcohol income across the states, but this share dropped from 75.7 percent to 70.5 percent over the period. In contrast, store net income as a share of total alcohol income grew from 19.6 percent to 24.0 percent for the period. License income also grew proportionately, from 4.6 to 5.5 percent of total alcohol income. Figure 3.3.2 illustrates the same measures for just the monopoly states.



As expected, the adjusted alcohol income trends follow a pattern similar to the one for all the states (see Figure 3.3.1), with total alcohol income declining from $96.92 to $47.70 over the time period. Income stabilization occurs about a decade earlier, however, for monopoly than for license states. With Figure 3.3.2, we gain a more accurate understanding of the relative contributions made by store net income, alcohol taxes, and alcohol licenses. In 2010, store net income comprised 46.3 percent; taxes were 47.8 percent; and alcohol licenses were 5.7 percent of total alcohol income. The percentages for net income and taxes, as mentioned above, depend

on how the states decide to categorize product price increases; i.e., with state stores, a mark-up looks much like a tax. But what is obvious from Figure 3.3.2 is that the income contribution from alcohol licenses is comparably small; on average, license revenues would have to increase by a factor of 8 to come close to the income generated from state stores or taxes.

Figure 3.3.3 shows the per capita total alcohol income trend for the license states, and the two components, alcohol taxes and licenses. Total alcohol net income per capita for license states is roughly half of the alcohol income of monopoly states. Nearly all of the alcohol income in license states is derived from taxes.



Notable in comparing Figure 3.3.2 and Figure 3.3.3 is just how close the two regulatory models are in terms of alcohol tax and alcohol license revenue. In 2010, the per capita alcohol income from taxes was $23.79 for license states and $22.85 for monopoly states. In that same year, license states averaged $1.34 per capita from alcohol licenses whereas monopoly states averaged $2.71. Thus, alcohol taxes and licenses combined brought in per capita amounts of $25.13 versus $25.56 for license and monopoly states, respectively. The difference in total alcohol income between the two regulatory models can be almost fully explained by whether the state holds ownership of the wholesale and retail industry.

In addition to examining direct alcohol-related revenues, COG data is used to test for whether state control over alcohol retail outlets affects state spending in three areas: police protection,[17] non-hospital health services[18] and the judiciary.[19] For the regression analyses, all variables derived from the COG were expressed as per capita ratios in logarithmic form.

3.4 Alcohol-Related Traffic Fatalities

In any given year, approximately one-third of traffic fatalities involve at least one drunk driver. Blood alcohol concentration (BAC) specifies the level at which it is a crime to operate a motor vehicle. Currently, the nationwide BAC standard is 0.08 (0.08 g of alcohol per 100 ml blood), but this was not always the case. Beginning in 1983, encouraged by a federal highway initiative, states tightened the BAC standard from 0.10 to 0.08. All fifty states made the transition to the 0.08 standard by 2004.

Statistics for alcohol-related traffic fatalities were obtained from the National Highway Traffic Safety Administration (NHTSA) through the Fatality Analysis Reporting System. The NHTSA provides data on traffic fatalities involving drivers with BAC levels greater than 0.01 and 0.08. We obtained these data from 1982 to 2010.

The measures for alcohol-related fatalities were standardized in three ways: first, as a per capita ratio of the adult population (over 18 years); second, as a ratio of vehicle traffic miles (VTM); and third, as a proportion of total traffic fatalities. Statistics for the per capita measure (in millions of adults) are presented in Figure 3.4.1; statistics for the ratio of VTM (in billions) are presented in Figure 3.4.2. Each graph shows driver fatality rates for a BAC of 0.01 or above and for a BAC of 0.08 or above.

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[17]Duties defined as: preservation of law and order and traffic safety, including police patrols and communications; crime prevention activities; detention and custody of persons awaiting trial; traffic safety; and vehicular inspection. COG code E62.

[18]Duties defined as: outpatient health services other than hospital care, including public health administration, research and education, categorical health programs, treatment and immunization clinics, nursing, environmental health activities such as air and water pollution control, ambulance service if provided separately from fire protection services, and other general public health activities such as mosquito abatement. School health services provided by health agencies (rather than school agencies) are included here. COG code E32.

[19]Duties defined as: courts and activities associated with courts including law libraries, prosecutorial and defendant programs, probate functions, and juries. COG code E25.

Figure 3.4.1: Alcohol-Related Fatalities per Million Adults, 1982 to 2010

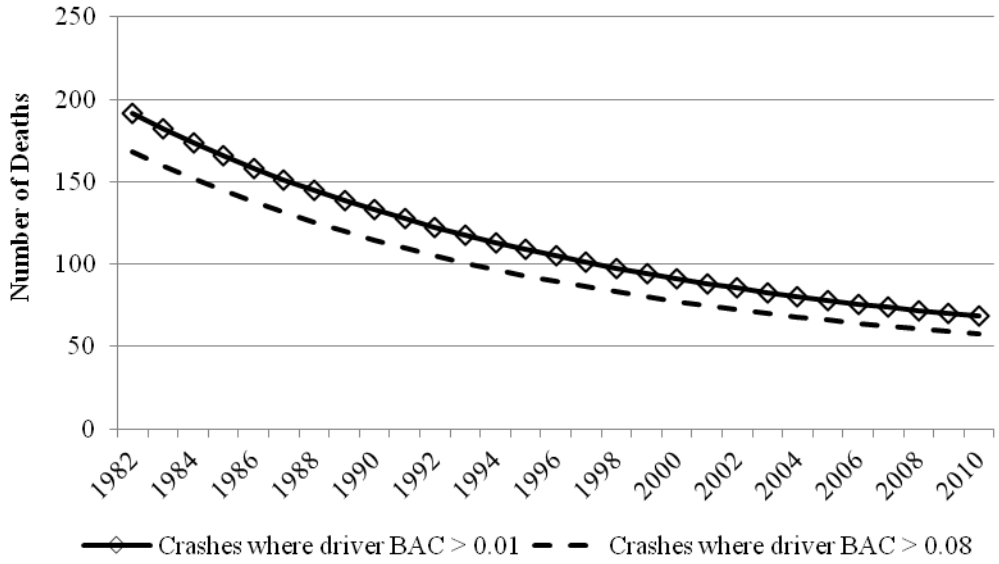
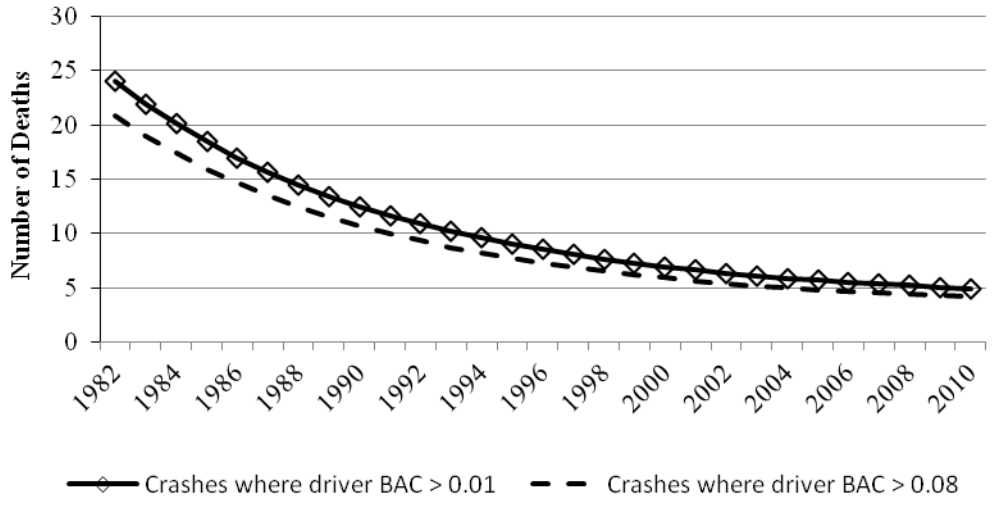
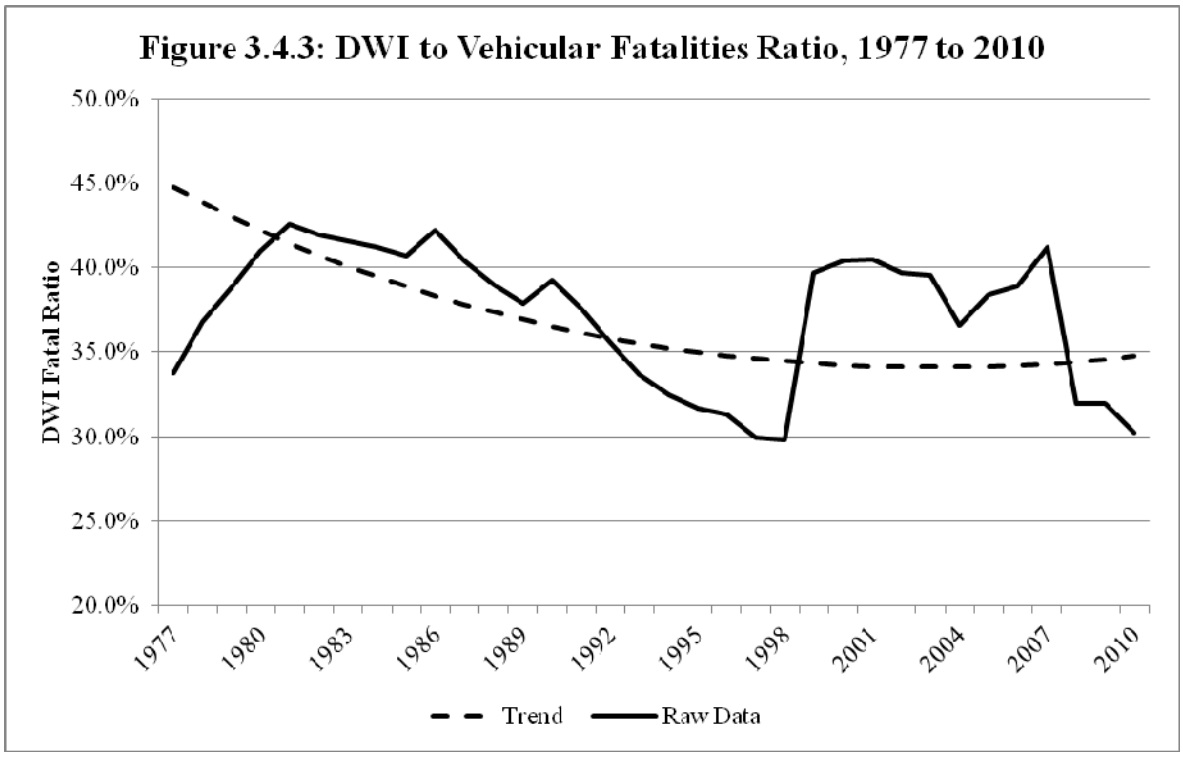


Figure 3.4.2: Alcohol-Related Fatalities per Billion Vehicle Traffic Miles, 1982 to 2010



Both graphs map an encouraging reduction in alcohol-related fatalities from the 1982 to 2010 period. At the beginning of the 1980s, annual alcohol-related fatalities per million adults were over 150, and this statistic has steadily declined to less than 60. A similar pattern exists for the annual rate of alcohol-related fatalities per billion VTM. In 1982, the states averaged over 20 deaths per billion VTM, but by 2010 this statistic was below 5. For either measure, the values at 0.01 BAC closely track the values at 0.08 BAC, and so our analysis will only examine fatalities at the 0.08 BAC level.

Statistics for the ratio of traffic fatalities that involve at least one DWI case display a more erratic pattern, as plotted in Figure 3.4.3.



The percentage of DWI fatalities to total fatalities fluctuates between 30 percent (1988) and 43 percent (1981) over the time period, but the trend is declining. Figure 3.4.3 includes a trend line to show the gradual reduction in this statistic. All measures were converted to logarithmic form in the regression analyses.

3.5 Crime Rates

The final set of dependent variables is a list of state crime statistics. Crime, especially violent and non-organized "street" crime, has been associated with alcohol consumption. This series of tests asks whether there is any relationship between control policies and state crime rates. The analysis relies on an extensive list of crime types based on data from the Uniform Crime Reporting Program Data compiled by the United States Department of Justice and Federal Bureau of Investigation, years 1980 through 2009. Table 3.5.1 lists the crimes by category, the average per capita rate across the states, and the three-decade trends for each crime for all the states.

Table 3.5.1: Crime Categories, State Averages, and Trends

Crime Types	Crimes	Average Rate (per million adults)	1980–1999 Trend
Personal/Violent	Murder	50.6	Decreasing
	Aggravated assault	1175.7	Decreasing
	Robbery	351.0	Decreasing
	Rape	107.3	Decreasing
Property	Theft (non-vehicle)	4855.4	Decreasing
	Burglary	1192.8	Decreasing
	Vehicle theft	468.9	Decreasing
	Arson	64.8	Decreasing
Alcohol-related	Drunkenness	2592.1	Decreasing
	Liquor laws	2758.6	Decreasing
	DWI	5404.3	Decreasing
Youth/Poor	Runaways	631.9	Decreasing
	Loitering	420.6	Increasing
	Vagrancy	134.7	No Change
	Sex offenses	289.5	Decreasing
White-Collar/ Organized	Fraud	1316.8	Decreasing
	Embezzlement	58.7	Decreasing
	Prostitution	319.0	Decreasing
Others	Domestic Violence[1]	368.0	Decreasing
	Disorderly conduct	2553.2	Decreasing
	Manslaughter	7.1	Decreasing
	Other assaults	3813.3	Increasing
	Vandalism	1023.7	Decreasing

[1]Classified by United States Department of Justice as "offenses against families and children."

Overall crime rates are declining in the United States, although it should be emphasized that these averages mask the different changes taking place within any single state. The only two crimes that appear to be increasing are loitering and other assaults (not aggravated assaults). One crime, vagrancy, has remained stable. The per capita crime ratios used in the analyses were expressed in natural log form.

3.6 Advertising Regulations for Distilled Spirits

One method of encouraging responsible alcohol consumption is to regulate advertising. Many states have enacted laws that attempt to minimize the exposure of underage drinkers to industry promotions by placing constraints on advertisement, with the strictest regulations applying to distilled spirits. To explore the effect of such policies, variables were developed for advertising regulations from compilations published by the Distilled Spirits Council of the United States (DISCUS). DISCUS reports are published every two years, and the research team filled time gaps by referencing the relevant state statutes. A continuous data set of annual state-level measures was compiled from 1977 through 2012 for outdoor billboard advertising and for restrictions on newspaper, magazine, television, and radio advertising

Outdoor billboard regulation is common across the states. The DISCUS data has three classifications for the level of restrictions on billboard advertising for distilled spirits:

1. No restriction. Typical statutory regulation statements that are coded as no restriction are "Allowed," "No restrictions or specifications," and "Joint Committee of the States Uniform Advertising code adopted."
2. Prohibited. Typical statements that are coded as prohibited are "Not allowed" and "Prohibited."
3. Some restriction. Typical regulation statements coded as some restriction include "Prior Approval," "Only allowed in wet counties," "May not portray intoxication or lewdness," "Must be dignified in good taste," "Not near school," and "No obscene or indecent material."

This categorical measure was operationalized with two indicator variables; one for some restriction and another for prohibited. The omitted category is no restrictions.

Newspaper, magazine, television, and radio advertising is the second area of regulation analyzed. The DISCUS categories are similar to billboard advertising, but given that complete prohibition is rare, prohibited and some restriction were combined into a single category and expressed with an indicator variable. A code of 0 means that no restriction is imposed on advertising of distilled spirits on newspaper, magazine, television, and radio. Typical regulation statements that are coded as 0 are "Allowed," "Yes," "No restrictions or specifications," and "Joint Committee of the States Uniform Advertising code adopted." The variable coded as 1 signifies some restrictions or complete prohibition imposed on advertising of alcoholic beverages (spirits, wine, beer) on newspaper, magazine, television, and radio. Typical regulation statements coded as 1 are "Prior Approval," "FAA Act adopted," "No reference to price," "No obscene or indecent material," "No depiction of violence," "No illustration of person drinking," and "Prohibited."

In 2010, four states banned spirit advertising on outdoor billboards, while fifteen had some restrictions (e.g., proximity to schools, content, and so forth), and thirty-one had no restrictions. In 1980, the numbers for the states in these same categories was nine, twenty-two, and nineteen, respectively. Thus, billboard advertising has become less restrictive. Advertising in newspapers, magazines, television, and radio also deregulated over the past three decades. In 1980, only fifteen states had no restriction on spirit advertising in these mediums, but by 2010 this number had grown to thirty-nine. By these measures, alcohol advertising has deregulated over the decades.

3.7 Prohibited Hours and Days of Sale

Another method of regulating alcohol consumption is to limit the times when it can be legally sold, at either on-premise or off-premise locations. On-premise licenses are granted to places such as bars, restaurants, hotels, and clubs. Off-premise licenses are for establishments where packaged alcohol is purchased, such as liquor stores, groceries, and pharmacies. Within a state, restrictions on hours and days of sale are often different for off-premise and on-premise establishments, but in general there is a strong correlation between the treatments of the two venue types; states that restrict the hours of off-premise alcohol sales also tend to restrict the hours of on-premise alcohol sales, and vice versa. And numerous states make exceptions for the sale of alcohol in closed settings, such as private clubs.

Data on prohibited hours and days of sale were available from the Alcohol Policy Information System (APIS), for years 1977 through 2005. The original source for APIS is the DISCUS compilations. Additional DISCUS publications were obtained to upgrade and append the information to 2011. Data gaps were filled in by referencing the appropriate state statute.

Consistent with the APIS operationalization, the level of restriction was assessed by the number of prohibited hours for Sunday and non-Sunday sales. Restrictions for off-premise and on-premise retail establishments usually differ, so separate measures are needed for these two types of outlets. Thus, four measures were used for restrictions on sale hours: Sunday on-premise, Sunday off-premise, non-Sunday on-premise, and non-Sunday off-premise. Categorical variables were created for each, using "low," "medium," and "high" designations. For Sunday sales, a state had low restrictions if the prohibited hours were 8 or less, medium restrictions if prohibited hours were greater than 8 but less than 18, and high restrictions if the prohibited hours are 18 or greater. For non-Sunday sales, a low level of restrictions was 24 or less, medium was greater than 24 to 36, and high was greater than 36 prohibited hours. Table 3.7.1 below summarizes this variable coding.

Table 3.7.1: Variable Codes for State Retail Hours Restrictions

Restriction Level	Non-Sunday Restricted Hours (on-premise or off-premise)	Sunday Restricted Hours (on-premise or off-premise)
Low	24 or less	8 or Less
Medium	Greater than 24 to 36	Greater than 8 to 18
High	Greater than 36	Greater than 18

A test was done for the effect of prohibited hours on Election Day, and whether the state provides a local option at the county level. Both of these variables were structured as indicator variables where a value of 1 means that a policy existed and zero otherwise.

In 2010, the most permissive states allowed alcohol to be sold twenty-four hours a day, weekdays and Saturdays, while the most restrictive state, South Carolina, allowed for ten open store hours on those days. We pointed out, however, that considerable variation on retail hours exists within states, since two-thirds (in 2010) of states delegate to local governments some degree of authority to set hours. South Carolina, for instance, grants local control to set hours of retail operation, which typically liberalizes alcohol purchases in urban regions.

Across all states, Sunday usually has the strictest limits for alcohol sales; a residual from the "Blue Laws" of the eighteenth century that were meant to promote piety on the Sabbath. As of 2010, eight states prohibited off-premise alcohol sales on Sunday, and another twenty had bans but allowed for exceptions based on local circumstances. Nevada was the most permissive state, with 24-hour Sunday sales except if local governments decided to impose restrictions. Approximately 20 percent of the states limit alcohol sales on Election Day to encourage political participation.

3.8 Penalties Related to Alcohol and Driving

The final set of regulatory measures involves the penalties for driving while intoxicated, drinking alcohol in the automobile when driving, and for alcohol servers. The primary source for this data is the annual Digest of State Alcohol Highway Safety Related Legislation, state-level data, years 1983 through 2011. The digest offers comprehensive information on state laws and regulations that pertain to DWI and related infractions using standard definitions across states and time.

This research focuses on mandatory penalties for DWI first convictions. Three measures were developed: (1) mandatory fines (in terms of dollars), (2) mandatory imprisonment (in terms of hours), and (3) mandatory revocation or suspension of a driver's license (in terms of days). If a state had mandatory penalties in these areas, the indicator variable was coded 1, zero otherwise. Note that the code zero does not mean an absence of a penalty, but only that a state does not mandate the penalty to local authorities. A final policy tested is whether the state has an Anti-Consumption Law, which makes it a crime to consume alcoholic beverages in a motor vehicle. This information was available from 1985 to present, and was structured as a dichotomous variable with 1 if a law exists and zero otherwise. All of the above measures can be conceptualized as proxies of the intolerance of a state toward drinking and driving.

Consistent with the "tough on crime" movement that began in the 1980s, penalties for driving while intoxicated have become more severe. Thirty-two states mandated fines for first-time DWI convictions in 2010, up from ten in 1983; twenty states imposed a mandatory prison sentence for first-time DWI convictions in 2010, up from eleven in 1983. These harsher penalties have accompanied a stricter national definition for "driving while intoxicated," which transitioned from a BAC of 0.10 or above to a BAC of 0.08 or above through the states from 1983 to 2004. Comparatively stable are laws mandating the suspension or revocation of driver's

licenses for first-time DWI convictions. Twenty-eight states had such laws in 1983 and twenty-nine in 2010.

During this same period, states also adopted measures that inflict stiffer punishments on the servers of alcohol. A dram shop law makes a server of alcohol fully or partially liable for the damages caused by the customer, and applies primarily to on-premise retail establishments. Dram shop laws were nonexistent in the 1970s, but proliferated in the 1980s, either through statutory enactments or court decisions. By 2010, thirty-six states had a dram shop law on the books, and seven others through common law doctrine.

Section 4: State Financial Trends and Histories

This section examines trends in the COG financial statistics for a group of eight monopoly states. To the extent possible, changing patterns in the statistics are discussed in relation to policy changes for alcohol control. The discussion begins with states that can be considered "strong" monopoly states that have had very little change in policy: namely, Utah and Pennsylvania. The states that follow this group had various forms and levels of privatization.

4.1 Utah

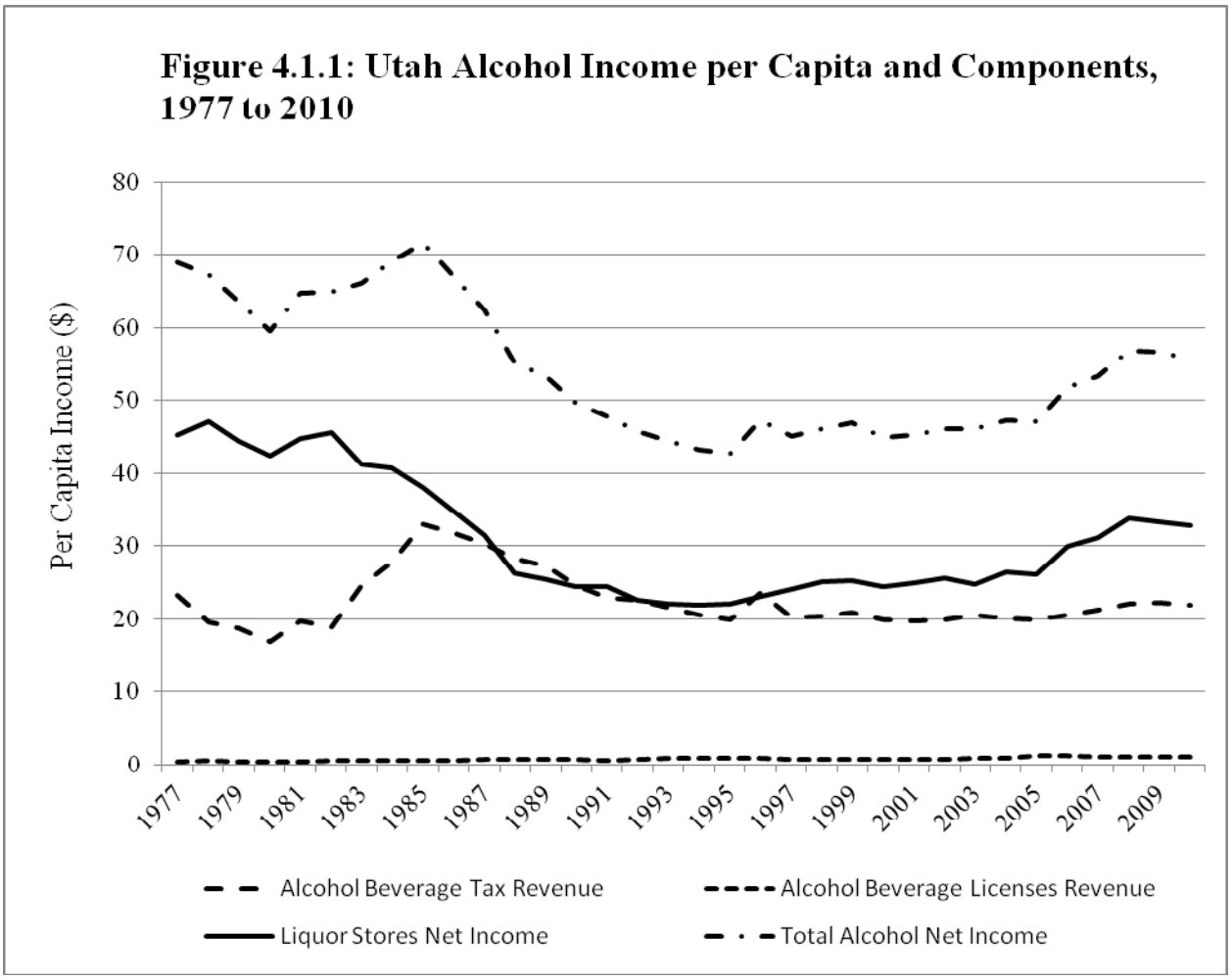
The Beehive State has the most comprehensive level of state control, encompassing the wholesale and retail of any drink with over 4% alcohol content. As of 2012, Utah's retailers are split between forty-five state run stores and about a hundred package agencies that are operated by private owners. Product prices are set by the state at all retail locations.

Figure 4.1.1 plots the COG measures for Utah from 1977 to 2010. Alcohol-related income over the past two decades has fluctuated in the range of $45 to $55 per capita, with approximately half derived from alcohol store net income and the other half from alcohol taxes. Income from alcohol licenses adds comparatively little to Utah's state coffers. Alcohol-related income reached a low point in the mid-1990s, and has steadily grown since, largely attributable to the rise in store net income.

A review of the recent financial reports from Utah show that in 2011, the net income from alcohol was over $107 million. From this income, about 58 percent went to the state general fund and to local governments, about 15% was transferred to supplement sales tax and about 27% or almost $30 million, supported the school lunch program.

The Utah Department of Alcoholic Beverage Control (DABC) is not a law enforcement agency. It is primarily a retailer of alcohol through its state liquor stores and package agencies. It also issues licenses and permits to restaurants, clubs, and beer establishments (other than grocery

and convenience stores), and organizers of temporary events. Utah enforces liquor laws through the state's Department of Public safety, Bureau of criminal Investigation. State enforcement is supplemented with local city and county police and sheriff offices. These agencies have the authority to confiscate alcohol, issue citations, close events, and pursue criminal charges against those found to be in violation of Utah's laws.



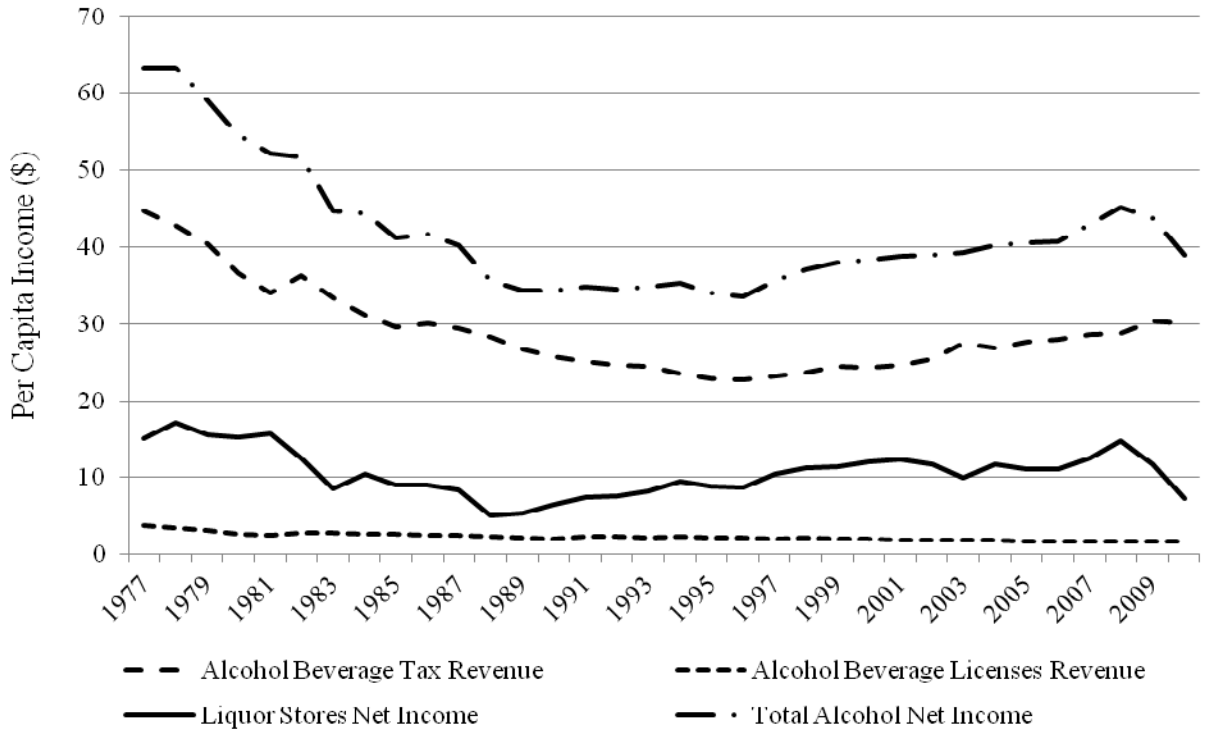
4.2 Pennsylvania

Pennsylvania controls liquor and wine at the wholesale and retail levels, and this model hasn't changed over the past forty years. Pennsylvania has, however, experimented in retail liquor store policy. New stores have opened to increase consumer access to product and reduce the rate of "border bleed," i.e., Pennsylvania residents buying products out-of-state. In 1990, Pennsylvania opened its first superstore, and in 2003, Pennsylvania opened three outlet stores that provide a large selection of wine and

spirits at discount prices. Finally, to increase consumer convenience, Pennsylvania has established several retail outlets within grocery markets.

Figure 4.2.1 plots the COG measures for Pennsylvania from 1977 to 2010. As with Utah, the graph illustrates a sharp decline in alcohol-related per capita income in the late 1970s. This pattern, which exists for all the states, is less an indicator of poor financial performance than an artifact of the inflation adjustments made to our measures.[20] Alcohol-related income continues to fall in Pennsylvania through the early 1980s, even after inflation dropped to around 3 percent. We speculate that the extended decline was due to the recession of the 1980s, which hit Pennsylvania especially hard in steel-producing regions. Since the late 1980s, alcohol related income has steadily increased, and is now at about $40 per capita.

Figure 4.2.1: Pennsylvania Alcohol Income per Capita and Components, 1977 to 2010



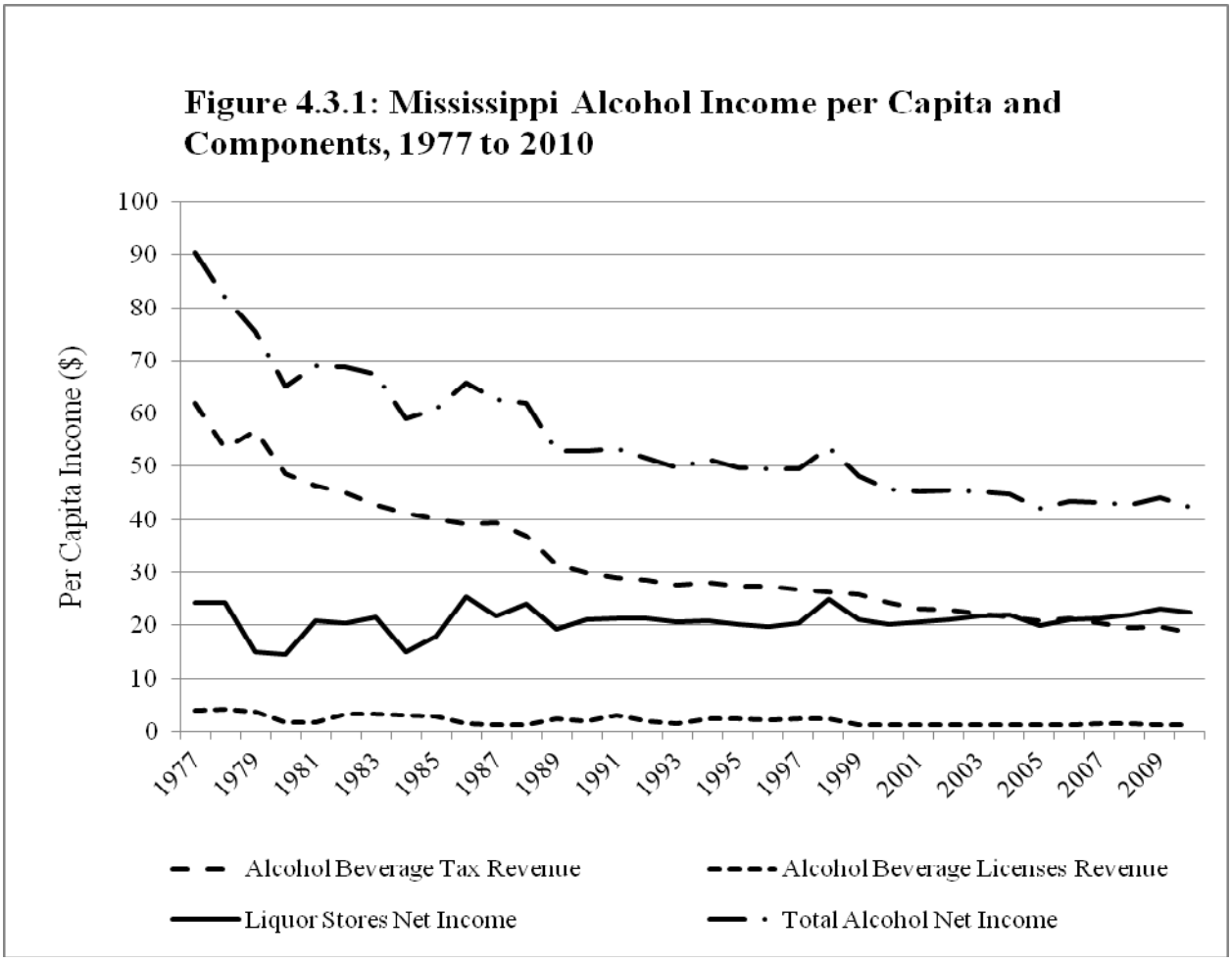
From its sale of wine and spirits, Pennsylvania's net income in 2011 was over $100 million. Of this, about 20 percent, or $20.3 million, was allocated to the Pennsylvania State Police for liquor law

[20]Inflation in the late 1970s exceeded 10 percent, so the sale of any product that did not keep pace with that rate of increase will exhibit a decline in value over the years as long as the unadjusted income for the product was rising at a rate lower than inflation.

enforcement, and 1.7 million, or about 2 percent, went to drug and alcohol treatment programs. The remaining income from the stores was allocated to the state's general fund. The Pennsylvania Liquor Control Board (PLCB) has an established formal bureau for alcohol education, which provides educational material to youth, legal consumers, and beverage alcohol servers. The Pennsylvania State Police, Bureau of Liquor Control Enforcement, is responsible for the enforcement of all liquor laws. The PLCB fully funds this function out of operational revenues.

4.3 Mississippi

Mississippi controls the wholesale liquor and wine business and licenses for the retail sales of alcohol. This model was consistent over the time period of this study. Figure 4.3.1 plots the COG financial measures for Mississippi from 1977 to 2010.



Mississippi provides an example of how a change in policy dealing with product mark-up can affect state alcohol income. A major pricing policy change occurred in 1985. Prior to that year, the wholesale mark-up was set by the alcohol board. Afterward, the legislature set the wholesale mark-up at

27.5 percent. Evident from Figure 4.3.1 is an immediate uptick in liquor store net income after 1985 to a level that continues to 2010. In 2010, the alcohol-related income for Mississippi was about $42 per capita. Roughly half of that was from wholesale operations and half from alcohol beverage taxes. As for trends, the net income from the wholesale has gradually increased over the decades, while income from alcohol taxes has gradually decreased.

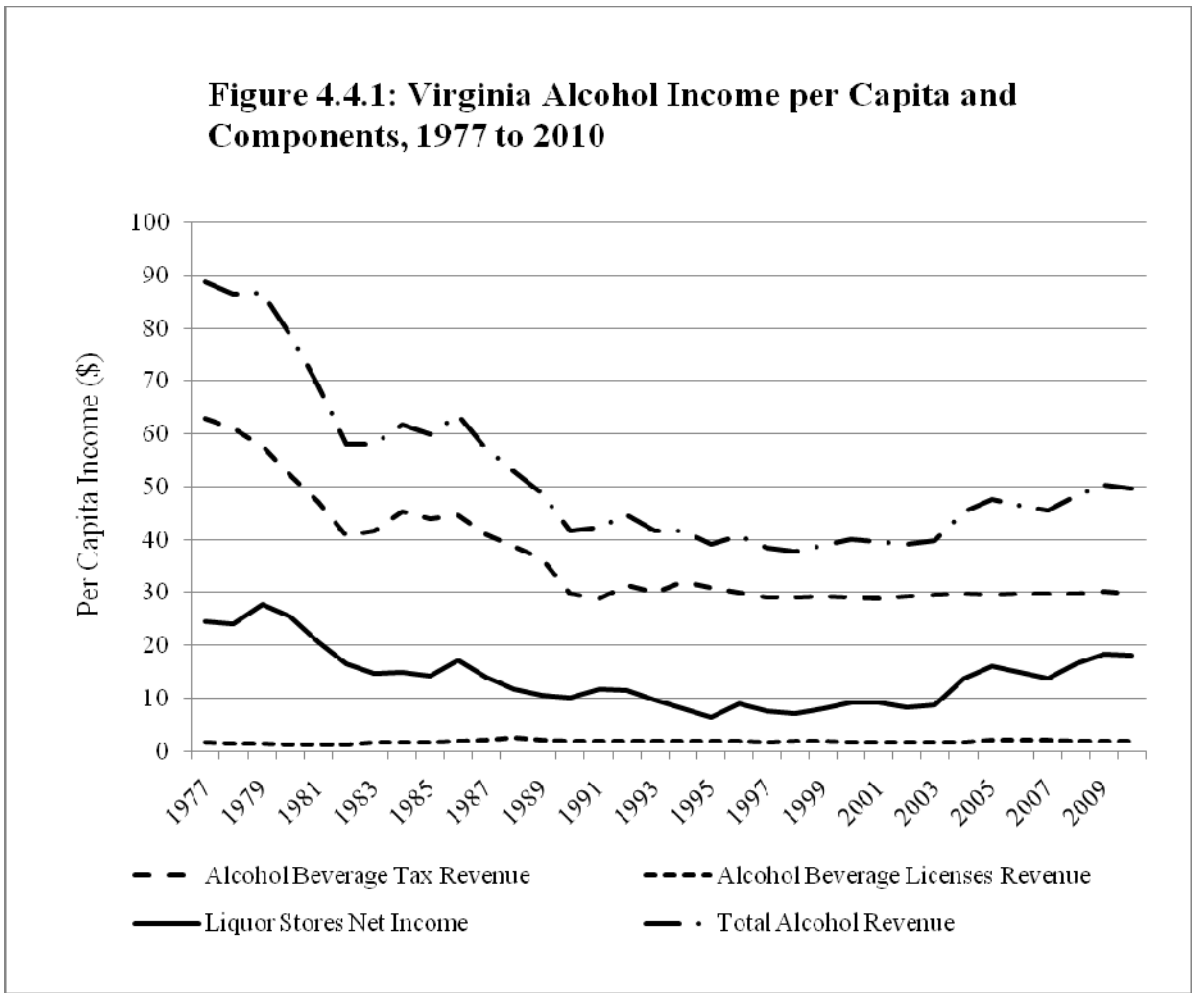
In fiscal year 2011, Mississippi took in about $92 million in alcohol-related income. The majority of these funds, 71.5 percent, were allocated to the general fund account; 21 percent was transferred to the sales tax department; 6.4 percent was earmarked for the Department of Mental Health to deal with alcohol abuse, and 2.7 percent was allocated to the cities and counties.

Alcoholic Beverage Control (ABC) is a division within Mississippi's Department of Revenue. The ABC has a dedicated unit for liquor enforcement, and like local law departments, will enforce DWI and underage drinking violations. The ABC also approves permits and investigates illegal production.

4.4 Virginia

Virginia's alcohol control policy had one major change since the 1970s. After 1986, the alcohol control board stopped selling wine, except for Virginia-made brands, and eventually all wine was phased out from the state stores. Virginia controls the wholesale and retail for liquor only. Figure 4.4.1 below plots the COG measures for Virginia from 1977 to 2010.

In Graph 4.4.1, alcohol revenue per capita declines from 1977 to 1982, and then begins to recover up to 1986. After 1986, when Virginia phased wine out from inventory, both store income and alcohol tax revenue declined. The remarkable drop in net income following 1986 appears to have arrested the financial rejuvenation following the recession in the early 1980s. Alcohol income per capita is stabilized over the 1990s, essentially matching inflation, and then it grew from 2003 onward. In 2010, Virginia's alcohol income was about $50 per capita.



Virginia stores earned about $120.9 million in net income in 2010–11.[21] The majority of these funds, about $67.7 million, was transferred to other state agencies. A substantial proportion, $65.4 million, was allocated to the Department of Behavioral Health and Developmental Services for the "care, treatment, study, and rehabilitation of alcoholics." The rest of the net income, $53.3 million, was allocated to the state's general fund.

The Virginia Department of Alcoholic Beverage Control is a division within the state office of public safety, and employs special agents based out of eight regions across the state that have full police powers with a diverse range of duties, including enforcing criminal and ABC laws in more than 15,000 licensed establishments, detecting illegal distilleries, investigating

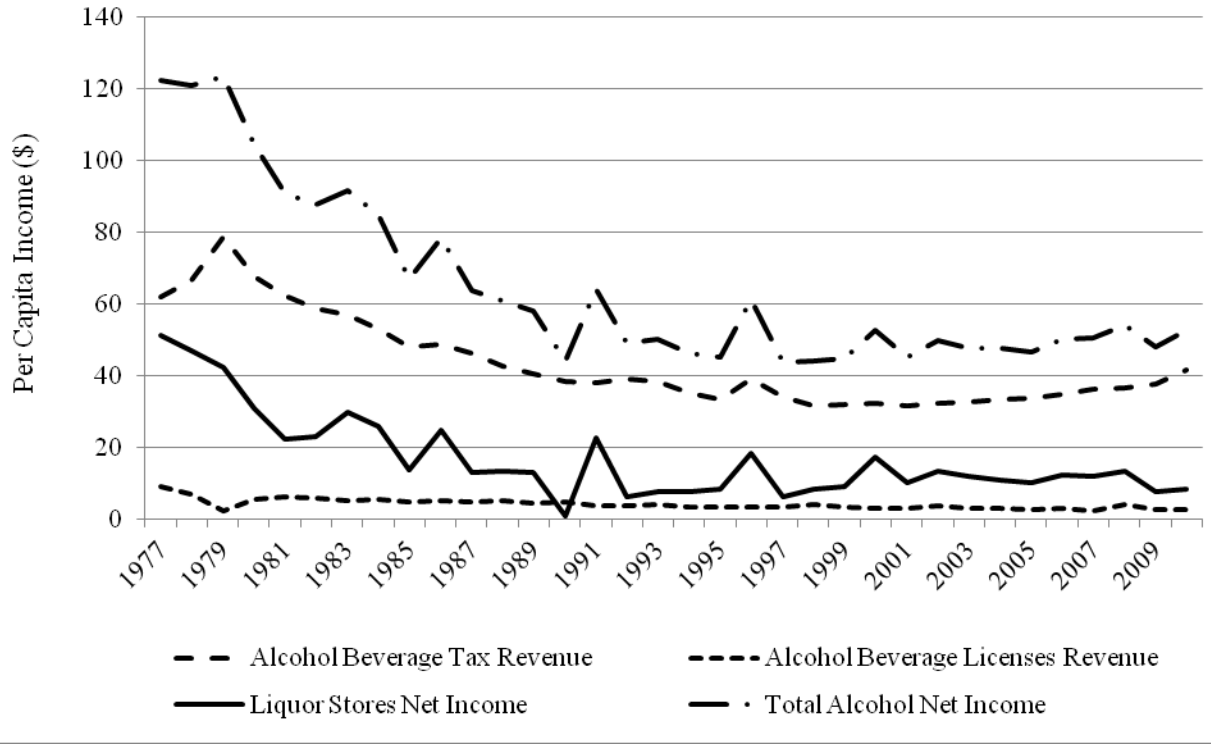
[21]This figure includes a tax on wine wholesalers and non-alcohol revenue sources, most notably the lottery. See: Virginia Department of Alcoholic Beverage Control: Mission in Review 2011 (Annual Report).

license applications, and performing underage buyer checks. This enforcement role is supplemented by local law enforcement efforts to deal with DWIs and underage drinking.

4.5 Montana

Montana's alcohol control policy has undergone several changes over the past thirty-five years. In 1986, the state stopped being the exclusive retailer of wine and allowed private outlets to sell wine. In 1991, the state got out of the retail wine business altogether. Also, from 1985 to 1993, the state phased out control of the wholesale monopoly of wine. Finally, from 1995 to 1996, Montana converted the state-run stores into agency stores. Figure 4.5.1 plots the COG measures for Montana from 1977 to 2010.

Figure 4.5.1: Montana Alcohol Income per Capita and Components, 1977 to 2010



The data pattern for Montana shows a steady decline in per capita alcohol-related income from the 1970s and through the 1990s, punctuated by occasional spikes in income. The late 1970s decline in Montana, as in the other states considered in this section, is due to our use of inflation-adjusted measures. The period from the mid-1980s to the end of the 1990s was when Montana began to deregulate alcohol control. The income spikes in 1986, 1991, and 1996 can be attributed to the liquidation of inventory, which on each occasion provided a short-term boost in revenue for the Montana system. Otherwise,

however, Montana experienced a steady decline in per capita income during the divestment period. This decline occurred even during periods when the economy was relatively buoyant. By year 2000, the alcohol-related income stream recovered and began to grow, but this is due to tax revenue, not net income from the wholesale operations.

In fiscal year 2011, Montana collected $31.5 million in alcohol-related income. About 80 percent of these funds were directed to Montana's general fund. The remaining 20 percent was allocated to the a special revenue fund to be used by the Department of Public Health and Human Services to treat, rehabilitate, and prevent alcohol and chemical dependency. Local law enforcement is responsible for enforcing Montana's liquor laws.

4.6 Iowa

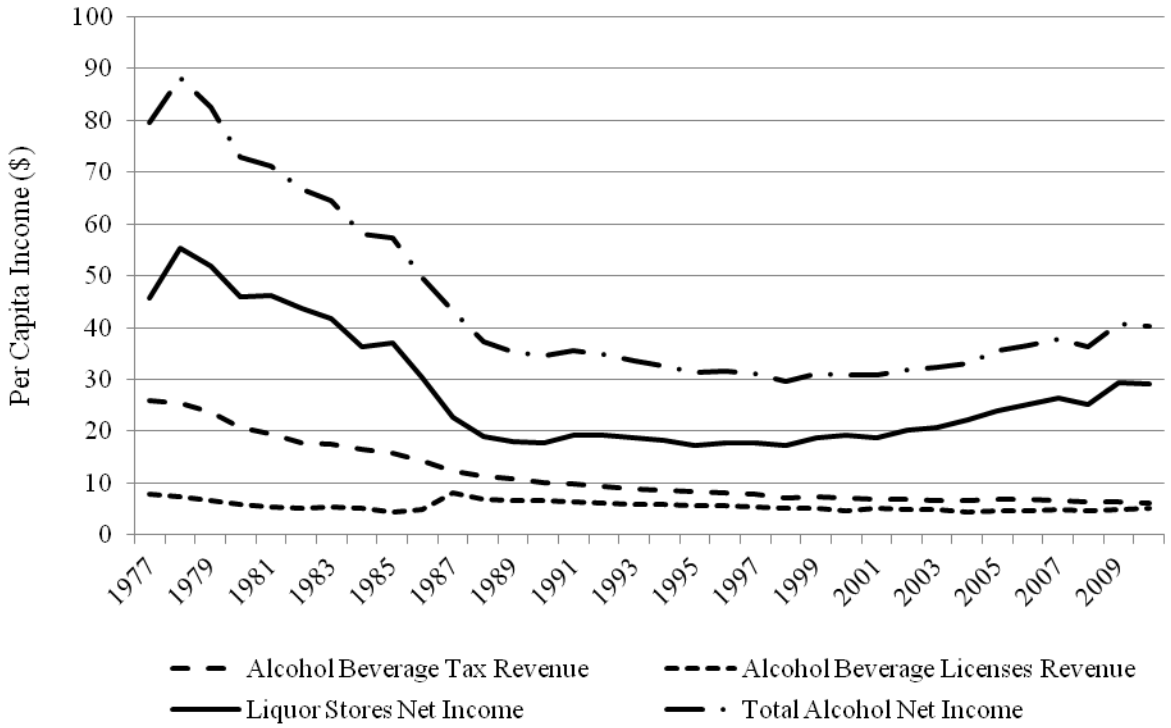
Figure 4.6.1 plots the COG measures for Iowa from 1977 to 2010. Iowa's alcohol control policy has changed considerably since 1977, and is frequently discussed in the literature. In the 1970s, Iowa wholesaled and retailed wine and liquor through state-run stores. In 1985, Iowa's wine monopoly ended when wholesale and retail wine licenses were issued. State-run stores continued to stock wine, competing with private outlets, until wine was phased out in 1987. That same year, Iowa privatized spirits retail, closing 221 state retailers and licensing 410 private stores.[22] To retain a proportion of lost revenue from the conversion to license retail, the Iowa government placed a 50 percent tax on wholesale to retail transactions. At present, Iowa controls wholesale liquor only.

Figure 4.6.1 encompasses the three phases in Iowa alcohol control policy. Prior to 1985, when Iowa controlled wine and spirits at the wholesale and retail level, the data show a decline in per capita alcohol-related income. As with the other states, the exceptionally high inflation in the late 1970s and the recession of the early 1980s explain much of the decline in our measures for these years. The 1985 to 1987 period was Iowa's deregulation era; first for wine at the wholesale and retail levels and later for retail alcohol. Alcohol-related income continued to decrease in Iowa during these two years, and as Figure 4.6.1 illustrates, most of the drop was due to a loss of store net income. We do note, however, a small gain in income from the sale of alcohol licenses in 1987, which was probably caused by the newly licensed retail liquor stores. Alcohol-related income per capita continued to decline through the 1990s, reaching a nadir in 1998, and recovered gradually to about $40 per adult in 2010.

[22]The number of retail liquor outlets in Iowa has steadily grown. By 2012, about 1,000 liquor stores were in operation in Iowa, roughly four times the number of state stores in 1987.

In 2010, Iowa earned almost $100 million in net alcohol-related income, 80 percent of it going to the general fund, of which $14 million was earmarked for substance abuse education and treatment. Of the remaining 20 percent of income, 14 percent went to the state treasurer and other state departments, 3 percent was given to cities and counties, 1 percent to economic development, 1 percent to a license education fund, and 1 percent directly to substance abuse treatment. Iowa does not have a dedicated state agency for enforcing liquor laws; local law enforcement agencies have this responsibility.

Figure 4.6.1: Iowa Alcohol Income per Capita and Components, 1977 to 2010

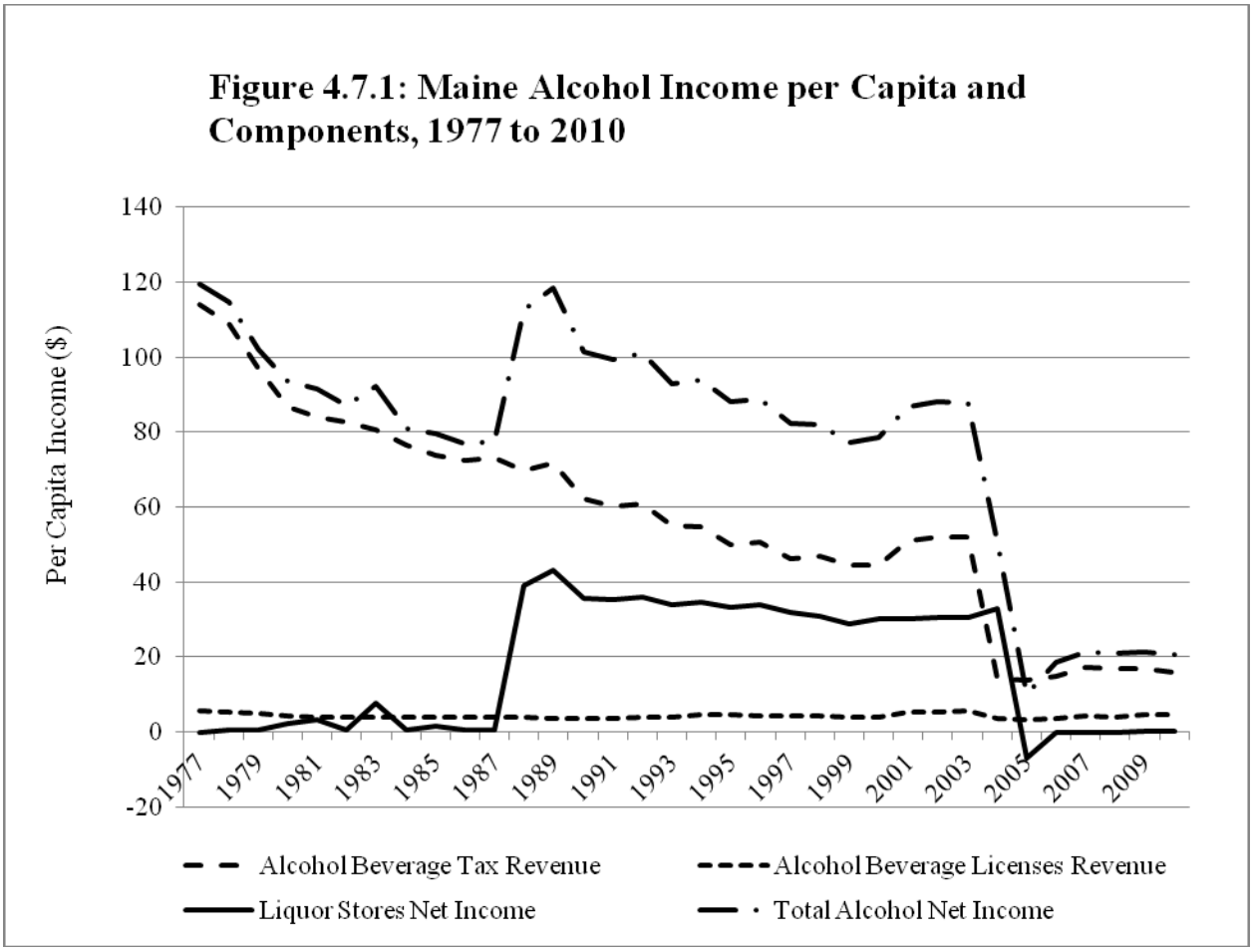


4.7 Maine

Of the eight states, Maine has experienced the greatest variability in alcohol-related income over the period of study. Figure 4.7.1 plots the COG measures for Maine from 1977 to 2010.

In the late 1970s, Maine controlled wholesale and retail sales of liquor. As Figure 4.7.1 illustrates, most of the income from this period is generated through alcohol taxes; net income from the stores is near zero, suggesting that the stores operated at break-even. Maine thus offers a unique example of a historical period when the stores operated as non-profit entities. As Figure 4.7.1 shows, store net

income increases sharply in 1988. Interview evidence suggests that Maine began to depart from the non-profit model by experimenting with higher product mark-ups. In 1989, a minimum mark-up pricing was introduced.[23]



From 1992 to 2004, the Maine State Liquor and Lottery Commission began to downsize by closing state stores and establishing agency stores, where alcohol prices were set by the state yet sales occurred in private stores. Hence, another unique aspect of Maine's deregulation is that it occurred gradually; the conversion to agency stores took place over a twelve-year period. In 2004, the liquor wholesale business was leased to the Maine Beverage Company, and afterward Maine experienced a sharp decline in store net income, tax income, and total income, which can be seen in Figure 4.7.1. Between 2003 and 2005, the liquor store net income per capita dropped from $30–$35 per capita to zero

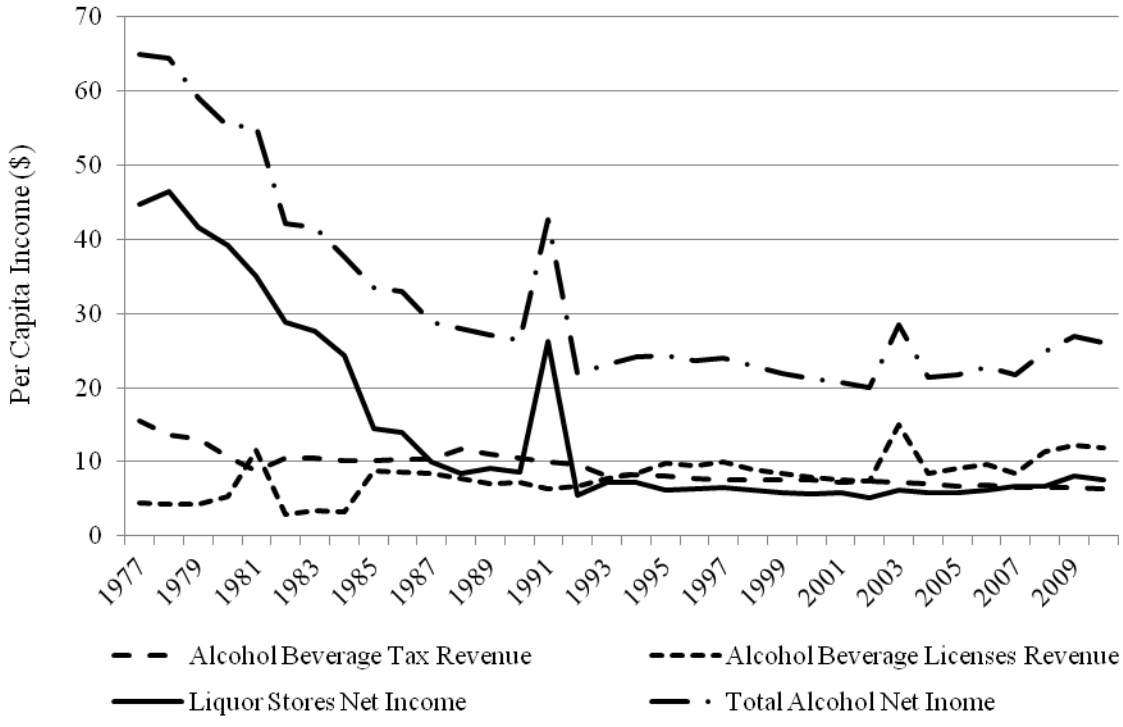
[23]The Maine Bureau of Alcoholic Beverages did not have an explanation for this spike in store income, but the Census of Governments data provided clues. Up until 1988, sales revenues were a small fraction greater than cost of goods sold. In 1988, sales revenues jumped in historical terms, while cost of goods remained stable.

and the alcohol tax revenue per capital fell approximately 66 percent. There is presently an effort in Maine to renegotiate the contract terms with a private wholesale entity.

In 2010, the estimated alcohol-related income was $20 per capita, almost all derived from alcohol taxes. In 2011, Maine garnered over $10 million in alcohol-related revenue, all of which was appropriated to the Office of Substance Abuse for alcohol treatment, education, and rehabilitation. Maine had a dedicated state agency for liquor law enforcement until 2005 (when the wholesale system was privatized), and afterward this responsibility was transferred to the State Department of Public Safety. Budget constraints have reduced the staffing for liquor law enforcement, and as a result, most enforcement is conducted by local police agencies.

4.8 West Virginia

Figure 4.8.1: West Virginia Alcohol Income per Capita and Components, 1977 to 2010



Prior to 1981, West Virginia sold wine and spirits through state stores. In 1981, the Mountain State divested from wine sales. Figure 4.8.1 illustrates the COG net income sources for West Virginia, and the loss of wine product corresponds with a continued sharp decline in total revenue. In 1990–1991, West Virginia experimented with an auction system for retail spirits. Permits were auctioned for the right

to sell spirits across the state; less-populated counties were limited to one retailer, more populous counties had multiple spirits retailers. Permits are good for ten years, and upon expiration a new auction is held. The auction system in West Virginia is responsible for the two spikes in income in Figure 4.8.1. Note that in the years of (or just following) an auction, store net income increased. Also note that the first auction (1990–1991) yielded about twice as much revenue as did the second round a decade later, suggesting a diminishing return from this licensing method.

West Virginia retains control of wholesale spirits, and imposes a 28 percent mark-up on retailers. Retailers own the spirits inventory, and must mark up product by a minimum of 10 percent. There is a 5 percent tax on spirits that is retained by the counties. According to the COG, the 2010 per capita alcohol revenue for the State of West Virginia was $26.

West Virginia has an enforcement division within the Alcohol Beverage Control Administration that collaborates with local law agencies to enforce state liquor laws. Matters dealing with licensing, such as background checks and inspections, are performed at the state level. Underage drinking, DWIs, and criminal charges are performed at the state and local level.

General Observations

These eight state sketches provide evidence on the relationship between alcohol-related sources of income, state control of alcohol distribution and sales, and expenditures on state services.

1. There is a unique character to all state control systems. Ownership and management models vary across the states, but so do other important factors that affect the fiscal contribution of state systems, such as taxes and product mark-up policy. In the case of Maine, we observe a time period (1977–1987) when the state-managed stores operated as non-profit entities, and nearly all alcohol-related income was derived from alcohol taxes. Other states, like Iowa, derive the majority of their alcohol-related income from warehouse operations. States like Pennsylvania have state retail outlets, whereas others have a combination of state stores and agency stores. The Iowa privatization of retail outlets was based on a conventional license model, while West Virginia imposes auctions for retail off-premise spirits sales every decade.

2. Across all the states, double-digit inflation of the late 1970s and recession of the early 1980s led to a real decline in alcohol-related income. A comparison of the graphs, however, suggests that the decline was steeper for states that privatized the retail system during this period. The two states that kept their monopoly systems intact, Utah and Pennsylvania, have the lowest declines in alcohol-related income from their late 1970s peak to their mid-1990s trough. These two states

also appear to recover earlier than the rest; both show signs of recovery by the mid-1990s, whereas the others continue a per capita income decline into the late 1990s or early 2000s.

3. Taxes on alcohol products and net income from state stores are the primary sources of income. State income from licenses is trivial by comparison. The major implication is that for states that do divest from alcohol retail sales, there is little hope that increases in license fee income will compensate for the reduction in income from store privatization. Iowa has shown that the most feasible way for a state to retain a substantial share of alcohol-related income after privatizing retail stores is by instituting a hefty tax on alcohol. Indeed, this is what happened in the State of Washington when the whole system was privatized in 2011.

4. While a large share of net income is allocated to state general funds, it is quite common for monopoly states to earmark net income for other state services. Two popular usages of revenues are for liquor law enforcement and substance abuse treatment. Other uses include tax relief, support for local governments, and school lunch programs.

5. Strong control states often support state alcohol enforcement agencies. Virginia, a relatively strong control state, has a comprehensive network of liquor law enforcement agents. Other strong control states, such as Pennsylvania, use alcohol-related net income to fund divisions within the state police force. States that divest from direct control, such as Maine, lose the ability to fund liquor law enforcement at the state level, and thus the responsibility transfers to local police agencies.

Section 5: Analysis

This section walks though four research topics: (1) alcohol consumption, (2) alcohol-related revenues, (3) alcohol-related traffic fatalities, and (4) alcohol and crime. In each sub-section, background information is provided and findings are described. The empirical model used in the analysis is explained in detail in Appendix A. This regression technique tests for the relationship between variables after adjusting for general trends in the variables for each state and for unmeasured state traits. The presentation here consists of graphs, tables, and discussion; the full regression equations and summary statistics used to produce the results are in Appendix C.

5.1 Alcohol Consumption

A topic that is often discussed when comparing monopoly and license systems is consumer access to product. Monopoly states that have either state-owned stores or agency stores usually have fewer retail outlets per capita, but larger stores on average. Moreover, state-

owned stores are often located separately from grocery or other domestic needs, which further reduces the purchasing convenience for consumers. A trade-off for convenience is security and policy enforcement. Product theft is easier to prevent when a store has one public egress point, is staffed by persons that specialize in the product, and when store hours match with alcohol sales hours. Underage access to alcohol should be easier to prevent when a store exclusively sells alcohol products because there is no reason for underage youth to enter the premise unless accompanied by an age-legal adult. It is therefore reasonable to expect that liquor law is more effectively enforced with monopoly systems.[24]

We first examine alcohol consumption with respect to state monopolies of distribution and sales. The graphs below plot the estimated average consumption rates of spirits for the 1977 to 2010 period across four systems: (1) license, (2) state wholesale only, (3) state wholesale and agent retail, and (4) state wholesale and state retail.

Figure 5.1.1 depicts the estimated consumption rate for spirits across the four control models with and without adjustments for the level of restrictions imposed by the state on the hours of operation. License states have the highest rate of spirit consumption, averaging 2.1 gallons per capita over the time period. All of the monopoly models have lower rates of spirit consumption, although they vary.[25] Control of wholesale only is associated with 14.3 percent lower per capita consumption of spirits. Direct state ownership of retail and state agency retail are 12.2 percent and 15.1 percent less than license states, respectively. Statistically, state control of wholesale only and wholesale plus retail do not differ. The estimated per capita consumption of spirits for the models are as follows: license, 2.2 gallons; state wholesale only, 1.9 gallons; state wholesale and retail, 1.9 gallons; and state wholesale and agency retail 1.8 gallons. The findings imply that the cause for the lower spirit consumption in monopoly states is related to state ownership at the wholesale level.

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[24]One method of augmenting convenience, yet retaining the advantages of security and policy enforcement, is to locate state stores within grocery or big-box retail outlets. A "store-within-a-store" model features a secured inventory area and separate check-out locations. Shoppers gain in convenience by having the ability to purchase alcohol product in the same building as non-alcohol items. Retail establishments, in turn, benefit by leasing the space to the state and from increased customer traffic.

[25]See Stockwell et al. (2009) for similar findings from British Columbia, Canada. Much of the research in this area has focused on how alcohol taxes affect consumption (Elder et al. 2010). A transaction cost explanation by Trolldal and Ponicki (2005) relates directly to alcohol monopolies.

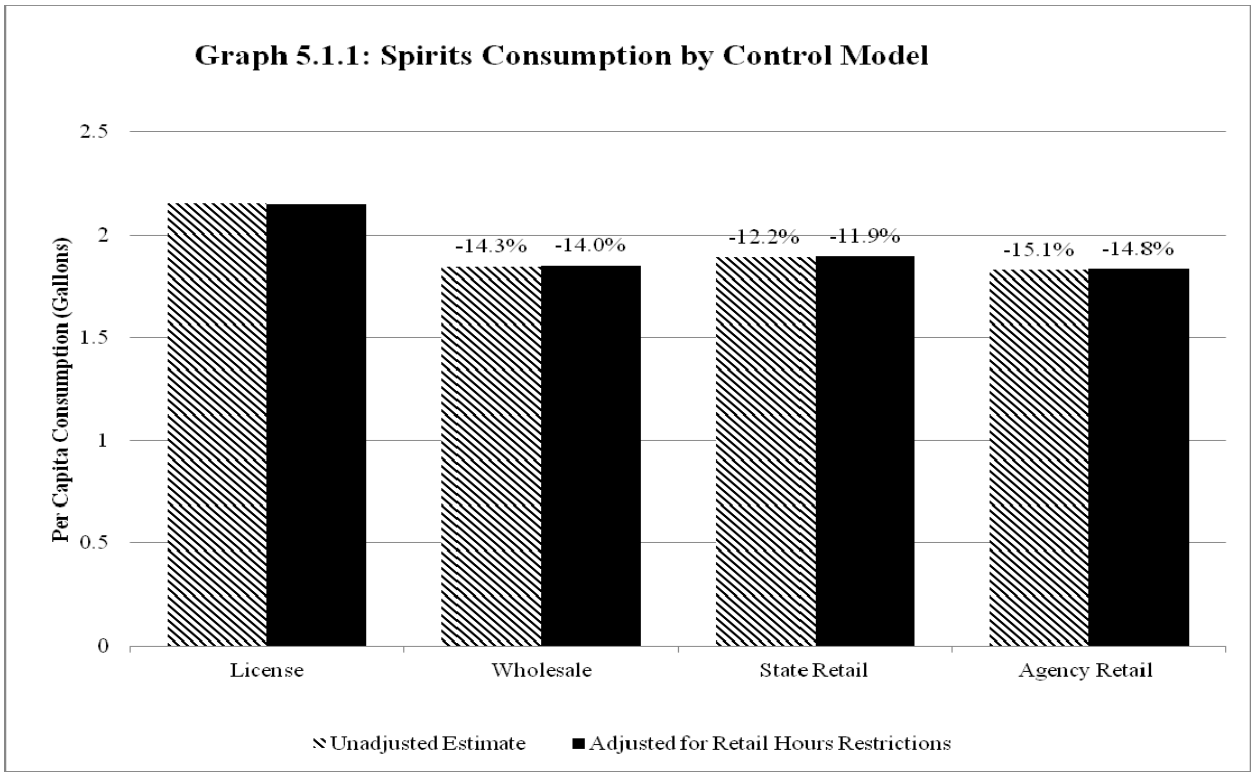
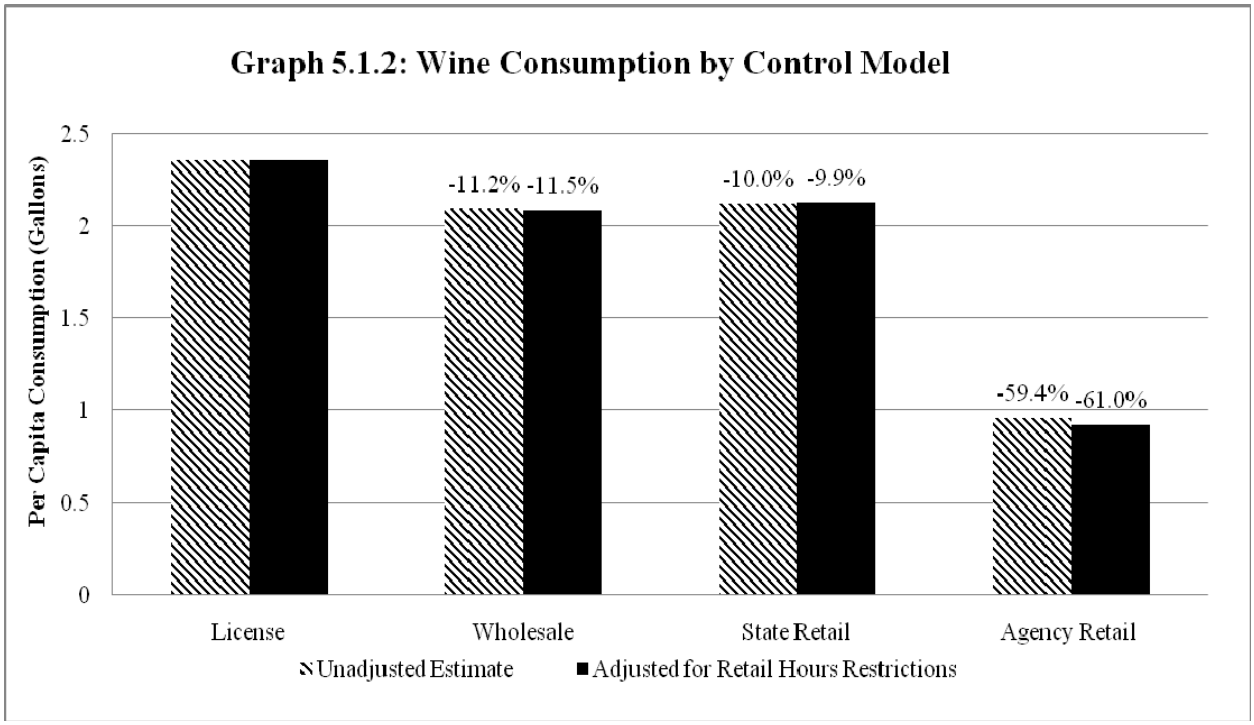


Figure 5.1.2 illustrates the estimated wine consumption rates with respect to the various models of control.



Once again, license states have the highest per capita consumption, averaging 2.4 gallons annually. State wholesale control of wine is associated with an 11.2 percent lower rate of wine consumption, about 2.0 gallons annually. State ownership of wholesale and retail is associated with 10 percent less wine consumption when compared with license states, averaging 2.1 gallons per capita. State retail sales through an agency arrangement, however, drops wine consumption to less than a gallon per capita, representing an approximate 59.4 percent difference from license models.

One possible explanation for the lower consumption rates in monopoly states is fewer hours of retail operation. Over the time period covered in this study, monopoly states averaged about six fewer hours of access for non-Sundays, and three fewer hours of access for Sunday retail sales. To test whether the more restricted hours explained the consumption rate difference between monopoly and license models, we included control variables (i.e., low, medium, and high restrictions) for Sunday and non-Sunday hours in the equations.

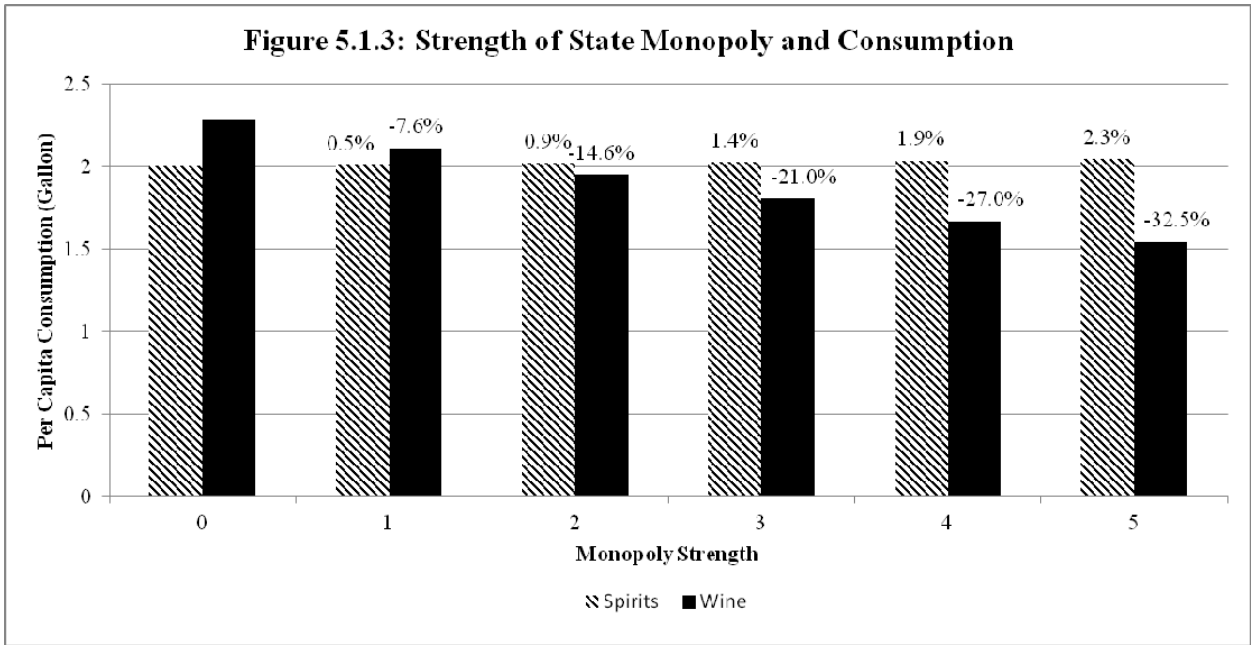
Results do not show that more restrictions on retail hours equate with lower consumption, but rather, there is a statistically significant positive relationship between off-premise hours restrictions and wine consumption. Compared with a low level of restricted non-Sunday, off-premise hours, a state with high hours restriction is associated with a gain in wine consumption by 7.4 percent, and medium restriction is associated with a gain in wine consumption of about 4.9 percent. Restrictions on Sunday hours of sales exhibit a similar pattern of positive associations with wine consumption, although lower in magnitude than for non-Sundays: 5.9 percent gain for high restrictions and 4.1 gain for medium restrictions when compared with low restrictions. Spirits consumption was unchanged by hours of off-premise operation.

Our controls for retail operation hours do not distinguish between product types. Given that the laws on hours might apply exclusively to spirits (i.e., wine and beer are often sold in retail outlets where spirits are not), the positive association between hour restrictions might be indicative of a substitute effect. If the states with restricted retail hours allow more permissive access for wine and beer, then perhaps consumers who would otherwise prefer spirits choose wine or beer instead.

The inclusion of the store hours variables did not substantively change the estimates for the differences in consumption across control models. Figures 5.1.1 and 5.1.2 above illustrate this finding by providing estimates for the control models after adjusting for restrictions on the

hours of retail operation. Note in the figures that the consumption rates change little after the hours adjustments. From a policy perspective, this finding implies that monopoly states will not substantively increase consumption by expanding retail access hours.

Figure 5.1.3 provides the estimated consumption rates based on the strength of the state monopoly control over spirits and wine. Unlike the previous graphs, the predictor variable (i.e., strength of state control) is constrained to be linear, where state ownership of the sales and distribution system is zero for a license system and grows incrementally by 1 up to a value of 5 that equates with state ownership and management of wholesale and retail.

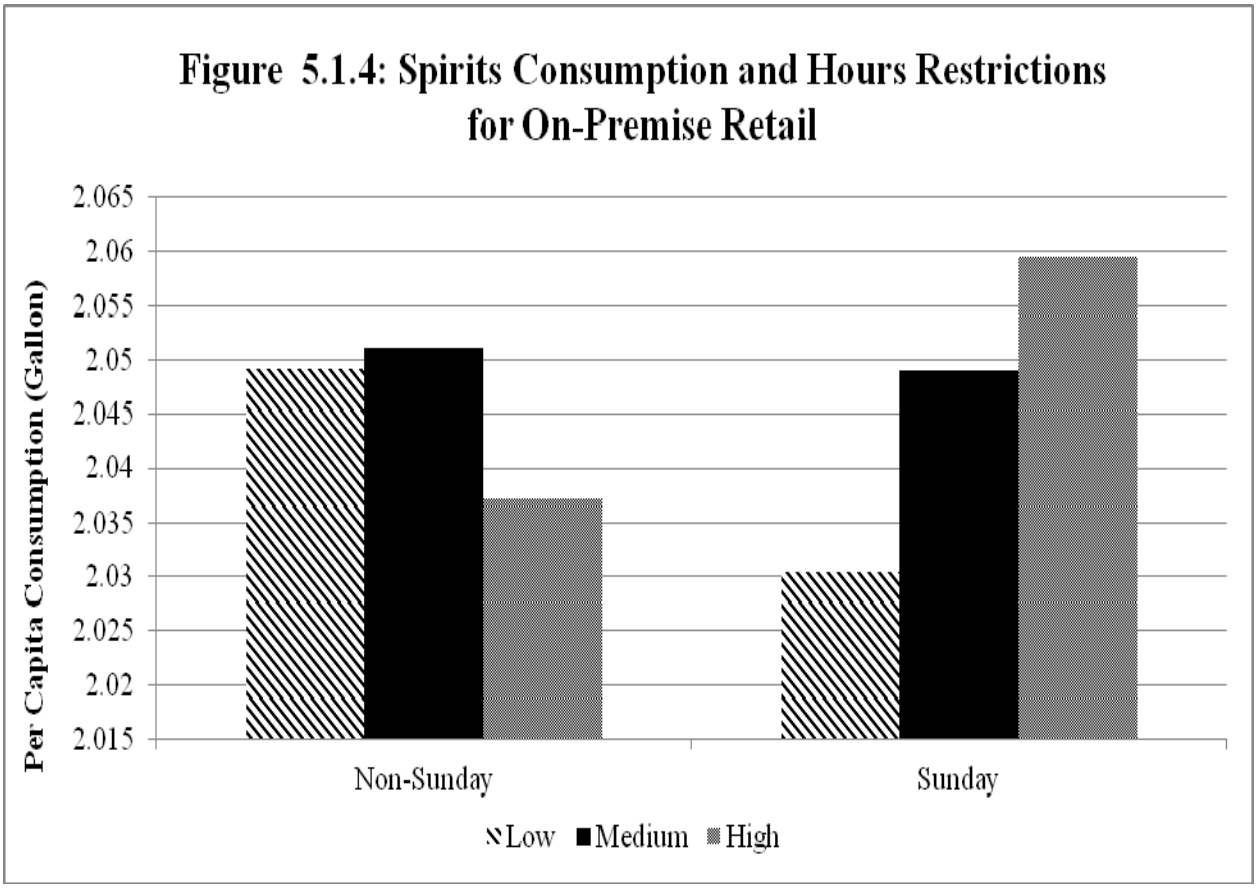


The graph shows that for every 1-point increase in our measure of the strength of the state monopoly over wine, wine consumption declines by about 7.9 percent, and this decline is statistically significant at conventional levels. Contrarily, we find no statistical relationship between the strength of state control over spirits and the per capita consumption of spirits. A possible reason is that the suppressed consumption effect for spirits resides at the wholesale level.

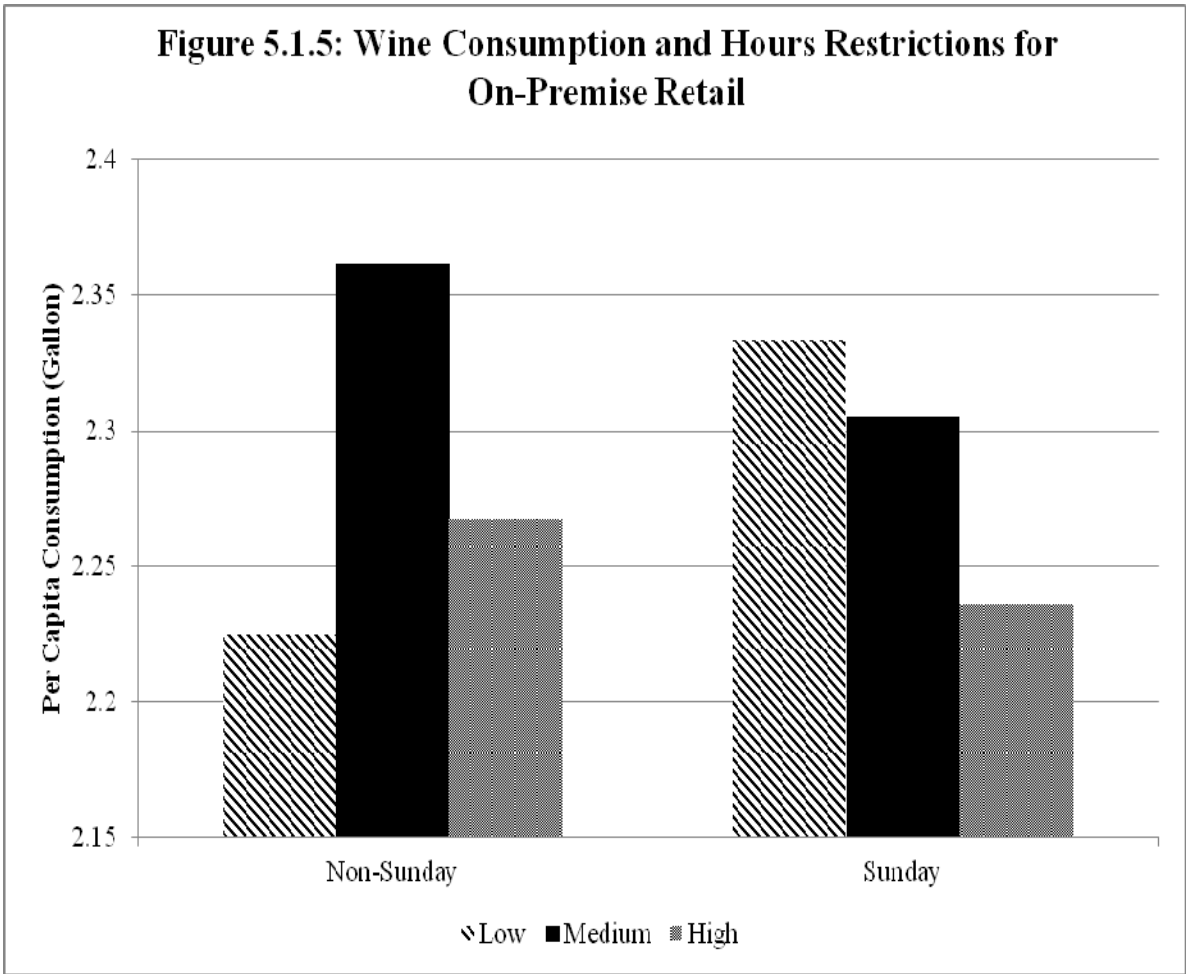
Other policy effects on alcohol consumption were tested. One area of interest was whether restrictions or penalties for on-premise retailers, such as bars, restaurants, and hotels, affected alcohol demand. The variables tested were the non-Sunday and Sunday hours for on-premise alcohol establishments, the existence of a dram law which makes alcohol servers

potentially liable for harm caused by intoxicated customers, whether the state hours of operation were locally determined, and whether the state had Election Day restrictions.

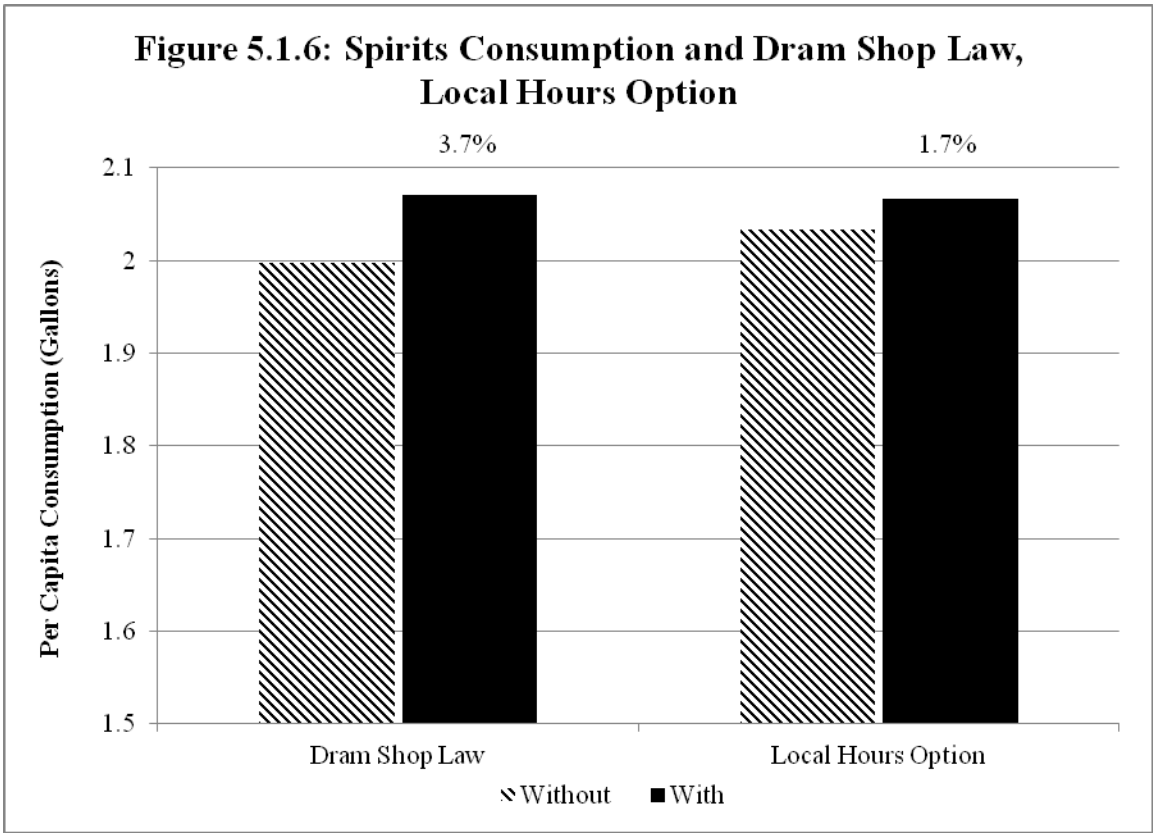
Figures 5.1.4 and 5.1.5 illustrate the estimated differences in consumption for states with low, medium, and high restrictions on hours of operation for on-premise retail establishments.



For spirits consumption, Figure 5.1.4 suggests an association between hours of operation and consumption that is contrary to expectations, i.e. with higher restrictions come an increase in consumption. However, statistical tests indicate no difference across the three categories. The results only yielded a statistical difference between medium and low restrictions for non-Sunday hours and wine consumption, depicted in Figure 5.1.5. Election Day restrictions had no significant effect on alcohol consumption.

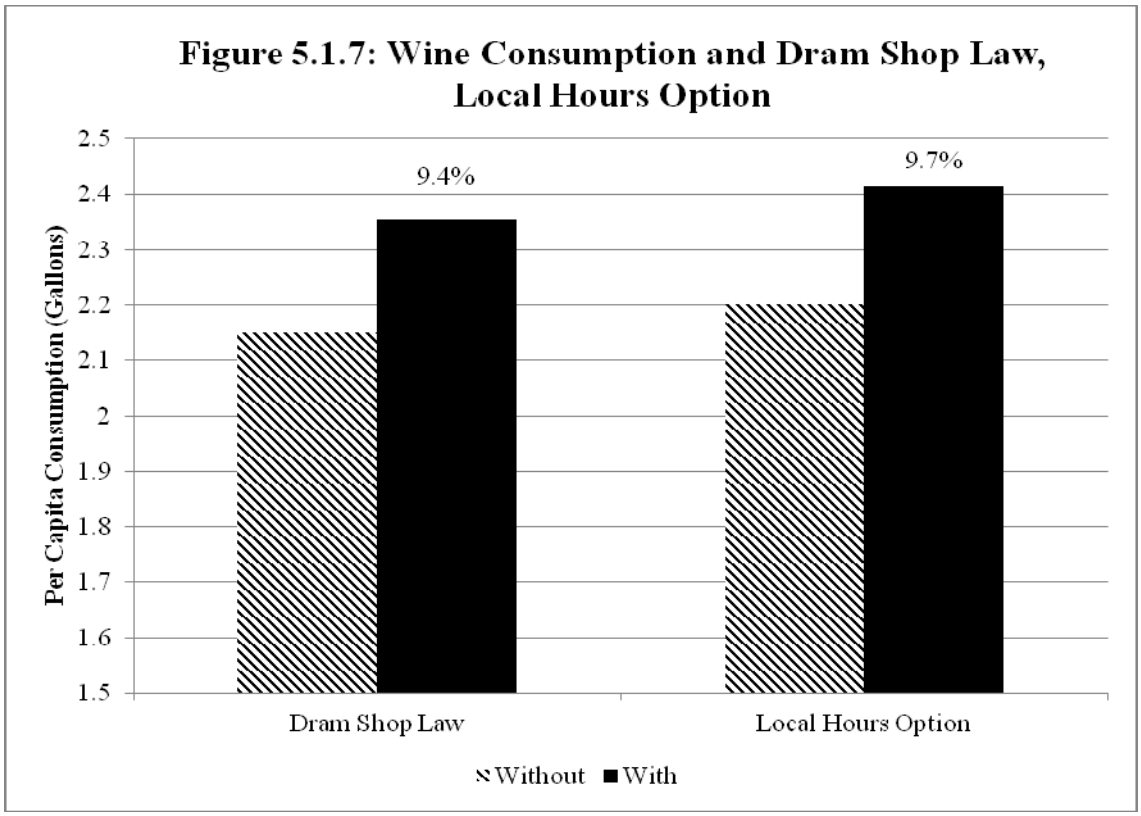


One reason why state-level hours policy displays little relation to alcohol product consumption might have to do with local option policies. Approximately 40 percent of states give municipalities the right to establish retail seller hours. Most of the exceptions to state hours standards are found in urban centers. Another policy to consider is the dram shop law, which imposes liabilities on servers of alcohol. Figure 5.1.6 plots the estimated consumption rates of spirits for states with and without a local hours option and dram shop law.



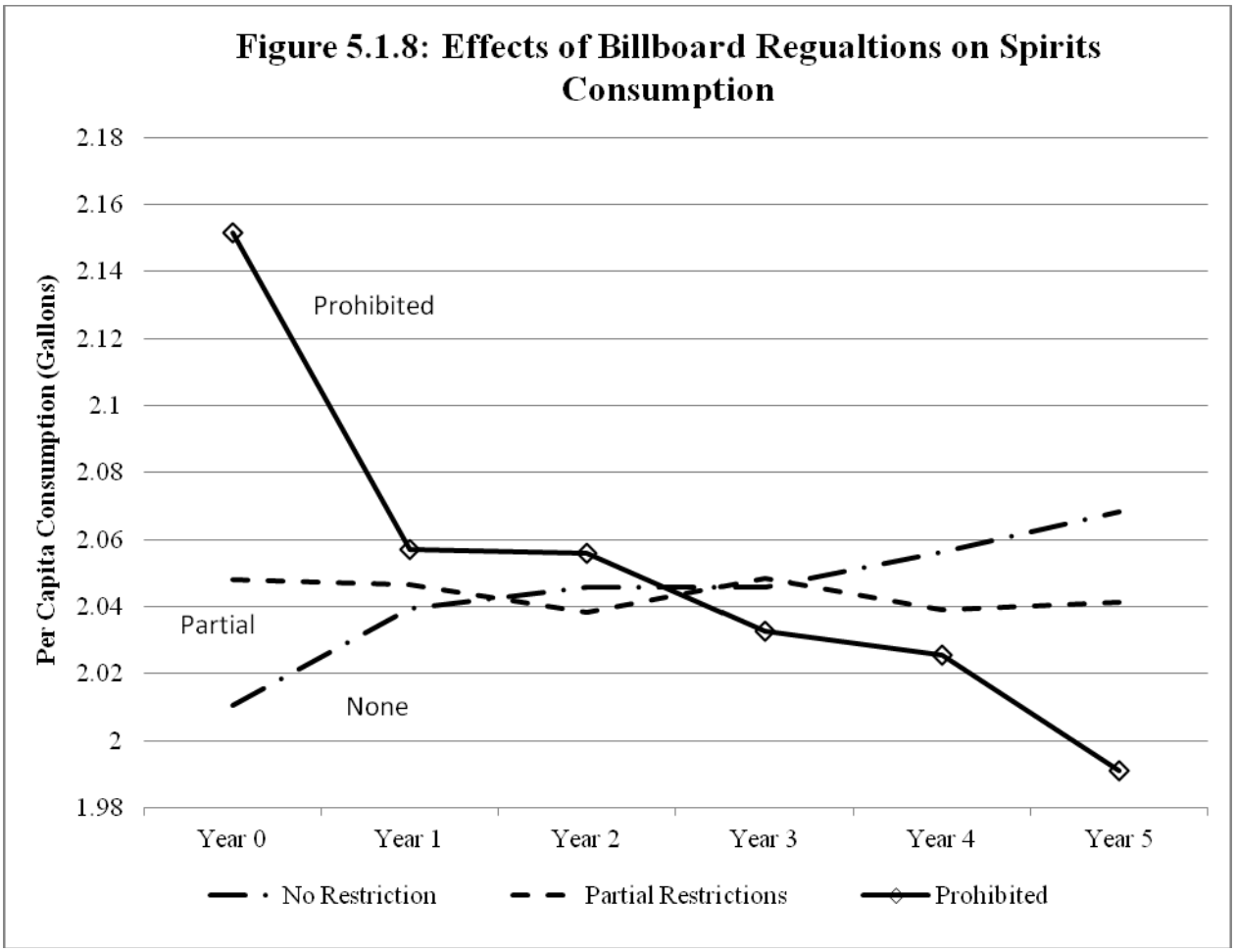
Both policies are associated with higher consumption of spirits. Intuitively this is logical for local hours option policies, because usually the result is the liberalization of retail hours within cities. Spirits consumption is 1.7 percent higher with a local option on retail hours. Somewhat puzzling is the positive association between dram shop law and consumption, since the expectation is that liabilities imposed on servers would reduce alcohol sales. States with a dram shop law average 3.7 percent higher spirits consumption.

A similar pattern exists with wine consumption, plotted in Figure 5.1.7.



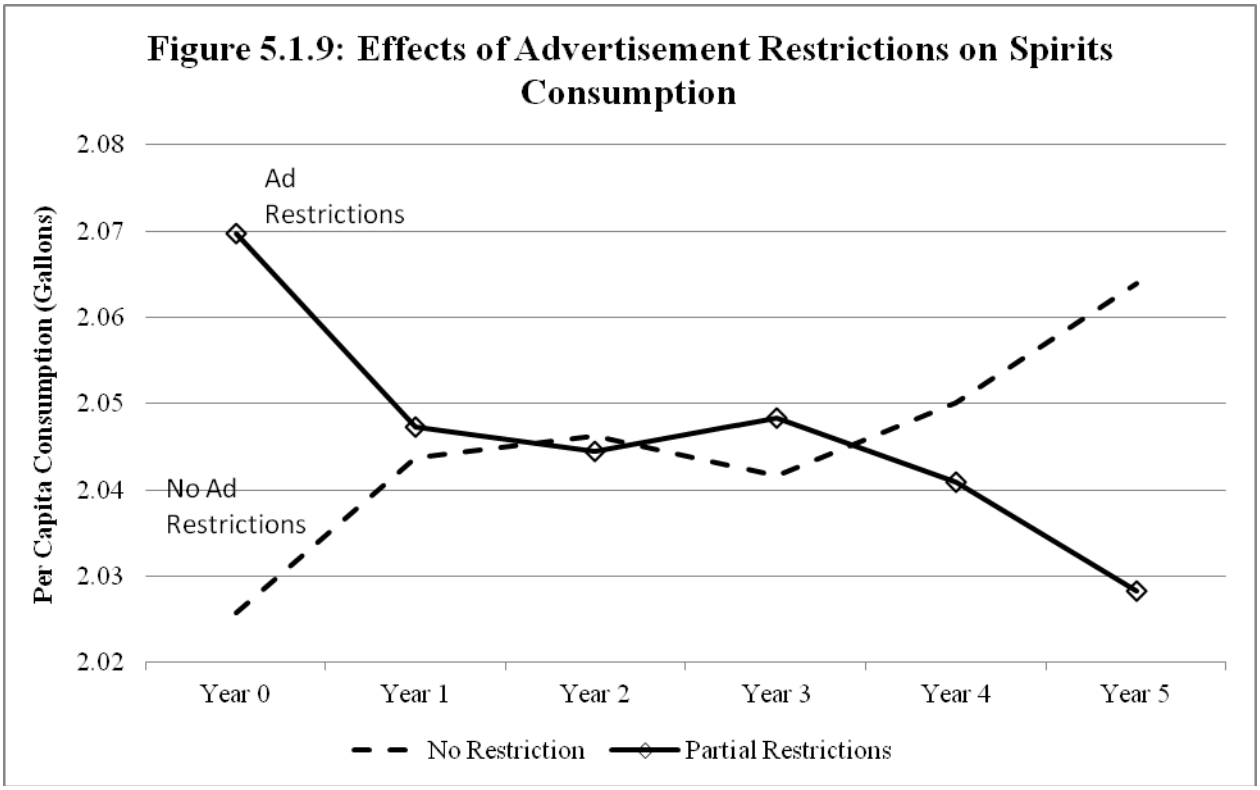
Wine consumption is 9.7 percent higher in states that grant local municipalities the right to set on-premise and off-premise retail hours. A dram shop law is associated with 9.4 percent higher wine consumption.

Finally, analyses were performed to explore the effect of advertising regulations on alcohol consumption. The advertising restrictions tested are featured in the DISCUS publications and apply only to spirits. The first, billboard advertising, was coded in three categories: (1) no restriction, (2) prohibited, and (3) partial restriction. Figure 5.1.8 provides the predicted effect of the three legal frameworks.



The results indicated that states that enact billboard prohibitions have, on average, higher spirits consumption rates. The effects of the advertising ban take about five years to reduce spirits consumption significantly. Figure 5.1.8 illustrates this effect with a downward sloping line labeled "prohibited," which traces the estimated per capita consumption of spirits under a complete ban on billboard advertising over a five-year period from the point of enactment. After five years, a full ban reduces spirits consumption by an estimated 8.1 percent. Similarly, Figure 5.1.8 illustrates the effect of eliminating the restrictions on billboard advertising on spirit consumption. The line labeled "none" plots the point estimates for per capita spirit consumption over a five-year period. Five years after lifting restrictions on billboard advertising, per capita spirits consumption is 2.9 percent higher.

States can also encourage responsible consumption by restricting newspaper, magazine, television, and radio advertising.[26] Figure 5.1.9 plots the five-year effect of laws that fully or partially restrict spirits advertising in these mediums.



As Figure 5.1.9 illustrates, after restrictions are lifted, consumption modestly increases. The five-year effect of lifting bans on spirits advertising is an estimated gain in consumption of 1.9 percent. Imposing restrictions decreases spirit consumption by 2.0 percent after five years.

5.2 Alcohol-Related State Income

States earn revenue from the alcohol industry in the form of alcohol sales taxes and alcohol beverage licenses. When a state owns all or part of the alcohol distribution system, the state also receives revenue from the sale of alcohol products. This section quantifies the economic contribution of alcohol control systems to state budgets using Census of Governments

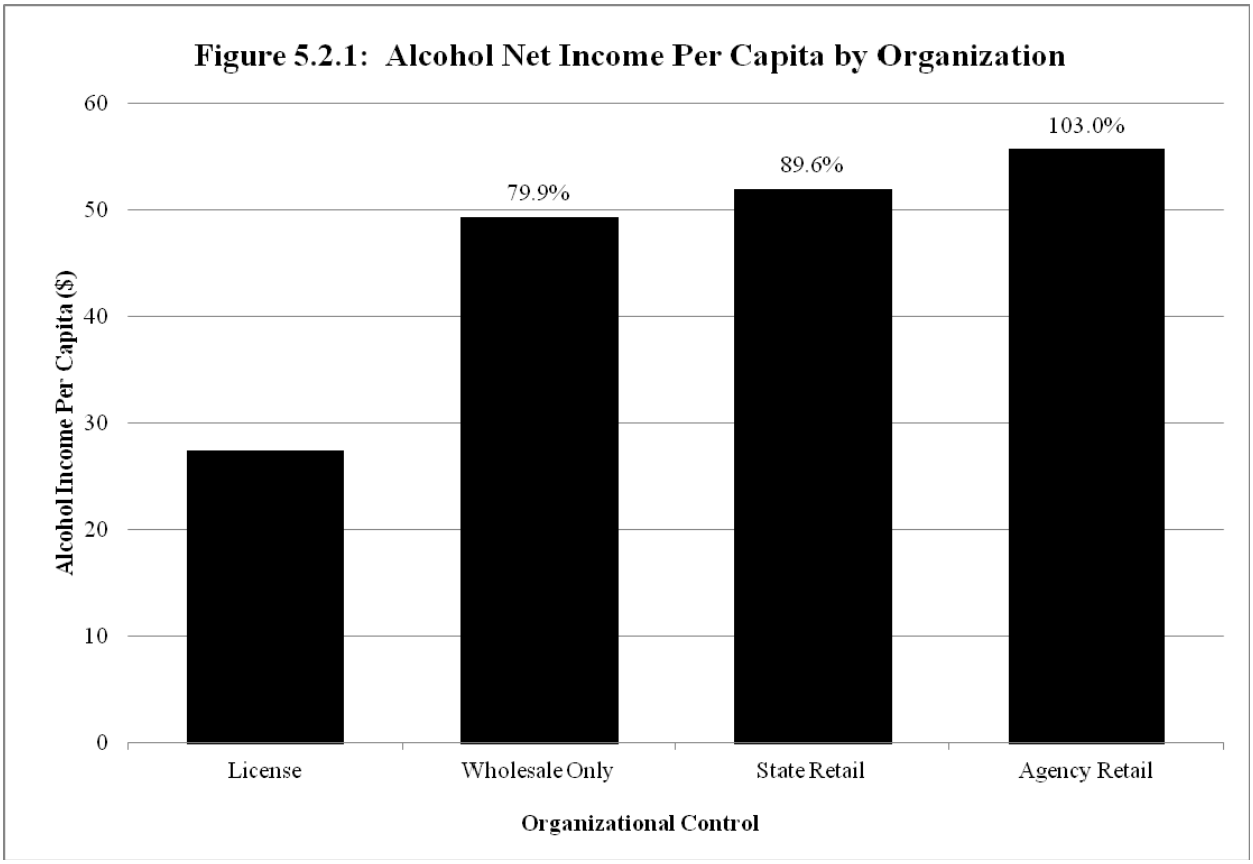
[26]See CAMY (2011) for an example of reports, and Calfee and Scheraga (1994) Chaloupka 2002 and Nelson (2004) for literature reviews.

data, years 1977 to 2010. With the exception of North Carolina, every state is included in the analyses.[27]

As described in the measurement section, three measures are combined: net income per capita, alcohol taxes per capita, and license fees per capita, to produce a composite statistic, alcohol income per capita, to compare total income across monopoly and license states. Figure 5.2.1 provides the estimated per capita revenues across the control models for spirits and wine.

As Figure 5.2.1 illustrates, states that exert ownership over the distribution of spirits enjoy a per capita income stream that is greater than license-only states. The inflation-adjusted average per capita income for license states was $27.43 for spirits. By comparison, states that controlled wholesale spirits only earned $49.36, wholesale and with agency retail earned $55.68, and wholesale with state retail earned $52.01, for respective gains of 79.9%, 103.0% and 89.6% above license states. Thus, most of the gains earned by monopoly states occur at the wholesale level. Retail control through direct ownership or agency contracts provides an incremental, but statistically insignificant, revenue gain. Figure 5.2.1 suggests that agency retail outperforms state-owned retail, but this estimated difference is in part a coding issue. The measure of agency retail includes any state that had an agency store, encompassing states that had a mix of state-owned and agency retail outlets.

[27]North Carolina is a control state that delegates alcohol regulatory power to the counties, granting each county a spirits control board with the option of running public stores. The unique arrangement in the Tar Heel State provides a fine example of the range of spirits control models. Because North Carolina store operation is a local affair, however, it is a poor match with our aim of analyzing state-level finances (i.e., revenues earned by the county stores do not show up as state income because they are retained by the counties). Therefore, North Carolina is excluded from the analysis on state revenues. Several Maryland counties also control alcohol sales. Washington State privatized wholesale and retail alcohol in 2012 and is now a license state, but it was a monopoly state during the time period of the data.

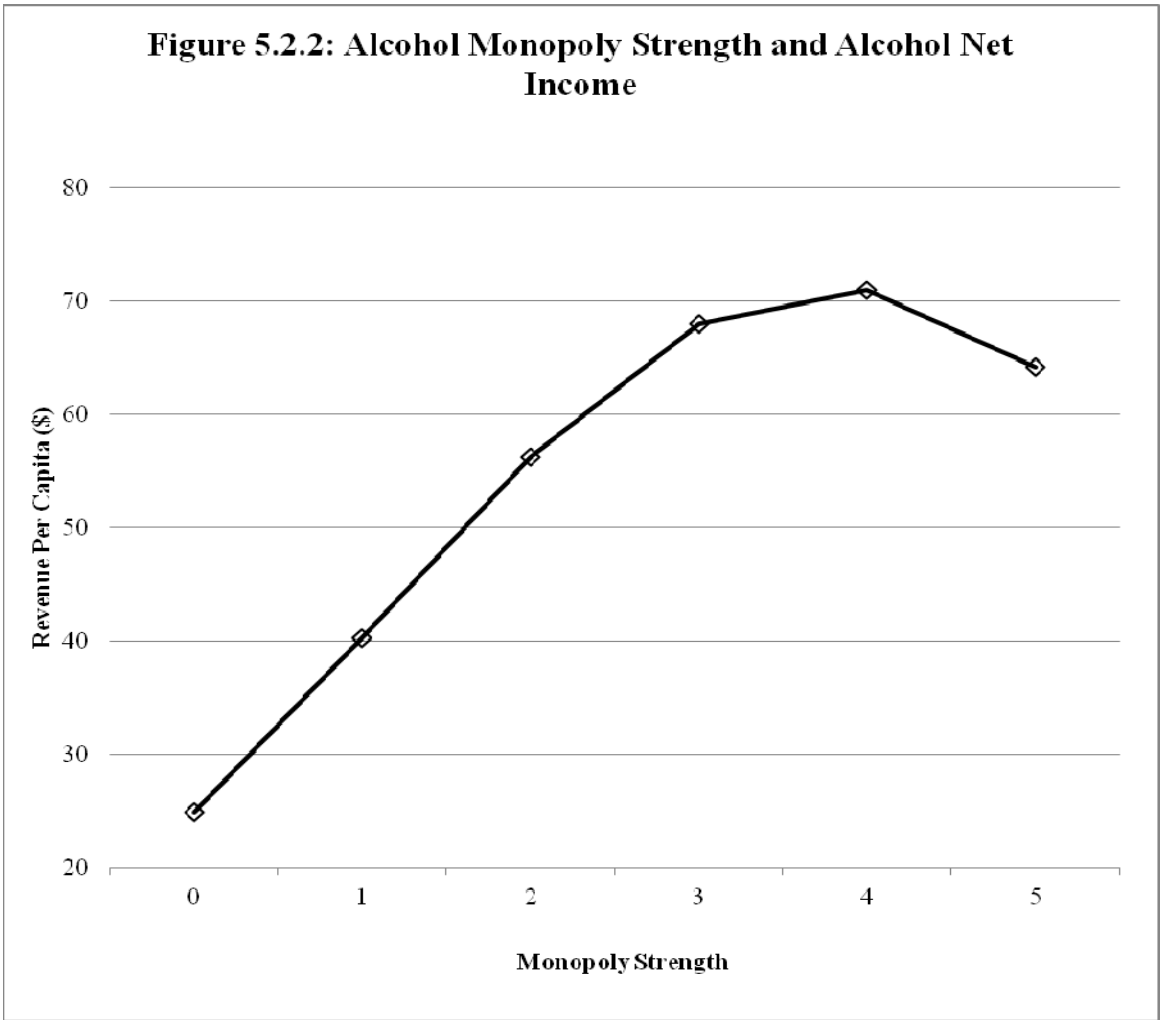


Control over product appears to matter. Increasing degrees of control equate with higher alcohol income per capita, but this effect is limited to spirits. When spirits monopoly is in linear form, every 1-point increase in the strength of monopoly control over spirits represents a 5.1 percent gain in revenues. This estimate held even after adjusting for per capita spirits consumption. Control over wine distribution, on the other hand, yields a statistically insignificant revenue gain of 0.9 percent for every 1-point increase in monopoly strength. There are two plausible reasons for the difference between spirits and wine. First, many of the states that market wine products through the retail systems permit a limited number of private licensees to sell wine also. This is often done to create opportunities for consumers to access specialty wines. Several states carry a limited stock of wine from state producers to support local wineries. What this means for this analysis is that unlike spirits, few states hold a monopoly over wine sales, and as the monopoly weakens we can expect revenue to decline. Second, wine in general is a more competitive industry—there are far more wineries than distillers—and thus the gross margins on wine are lower than for spirits.

Similar reasoning explains why the gain by controlling retail is substantively smaller than for wholesale. All states allow sales through licensed private retailers, on-premise and off-premise, which competes with state stores. A state wholesale operation, on the other hand, can more resemble a true monopoly, and reap greater revenues.[28] Second, wholesalers have lower operational costs, which produce higher net incomes on average than retailers.

The relationship between state control models and alcohol-related income is plotted in Figure 5.2.2. In this model, the composite measure for spirits monopoly is expressed in curvilinear form.

Figure 5.2.2: Alcohol Monopoly Strength and Alcohol Net Income



[28]Of course, a perfect monopoly on alcohol sales is impossible because citizens have the right to cross state lines to purchase products.

Figure 5.2.2 reinforces Figure 5.2.1. The steep upward slope for lower levels of monopoly control is capturing the substantive alcohol-related revenues when the state owns wholesale operations. Net revenues increase with ownership, but only up to the point just prior to where the state completely owns retail stores. This finding is consistent with Figure 5.2.1, which indicates a large net revenue gain from state ownership of wholesale and much less of an income contribution from state retail ownership.

In terms of generating revenue, the optimal organizational model is where the state owns wholesale and retail directly, but also has limited agency retail arrangements. Several states in the sample establish state-owned stores in densely populated areas, but also establish a limited number of agency contracts in less populated areas. The advantage to this approach is that the state secures a monopoly in the most lucrative retail markets while through agency arrangements is able to extend the distribution network to regions where the product market is not strong enough to justify the expense of a stand-alone state store.

Finally, the research examined the question of whether state control over spirits or wine was associated with state expenditures on police, non-hospital health, and the judiciary. The supposition is that state control over retail would in particular promote responsible consumption, which in turn would be reflected in the per capita cost of these services.[29] The results produced no evidence of a statistically significant relationship between monopoly models and the per capita expenses for these services. However, it is important to point out a major confounding factor relating to the data that may explain this result. The COG data is for expenses made by the state only, but expenses for police, the courts, and non-hospital health are frequently shared with the state by local governments or passed on as private costs. As described in Section 4, "State Financial Trends and Histories," alcohol policy enforcement is frequently handled by local law enforcement agencies, which the state COG data does not capture. Likewise, the negative health consequences of alcohol are well known,[30] but the expenses for dealing with health problems might be paid primarily by private insurance, as opposed to the state. In short, the COGS data did not include the expenses incurred by non-state entities, which might have affected the outcome.

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[29]Stockwell el al. (2009) conclude that alcohol-related fatalities increase with store privatization in British Columbia. Zalcman and Mann (2007) find an association between retail store privatization and suicides in Alberta, Canada. See also Wagenaar, et al. (2010) for a meta-analysis.

[30] See Room (1984); Wagenaar, Tobler, and Kelli. (2010).

Another potential confounding factor is that monopoly states frequently earmark income from state-owned wholesale and retail for law enforcement and health. Expenses in monopoly states for these services might be elevated simply because monopoly states have this revenue source as an asset.

5.3 Alcohol-Related Traffic Fatalities

A historic justification for state ownership of the alcohol retail sector was a belief that state control promotes responsible consumption. Reformers at the end of the Prohibition Era argued that with a license system the merchant had a financial incentive to sell alcohol products, regardless of the social implications. And although all states have laws regulating private sellers of alcohol, the effectiveness of any law depends on enforcement diligence, which can vary across and within states depending on government budgets and the priorities of elected officials. State control of retail sales, it was argued, blunts the monetary incentive to sell product. Retail clerks and store managers in control states typically have fixed wage rates, so they suffer no penalty by refusing to sell product to underage persons, persons that are visibly intoxicated, or for any other reason that might result in harm.[31]

This theory is explored by testing whether state control is associated with alcohol-related vehicular fatalities. The analysis matches state control variables with traffic fatality data from the National Highway Traffic Safety Administration (NHTSA). Traffic fatalities involving at least one driver with a BAC of 0.08 or higher were standardized in three ways: (1) per capita (millions of adults), (2) per distance traveled (billions of vehicle traffic miles or BVTM), and (3) as a ratio of total fatalities.

To begin, fatality rates are compared across the four state regulation types: (1) license, (2) state wholesale only, (3) state wholesale and retail, and (4) state wholesale with agency retail. Figures 5.3.1 through 5.3.3 below provide the average estimates for the measures across license and monopoly regulatory models.

[31]In this sense, our inquiry departs from prior research. Nearly all the research to date on alcohol-related vehicular fatalities and alcohol policies has focused on alcohol taxes, retail outlet density, or drunk driving penalties. See: Blomberg et al (2009), Campbell et al. (2009), Chang et al. (2012), Chaloupka et al. (1991), Dee (1999), Peck et al. (2008), Ruhm (1996), Zwerling and Jones (1999). For an analysis that begins the discussion on the role of alcohol monopolies, see Wang, Price, and Herzenberg (2012).

Figure 5.3.1: DWI Fatalities per Million Adults by Control Model

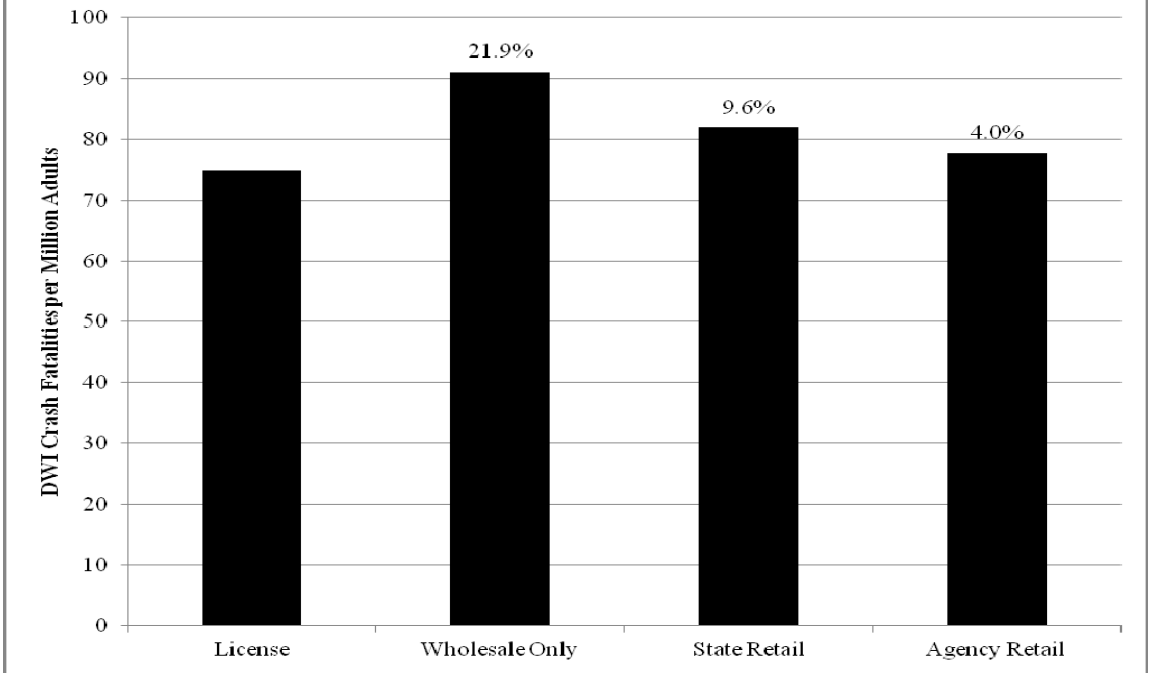
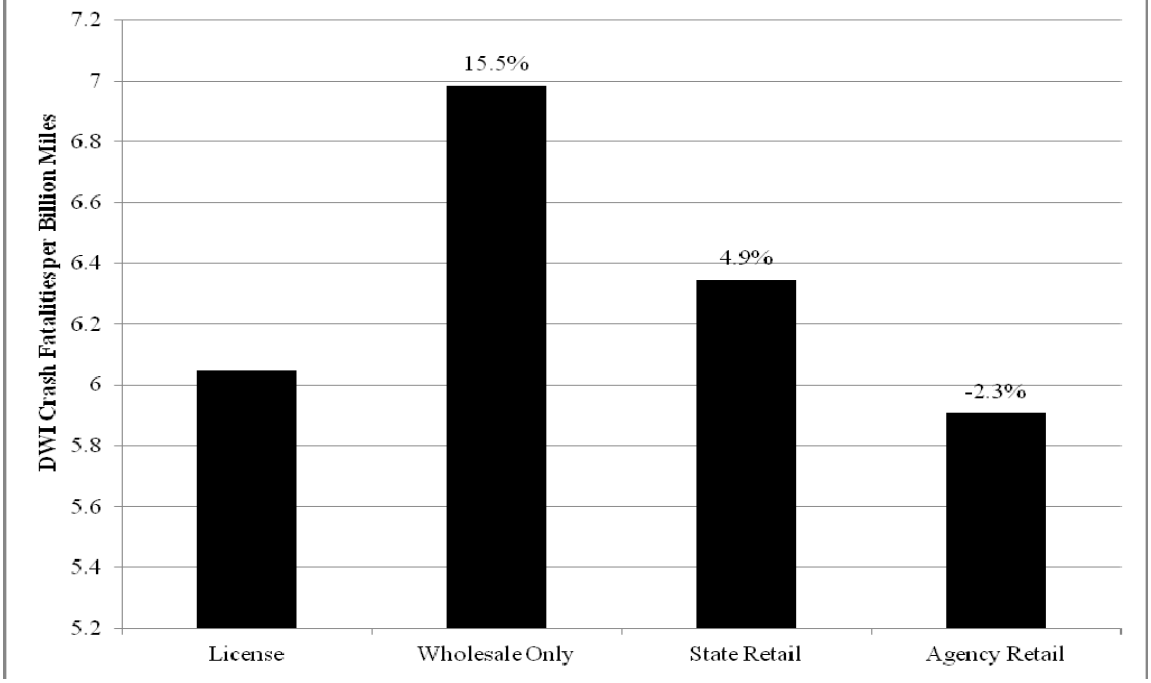
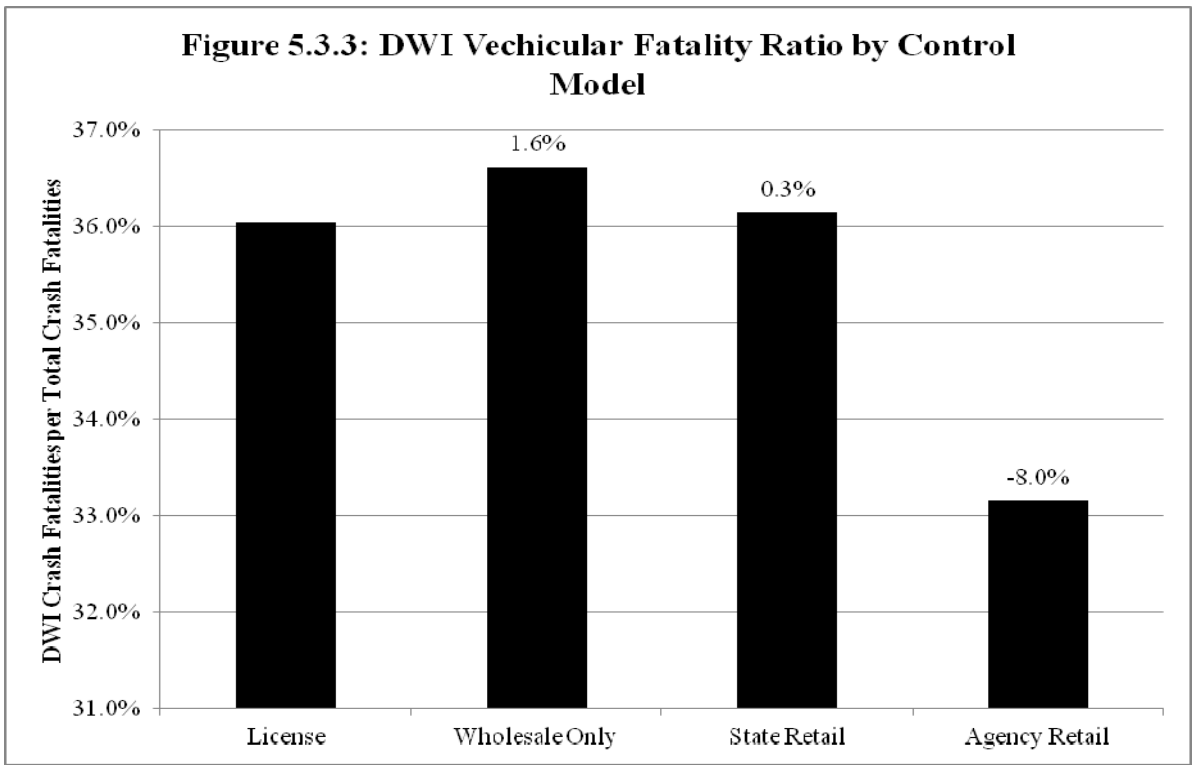


Figure 5.3.2: DWI Fatalities per Billion Vehicle Miles by Control Model





The three graphs display a consistent pattern. For each, the highest rate of alcohol-related fatalities is associated with systems featuring state ownership of wholesale only, followed by state ownership of wholesale and retail, followed by license states, and last are models where the state owns wholesale and has agency retail stores. We have no theoretical or sensibly plausible explanation for why state control of wholesale would elevate alcohol-related fatalities. In states where the monopoly system extends only to wholesale, sales to consumers occur through licensed private retailers, much as they would in license states.

To isolate the retail control effect, tests were run without the wholesale variable, which essentially lumps together the states that own wholesale only and license states. The new comparison is between states that exert control over retail and states where retail is controlled by private firms. Figures 5.3.4 through 5.3.6 provide unadjusted point estimates for the effect of state control over retail for the three alcohol-related fatality measures, and identical estimates after adjusting for spirit and wine consumption, off-premise consumption hours, and the presence of a dram law.

Figure 5.3.4: DWI Fatalities per Million Adults by Retail Store Type

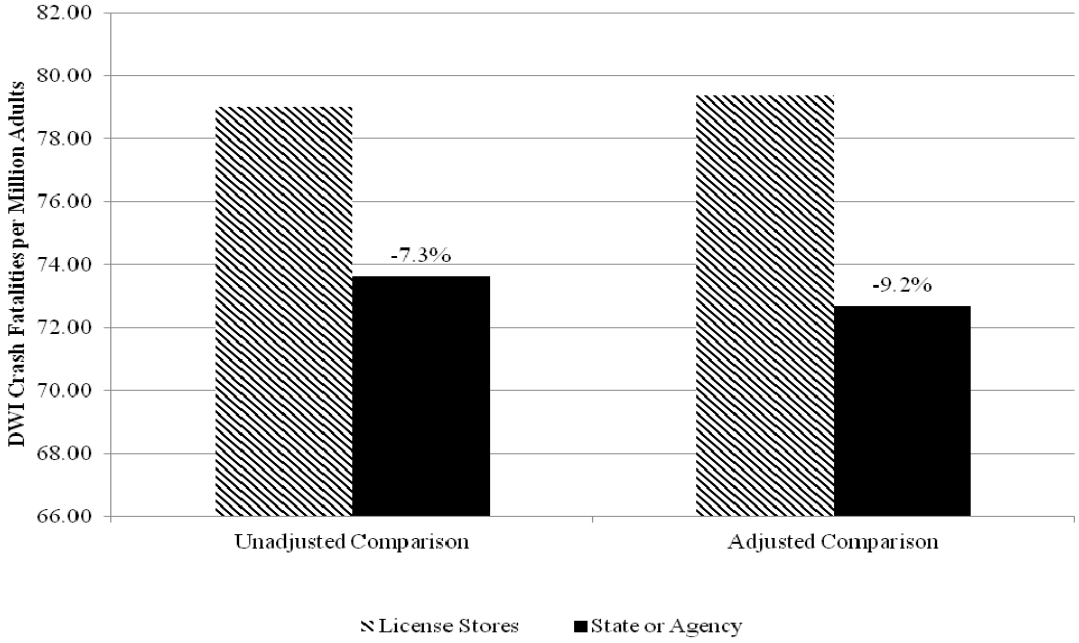
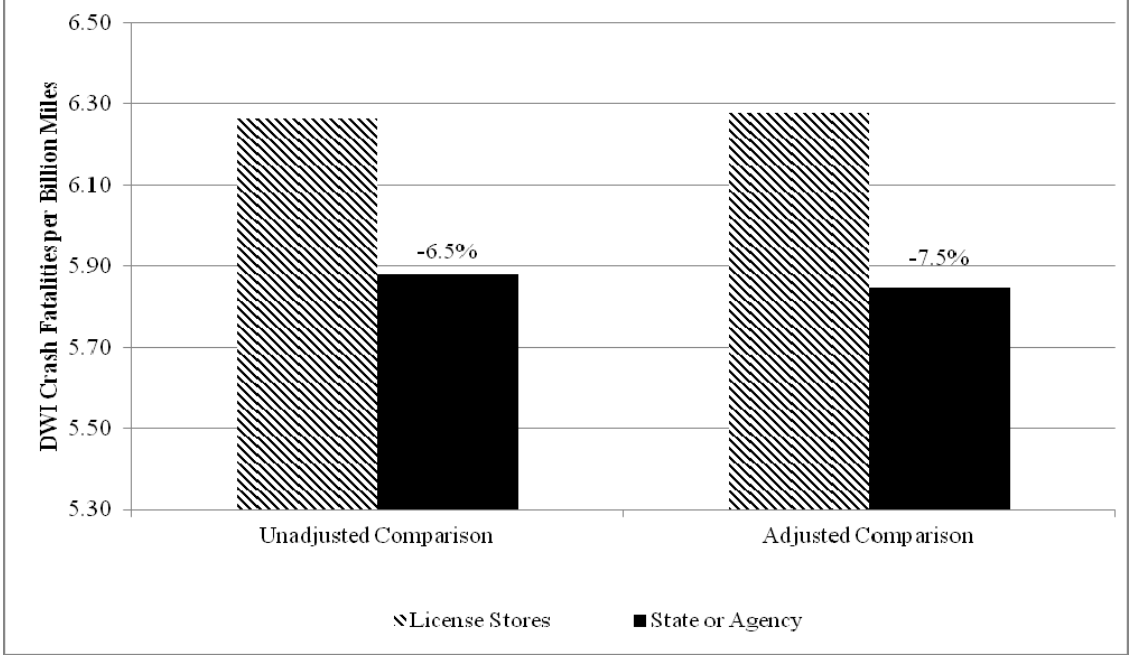
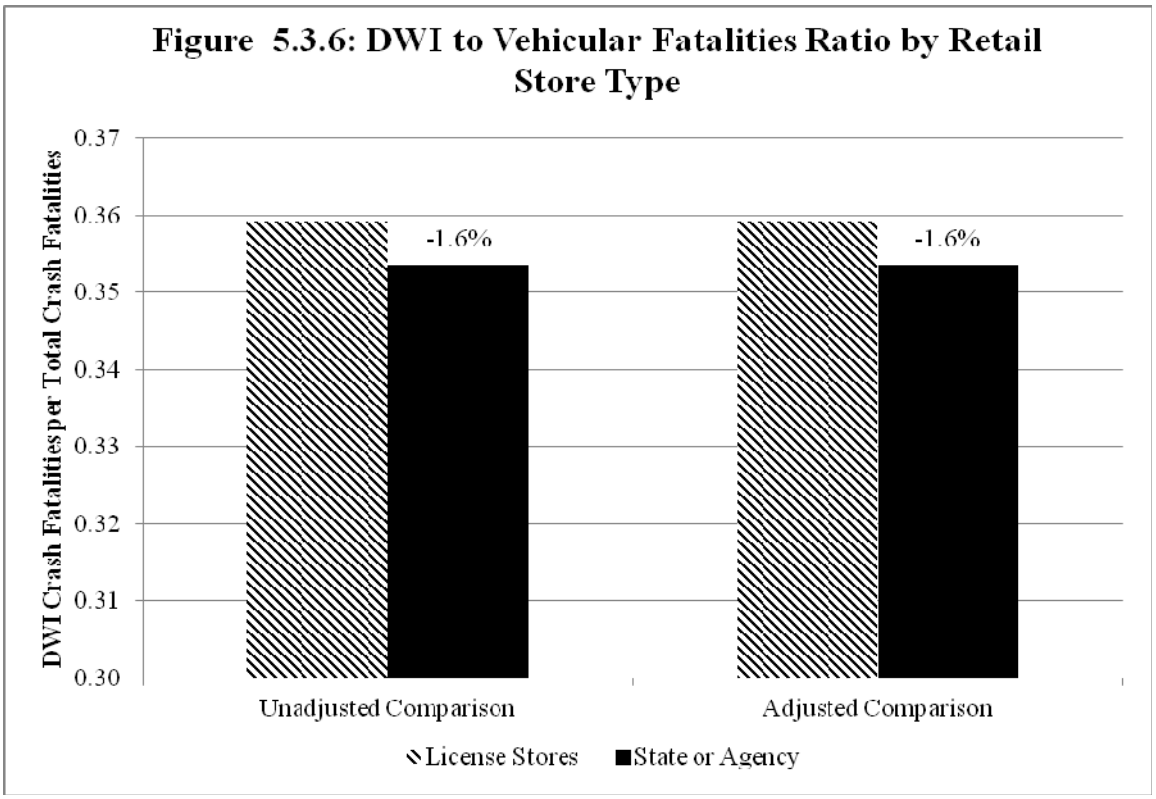


Figure 5.3.5: DWI Fatalities Per Billion Vehicle Traffic Miles by Retail Store Type





Illustrated in the figures are the average estimates for the fatality statistics for the 1982 to 2010 period after controlling for national trends and unmeasured state traits. The percentages in the graphs are the difference between state retail (ownership or agency) and retail through private licensees. In general, monopoly states that retained control over retail outlets, through direct ownership or an agency contract, fared better than states with licensed alcohol retailers. The result is strongest for the DWI crash rate per million adults, producing a statistically significant reduction of 7.3 percent with state control of retail. This estimated reduction increases to 9.2 percent when the models adjust for alcohol consumption, hours of retail operation and whether the state has a dram shop law. For crash fatalities per billion VTM, the point estimates indicate a 6.5 percent reduction attributable to state control of retail, which increases to 7.5 percent when other factors are included in the model.[32] Finally, the estimated ratio of DWI crash fatalities to total fatalities is no different, statistically, between states with private licensed retailers and states with public or agency retail stores.

[32]This finding was statistically significant at $\alpha < 0.10$.

Another way to examine these three alcohol-related vehicular fatality measures is to compare them with our measure of alcohol monopoly. Figures 5.3.7 to 5.3.9 provide the predicted values for alcohol-related fatalities per capita, per vehicle mile, and as a ratio to total vehicular fatalities.

Figure 5.3.7 : DWI Fatalities per Million Adults by Monopoly Strength

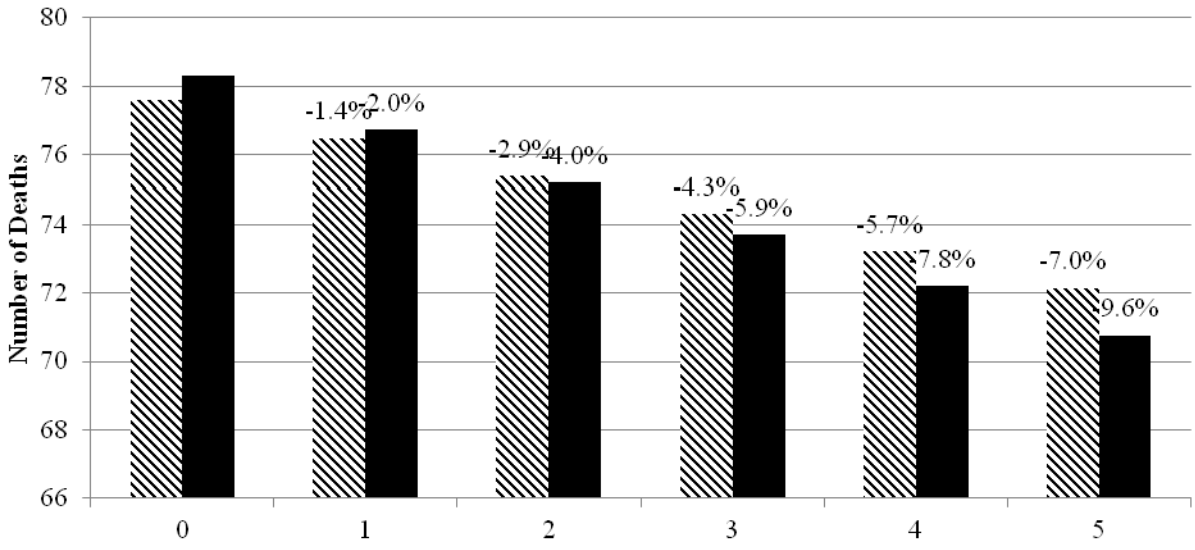


Figure 5.3.8 : DWI Fatalities per Billion Vehicle Traffic Mile by Monopoly Strength

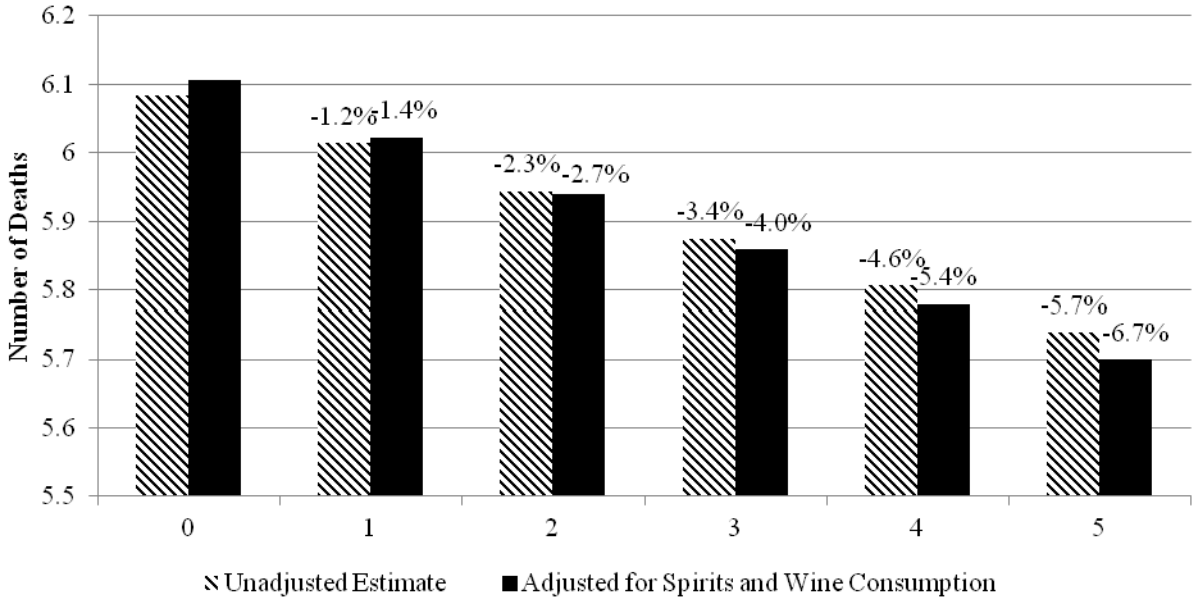
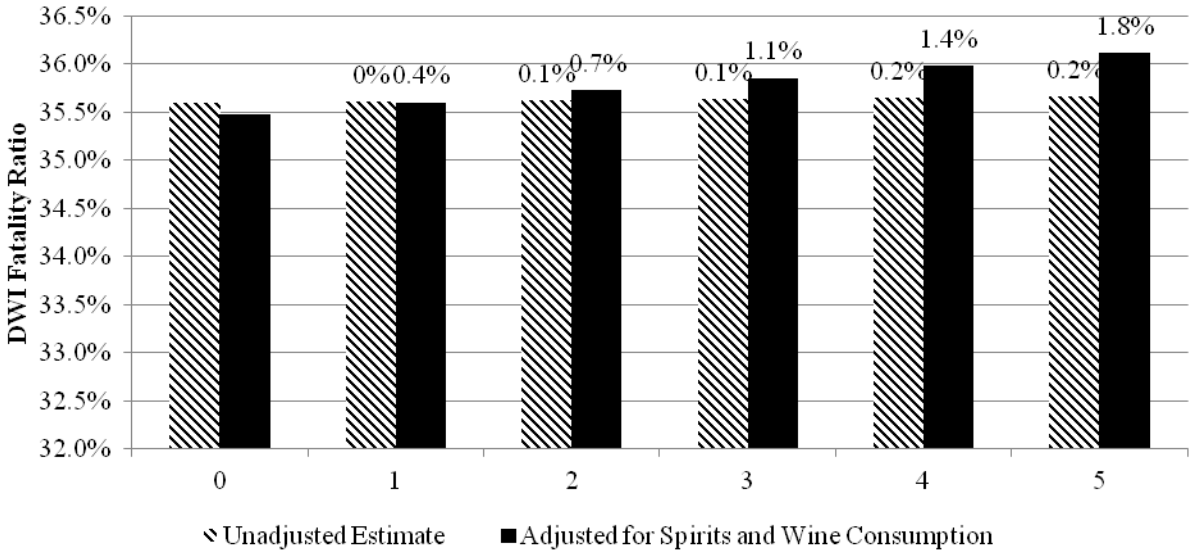


Figure 5.3.9 : DWI to Vehicular Fatality Ratio by Monopoly Strength



Consistent with Figures 5.3.4 and 5.3.5, fatality rates appear to decline with increasing monopoly strength. These results, however, did not breach conventional levels of statistical significance. Likewise, the upward trending slope in the DWI fatality ratio is not statistically different from zero. In all, the results suggest a decline in alcohol-related vehicle fatalities when the state owns retail or establishes retail agencies, but the results are not confirmatory.

Other alcohol policies were tested as well. Having a dram shop law, which makes the seller of alcohol potentially liable for alcohol-related accidents, appears to lower alcohol-related vehicular fatalities. Compared with states that do not have a dram law, states with dram laws had 7.9 percent lower per capita DWI fatalities, 5.1 percent lower per-mile DWI fatalities, and a 6.1 percent lower DWI-to-fatality rate.

Penalties for DWI convictions have increased over the three decades. Also, the DWI threshold tightened from 0.10 to 0.08 BAC, and police powers to administer a breathalyzer have expanded. In the models used in this study, the BAC level shift from 0.10 to 0.08 had no discernable effect on DWI fatalities. Moreover, three mandatory sentencing laws for first-time DWI offenders—imprisonment, fines, and the suspension or revocation of the driver's license—

were largely unassociated with the three alcohol-related fatality measures.[33] There was a 5.9 percent decline in the DWI-to-fatality ratio associated with mandatory fines for first-time offenses, but this same policy was not associated with the other fatality measures, and therefore lacks reliability.

5.4 Crime Rates

The final section analyzes alcohol control policy and crime. We report on twenty-three crime types grouped in six categories: violent, property, alcohol-defined, crimes associated with youth or the poor, white-collar or organized crime, and other. Certain categories of crime were analyzed but did not have an association with alcohol policy, so they are omitted from this list. Specifically, crimes usually committed by organized groups, especially those related to gambling (e.g., lottery/numbers and bookmaking), were not included.

The results are presented in two tables, one for policy pertaining to off-premise retail establishments and a second for policy regarding on-premise retail establishments. Table 5.5.1 provides the statistical tests for crime in relation to off-premise retail policy.

Each cell in Table 5.5.1 provides the average estimated crime rate for all years for each crime type (row) and each policy (column). For each cell, statistical significance is judged by the difference with a comparison group. For instance, in Table 5.5.1 the policy "Retail Ownership" has three groupings: License, State and Agency. In our test "License" is the group that is used to compare the effect of "State" and "Agency" retail ownership models. Cells shaded in grey represent statistically significant differences between the treatment group (i.e. states with the policy option in the header) and the comparison group.

In Table 5.5.1 there are six statistically significant results under the policy grouping "Retail Ownership." Comparing state ownership of retail with license retail, three crimes are lower: aggravated assault, fraud, and domestic violence. Vehicle theft and vandalism rates were lower with state retail control, but at a less stringent statistical test.[34] These results replicate

[33]These results conform to Freeman (2007), but are contrary to the meta-analysis by Zwerling and Jones (1999). One possibility is that BAC standards and penalties have a limited effect for reducing fatalities among youth (Peck et al., 2008; Blomberg et al., 2009).

[34] An $\alpha < 0.10$ is sometimes described as "trend level" significance. Using the monopoly strength measure, vehicle theft, arson, vagrancy, and fraud are all lower in control states when compared to license states at this level of statistical significance. Prostitution and DWI arrests are higher in control states.

when models include the measure for monopoly strength. Aggravated assaults and other (non-aggravated) assaults are statistically lower in states that have private agency stores compared with license store states. Rates of liquor law violations are higher in states with agency retail outlets, but this could be due to increased enforcement in states that have a dedicated agency for investigating liquor law violations.

Table 5.5.1: Off-Premise Alcohol Regulations and Crime

Alcohol Regulations		Retail Ownership			Non-Sunday Hours Restrictions			Sunday Hours Restrictions		
Crime Types	Crimes	License[1]	State	Agency	Low[1]	Medium	High	Low[1]	Medium	High
Violent	Murder	37.2	40.2	33.4	40.7	35.0	36.9	36.9	40.7	36.2
	Aggravated Assault	1037.6	813.3	737.1	1065.8	902.8	939.0	994.5	1029.5	926.4
	Robbery	253.6	255.9	241.0	268.9	250.5	243.7	274.0	266.6	242.0
	Rape	89.6	100.0	100.7	96.0	86.5	95.1	90.9	97.5	91.2
Property	Theft (non-vehicle)	4260.7	4707.8	4815.5	4456.8	4243.5	4469.9	4687.6	4723.4	4199.8
	Burglary	1000.8	1126.8	1077.6	1044.3	972.4	1067.3	1085.9	1114.0	985.7
	Vehicle Theft	386.9	333.8	279.1	389.3	375.0	341.0	341.9	367.4	370.4
	Arson	56.1	49.6	54.5	56.5	56.6	52.3	50.8	55.0	56.0
Alcohol-defined	Drunkenness	227.1	165.7	181.1	339.8	174.6	164.8	263.9	223.9	194.5
	Liquor Laws	1865.5	1832.8	2832.0	2045.7	1811.4	1996.8	2035.2	1999.3	1904.0
	DWI	4184.6	5103.1	5141.0	4550.7	4108.8	4611.6	4582.7	4830.3	4248.4
Youth/Poor	Runaways	329.3	344.8	452.5	369.5	314.2	351.4	349.8	382.3	329.8
	Curfew	150.2	151.5	184.4	191.5	145.4	137.7	229.0	164.9	133.5
	Vagrancy	28.6	21.8	42.9	55.1	25.7	19.6	22.9	29.2	29.8
	Sex Offenses	243.2	213.5	196.1	221.0	246.9	228.6	245.1	234.0	227.9
White-Collar/ Organized	Fraud	792.6	589.3	627.0	771.5	718.9	725.5	648.7	797.7	743.0
	Embezzlement	23.0	22.0	25.3	27.6	23.1	20.4	16.6	29.0	23.5
	Prostitution	122.9	159.1	122.2	149.0	121.4	121.7	146.6	143.1	118.0
Others	Domestic Violence[2]	242.1	135.3	211.4	205.5	216.1	224.1	215.6	235.3	210.4
	Disorderly Conduct	1913.5	2168.9	2326.2	1847.9	1873.2	2217.3	1933.4	2193.5	1950.8
	Manslaughter	5.1	4.7	4.6	4.6	4.8	5.3	5.6	5.0	4.7
	Other Assaults	3271.9	3127.8	2396.9	3304.1	3102.0	3066.1	3019.6	3378.1	3095.5
	Vandalism	910.5	784.2	757.7	913.0	858.3	853.7	824.9	924.6	866.5

Notes: 1 = comparison group; 2 = offenses against families and children.
Cells shaded in grey are where the statistical probability is 0.05 or less.

All totaled, the results provide evidence that state control over retail reduces crime rates in the following categories: assaults, fraud, domestic abuse, and vandalism. Less compelling, the results suggest that vehicle theft, arson, and vagrancy are also lower in control states. There does appear to be evidence of a pattern; crimes of assault, arson, and domestic violence constitute a set of property and violent crimes that are often linked to alcohol consumption.[35]

There are six crime rate comparisons that are statistically significant under the heading "Non-Sunday Hours Restrictions." Several appear to be consistent with the hypothesis that fewer retail hours will lower crime: aggravated assault, drunkenness and vagrancy. Disorderly conduct appears to increase in states with restricted non-Sunday hours. The analysis of Sunday hours suggests that rates of vehicle theft and curfew violations are lower when a state restricts Sunday hours for off-premise retail sales. However, embezzlement and fraud are higher with the liberalization of Sunday hours.

Table 5.5.2 provides the summary findings for the relationship between on-premise alcohol retail regulations and crime. For on-premise establishments we examine whether the state has a dram shop law, non-Sunday hours restriction and Sunday hours restrictions.

Of the results, the most striking pattern for on-premise restrictions is for a dram shop law. Theory would predict that a dram shop law, which makes servers of alcohol potentially liable for the actions of customers, would be negatively associated with crime. With the exception of two crime categories (drunkenness and vehicle theft) the results indicate that a dram law is positively associated with rape, burglary, liquor laws, DWI, sex offenses, and vandalism. Restrictions on non-Sunday hours better fit our expectations. Having medium or high restrictions on hours is associated with lower rates of murder, aggravated assault, robbery and vagrancy. Two white collar crimes, fraud and embezzlement, are also negatively associated with non-Sunday hours restrictions. Sunday restricted hours, on the other hand, is positively associated with five crime categories: murder, aggravated assault, arson, embezzlement, and disorderly conduct.

[35]See Chaloupka et al., (2002) for a review.

Table 5.5.2: On-Premise Alcohol Regulations and Crime

Alcohol Regulations		Dram Law		Non-Sunday Hours Restrictions			Sunday Hours Restrictions		
Crime Types	Crimes	No[1]	Yes	Low[1]	Medium	High	Low[1]	Medium	High
Violent	Murder	37.1	37.4	42.2	33.9	35.9	32.7	41.4	38.0
	Aggravated Assault	898.9	986.3	1035.6	946.9	882.8	865.7	1034.3	989.9
	Robbery	242.2	256.6	277.9	244.1	230.6	261.0	252.1	246.9
	Rape	80.5	96.8	96.6	86.9	95.4	90.1	97.3	90.2
Property	Theft (non-vehicle)	3907.3	4573.3	4473.6	4344.7	4352.3	4305.1	4567.6	4322.4
	Burglary	939.8	1062.3	1071.7	986.0	1040.5	988.1	1080.5	1022.3
	Vehicle Theft	390.5	355.9	392.6	348.8	349.6	356.3	367.3	368.8
	Arson	53.8	55.2	56.5	54.8	52.4	50.1	57.3	57.1
Alcohol-defined	Drunkenness	238.5	192.5	188.4	292.9	141.6	210.8	180.7	216.4
	Liquor Laws	1748.5	2025.6	1965.6	1952.2	1926.6	1783.7	2035.5	2026.6
	DWI	3432.6	4831.0	4494.2	4283.9	4591.1	4189.4	4722.9	4393.7
Youth/Poor	Runaways	355.9	338.1	308.6	373.7	349.4	355.6	351.2	324.3
	Curfew	169.8	149.1	160.1	159.2	136.4	158.5	154.7	150.1
	Vagrancy	29.2	27.5	38.1	21.3	26.6	27.1	31.9	25.3
	Sex Offenses	188.6	249.7	242.7	230.7	221.7	219.1	240.1	239.0
White-Collar/ Organized	Fraud	754.3	731.6	840.0	652.6	739.9	717.3	746.9	746.6
	Embezzlement	21.8	23.4	26.9	19.5	23.8	18.2	31.7	21.3
	Prostitution	113.2	133.3	137.7	119.0	128.9	155.6	127.4	108.2
Others	Domestic Violence[2]	214.0	218.3	212.3	219.9	220.4	217.8	224.4	210.7
	Disorderly Conduct	1912.3	2036.3	2026.0	1960.7	2045.4	1791.3	2168.4	2054.2
	Manslaughter	4.7	5.0	4.7	5.0	5.3	5.0	5.0	4.9
	Other Assaults	3058.9	3167.0	3258.8	2940.7	3304.7	3050.7	3303.8	3079.3
	Vandalism	789.5	900.5	875.5	838.0	921.9	836.2	919.5	861.6

Notes: 1 = comparison group; 2 = offenses against families and children.
Cells shaded in grey are where the statistical probability is 0.05 or less.

Section 6: Summary

The Roles of State Alcohol Monopolies

Public services are commonly thought to encompass goods and services that rely on tax revenue to fulfill a social mandate. Certainly services such as public education, firefighting and police have operational costs that are far in excess of revenues, thus requiring some form of tax-sourced subsidy to exist. Still others like urban transit and universities obtain sizable amounts of operating revenue through user fees, but nonetheless depend on public subsidy in order to sustain high levels of accessibility or to fill a public mission.

State alcohol monopolies are different; they earn revenue for states. For spirits sales, our results indicate that state alcohol monopolies generate over twice the per capita revenue as do license states. These funds are net of operational costs, which mean that alcohol monopolies require no subsidies from taxpayers. The monies earned by alcohol monopolies are frequently earmarked for law enforcement, substance abuse programs or allocated to general fund accounts to support public services that are tax-dependent. Alcohol monopolies are not alone in the revenue-generating category of public services; toll roads, parking ramps and meters, lotteries, golf courses, utilities, hospitals, sports facilities, and so forth, can also bring positive financial contributions to state budgets and ease the tax burden on citizens and businesses.

In an environment of state fiscal stress, when revenues are dropping and the demand for public services is rising, it becomes tempting to sell revenue-producing state assets in order to remedy budget deficits without having to raise taxes or engage in draconian service cuts. From the 1980s through the 1990s, several states with alcohol monopolies did divest from retail stores in an effort to improve state finances. Our results suggest that these experiments did not improve state finances; states that sold off stores fared no better financially than states that retained stores. Indeed, the estimated per capita revenue was slightly higher for states that held onto state stores (either through direct ownership or an agency model). More generally, our results indicate that per capita alcohol-related revenues (taxes, licenses, and product sales) grow with increased state monopoly control over the sales and distribution system. State control of alcohol, on average, increases alcohol-related net income by a factor of between 2 and 3, depending on the monopoly model. The state ownership model that is most lucrative is where the state owns wholesale and

retail, yet also allows for limited numbers of private agency outlets to serve less-populated regions.

These empirical findings are consistent with the maxim that there is no easy way for states to divest from a surplus-generating industry, yet retain the long-term financial benefits from direct ownership. Recent alcohol monopoly privatization cases support this conclusion. Proposals in the Commonwealth of Pennsylvania to privatize state wine and spirits stores in 2011–12 stalled after it became clear that there was no feasible way to guarantee a replacement for an estimated $188 million (in 2011 dollars) of net operating income from the state system.[36] A Washington State referendum in 2011 did lead to the privatization of state spirits wholesale and retail operations, but in order to avoid a sharp loss in revenue, the ballot initiative included the imposition of taxes at the wholesale and retail levels, 10 percent and 17 percent, respectively. The initiative passed, and after privatization took place in 2012, spirits prices sharply escalated.[37] Washington's new system could not painlessly accommodate the profit requirements of private investors yet remain "revenue neutral" for the state. Someone had to pay, and in Washington State the early evidence suggests that it will be alcohol consumers.[38]

Alcohol monopoly states received greater alcohol-related revenues even while selling less alcohol product. Spirits consumption was 12 to 15 percent lower in monopoly states, depending on whether the state owned the wholesale only, or the wholesale plus retail. Restrictions on store hours did not explain the lower rates of consumption (or, more accurately, sales). The cause for the reduction in consumption appears to be located at the wholesale level.

We do find evidence that the state is a more responsible seller of alcohol product than private firms. Control of retail stores, either through direct ownership or agency contracts, was

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[36]See: Zullo (2012). The estimate from the above cited report has been revised based on audited figures. According to the 2010-11 fiscal year summary, the Pennsylvania Spirits Control Board had $1.970 billion in sales from wine and spirit goods that cost $1.081 billion, earning a gross revenue of $889 million. If we subtract the expenses from the state stores, warehouses, transportation, administration, and support from other agencies, we arrive at a net income of $503 million.

[37]Laura L. Myers. "Washington State Spirits Privatization: Prices Could Rise 10 To 30 Percent Per Bottle" Reuters, 6-4-2012. Posted at: http://www.huffingtonpost.com/2012/06/04/washington-state-spirits-privatization_n_1565414.html

[38]Border regions in Oregon and Idaho have experienced surges in alcohol sales after Washington sold off the liquor monopoly. Of course, Washington citizens could have another referendum to vote out the tax, but then the pain would be inflicted on State budgets, and ultimately, the public.

associated with significant reductions in alcohol-related vehicular fatality rates: 7.3 to 9.2 percent per capita and 6.5 to 7.5 percent per VTM. However, more conclusive evidence is required to validate this finding. Results also imply that state control over retail reduces rates of assault, fraud, vandalism, and domestic violence. Less compelling evidence suggests that vehicle theft, arson, and vagrancy might be reduced as well. These estimated effects are independent of alcohol product consumption rates, telling us that restricted access to alcohol is not the cause, but rather, store administrative policies are responsible.

In sum, per capita alcohol-related revenue nearly doubles when states have monopolies over sales and distribution of product. The greatest financial contribution comes from wholesale rather than retail, and from spirits rather than wine. More generally, per capita revenues increase with the strength of monopoly control at these organizational levels and between products. For state control over retail systems, the social value is less related to direct finances, but instead manifests as a system for ensuring responsible product sales. The key social value in controlling retail appears to be lower rates of vehicular fatality rates and alcohol-related crime. Put in place nearly eighty years ago, for reasons that are unrelated to finance, alcohol monopolies are self-funding services that make positive contributions to state budgets. When state monopolies take on a robust form that involves control over retail stores, monopolies serve the founding intent of reducing the harm caused by product consumption.

Other Alcohol Regulatory Policies

Advertising regulations. Billboard restrictions do appear to reduce spirit consumption, but the effect is not immediate. After five years, a full ban on billboard advertising is associated with an estimated 3.8 percent lower spirit consumption. The trend in recent decades is to deregulate billboard advertising. States that lifted restrictions have experienced slightly faster rates of per capita spirit consumption; 0.06 percent annually. Restrictions on other mediums, such as radio, magazines, and newspapers, also appear to reduce spirits per capita consumption. Again, the effect is lagged and modest; after five years, states with such restrictions show 1.7 percent lower per capita consumption.

Prohibited hours and days of sale. Our findings indicate that restricting the hours of retail operation had no effect on the per capita consumption of spirits, and a positive effect on the per capita consumption of wine. We posit that the positive relations between hours restrictions

and wine consumption might be a substitute effect, i.e., if the restrictions apply to spirits, then people consume more wine. Adding retail hours to the equations brings no substantive change to the estimated effect of alcohol monopolies. We did find, however, that states with a local option on retail sales hours, which typically liberalizes retail hours in urban centers, is associated with 9.3 percent higher wine consumption and 1.7 percent spirit consumption.

Contrary to our expectations, greater restrictions on retail hours did not associate with fewer alcohol-related vehicular fatalities. States with high restrictions for off-premise retail hours had greater ratios of alcohol-related fatalities (8.7 percent per capita; 8.2 percent per VTM; 16.1 percent ratio to total fatalities). It might be that when the off-premise retail locations are not open, consumers instead go to on-premise alcohol establishments, where they are more likely to consume alcohol and then operate a motor vehicle.

A dram shop law, which penalizes server negligence, is associated with 9.0 percent higher per capita wine consumption and 3.6 percent higher spirit consumption. Interestingly, the dram shop law consistently was associated with fewer alcohol-related vehicular fatalities (5 to 8 percent, depending on the measure), and yet paradoxically is associated with higher rates of some crime categories.

Penalties related to alcohol and driving. Over the three decades of time covered in our analyses, state penalties for drinking and driving have become more severe. Presumably these policy changes are made to punish irresponsible consumer behavior and reduce alcohol-related social harm. Our results suggest, however, that tightening the BAC standard from 0.10 to 0.08 did not reduce alcohol-related vehicular fatalities. Likewise, mandatory jail terms, fines, and driver's license revocation were poor predictors of alcohol-related vehicle deaths. What these findings imply is that penalties imposed on the consumers of alcohol have little effect on the social harm from irresponsible alcohol consumption.

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Appendix A: Estimating Equation

For this report, the association between measures of alcohol monopoly and the financial and social measures are analyzed using multi-level regression based on growth curve modeling as described by Rabe-Hesketh and Skrondal (2008). A main advantage of this approach is the ability to use the annual repeated observations within the states to control for unmeasured factors that might explain variation in the dependent variable. The basic formula is follows:

$$Y_{it} = \beta_0 + \beta_1(\text{Regulation}) + \beta_2(\text{Year}) + \beta_3(\text{Year}^2) + \mu_i + \mu_i(\text{Year}) + \mu_i(\text{Year}^2) + \varepsilon_{it}$$

Where Y_{it} is the dependent financial or social variable of interest (usually expressed in natural log form) for state i and year t; β_0 is the sample intercept; β_1 is the coefficient for our state monopoly measure or any other alcohol-related state regulation (Regulation) that we test; β_2 and β_3 are coefficients for linear (Year) and curvilinear (Year-squared) trends, respectively. The time trend factors out national change in the dependent variables over the period of analysis.

The μ_i symbols are random components for state intercepts. When μ_i is a coefficient for time trend Year and Year-squared they are random state slopes. Including state intercepts and slopes factor out unmeasured state attributes and unmeasured factors that might affect the trends in the dependent variable for any given state. Essentially, variable intercepts adjust the findings for state traits that are stable over the time period. So for instance, the fact that the State of Hawaii is a popular tourist destination (which might affect alcohol consumption) is controlled. Variable slopes adjust for the unique trajectories of the dependent variable for the states. So, for instance, if during the time period of analysis the State of Hawaii witnessed an immigration of retirees (which might affect alcohol consumption), the effect of the trend is controlled. Symbol ε_{it} is unexplained sample error.

Appendix B: Data Sources

Alcohol Policy:

DISCUS (1977) *Summary of State Laws and Regulations Relating to Distilled Spirits* (22nd ed.). Washington, DC: Distilled Spirits Council of the United States.

DISCUS (1981) *Summary of State Laws and Regulations Relating to Distilled Spirits* (23rd ed.). Washington, DC: Distilled Spirits Council of the United States.

DISCUS (1983) *Summary of State Laws and Regulations Relating to Distilled Spirits* (24th ed.). Washington, DC: Distilled Spirits Council of the United States.

DISCUS (1985) *Summary of State Laws and Regulations Relating to Distilled Spirits* (25th ed.). Washington, DC: Distilled Spirits Council of the United States.

DISCUS (1989) *Summary of State Laws and Regulations Relating to Distilled Spirits* (26th ed.). Washington, DC: Distilled Spirits Council of the United States.

DISCUS (1991) *Summary of State Laws and Regulations Relating to Distilled Spirits* (27th ed.). Washington, DC: Distilled Spirits Council of the United States.

DISCUS (1996) *Summary of State Laws and Regulations Relating to Distilled Spirits* (29th ed.). Washington, DC: Distilled Spirits Council of the United States.

DISCUS (1998) *Summary of State Laws and Regulations Relating to Distilled Spirits* (30th ed.). Washington, DC: Distilled Spirits Council of the United States.

DISCUS (2000) *Summary of State Laws and Regulations Relating to Distilled Spirits* (31st ed.). Washington, DC: Distilled Spirits Council of the United States.

DISCUS (2002) *Summary of State Laws and Regulations Relating to Distilled Spirits* (32nd ed.). Washington, DC: Distilled Spirits Council of the United States.

DISCUS (2004) *Summary of State Laws and Regulations Relating to Distilled Spirits* (33rd ed.). Washington, DC: Distilled Spirits Council of the United States.

DISCUS (2011) *Summary of State Laws and Regulations Relating to Distilled Spirits* (36th ed.). Washington, DC: Distilled Spirits Council of the United States.

Note: DISCUS data was supplemented by referencing the appropriate state statutes.

Traffic Fatalities Statistics, BAC Law, and Alcohol Law:

NHTSA (1983) *Digest of State Alcohol Highway Safety Related Legislation* (1st ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (1984) *Digest of State Alcohol Highway Safety Related Legislation* (2nd ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (1985) *Digest of State Alcohol Highway Safety Related Legislation* (3rd ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (1986) *Digest of State Alcohol Highway Safety Related Legislation* (4th ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (1987) *Digest of State Alcohol Highway Safety Related Legislation* (5th ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (1988) *Digest of State Alcohol Highway Safety Related Legislation* (6th ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (1990) *Digest of State Alcohol Highway Safety Related Legislation* (8th ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (1992) *Digest of State Alcohol Highway Safety Related Legislation* (10th ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (1993) *Digest of State Alcohol Highway Safety Related Legislation* (11th ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (1994) *Digest of State Alcohol Highway Safety Related Legislation* (12th ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (1995) *Digest of State Alcohol Highway Safety Related Legislation* (13th ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (1996) *Digest of State Alcohol Highway Safety Related Legislation* (14th ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (1998) *Digest of State Alcohol Highway Safety Related Legislation* (16th ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (2000) *Digest of State Alcohol Highway Safety Related Legislation* (18th ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (2001) *Digest of State Alcohol Highway Safety Related Legislation* (19th ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (2002) *Digest of State Alcohol Highway Safety Related Legislation* (20th ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (2003) *Digest of State Alcohol Highway Safety Related Legislation* (21st ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (2006) *Digest of State Alcohol Highway Safety Related Legislation* (23rd ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (2007) *Digest of State Alcohol Highway Safety Related Legislation* (24th ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

NHTSA (2011) *Digest of State Alcohol Highway Safety Related Legislation* (26th ed.). Washington, DC: U.S. Dept. of Transportation, National Highway Traffic Safety Administration.

Crime:

United States Department of Justice. Federal Bureau of Investigation. Uniform Crime Reporting Program Data: Arrests by Age, Sex, and Race. Ann Arbor, MI: Inter-university Consortium for Political and Social Research, Years 1980–2010.

Alcohol Consumption:

Alcohol Policy Information System (APIS), at: http://www.alcoholpolicy.niaaa.nih.gov/. (years 1977 to 2004). Beverage Information Group (years 2004 to 2010).

Appendix C: Variables, Statistics and Regression Results

Table C1: Variables and Definitions	
Net Income per Capita	Net income from operations controlled by states divided by the state adult population.
Alcohol Taxes per Capita	Income from alcohol beverage taxes divided by the state adult population.
License Fees per Capita	Income from alcohol beverage licensing divided by the state adult population.
Alcohol Income per Capita (natural log form)	Sum of store net income, alcohol taxes, and license income divided by the state adult population.
Wholesale Only	Indicator variable (yes = 1) if state controls wholesale operations, zero otherwise.
Retail State	Indicator variable (yes = 1) if state controls retail operations, zero otherwise.
Retail Agency	Indicator variable (yes = 1) if state controls retail operations through a private agency contract, zero otherwise.
Spirits Monopoly Strength	Six point scale (0 to 5) for the degree of state control over spirits
Wine Monopoly Strength	Six point scale (0 to 5) for the degree of state control over wine
Spirits Consumption per Capita (natural log form)	Annual gallons of spirits consumed divided by the state adult population.
Wine Consumption per Capita (natural log form)	Annual gallons of wine consumed divided by the state adult population.
Alcohol Consumption per Capita (natural log form)	Annual gallons of beer consumed divided by the state adult population.
Billboard restrictions	Code 0 means that no restriction is imposed on advertising of distilled spirits on billboards; Code 1 means some restrictions are imposed (e.g. location, content); Code 2 means that billboard advertising of distilled spirits are prohibited.
Advertising restrictions (newspaper, magazine, television, and radio)	Code 0 means that no restriction is imposed on advertising of distilled spirits on newspaper, magazine, television, and radio; Code 1 means that some restrictions, including prohibition, are imposed on advertising of spirits on newspaper, magazine, television, and radio.
BAC Law	Indicator variable (yes = 1) if state adopts Blood Alcohol Concentration

	Law, zero otherwise.
PBT Law	Indicator variable (yes = 1) if state adopts Preliminary Breath Test (Pre-arrest/no evidentiary breath test) Law, zero otherwise.
Open Container Law	Indicator variable (yes = 1) if state adopts Open Container Law, zero otherwise.
Anti-Consumption Law	Indicator variable (yes = 1) if state adopts Anti-Consumption Law, zero otherwise.
Dram Shop Law	Indicator variable (yes = 1) if state adopts Dram Shop Law, zero otherwise.
Mandatory Fine for DWI	Indicator variable (yes = 1) if state has mandatory fine ($) for first DWI conviction, zero otherwise.
Mandatory Imprisonment for DWI	Indicator variable (yes = 1) if state has mandatory imprisonment for first DWI conviction, zero otherwise.
Community Service for DWI	Indicator variable (yes = 1) if state offers community service in lieu of mandatory jail for first DWI conviction, zero otherwise.
Mandatory Licensing Action for DWI	Indicator variable (yes = 1) if state mandates driver's license revocation or suspension for first DWI conviction, zero otherwise.
Sunday Hours, On-Premise Low Restricted	Indicator variable (yes = 1) if prohibited hours on-premise on Sunday retail is 8 or fewer.
Sunday Hours, On-Premise Medium Restricted	Indicator variable (yes = 1) if prohibited hours on-premise on Sunday retail is greater than 8 to 18.
Sunday Hours On-Premise High Restricted	Indicator variable (yes = 1) if prohibited hours on-premise on Sunday retail is greater than 18.
Sunday Hours Off-Premise Low Restricted	Indicator variable (yes = 1) if prohibited hours off-premise on Sunday retail is 8 or fewer.
Sunday Hours Off-Premise Medium Restricted	Indicator variable (yes = 1) if prohibited hours off-premise on Sunday retail is greater than 8 to 18.
Sunday Hours Off-Premise High Restricted	Indicator variable (yes = 1) if prohibited hours off-premise on Sunday retail is greater than 18.
Non-Sunday Hours On-Premise Restricted Low	Indicator variable (yes = 1) if prohibited hours on-premise retail from Monday to Saturday is 24 or fewer.
Non-Sunday Hours On-Premise Restricted Medium	Indicator variable (yes = 1) if prohibited hours on-premise retail from Monday to Saturday is greater than 24 to 36.
Non-Sunday Hours On-	Indicator variable (yes = 1) if prohibited hours on-premise from

Premise High Restricted	Monday to Saturday is greater than 36.
Non-Sunday Hours Off-Premise Low Restricted	Indicator variable (yes = 1) if Prohibited hours off-premise retail from Monday to Saturday is 24 or fewer.
Non-Sunday Hours Off-Premise Medium Restricted	Indicator variable (yes = 1) if Prohibited hours off-premise retail from Monday to Saturday is greater than 24 to 36.
Non-Sunday Hours Off-Premise High Restricted	Indicator variable (yes = 1) if prohibited hours off-premise retail from Monday to Saturday is greater than 36.
Local Hours Option	Indicator variable (yes = 1) if state has local option for prohibited hours of sale for either on or off premise retail outlets, zero otherwise.
Election Day	Indicator variable (yes = 1) if state prohibits sales on election day, zero otherwise.
Fatality 0.08 per Capita (natural log form)	Vehicular fatalities in crashes where highest driver BAC >0.08 per capita.
Fatality 0.08 per VTM (natural log form)	Vehicular fatalities in crashes where highest driver BAC >0.08 per vehicle traffic mile.
DWI Fatality Ratio (natural log form)	Ratio of vehicular fatalities that involved at least one intoxicated driver.
Year	Years

Notes on restricted hours:

In South Carolina, off-premise is called "package." In Utah, we chose restaurant over club when coding non-Sunday restricted hour on-premise and off-premise, because there are more restaurants. As for Utah, in the year of 1977, 1981 and 1983, "no on-sale licenses except to trains and planes. State stores may be established on premises of restaurants and hotels for sale of miniatures for on-premise consumption." In Pennsylvania, we chose hotel and restaurant over clubs when coding non-Sunday restricted hour on-premise and off-premise, because there are more hotels and restaurants. In Wisconsin, we chose counties under 500,000 when coding restricted hours on-premise, because there are more counties under 500,000 in Wisconsin.

Occasionally Sunday hours are set locally. If so, we imputed the average number of restricted days for non-Sunday days, assuming that Sunday hours (even if established locally) would be no more lenient than for non-Sundays. We also coded 1 in these cases for Local Option.

Table C2: Statistics for Consumption Equations (N= 1700 for wine; 1693 for spirits)		
Variable	Mean	S.D.
Wine Consumption per Capita (natural log form)	0.829	0.508
Spirits Consumption per Capita (natural log form)	0.715	0.338
Wholesale - Wine	0.116	0.321
Retail State - Wine	0.098	0.297
Retail Agency - Wine	0.020	0.140
Wholesale - Spirits	0.361	0.481
Retail State - Spirits	0.240	0.427
Retail Agency - Spirits	0.105	0.307
Wine Monopoly	0.384	1.084
Spirits Monopoly	1.407	2.012
Sunday Hours Off-Premise High	0.605	0.489
Sunday Hours Off-Premise Medium	0.209	0.406
Non-Sunday Hours Off-Premise High	0.411	0.492
Non-Sunday Hours Off-Premise Medium	0.322	0.467
Local Hours Option	0.414	0.493
Election Day Restrictions	0.363	0.481
Dram Shop Law	0.802	0.399
Year	16.504	9.798
Year-Squared/100	3.683	3.345

Table C3. Regression Estimates for Wine Consumption per Capita, 1977-2011					
Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Wholesale Only				-0.120* (0.046)	-0.123** (0.046)
Retail State				0.013 (0.037)	0.019 (0.037)
Retail Agency				-0.796 (0.465)	-0.837 (0.473)
Wine Monopoly		-0.079*** (0.011)			
Sunday Hours Off-Premise High			-0.043* (0.02)		0.056** (0.023)
Sunday Hours Off-Premise Medium			-0.012 (0.02)		0.039 (0.023)
Non-Sunday Hours Off-Premise High			0.019 (0.027)		0.075* (0.031)
Non-Sunday Hours Off-Premise Medium			0.059** (0.023)		0.049 (0.028)
Local Hours Option			0.093*** (0.015)		
Election Day			-0.013 (0.016)		
Dram Shop Law			0.090*** (0.013)		
Year	-0.009*** (0.002)	-0.011*** (0.003)	-0.016*** (0.003)	-0.010*** (0.002)	-0.009 *** (0.002)
Year-Squared/100	0.036*** (0.006)	0.041*** (0.006)	0.047*** (0.007)	0.037*** (0.006)	0.034*** (0.006)
Constant	0.849*** (0.077)	0.898*** (0.075)	0.821*** (0.079)	0.881*** (0.077)	0.794*** (0.084)
Log Likelihood	1094.036	1118.125	1125.705	1099.180	1105.873
N (states)	50	50	50	50	50
N (observations)	1700	1700	1683	1700	1700
*=P < 0.05; **=P < 0.01; ***=P < 0.001, standard error in parentheses.					

Table C4: Regression Estimates for Spirits Consumption per Capita, 1977-2011					
Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Wholesale Only				-0.155 (0.080)	-0.151 (0.081)
Retail State				0.025 (0.019)	0.024 (0.019)
Retail Agency				-0.033 (0.018)	-0.033 (0.019)
Spirits Monopoly		0.005 (0.006)			
Sunday Hours Off-Premise High			0.014 (0.011)		0.015 (0.013)
Sunday Hours Off-Premise Medium			0.009 (0.011)		0.025 (0.013)
Non-Sunday Hours Off-Premise High			-0.006 (0.015)		0.021 (0.017)
Non-Sunday Hours Off-Premise Medium			0.001 (0.013)		0.001 (0.016)
Local Hours Option			0.017 * (0.008)		
Election Day Restrictions			-0.016 (0.009)		
Dram Shop Law			0.036*** (0.007)		
Year	-0.051*** (0.002)	-0.051*** (0.002)	-0.054*** (0.002)	-0.051*** (0.002)	-0.050*** (0.002)
Year-Squared/100	0.116*** (0.005)	0.116*** (0.005)	0.121*** (0.005)	0.115*** (0.005)	0.114 *** (0.005)
Constant	1.131*** (0.046)	1.123*** (0.048)	1.126*** (0.048)	1.180*** (0.054)	1.151*** (0.056)
Log Likelihood	2208.729	2209.073	2198.555	2212.769	2215.463
N (states)	50	50	50	50	50
N (observations)	1693	1693	1676	1693	1693
*=P < 0.05; **=P < 0.01; ***=P < 0.001, standard error in parentheses.					

Table C5: Regression Estimates of the Effect of Billboard Restrictions on Spirits Consumption		
Independent Variables	Model 1	Model 2
Billboard Restricted (t)		0.018 (0.009) *
Billboard Prohibited (t)		0.068 (0.017) ***
Billboard Restricted (t-1)		0.003 (0.012)
Billboard Prohibited (t-1)		0.009 (0.021)
Billboard Restricted (t-2)		-0.004 (0.012)
Billboard Prohibited (t-2)		0.005 (0.021)
Billboard Restricted (t-3)		0.001 (0.012)
Billboard Prohibited (t-3)		-0.006 (0.021)
Billboard Restricted (t-4)		-0.008 (0.012)
Billboard Prohibited (t-4)		-0.015 (0.021)
Billboard Restricted (t-5)		-0.013 (0.010)
Billboard Prohibited (t-5)		-0.038 (0.017) *
Year	-0.051 (0.002) ***	-0.050 (0.002) ***
Year-Squared/100	0.116 (0.005) ***	0.114 (0.005) ***
Constant	1.131 (0.046) ***	1.124 (0.047)
Log Likelihood	2208.729	2240.143
N (states)	50	50
N (observations)	1693	1693
*=P < 0.05; **=P < 0.01; ***=P < 0.001, standard error in parentheses.		

Table C6: Regression Estimates of the Effect of Advertising Restrictions on Spirits Consumption		
Independent Variables	Model 1	Model 2
Advertising Restricted (t)		0.021 (0.008) **
Advertising Restricted (t-1)		0.002 (0.011)
Advertising Restricted (t-2)		-0.001 (0.011)
Advertising Restricted (t-3)		0.004 (0.011)
Advertising Restricted (t-4)		-0.004 (0.011)
Advertising Restricted (t-5)		-0.017 (0.009) *
Year	-0.051 (0.002) ***	-0.050 (0.002) ***
Year-Squared/100	0.116 (0.005) ***	0.114 (0.005) ***
Constant	1.131 (0.046) ***	1.126 (0.047) ***
Log Likelihood	2208.729	2222.241
N (states)	50	50
N (observations)	1693	1693
*=P < 0.05; **=P < 0.01; ***=P < 0.001, standard error in parentheses.		

Table C7: Statistics for Revenue Equations (N= 1659)		
Variable	Mean	S.D.
Alcohol Income per Capita (log)	3.535	0.615
Wholesale	0.348	0.477
Retail State	0.264	0.441
Retail Agency	0.107	0.310
Spirits Monopoly	1.333	1.965
Wine Monopoly	0.394	1.096
Year	16.557	9.794
Year-Squared/100	3.700	3.350

Table C8: Regression Estimates of Alcohol Related Revenue, 1977-2011				
Independent Variables	Model 1	Model 2	Model 3	Model 4
Wholesale Only		0.587*** (0.123)		
Retail State		0.052 (0.043)		
Retail Agency		0.068 (0.042)		
Wine Monopoly			0.009 (0.014)	0.005 (0.014)
Spirits Monopoly			0.051*** (0.012)	0.548*** (0.067)
Spirits Monopoly Squared				-0.073*** (0.010)
Year	-0.058 *** (0.006)	-0.058*** (0.006)	-0.057*** (0.006)	-0.058*** (0.006)
Year-Squared/100	0.105 *** (0.016)	0.105*** (0.016)	0.104*** (0.015)	0.106*** (0.016)
Constant	4.115 *** (0.074)	3.891*** (0.072)	4.026*** (0.067)	3.790*** (0.072)
Log Likelihood	799.826	813.317	808.943	835.896
N (states)	49	49	49	49
N (observations)	1659	1659	1659	1659
*=P < 0.05; **=P < 0.01; ***=P < 0.001, standard error in parentheses.				

Table C9: Statistics Vehicular Fatalities Equations (N= 1448)		
Variable	Mean	S.D.
Fatality 008 per Capita (natural log form)	-9.465	0.491
Fatality 001 per Vehicle Traffic Mile (natural log form)	-5.09	0.495
Fatality 008 per Vehicle Traffic Mile (natural log form)	-5.09	0.495
Wholesale Only	0.360	0.480
Retail State	0.271	0.444
Retail Agency	0.113	0.317
Spirits Monopoly	1.131	1.606
Spirits Consumption per Capita (natural log form)	0.665	0.314
Wine Consumption per Capita (natural log form)	0.838	0.501
Dram Shop Law	0.802	0.399
Sunday Hours Off-Premise Medium Restricted	0.206	0.405
Sunday Hours Off-Premise High Restricted	0.604	0.489
Non-Sunday Hours Off-Premise Medium Restricted	0.325	0.468
Non-Sunday Hours Off-Premise High Restricted	0.418	0.493
Year	19.019	8.360
Year-Squared/100	4.316	3.240

Table C10: Regression Estimates of DWI Fatalities per Million Adults, 1982-2010						
Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Wholesale Only		0.198 (0.103)				
Retail State		-0.106* (0.048)	-0.071 (0.044)	-0.088* (0.043)		
Retail Agency		-0.052 (0.051)				
Spirits Monopoly					-0.015 (0.012)	-0.020 (0.012)
Wine Consumption per Capita				0.218*** (0.040)		0.191*** (0.040)
Spirits Consumption per Capita				0.655*** (0.072)		0.657*** (0.073)
Sunday Hours Off-Premise High				-0.030 (0.030)		
Sunday Hours Off-Premise Medium				0.070* (0.030)		
Non-Sunday Hours Off-Premise High				0.083* (0.041)		
Non-Sunday Hours Off-Premise Medium				0.000 (0.037)		
Dram Shop Law				-0.079*** (0.020)		
Year	-0.052 *** (0.003)	-0.053*** (0.003)	-0.053*** (0.003)	0.003 (0.005)	-0.053*** (0.003)	-0.003 (0.005)
Year-Squared/100	0.050 *** (0.007)	0.051*** (0.007)	0.051*** (0.007)	-0.082*** (0.013)	0.050*** (0.007)	-0.067*** (0.012)
Constant	-8.690 *** (0.048)	-8.711 *** (0.058)	-8.663*** (0.051)	-9.737*** (0.116)	-8.663*** (0.053)	-9.685*** (0.113)
Log Likelihood	527.173	530.665	528.477	608.868	527.927	587.880
N (states)	50	50	50	50	50	50
N (observations)	1448	1448	1448	1448	1448	1448
*=P < 0.05; **=P < 0.01; ***=P < 0.001, standard error in parentheses.						

Table C11: Regression Estimates of DWI Fatalities per Billion VTM, 1982-2010						
Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Wholesale Only		0.144 (0.082)				
Retail State		-0.096* (0.048)	-0.063 (0.039)	-0.071 (0.041)		
Retail Agency		-0.072 (0.048)				
Spirits Monopoly					-0.012 (0.010)	-0.014 (0.011)
Wine Consumption per Capita				0.164*** (0.039)		0.141*** (0.039)
Spirits Consumption per Capita				0.405*** (0.069)		0.411*** (0.069)
Sunday Hours Off-Premise High				-0.020 (0.029)		
Sunday Hours Off-Premise Medium				0.078** (0.029)		
Non-Sunday Hours Off-Premise High				0.077* (0.039)		
Non-Sunday Hours Off-Premise Medium				0.006 (0.035)		
Dram Shop Law				-0.050* (0.020)		
Year	-0.093 *** (0.002)	-0.093*** (0.003)	-0.094*** (0.003)	-0.057*** (0.005)	-0.093*** (0.003)	-0.062*** (0.005)
Year-Squared/100	0.127 *** (0.006)	0.128*** (0.007)	0.129*** (0.007)	0.042*** (0.012)	0.128*** (0.007)	0.053*** (0.012)
Constant	-3.871 *** (0.038)	-3.886*** (0.046)	-3.848*** (0.042)	-4.568*** (0.103)	-3.851*** (0.043)	-4.516*** (0.099)
Log Likelihood	562.752	566.432	564.018	609.411	563.386	593.193
N (states)	50	50	50	50	50	50
N (observations)	1448	1448	1448	1448	1448	1448
*=P < 0.05; **=P < 0.01; ***=P < 0.001, standard error in parentheses.						

Table C12: Regression Estimates of DWI to Vehicular Fatality Ratio, 1982-2010						
Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Wholesale Only		0.016 (0.079)				
Retail State		-0.013 (0.051)	-0.016 (0.042)	-0.012 (0.045)		
Retail Agency		-0.086 (0.053)				
Spirits Monopoly					0.000 (0.010)	0.004 (0.011)
Wine Consumption per Capita				0.268*** (0.045)		0.244*** (0.044)
Spirits Consumption per Capita				0.260*** (0.077)		0.244** (0.075)
Sunday Hours Off-Premise High				0.004 (0.033)		
Sunday Hours Off-Premise Medium				-0.004 (0.033)		
Non-Sunday Hours Off-Premise High				0.152*** (0.043)		
Non-Sunday Hours Off-Premise Medium				0.049 (0.039)		
Dram Shop Law				-0.056* (0.024)		
Year	-0.021*** (0.003)	-0.020*** (0.003)	-0.021*** (0.003)	0.011 (0.006)	-0.021*** (0.003)	0.005 (0.005)
Year-Squared/100	0.040*** (0.008)	0.039*** (0.008)	0.040*** (0.008)	-0.041** (0.013)	0.040*** (0.008)	-0.023 (0.013)
Constant	-0.804*** (0.038)	-0.802*** (0.045)	-0.798*** (0.041)	-1.492*** (0.108)	-0.805*** (0.043)	-1.390*** (0.099)
Log Likelihood	292.025	293.416	292.097	335.085	292.026	322.871
N (states)	50	50	50	50	50	50
N (observations)	1448	1448	1448	1448	1448	1448
*=P < 0.05; **=P < 0.01; ***=P < 0.001, standard error in parentheses.						