The Effect of Sunday Sales Bans and Excise Taxes on Drinking and Cross–Border Shopping for Alcoholic Beverages

Abstract - *State excise taxes and Sunday sales bans are important interventions in the markets for beer and spirits. This paper estimates the effect of these policies on within–state and cross–state purchases of beer and spirits for 50 states plus the District of Columbia over the period 1990–2004. The results indicate that while demand for both spirits and beer appears to be quite price elastic, 20 to 40 percent of the elasticity for spirits is due to displacement of sales across state borders rather than decreases in own–state drinking. The paper also finds that although repeal of a Sunday sales ban leads to an increase in the sale of spirits, much of the increase in sales of beer is due to a continuation of pre–existing trends in those states that repealed their bans. Approximately 80 percent of the increase in sales of spirits that results from repealing a Sunday ban on spirits is due to an increase in own–state drinking, while the remaining 20 percent is due to changes in cross–border shopping.*

INTRODUCTION

Excessive consumption of alcohol has been associated with adverse health effects, including cirrhosis of the liver, pancreatitis, gastritis, and various cancers (Friedman and Klatsky, 1993). Excessive drinking has also been charged with generating a myriad of negative outcomes stemming from behavioral change including highway fatalities (Ruhm, 1996), suicide (Carpenter, 2004), youth risky sexual behavior (Markowitz, Kaestner, and Grossman, 2005), transmission of STDs (Chesson, Harrison, and Kassler, 2000), child abuse (Markowitz and Grossman, 2000), nuisance crime (Carpenter, 2005), and workplace accidents (Ohsfeldt and Morrisey, 1997). Economic theory suggests that the market failure due to the presence of negative externalities may be corrected by the application of an excise tax, but Saffer and Chaloupka (1994) and Kenkel (1996) argue that excise taxes on alcoholic beverages are too low to correct for these externalities. In addition to concern for health and safety, many oppose consumption of alcoholic beverages because of moral or religious beliefs.

Against this backdrop, state governments have a variety of policies in place that intervene in the market for alcoholic beverages. Prominent among these have been laws that influence the prices of alcoholic beverages. At the end of

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2002, for example, all states levied excise taxes on beer and in 32 "license" states the primary intervention in the spirits market was also an excise tax. In the remaining "control" states, spirits were sold only through state stores where prices were set by legislated markups on wholesale prices. In recent decades, no state has converted from "license" to "control" and conversions in the other direction have been rare.[1] In addition to being relatively low, many excise taxes have fallen when measured in real terms. From 1990 to 2003, for example, the average state beer tax fell from 17.1 to 13.6 cents per gallon measured in 1982 cents, and the average state spirits tax fell from $2.53 to $2.06. While the federal beer tax increased from 22.2 to 42.6 cents in 1991, inflation eroded it to 31.5 cents by 2003, and the real federal spirits tax decreased from $9.56 to $7.34 over the same time span. In fact, even when measured in 2003 prices, the combined excise tax on beer is below one cent per ounce.[2] Because of their relatively low levels, excise taxes on alcohol raise only modest revenues for state governments. In 2002, excise taxes on beer, wine, and spirits provided states with approximately 3.2 billion dollars in revenues, sales taxes on alcoholic beverages provided approximately six billion dollars of additional revenue, and control states collected nearly 800 million dollars in revenue net of expenses through operation of their state–owned spirits stores (U.S. Census Bureau, 2006). Summed together, these policies were responsible for approximately one percent of state government revenues, a contribution slightly lower than the roughly 12 billion dollars states earned from excise taxes on tobacco products for the same year (Orzechowski and Walker, 2003). Despite their relatively low levels, alcohol taxes are likely targets for increases because they are one of the few taxes palatable to the general public. A survey released by the American Medical Association Office of Alcohol and Other Drug Abuse reveals that while 65 percent of respondents favored increasing alcohol taxes, 75 percent or more were against raising either the sales or income taxes or reducing spending on social services, Medicaid, or education (American Medical Association, 2004).

In addition to tax and price policies, federal, state, and local governments have a long history of enacting laws that ban the sale of alcoholic beverages. Most famously, the eighteenth amendment to the U.S. constitution banned the sale of alcoholic beverages from 1920 until 1933 when the twenty–first amendment repealed it and explicitly gave states the right to restrict the sale of alcohol. Although Mississippi repealed the last statewide ban on the sale of alcohol in 1966, numerous local governments still ban the sale of alcohol, and many states have in place bans on the Sunday sale of alcohol. Sunday sales bans were originally an outgrowth of Blue Laws enacted before the American Revolution to regulate behavior on the Christian Sabbath. They were revived toward the end of the nineteenth century as part of the temperance movement and again after the end of Prohibition when states regained control of laws governing the sale of alcohol (*Christian Science Monitor,* 2003). At the end of 2002, 11 states had bans on Sunday sales of beer and 27 states plus the District of Columbia had such bans in place for spirits.

Sunday sales bans, and to a lesser extent excise taxes, have been the focus of much recent legislative and judicial activity. The Distilled Spirits Council of

[1] Since 1965, private retailers gained the right to sell wine in Maine in 1971, in Alabama in 1973, and in Montana in 1979. They gained the right to sell spirits in Iowa in 1987 and in West Virginia over 1990–1991.

[2] Author's calculation based on tax and sales data from the Distilled Spirits Council of the United States (DISCUS) and Cook and Moore (2000).

the United States (DISCUS) records 28 excise tax changes for beer between 1990 and 2004 and over 30 changes in state excise taxes and markups for spirits; in 2005 at least twelve states considered bills to increase their taxes on alcoholic beverages (Center for Science in the Public Interest, 2005). Table 1 summarizes recent changes in Sunday sales bans for beer and spirits. New Mexico and Oregon repealed their bans on Sunday sales in 1995 and 2002, respectively; Delaware, Kansas, Massachusetts, New York, and Pennsylvania repealed or relaxed restrictions on Sunday sales of alcohol in 2003, five other states adopted similar measures in 2004 and Washington followed suit in 2005. No states have imposed new Sunday sales bans in recent decades. Because these interventions raise the full price of alcohol, some consumers may choose to purchase substitute products or to circumvent them by traveling to jurisdictions where laws or enforcement are more lenient. Higher prices, for example, may cause some consumers to travel to other states where prices are lower and some consumers may shop in other states when faced with a Sunday sales ban at home. Such activity is of concern because it undermines the ability of states to curb drinking, influences the amount of revenue states collect through taxation, and wastes resources by imposing unnecessary time and transportation costs on consumers.

TABLE 1
REPEAL OR RELAXATION OF BANS ON SUNDAY SALES OF BEER OR SPIRITS

Year	Beer	Spirits
1995	NM	NM
2002		OR
2003	DE, KS*, MA, PA	DE, KS*, MA, NY, PA
2004	RI	ID, KY, OH, RI, VA
2005		WA

Notes: Data are from DISCUS. No states enacted Sunday sales bans during the sample period 1990–2004. *A court ruling in 2003 permitted local governments to allow the Sunday sale of alcoholic beverages. The Kansas state legislature formally legalized Sunday sales in 2005.

The literature contains several papers that consider commodity tax competition and cross–border shopping from a theoretical perspective. Mintz and Tulkens (1986) examine commodity taxation in a general equilibrium model of two countries trading two goods. Although their model is quite general, this generality comes with a price; the paper reaches few general conclusions regarding the welfare effects of tax competition. More to the point, it does not consider the effect of country size on strategic interaction, an element likely to be important when explaining cross–border traffic between U.S. states. Kanbur and Keen (1993) develop a partial equilibrium model of two countries with one taxed good where population sizes are allowed to differ. Two predictions from their model are of particular relevance to this study. First, they find that the smaller country always undercuts the tax of the larger country. Second, they find that per–capita revenue is larger in the smaller country even though the smaller country has a lower tax rate, implying that it must be exporting sales to the larger country. The prediction for the U.S. is, thus, that smaller states will undercut the taxes of their larger neighbors and earn revenues from cross–border shoppers.

Empirical studies in this literature fall into two categories: those showing the interdependence of policies across jurisdictions and those showing that policy differences can result in cross–border shopping or migration. Conway and Rork (2004) find evidence that states' inheritance, gift, and estate taxes are influenced by the reliance on those taxes of competitor states. Rork (2003) shows that tobacco, gasoline, personal income, sales, and corporate income taxes are affected by the rates of those taxes in neighboring states. Although the implication in these papers is that competition is driven by cross–border shopping or migration, the papers do not directly test whether migration or sales in a state are influenced by the

policies of neighboring states. Cross–border shopping has, however, been well documented in other studies. Using data from Tennessee, Luna (2004) shows the interdependence of county sales tax rates and that county tax bases are influenced by the sales taxes of neighboring counties.[3] Numerous authors in the tobacco literature have shown that interstate differences in cigarette taxation have led to cross–border shopping or long–distance cigarette smuggling (Baltagi and Levin, 1986; Coats, 1995; Saba, Beard, Ekelund, and Ressler, 1995; Thursby and Thursby, 2000; Yurekli and Zhang, 2000; and Stehr, 2005).

If tax or policy differences lead consumers to cross state lines to purchase alcoholic beverages, then this behavior should be reflected by unexpected variation in sales across states. Table 2 presents average state per–capita annual sales of beer and spirits for the years 1990–2004 from DISCUS. Sales of spirits in New Hampshire, Washington DC, Delaware, and Nevada are very high, while sales in Utah and Pennsylvania are very low, relative to other states. Dispersion in per–capita beer sales is not as great but is also evident. While the data are consistent with cross–border traffic, they are also consistent with other hypotheses. Low sales in Utah, for example, are likely due to the strong religious influences in that state, and high sales in Nevada are likely due to the strong tourism and gambling industries.

Previous research on alcoholic beverages has attempted to separate these effects, but the focus has been on border crossing in response to price differences with little attention given to Sunday sales bans. In addition, previous studies have drawn on price data, but prices may be endogenous if they are set by suppliers in response to changing demand conditions.

TABLE 2
PER CAPITA ANNUAL SALES OF BEER AND SPIRITS BY STATE

State	Beer	Spirits
Alabama	20.78	1.05
Alaska	23.35	1.85
Arizona	26.29	1.39
Arkansas	19.55	1.08
California	19.62	1.28
Colorado	23.71	1.65
Connecticut	17.49	1.57
Delaware	24.84	2.03
D.C	26.23	3.23
Florida	24.94	1.72
Georgia	21.27	1.39
Hawaii	23.54	1.13
Idaho	20.93	1.01
Illinois	23.00	1.34
Indiana	20.32	1.20
Iowa	23.67	0.96
Kansas	19.69	1.02
Kentucky	19.16	1.08
Louisiana	26.31	1.38
Maine	21.40	1.48
Maryland	19.04	1.52
Massachusetts	20.75	1.62
Michigan	21.35	1.36
Minnesota	22.20	1.67
Mississippi	24.23	1.19
Missouri	23.64	1.23
Montana	27.79	1.38
Nebraska	24.79	1.16
Nevada	33.45	2.86
New Hampshire	31.41	3.54
New Jersey	18.16	1.53
New Mexico	26.50	1.16
New York	17.56	1.20
North Carolina	20.86	1.07
North Dakota	27.24	1.61
Ohio	23.24	0.97
Oklahoma	19.61	0.99
Oregon	21.95	1.26
Pennsylvania	22.68	0.96
Rhode Island	21.74	1.39
South Carolina	25.09	1.42
South Dakota	24.75	1.39
Tennessee	21.39	1.04
Texas	26.92	0.97
Utah	12.67	0.71
Vermont	23.22	1.34
Virginia	21.39	1.02
Washington	20.26	1.29
West Virginia	21.82	0.78
Wisconsin	27.99	1.74
Wyoming	24.99	1.66
Mean	22.84	1.41
Standard Deviation	3.60	0.54

Notes: Data are from DISCUS and are averaged over the years 1990–2004. Figures are in gallons per capita per year.

[3] The tax base is defined as total sales tax revenues divided by the sales tax rate.

Baltagi and Goel (1990) and Baltagi and Griffin (1995) examine demand for spirits from 1959–1982 and find little evidence of border–crossing effects. Beard, Gant, and Saba (1997) find that for the period 1989 to 1993, border crossing for lower prices was a statistically significant factor in explaining beer but not spirits sales, and that in 1993 in the typical state, such activity accounted for less than one percent of total sales. Despite this finding, greater dispersion in spirits prices suggests that shoppers are more likely to cross the border to purchase spirits than beer. In the lower 48 states, the lowest and highest average state prices for a six pack of Heineken beer in 2003 were $6.79 and $9.00, respectively, but the price difference between the states at the 25th and 75th percentiles of the distribution was just $0.56.[4] In the same year, the lowest and highest prices for a 750 ml bottle of J&B Scotch were $17.25 and $26.67, respectively, and the difference between prices at the 25th and 75th percentiles was $2.30. Furthermore, spirits can be stored for a greater period of time, allowing shoppers to stock up and achieve greater savings per trip.

Several authors have also examined alcohol taxation in the United Kingdom. Crawford and Tanner (1995) find that price elasticities for beer, wine, and spirits in southeastern England began to diverge from elasticities for the UK as a whole in 1993, right after completion of the single European market relaxed limits on the legal importation of alcoholic beverages for personal use. Although these results are consistent with an increase in cross–border shopping through southeastern port cities such as Dover to destinations in continental Europe, the differences are only statistically significant for wine. A follow up study by Crawford, Smith, and Tanner (1999) failed to find any differences in elasticities between the 1989–1992 and 1993–1996 periods for beer, wine, or spirits. The failure to find divergence in elasticities is not, however, conclusive evidence against the presence of border crossing because the standard errors on many of the point estimates are quite large. These two studies and an additional one by Smith (1999) all find that tax revenues could be increased by increasing taxes on beer or wine, but that the tax on spirits is already near its revenue maximizing level.

This author is not aware of any research that examines the effect of Sunday sales bans on either own–state sales or cross–border shopping. Even if price differences appear sufficient to motivate cross–border traffic, they may be correlated with Sunday bans and other alcohol policies. In this case, these variables must be analyzed together in order to avoid any omitted variable bias that may emerge if they are considered in isolation. Indeed, in the tobacco literature, previous work finds that omitting smoking restrictions alters the estimated effect of cigarette taxes (Tauras, 1999).

This paper contains three key contributions. First, it estimates the effect of the repeal of Sunday sales bans on state sales of beer and spirits. Second, it estimates the effect of these repeals along with interstate price variation on the degree of state border crossing to purchase beer and spirits. Third, it relies on variation in taxes, which is more plausibly exogenous than variation in prices, to identify the own–state and cross–border price effects. The rest of the paper is organized as follows: the second section outlines the empirical specification, the third

[4] Priced data are based on state averages from the third quarter 2003 American Chamber of Commerce Research Association (ACCRA) survey. See the third section of the paper and Table 2 for a description of this data source.

section describes the data used in the analysis, the fourth section presents the results, and the fifth section concludes the paper with a discussion of policy implications.

EMPIRICAL SPECIFICATION

Price endogeneity is a key concern in identifying both own–state and cross–border price responses. It is quite plausible that beer and spirits suppliers adjust prices in response to changing demand conditions. For this reason, I follow the approach common in the literature and use state excise taxes on beer to identify the own–state response to changes in the beer price. For spirits, I use the excise tax on spirits in license states and percent markups on wholesale prices in control states. Because I use a specification that includes state fixed effects, it is essential that changes in the beer tax, spirits tax, and markups are passed through to changes in prices. Young and Bielinska–Kwapisz (2002) show that although the raw correlation between the level of alcohol taxes and prices can be quite low, changes in alcohol taxes are passed through to prices within a quarter of a year. Using data from Alaska, Kenkel (2005) also finds a strong relationship between changes in alcohol taxes and prices. Although this argues for the use of tax data, the use of such data presents two dilemmas. First, it is unclear how to compare excise taxes on spirits in license states with percent markups in control states. This problem can be solved by multiplying excise taxes and markups by their respective pass through rates to prices. Following Young and Bielinska–Kwapisz, I regress prices on excise taxes and markups with state and year fixed effects included and a correction for serial correlation of the errors. The results of these regressions, shown in Table 3, confirm that the relationships between changes in state beer and spirits taxes and changes in prices are statistically significant. I then multiply by one plus the state sales tax on alcoholic beverages to create the fitted prices I ultimately use to construct measures of interstate border crossing. With the inclusion of state fixed effects in the final specification, identification of the coefficients on the border–crossing variables will come from plausibly exogenous within–state variation over time in excise taxes, markups, and sales taxes.

TABLE 3
PASSTHROUGH FROM TAXES TO PRICES FOR BEER AND SPIRITS

	Beer	Spirits
State beer tax	0.94	-
	(2.43)	-
State liquor tax	-	1.56
	-	(4.16)
Markup on spirits	-	0.19
	-	(4.32)
Observations	701	701

Notes: Tax data are from DISCUS. Price data are from ACCRA. Sample period is 1990–2004. Price data for some states are missing in some years. T–statistics are given in parentheses. Both regressions include state and year fixed effects and a correction for serial correlation of the errors.

It is also possible that repeals of Sunday sales bans are endogenous. One might argue that repeals were introduced and passed in those states where attitudes toward drinking were more permissive. These more permissive attitudes might then lead both to greater increases in drinking and the repeal of Sunday sales bans. If this hypothesis were true, then we would expect to see greater increases in sales in states that repealed their bans than in states that did not in the years before bans were repealed. Table 4 reports the results of regressions of the log of per–capita state beer or spirits sales on state and year fixed effects, demographic variables, and a dummy for states that repealed bans interacted with a linear time trend. The sample begins in 1990

TABLE 4
TIME TRENDS IN SALES IN STATES THAT REPEALED SUNDAY BANS

	Beer	Spirits
*Repealed ban*time trend*	0.0031	0.0038
	(3.15)	(3.22)
State fixed effects	yes	yes
Year fixed effects	yes	yes
Observations	663	612

Notes: Dependent variable is log of per–capita annual sales in gallons. *Repealed ban*time trend* is an interaction between an indicator variable for whether or not a state repealed a Sunday sales ban and a linear time trend. The samples include 1990–2002 for beer and 1990–2001 for liquor, the years before the cluster of repeals that took place in the early 2000s. Regressions include avarage state income; the unemployment rate; fraction black, Hispanic, Native American, and Asian; and the fraction of the population that falls into 8 different age categories.

and includes all years through the last year before the cluster of repeals that emerged in the early 2000s, 2001 in the case of spirits and 2002 in the case of beer.[5] With state and year fixed effects included, the coefficient on *Repeal state * Time trend* equals the average annual percent deviation of per–capita sales in the repeal states relative to all other states. The results indicate that even before the first repeal went into effect, states that would later repeal their Sunday bans had annual increases in sales that were a statistically significant 0.34 percent and 0.38 percent higher than other states. For this reason, I include *Repeal state * Time trend* in the final specifications.

Sales of beer or spirits in a state are the sum of sales to members of that state plus sales to individuals who do not reside in that state, or exported sales. Exports may be identified by a positive association between sales in a state and a measure of cross–border demand from residents of neighboring states. Similarly, imports may be identified by a negative association between own–state sales and own–state resident demand for out–of–state purchases. The import and export functions I construct are similar to those Becker, Grossman, and Murphy (1994) use to capture cross–border shopping for cigarettes. I propose two measures of exported sales: the first captures exports resulting from price differences and the second measures exports that are due to differences in Sunday sales laws. Population will clearly affect the degree of border crossing. Small states may experience large percentage increases in sales if they are exporting sales to a populous adjacent state whereas the opposite holds true for large states that border small states. The distribution of population is also important. Those who live near the border are much more likely to cross it than those who live far away. For this reason, I rely on the population of border counties in an adjacent state rather than the population of the entire state. This approach has a clear advantage when population is unevenly distributed. Kansas, for example, had a ban on the Sunday sale of alcohol through all of the 1990s and borders both Colorado and Missouri, which have not had such bans in place. Much of the population of Kansas lives in and around Kansas City, located on the border with Missouri, while very few residents of Kansas live on the border with Colorado. In this case, relying on the entire population of Kansas to construct the export variable for Colorado would lead to clear misspecification. Transportation is important as well. Three freeways and numerous smaller roads traverse the relatively short border between Massachusetts and New Hampshire, but the border between Mississippi and Arkansas follows the Mississippi River and is only crossed easily where there is a bridge.

[5] The test is complicated by the presence of an early repeal of a Sunday sales ban on beer and spirits in New Mexico in 1995. The results shown here include New Mexico among repeal states. The results change very little if observations from New Mexico are dropped from the regression.

With these factors in mind, I construct the following variable to measure sales that are exported due to price differences:

$$[1] \quad Price\,Exports_{jt} = \sum_k \frac{countypops_{kt}}{statepop_{jt}} (\hat{p}_{kt} - \hat{p}_{jt}) \mid (\hat{p}_{kt} > \hat{p}_{jt}),$$

where j indexes state, k indexes states that border state j, and t indexes year.[6] $Countypops_{kt}$ is the sum of the populations of the counties in state k that border state j and that have direct overland access to state j or access via a bridge. The product of the excise tax or markup and its coefficient, multiplied by one plus the applicable sales tax, constitutes the fitted price, denoted $\hat{p}$. The last third of the expression sets the contribution of state k to zero when the fitted price in state k is higher than the fitted price in state j because, in this case, there is no price advantage that would lead to exported sales. $Price\ Export_{jt}$ is, thus, bounded from below at zero.

Next, I construct a similar variable to measure exports that are due to Sunday sales restrictions in neighboring states:

$$[2] \quad Sunday\,Export_{jt} = \left| \sum_k \frac{countypops_{kt}}{statepop_{jt}} (ban_{kt} > ban_{jt}), \right.$$

where ban_{kt} equals one when a state prohibits Sunday sales and zero when it allows them. For those years in which a Sunday sales law changed, I code the variable as equal to the fraction of Sundays for which sales were banned. The National Institute of Health's APIS (Alcohol Policy Information System) provides additional data indicating states that have statewide laws banning Sunday sales of all alcoholic beverages, but allow local governments to override the state law.[7] For these states, I code the Sunday ban on beer to be 0.5. The contribution of state k to $Sunday\ Export_{jt}$ is, thus, zero unless it has a ban that is more stringent than that of state j. Because both export variables are by construction non–negative, the expected sign on their coefficients is positive. The variables measuring imports are similar in spirit to those measuring exports, but because own–state residents are crossing the border to import alcoholic beverages, I sum over the populations of own–state counties that lie on the borders with other states. The variable measuring imported sales due price differences is, thus,

$$[3] \quad Price\,Import_{jt} = \sum_k \frac{countypops_{jt}}{statepop_{jt}} (\hat{p}_{jt} - \hat{p}_{kt}) \mid (\hat{p}_{jt} > \hat{p}_{kt}),$$

where $countypops_{jt}$ is the population of counties in state j that border state k and have direct access to state k. The variable measuring imports due to Sunday sales bans is

$$[4] \quad Sunday\,Import_{jt} = \left| \sum_k \frac{countypops_{jt}}{statepop_{jt}} (ban_{jt} > ban_{kt}). \right.$$

Both import variables are constructed to be non–negative, so the expected sign on their coefficients is negative.

The model also contains other variables that should affect sales of beer and spirits. I include own–beverage tax and markups as well as the taxes and markups of other alcoholic beverages to control for own– and cross–beverage price effects. Sunday sales bans are included to show the effect of own–state bans on own–state

[6] I also estimated models where the average "radius" of border counties in state k appeared in the denominator. Because the results were very similar to those reported, I chose the simpler specification. These results are available upon request.

[7] States with a Sunday ban on beer also ban Sunday sales of spirits, but the opposite does not hold true. For this reason, the APIS data on partial bans may only be applied correctly to beer sales.

sales independent of any border–crossing effects. I include income because increased consumption of alcoholic beverages has been associated with higher income. Fraction black, Hispanic, Asian, and Native American, and the fraction of the population that falls within specific age categories, are included to control for the possibility that drinking habits vary by race, ethnicity, and age.[8] I include the state unemployment rate because those without jobs may drink as a result of frustration or anxiety or because they have more free time. Unobserved determinants of drinking may also vary by state. Residents of Wisconsin, for example, may have a more positive attitude toward beer consumption than the residents of other states because many of their ancestors emigrated from countries such as Germany where beer is quite popular or because their state is home to Milwaukee, a city long associated with brewing beer. In addition, states have a Byzantine array of laws affecting the sale of alcoholic beverages, many of which are unique to particular states and have shown little variation over time.[9] With these factors in mind, I estimate specifications that include state fixed effects and rely on within–state variation over time for identification. I also include year dummies to capture the downward trend in per–capita beer sales that has occurred from 1990 to 2004 and the U–shaped trend in spirits sales that has occurred over the same period. Other observable characteristics of states such as church membership, whether a state borders Canada or Mexico, and the broader retail structure such as state control of spirits stores or the availability of alcohol in grocery stores may also be important determinants of state sales of alcoholic beverages. Because data on church membership are only available for 1990 and the other variables are largely time invariant, their influence on drinking will be subsumed in the state fixed effects and they are excluded from the analysis. The final equation for estimation is, thus,

$$[5]\quad log\ sales_{jt} = \alpha_j + \Delta Prices_{jt} + \Phi Bans_{jt} + \beta_1 priceimport_{jt} + \beta_2 priceexport_{jt} + \beta_3 sundayimport_{jt} + \beta_4 sundayexport_{jt} + repealstate * tt_{jt} + \Gamma Z_{jt} + \delta_t + e_{jt},$$

where $logsales_{jt}$ is the log of gallons of beer or spirits per capita per year, α_j is a state fixed effect, Z_{jt} is the vector of time varying control variables, δ_t are year fixed effects, and ε_{jt} is an error term. Because the dependent variable is log of per–capita sales, the coefficient on Ban_{jt} can be interpreted as the percent change in sales associated with repeal of a Sunday sales ban. Because a ban is coded as one when it is in effect and zero otherwise, the negative of the coefficient gives the percent change in sales associated with repeal of a ban.

DATA

Summary statistics for the key variables used in the analysis are presented in Table 5. Price data for beer and spirits are taken from the 1990–2004 third quarter editions of the American Chamber of Commerce Researchers Association (ACCRA) cost of living indexes. ACCRA surveys roughly 300 cities per year that provide coverage for 43–48 states per year. For those state years that have multiple survey cities, I average prices across cities. Prices for each alcoholic beverage are not weighted averages across all brands, but instead

[8] See Table 5 for a complete description of age categories.

[9] Texas law, for example, stipulates that an on–premise alcoholic beverage served to a customer between 10am and noon on Sunday must be accompanied by food. New York law requires that spirits stores be owned by a single owner who lives within a certain distance of the store, effectively banning chain stores. Puerto Rico bans the sale of alcoholic beverages during hurricane emergencies.

TABLE 5
SUMMARY STATISTICS FOR KEY VARIABLES

Variable	Obs.	Mean	St. dev.	Min.	Max.
Log beer sales	765	3.11	0.17	2.50	3.68
Log spirits sales	765	0.29	0.32	–0.39	1.41
State beer tax	765	0.15	0.12	0.01	0.68
State wine tax	765	0.43	0.32	0.00	1.72
Wine markup	765	3.96	13.48	0.00	66.96
State spirits tax	765	1.72	1.37	0.00	6.96
Spirits markup	765	22.63	33.71	0.00	113.00
Price export beer	765	2.05	3.51	0.00	21.41
Price import beer	765	1.92	2.81	0.00	15.88
Sunday beer ban	765	0.30	0.41	0.00	1.00
Sunday export beer	765	0.14	0.26	0.00	1.28
Sunday import beer	765	0.12	0.24	0.00	1.65
Price export spirits	765	2.17	5.25	0.00	34.39
Price import spirits	765	1.33	1.87	0.00	11.26
Sunday spirits ban	765	0.58	0.49	0.00	1.00
Sunday export spirits	765	2.08	4.14	0.00	30.51
Sunday import spirits	765	1.12	1.66	0.00	8.80
*Repeal state*timetrend beer*	765	0.82	2.70	0.00	14.00
*Repeal state*timetrend spirits*	765	1.78	3.75	0.00	14.00
*Sunday beer ban*grocery beer*	765	0.21	0.35	0.00	1.00
*Sunday spirits ban*grocery spirits*	765	0.06	0.24	0.00	1.00
Beer price	701	5.07	0.42	3.92	7.19
Spirits price	701	62.30	5.51	44.16	81.92
Income in 1000s	765	20.32	3.34	12.82	30.99
Unemployment rate	765	5.24	1.45	2.30	11.30
Percent age 15–19	765	7.18	0.73	4.65	10.42
Age 20–29	765	14.21	1.51	11.12	21.37
Age 30–39	765	15.70	1.57	11.48	21.45
Age 40–49	765	14.55	1.25	10.38	17.88
Age 50–59	765	10.31	1.45	6.75	14.93
Age 60–69	765	7.60	0.89	4.05	10.86
Age 70–79	765	5.72	0.91	1.73	8.78
Age 80 plus	765	3.19	0.71	0.57	4.88
Fraction Hispanic	765	0.070	0.084	0.004	0.430
Fraction Black	765	0.113	0.119	0.003	0.663
Fraction Native Amer.	765	0.019	0.031	0.001	0.181
Fraction Asian	765	0.035	0.089	0.004	0.671

Notes: Data on sales of beer and spirits and taxes are from DISCUS. Sales are expressed in gallons per capita per year. Price data for beer, wine, and spirits are from the ACCRA cost of living index. Income, prices, and taxes are in 1982 dollars. Wine and spirits markups are expressed as percentages. Repeal states are those states that repealed their Sunday sales bans during the sample period. *Grocery beer* equals one when grocery stores are allowed to sell beer, and zero otherwise. Import and export variables are defined in the second section of the paper. Data on income; unemployment; population; and population by age, ethnicity, and race are drawn from the Census and Bureau of Labor Statistics online files (www.bls.gov).

reflect the price of a specified quantity of a particular branded product. The beer price for the 1990s, for example, was for a six pack of Miller Lite or Budweiser. Although this price may be higher or lower than beer prices as a whole, differences in this price should reflect differences in beer prices across states with reasonable accuracy because they are likely to be driven primarily by factors common across brands such as taxes, regulations, transportation costs, the level of competition, or income.

A different problem occurs when ACCRA changes the good whose price is surveyed. In 2000, for example, ACCRA switched the brand of beer included in the survey. Because there are no data on both goods for the same year, it is impossible to know the true relative prices of the goods. In these cases, I multiply all of the new prices by a factor such that the first year of the new good has the same price as the last year of the old good. Although not ideal, this normalization avoids a large spurious change in the price in the year

that the good changes. It also preserves consistency in the magnitude of price differences with the exception of the two transition years.[10] I deflate the price data to 1982 dollars using the consumer price index (CPI) from the Bureau of Labor Statistics.

Data on state sales of beer and spirits, Sunday sales laws for spirits, excise taxes, and sales taxes on alcoholic beverages are from DISCUS and state statutes. Data on Sunday sales laws for beer are drawn from the Alcohol Policy Information System (APIS).[11] State level data on unemployment rates; per–capita income; fraction black, Hispanic, Asian, and Native American; the fraction of the population that falls within specific age categories; and county level population data are from the Bureau of Labor Statistics online files.

RESULTS

The first columns of Tables 6 and 7 show the results with no border–crossing variables included and without the time–trend variables to control for endogeneity of Sunday sales bans. In both the beer and spirits regressions, the coefficient on own–beverage state tax is negative and significant indicating that higher taxes are associated with significantly lower sales. The coefficients on Sunday sales bans are also negative and significant in both regressions and imply that the average state saw per–capita sales of beer or spirits increase by 4.1 percent or 5.2 percent, respectively, after repeal of a Sunday sales ban. In the second columns, when the linear time trends for repeal states are included, the effect of repealing a ban on spirits decreases to 3.5 percent and the effect of repealing a ban on the sale of beer drops to a marginally significant 2.4 percent. These results may appear surprising. Beer has a limited shelf life, is bulky, and is often consumed while viewing sports on Sundays. Spirits, on the other hand, are compact, have a long shelf life, and are not traditionally associated with viewing sports. Because Sunday bans are more likely to affect beer drinkers, their repeal might seem more likely to increase beer sales. I consider two explanations for these seemingly counterintuitive results. First, in each of the six states where the Sunday ban on the sale of beer was repealed, the ban on the Sunday sale of wine and spirits was also repealed. So, anyone wanting to purchase alcohol on Sunday saw their choice go from zero beverage categories to three, creating little scope for the repeal to affect substitution patterns between beverages. In the other six states where the ban on the Sunday sale of spirits was repealed, however, Sunday sales of beer were already legal. In these states, those who might go shopping for alcoholic beverages on Sunday saw their options increase to include spirits and those who bought beer because spirits were unavailable no longer had to make this compromise. If the substitution hypothesis is correct, then sales of spirits should increase more in those states where beer was already for sale on Sundays than in the other states. To test this hypothesis, I create a dummy variable equal to one when the repeal affected only the Sunday sale of spirits and equal to zero, otherwise and interact it with *Sunday spirits ban*. The coefficient of the interacted variable in the spirits regression indicates whether the effect of repealing a Sunday sales ban differed in those states where the sale of beer was already allowed. The results indicate no statistically significant difference ($p = 0.48$).[12] Greater scope for substitution

[10] The beer good was a Schlitz, Miller Lite, or Budweiser six–pack from 1990 to 1999 and a six–pack of Heineken from 2000 to 2004. The spirits good was a J&B Scotch 0.75 liter bottle from 1990 to 2004.

[11] APIS data extend from 2004 back to 1998. DISCUS reports that their lobbyists are unaware of any changes to Sunday sales laws dating back through at least 1990.

[12] The results are available upon request.

TABLE 6
REGRESSION COEFFICIENTS FOR MODELS OF BEER SALES

	Dependent variable is log state per capita beer sales			
	(1)	(2)	(3)	(4)
State beer tax	–0.189 (2.37)	–0.216 (2.69)	–0.211 (2.61)	–0.182 (2.18)
State wine tax	–0.076 (2.61)	–0.081 (2.80)	–0.080 (2.76)	–0.086 (2.92)
Wine markup	–0.010 (2.97)	–0.011 (3.28)	–0.011 (3.30)	–0.011 (3.25)
State spirits tax	0.026 (4.41)	0.028 (4.75)	0.028 (4.74)	0.026 (4.38)
Spirits markup	–0.0018 (3.37)	–0.0018 (3.36)	–0.0018 (3.36)	–0.0017 (3.16)
Price export beer	–	–	–	–0.0033 (1.51)
Price import beer	–	–	–	0.0020 (0.64)
Sunday beer ban	–0.041 (3.77)	–0.024 (1.90)	–0.030 (1.97)	–0.034 (1.46)
*Repeal state*time trend beer*	–	0.0026 (2.51)	0.0027 (2.53)	0.0028 (2.59)
*Sunday beer ban*grocery beer*	–	–	0.015 (0.70)	0.018 (0.79)
Sunday export beer	–	–	–	–0.0175 (1.09)
Sunday import beer	–	–	–	0.0051 (0.22)
Income	0.036 (9.55)	0.036 (9.54)	0.036 (9.55)	0.036 (9.27)
Observations	765	765	765	765

Notes: T–statistics in parentheses. All regressions include state and year fixed effects; unemployment; fraction of the state population that is Hispanic, black, Native American, and Asian; and fraction of the population that falls into eight age categories. Sample is for years 1990–2004. *Price export beer* and *Price import beer* are functions of state taxes on beer. See Table 5 for a list of data sources and the second section of the paper for a complete description of variables.

is, thus, an unlikely explanation for the differing results with respect to beer and spirits.

A second explanation lies in the availability of alcohol in grocery stores. Spirits could not be sold in grocery stores in ten of the 12 states that repealed their bans on the Sunday sale of spirits.[13] If the purchase of alcohol may be conveniently included with regular grocery shopping, then a Sunday sales ban may have little effect. If purchasing alcohol requires a trip to a special store, then allowing sales on Sunday when shoppers have more time to make an extra trip may have a greater effect. To test this hypothesis, I create a dummy variable equal to one when a state allows the sale of spirits in grocery stores and

[13] The data are from DISCUS.

TABLE 7
REGRESSION COEFFICIENTS FOR MODELS OF SPIRITS SALES

	Dependent variable is log state per capita spirits sales			
	(1)	(2)	(3)	(4)
State beer tax	0.909	0.868	0.926	0.642
	(7.46)	(7.09)	(7.59)	(4.33)
State wine tax	–0.091	–0.093	–0.089	–0.065
	(2.03)	(2.08)	(2.02)	(1.45)
Wine markup	0.011	0.010	0.009	0.010
	(2.17)	(1.96)	(1.90)	(2.03)
State spirits tax	–0.063	–0.060	–0.061	–0.036
	(7.00)	(6.70)	(6.87)	(2.63)
Spirits markup	–0.0003	–0.0007	–0.0008	0.0003
	(0.41)	(0.83)	(1.03)	(0.30)
Price export spirits	–	–	–	0.0094
				(2.77)
Price import spirits	–	–	–	–0.0116
				(1.28)
Sunday spirits ban	–0.052	–0.035	–0.072	–0.072
	(3.93)	(2.36)	(4.12)	(3.30)
*Repeal state*time trend spirits*	–	0.0029	0.0028	0.0027
		(2.73)	(2.74)	(2.63)
*Sunday spirits ban*grocery spirits*	–	–	0.100	0.097
			(3.88)	(3.69)
Sunday export spirits	–	–	–	0.0314
				(2.54)
Sunday import spirits	–	–	–	0.0130
				(0.54)
Income	0.028	0.030	0.031	0.030
	(4.83)	(5.19)	(5.38)	(5.14)
Observations	765	765	765	765

Notes: T–statistics in parentheses. All regressions include state and year fixed effects; unemployment; fraction of the state population that is Hispanic, black, Native American, and Asian; and fraction of the population that falls into eight age categories. Sample is for years 1990–2004. *Price export spirits* and *Price import spirits* are functions of state taxes and markups on spirits. See Table 5 for a list of data sources and the second section of the paper for a complete description of variables.

zero otherwise. I then interact this variable with *Sunday spirits ban* and include it in the spirits regression. The coefficient on the interacted variable shows how sales of spirits changed in states that allowed grocery store sales relative to states that did not when a Sunday ban was repealed. The results, shown in column 3 of Table 7, indicate that sales of spirits in states that did not allow grocery store sales increased by 7.2 percent following repeal of a Sunday ban. In the two states that allowed grocery sales, the effect was 10.0 percent less; adding the two coefficients together yields an overall decrease in sales of 2.8 percent that is not significantly different from zero. The results support the hypothesis that a Sunday sales ban is binding when a grocery store ban is already in effect. The results of a similar regression for beer are shown in column 3 of Table 6. Although the coefficients have the same

signs as in the spirits regression, the difference between states that allow and do not allow grocery sales is not statistically significant. The coefficient on *Sunday beer ban* is now just significant at the 5 percent level and, thus, consistent with the notion that repeal raises sales when grocery store sales are not allowed. Nevertheless, this finding is not as robust as the results for spirits. In the case of beer, there are again two repeal states that allow grocery store sales, but four rather than ten repeal states with no grocery store sales. The failure to find a robust effect for beer may, therefore, lie with the smaller number of repeal states that did not allow grocery store sales. With fewer identifying observations, any effects are less likely to be statistically significant.

The fourth columns of Tables 6 and 7 show the results with the import and export variables included. The coefficients on the border–crossing variables for beer are insignificant and the inclusion of these variables has a negligible effect on the coefficient on the state beer tax. The beer tax, thus, acts by reducing consumption of beer rather than by displacing sales across state borders. In the spirits regression, the coefficient of *Sunday export* is positive and significant, implying that repeal of Sunday bans acts not only by increasing own–state consumption of spirits but also through changes in Sunday shopping across state borders.[14] The coefficient on *Price export* is positive and statistically significant and the coefficient on the state spirits tax has decreased by roughly 40 percent, implying that this portion of the price response of spirits is due to border crossing. It would seem that if *Price export* were significant, then *Price import* should capture the same effect from the other side of the border, yet this variable is insignificant. The explanation for the discrepancy likely rests with the theoretical prediction of Kanbur and Keen (1993) that small states will tend to undercut large states. If this result holds, then we expect to see excess sales due to exports in small states and low sales due to imports in large states. When exports equal imports, imports are more difficult to identify because they are spread among larger populations and lead to less variation in per–capita sales. In the case of Sunday sales, even if bans are equally prevalent in small and large states, exports will still be easier to identify because they can come from excesses in sales to residents of potentially multiple bordering states. Imports, by contrast, appear in the data as a dearth of sales to own state residents.

To find the price elasticity of demand for spirits, I first compute the percent change in quantity from a one–cent increase in the spirits tax using the results from column 3 of Table 7. The corresponding percent change in price is computed by multiplying one cent by the pass–through rate from tax to price and dividing by the average price of a gallon of spirits.[15] This calculation yields a price elasticity of –2.44, which is higher than most other recent estimates. Baltagi and Goel (1990) and Baltagi and Griffin (1995), for example, both find the

[14] This result is robust to dropping each repeal state separately.

[15] The sales data are for all brands of spirits, but the ACCRA data reflect the price for J&B Scotch, which is higher than the price of an average brand. A bias occurs in calculation of the price elasticity if the pass–through rate for J&B Scotch does not rise in proportion with its price because the percent change in the price of J&B Scotch will not be representative of the true average percent change in price. Kenkel (2005) reports that three premium brands of spirits with prices roughly 50 percent higher than lower priced brands had pass–through rates that were only 20 percent higher than those of the low–priced brands. Following a tax increase, the percent increase in price for a premium brand will, thus, be 1.2/1.5 = 80 percent of the percent price increase for a lower–priced brand. Without data on the composition of spirits sales, it is difficult to determine the exact bias, but if sales were made up of half premium brands and half lower–priced brands, then the percent change in price of J&B Scotch would be roughly 90 percent of the true percent change and the elasticity would be 11 percent too high.

elasticity of spirits to be –0.7, but they do not control for cross–price effects. Such effects are important because states sometimes raise excise taxes on beer, wine, and spirits at the same time. If increases are coordinated, those who might substitute away from spirits if their prices rise in isolation may not do so if the price of beer increases at the same time. Not controlling for state beer and wine taxes may, therefore, induce downward bias in the coefficient on the state spirits tax. Indeed, with state beer and wine taxes omitted, the calculated price elasticity falls to –0.65. The price elasticity of demand for beer is also of interest to policy makers. Using the results from column 3 of Table 6, I calculate this elasticity to be –1.02.[16]

From a tax revenue perspective, it may not matter whether decreases in sales are due to decreases in drinking or displacement of sales across state borders. If policy makers wish to know the effect of these policies on own–state drinking, however, cross border sales become important. The coefficient on the state spirits tax from column 4 of Table 7 yields a price elasticity reflecting drinking equal to –1.44. The portion of the elasticity that is due to border crossing may be taken as the difference with the elasticity from column 2, (–1.00), but it is also possible to calculate it directly from the coefficient on the export variable. Since the export variable differs by state, this also allows for calculation of state specific elasticities. I simulate the effect of a one–cent tax increase by recalculating *Price export* for each state individually, assuming that the fitted price of that state has increased by one cent multiplied by the pass–through rate.[17] The change in *Price export* multiplied by its coefficient yields the changes in exports for the given state and each of its neighbors. The decrease in own–state exports plus any increase in the exports of neighboring states then equals the change in cross–border sales for the given state. The percent change out of total sales can then be divided by the percent change in price to arrive at a simulated price elasticity due to border crossing. The results of this exercise are presented for each state in column 2 of Table 8. The average state has an elasticity of border crossing equal to –0.35. Although this figure is not especially close to the –1.00 figure calculated above, the discrepancy is not unreasonable given the standard errors on the coefficients. The estimates vary widely by state as would be expected given the variation in bordering states and populations. Columns 3 and 4 present the total elasticities and the percentages that are due to border crossing for each state. Of the lower 48 states, Florida has the lowest with only 2.1 percent and Delaware is highest at 52.5 percent.[18]

In license states, the effect of an excise tax increase on tax revenues depends on the price elasticity of demand and the fraction of the price that is made up by the excise tax. Using the regression results, I calculate the change in tax revenues that would result from increases in state excise taxes. Because demand is elastic and total expenditures will decrease, it is quite likely that consumers will shift some of these expenditures to other goods, which may be subject to other excise taxes or a state sales tax. I adopt the conservative assumption that consumers either save

[16] The ACCRA prices reflect the price of a six–pack of Budweiser, but because this is a very common brand whose price is likely to reflect beer prices in general, no adjustment to this elasticity is necessary.

[17] In states with no excise tax, this is equivalent to levying a new excise tax equal to one cent per gallon.

[18] The coefficient on *Price export* represents an average marginal treatment effect. If one makes the fairly strong assumption that this treatment effect is constant, it is possible to calculate the percent of sales that are due to exports for a particular observation as *Price export* multiplied by its coefficient. Under this assumption, 1.0 percent of spirits sales are due to border crossing that arises from tax differences. A similar calculation implies that 0.3 percent of spirits sales are due to border crossing that arises from Sunday sales bans.

TABLE 8
PRICE ELASTICITIES OF SPIRITS BY STATE

State	Elasticity of Own State Consumption	Elasticity Due to Border Crossing	Total Sales Elasticity	Percent Due to Border Crossing
Alabama	–1.44	–0.26	–1.70	15.3
Alaska	””	0.00	–1.44	0.0
Arizona	””	–0.16	–1.60	10.2
Arkansas	””	–0.42	–1.86	22.6
California	””	–0.10	–1.54	6.2
Colorado	””	–0.08	–1.52	5.1
Connecticut	””	–0.50	–1.94	25.7
Delaware	””	–1.58	–3.02	52.3
D.C	””	–1.48	–2.92	50.7
Florida	””	–0.03	–1.47	2.0
Georgia	””	–0.15	–1.59	9.6
Hawaii	””	0.00	–1.44	0.0
Idaho	””	–0.51	–1.95	26.3
Illinois	””	–0.32	–1.76	18.0
Indiana	””	–0.49	–1.93	25.4
Iowa	””	–0.25	–1.69	14.6
Kansas	””	–0.21	–1.65	12.9
Kentucky	””	–0.40	–1.84	21.7
Louisiana	””	–0.17	–1.61	10.4
Maine	””	–0.11	–1.55	6.9
Maryland	””	–0.67	–2.11	31.7
Massachusetts	””	–0.39	–1.83	21.3
Michigan	””	–0.05	–1.49	3.1
Minnesota	””	–0.19	–1.63	11.5
Mississippi	””	–0.24	–1.68	14.2
Missouri	””	–0.31	–1.75	17.7
Montana	””	–0.24	–1.68	14.4
Nebraska	””	–0.20	–1.64	12.0
Nevada	””	–0.94	–2.38	39.6
New Hampshire	””	–0.53	–1.97	26.9
New Jersey	””	–0.72	–2.16	33.4
New Mexico	””	–0.28	–1.72	16.1
New York	””	–0.29	–1.73	16.7
North Carolina	””	–0.20	–1.64	12.0
North Dakota	””	–0.19	–1.63	11.7
Ohio	””	–0.21	–1.65	12.7
Oklahoma	””	–0.12	–1.56	7.6
Oregon	””	–0.21	–1.65	12.9
Pennsylvania	””	–0.37	–1.81	20.3
Rhode Island	””	–0.86	–2.30	37.5
South Carolina	””	–0.33	–1.77	18.7
South Dakota	””	–0.40	–1.84	21.8
Tennessee	””	–0.28	–1.72	16.4
Texas	””	–0.04	–1.48	2.4
Utah	””	–0.14	–1.58	8.7
Vermont	””	–0.37	–1.81	20.5
Virginia	””	–0.37	–1.81	20.3
Washington	””	–0.12	–1.56	7.6
West Virginia	””	–0.61	–2.05	29.9
Wisconsin	””	–0.23	–1.67	14.0
Wyoming	””	–0.61	–2.05	29.9
Mean	–1.44	–0.35	–1.79	17.6

TABLE 9
SIMULATED PERCENT CHANGE IN SPIRITS SALES DUE TO REPEAL OF SUNDAY SALES BAN

State	Change in Sales from Own State Consumption*	Change in Sales Due to Border Crossing	Total Change in Sales	Percent of Change Due to Border Crossing
Alabama	7.2	1.18	8.38	14.0
Arkansas	7.2	2.37	9.57	24.8
Colorado	7.2	0.63	7.83	8.0
Connecticut	7.2	3.24	10.44	31.0
Delaware	7.2	8.95	16.15	55.4
D.C	7.2	8.47	15.67	54.0
Georgia	7.2	0.69	7.89	8.7
Idaho	7.2	2.70	9.90	27.3
Indiana	7.2	1.99	9.19	21.7
Kansas	7.2	1.18	8.38	14.1
Kentucky	7.2	1.88	9.08	20.7
Massachusetts	–2.5	2.68	0.18	–
Minnesota	7.2	1.12	8.32	13.5
Mississippi	7.2	2.20	9.40	23.4
Montana	7.2	0.87	8.07	10.8
New York	7.2	1.55	8.75	17.7
North Carolina	7.2	1.12	8.32	13.4
Ohio	7.2	0.77	7.97	9.7
Oklahoma	7.2	1.21	8.41	14.4
Oregon	7.2	1.21	8.41	14.4
Pennsylvania	7.2	1.92	9.12	21.0
Rhode Island	7.2	6.79	13.99	48.5
South Carolina	7.2	1.91	9.11	21.0
Tennessee	7.2	0.89	8.09	11.0
Texas	7.2	0.23	7.43	3.1
Utah	7.2	0.93	8.13	11.4
Virginia	7.2	1.61	8.81	18.3
Washington	7.2	0.57	7.77	7.4
West Virginia	–2.5	3.38	0.88	–
Mean	6.6	2.17	8.73	19.6

Notes: States that are not listed had no ban on the Sunday sale of spirits in 2001. Simulation for each state assumes that no other states repeal their bans. *States that did not allow sales of spirits in grocery stores experienced a 7.2% increase in sales following repeal of their Sunday sales bans. States that allowed grocery store sales experienced a 2.5% decrease in sales following repeal of their Sunday sales bans. Of the states with Sunday bans in place in 2001, only MA and WV allowed grocery sales.

the money or spend it on items that are untaxed. Even with this assumption, because the state excise taxes on both beer and spirits average only two to three percent of the total retail prices and are never greater than 12 percent, in no case would a state lose tax revenues from a modest tax increase.

In control states, predicting the outcome of a price increase for spirits is complicated by the insignificance of the coefficient on the markup. This result may have occurred because there are only 18 control states or because, unlike nominal excise taxes, markups are unaffected by inflation and, hence, display less within–state variation over time, which is the source of identification in a model such as this one that includes state fixed effects. In any case, it seems nonsensical to assume that an increase in the price of spirits would not affect sales. I instead assume that the elasticity in these states is the same as that calculated from changes in the state spirits tax in license states. Similar to the case of an excise tax increase, the effect of a price increase on tax revenues depends on the fraction of the price that goes to the state in the form of profit. If this margin were sufficiently large, then the profits states earn from their spirits stores would decline following an increase in the price.

Some of the highest prices and presumably highest margins occur in Alabama, where the state reports that one–third of its revenues from the sale of spirits are used to fund state government programs (Alabama Alcoholic Beverage Control Board, 2004–2005). If the profit margin or effective tax is one–third of the price, then the "tax elasticity" is one–third of the price elasticity, or in the case of Alabama, $-1.70/3 = -0.57$. Because the absolute value of the tax elasticity is less than one, total profits or "tax revenues" would still increase if prices were raised. Other control states generally have lower prices than Alabama, suggesting that profit margins in these states are less than one–third of the retail price. In states where the absolute value of the total elasticity is less than three, the tax elasticities are all less than one. So, in these states an increase in the price of spirits would increase profits and revenues for state programs. In the states where the absolute value of the total elasticity is greater than three, information on state margins is required to determine the effect on profits.

The effect on cross–border sales of an end to a Sunday ban can be simulated by first recalculating the Sunday export variable for a particular state under the assumption that the ban has been repealed. The change in the Sunday export variable multiplied by its coefficient then equals the change in exports due to the repeal of the ban, assuming that no other states also repealed their bans. The sum of any new exports from the given state plus any decreases in the exports of surrounding states then equals the total change in cross–border sales for the given state. The results of these calculations performed for 2001 are listed in column 2 of Table 9. Column 1 lists the effect on own–state drinking from the coefficients listed in the final column of Table 7, column 3 lists the total change in sales from repeal of a ban, and column 4 lists the percent of the total change that is due to changes in cross–border sales. The simulation indicates that Delaware, Rhode Island, and Idaho would experience the largest percentage increases in sales if they were to relax their bans and no neighboring states followed suit, an unsurprising prediction given that these states are bordered by more populous states that had bans in place in 2001.

CONCLUSION

The results of this paper have policy implications for those who would raise excise taxes either to generate revenue or to correct for the negative externalities associated with excessive drinking. First, higher taxes on beer and spirits reduce drinking. Second, although consumers do cross state borders in response to increases in the state excise tax on spirits, in the vast majority of states, this activity is small enough that modest tax or price hikes would still raise tax revenues. Third, the change in state sales of spirits overstates the effect of tax or price policies on drinking because part of this change is due to displacement of sales across state borders. Fourth, the presence of cross–border shopping implies that if taxes on spirits are to be increased, they will be more effective in reducing drinking if they are coordinated across states.

Historically, Sunday sales bans were enacted to discourage drinking on the Christian Sabbath or as part of a broader set of restrictions on commerce that sought to enforce a day of rest. The argument that public policy should be used to impose the preferences of one group on another is difficult to defend on economic grounds, but we may ask whether Sunday sales bans have an economic rationale. Previous research has suggested that the repeal of these bans may increase traffic fatalities (McMillan and Lapham, 2006). Nevertheless, they are an oddly targeted intervention. Why should public policy target traffic fatalities on Sundays and not other days?

If the goal is to reduce reckless behavior such as drunk driving, a ban on Friday or Saturday sales including those in bars and restaurants would probably be more effective. Alternatively, one might argue that it is desirable to give owners and employees of spirits stores one day of rest per week, but if rest is the goal, why should the policy be restricted to this narrow segment of the labor force?[19] In short, there is no apparent economic rationale for banning the sale of alcohol on this particular day of the week. At the same time, the rise in the sales of spirits when Sunday bans are lifted suggests that consumers are inconvenienced by these laws. Future research might further explore whether Sunday sales bans are an effective or efficient means of reducing the negative externalities associated with excessive drinking.

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[19] Opposition to the repeal of Sunday sales bans in New York came in part from owners of spirits stores who were afraid they would be forced to stay open seven days a week in order to compete. Although New York eventually moved to allow stores to open seven days of the week, the initial compromise legislation permitted stores to open any six days of the week.

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