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ARTICLE

In Cervisia Veritas: The impact of repealing Sunday blue laws on alcohol sales and retail competition

Cristina Connolly[1], Marcello Graziano[2,3], Alyssa McDonnell[1] and Sandro Steinbach[4]

[1]Department of Agricultural and Resource Economics, University of Connecticut, Storrs, CT, USA, [2]Ruralis, University Center Dragvoll, Norway, [3]Connecticut Center for Economic Analysis (CCEA), University of Connecticut, Storrs, CT, USA and [4]Department of Agribusiness and Applied Economics, North Dakota State University, Fargo, ND, USA
Corresponding author: Cristina Connolly, email: cristina.connolly@uconn.edu

Abstract
This study examines the impact of repealing Sunday blue laws on alcohol sales and retail competition, focusing on Connecticut's 2012 policy change allowing Sunday beer sales in grocery stores. Using nationwide data from 2004 to 2021, we find a short-term increase in beer sales post-policy change, but no significant long-term economic effects on grocery and liquor stores. Our analysis also shows similar treatment effects for chain and standalone liquor retailers, suggesting limited lasting implications for the liquor retail industry's performance and conduct after Sunday sale restrictions were lifted.

Keywords: alcohol blue laws; Connecticut; event study; policy impacts; retail competition; Sunday sales; treatment heterogeneity

JEL classifications: Q13; Q18

I. Introduction

Blue laws in the United States include limits on access to alcohol and often reflect historical moral codes (Beliveau and Rouse, 2012; Teupe, 2019). Initially inspired by religious beliefs, these laws are believed to affect retail activities in regulated sectors (McNiel and Yu, 1989), and the loosening of these laws throughout the 1980s and 1990s by state and local governments potentially contributed to behavioral changes (Wyper et al., 2023). While research on alcohol accessibility suggests consumers may drink more alcohol when it can be sold in grocery stores (e.g., Adrian, Ferguson, and Her, 1996; Rickard, 2012), there is less clarity on the impact of repealing blue laws limiting alcohol sales on Sundays (Sunday blue laws) (Popova et al., 2009; Meany et al., 2018), although some studies suggest repealing these laws may either reduce (Green, Heywood, and Navarro, 2014) or have no effect (Lovenheim and Steefel, 2011) on linked negative behaviors

such as fatal vehicle accidents. In contrast, there is little empirical evidence regarding the effects on retail competition.

To address this gap in the literature, this paper examines the Sunday blue law repeal in Connecticut as a case study to assess its effects on sales, business survival, and employment in both the short and long terms. Before Connecticut repealed its Sunday blue law in 2012, the state-managed restrictions on Sunday sales, hours of operations of off-premises liquor sellers, and minimum pricing laws limited the discounting of alcohol (Chen and Dwyer, 2012). Connecticut has one of the most regulated environments for liquor sales in the United States (Gokcekus and Nottebaum, 2012). This policy landscape fostered an environment in which many liquor stores were independently owned, while concurrently, the grocery store industry has trended towards consolidation (Capozzi, 2022; Zeballos, Dong, and Islamaj, 2023). During multiple debates around the policy change, proprietors of liquor stores in Connecticut and store association lobbyists claimed that allowing Sunday sales would negatively impact their livelihoods. Not only would they need to pay operating costs for an extra day of the week, but there was also a concern that consumers would shift to purchasing beer at grocery stores as Sunday is one of the most popular grocery shopping days. Specifically, Connecticut's liquor store association claimed that, as a direct result of this policy, liquor stores would lose sales and reduce employment, or close (CPSA, 2010). While this type of rhetoric is common when a blue law repeal is proposed (Austermuhle, 2012), to our knowledge, there is no empirical evidence assessing these conjectures.

Our study uses micro-level establishment data and high-frequency scanner data from 2004 to 2021 to analyze the impact of repealing Sunday blue laws on grocery retailers and liquor stores, the two categories listed as "retailers" by Connecticut's statutes (Chen, 2018). Our estimates indicate that repealing these laws significantly increased beer sales at grocery and liquor stores directly after the policy shift, but these effects disappeared afterward. Additionally, there is no statistical evidence of adverse or positive treatment effects on the long-term economic outcomes for grocery retailers and liquor stores after the policy change. Our heterogeneity analysis also supports these results, demonstrating no differences in treatment effects for different types of grocery and liquor retailers. Despite repeated claims by liquor store associations, repealing these laws did not harm liquor stores, suggesting that it is possible to repeal Sunday blue laws without negatively impacting smaller businesses.

II. Methods and data

A. Methods

To assess the potential for dynamic treatment effects of repealing Sunday blue laws on business activities, we adopt a linear panel regression model with for count data with dynamic treatment effects (Freyaldenhoven et al., 2021):

$$y_{it} = \alpha_i + \alpha_t + \alpha_{m,t} + \sum_{k=-n}^{n} \delta_k \, BL_{i,t-k} + \varepsilon_{it}, \tag{1}$$

where we denote the establishment with i, the market (i.e., Census Core-based statistical area) with m, and the year/week with t. The model controls for the influence of

unobserved factors that could confound the relationship of interest with establishment α_i and time α_t fixed effects and accounts for changes in market attractiveness through market-year/week $\alpha_{m,t}$ trends. The specification of the linear market trends follows earlier research on the impact of competitive entry in the retail grocery industry (e.g., Arcidiacono et al., 2020).[1] The dependent variable is denoted by y_{it} and represents business survival, sales, and employment. We log-transform sales and employment and use the ordinary least squares estimator to identify the parameters of interest (Wooldridge, 1999). The additive error term is denoted by ε_{it}. To account for the high-dimensional fixed effects, we use a modified version of the iteratively re-weighted least-squares (IRLS) algorithm that is robust to statistical separation and convergence issues (Correia, Guimarães, and Zylkin, 2020). Following standard practice, we assume that the standard errors are correlated at the establishment level, prompting us to cluster them at this level (Cameron and Miller, 2015).

Instead of assuming static treatment paths, we allow them to be dynamic before and after the treatment year. We center the event study according to the year/week when the policy shift occurred on May 22, 2012 (week 21). We use an event window of 12 weeks to study the short-run response of beer sales and six years before and after the policy shift to assess the long-run treatment dynamics. We bin the endpoints of the event window to show long-term trends and test for pre-trends and leveling-off treatment effects. Under the parsimonious assumption that all latent confounders are invariant at the establishment, year, and market-trend levels, we identify the dynamic treatment effects by relying on variation between treated and untreated establishments over time.

B. Data

We employ two datasets in this analysis: the NielsenIQ retail scanner data (Chicago Booth, 2023), which contains weekly sales data at the Universal Product Code (UPC) level for all U.S. establishments for 2012, and the National Establishment Time Series (NETS) database, which covers business information (survival, employment, and sales) for all U.S. retail establishments. To control for confounding factors that could impact alcohol purchases, we use states with similar alcohol laws as a control group. Specifically, a state was included in the analysis if it allowed Sunday sales in the pre-period, allowed alcohol to be sold in grocery stores in the pre-period, and did not have any dry counties.

NielsenIQ retail scanner data

Data on weekly alcohol pricing and sales volume come from NielsenIQ retail scanner data. Participating retail stores range from 30,000–50,000 across all categories each year, and generally, all stores within a participating chain are included. The identity of individual stores is protected, though these establishments are primarily from the 90 largest U.S. retail chains, and the lowest available geographic information is the county in which the store is located (Chicago Booth, 2023). Each store in the Nielsen dataset is

[1] As no other states changed Sunday blue laws in the event window, we are not concerned about the research design being biased due to staggered adoption (Athey and Imbens, 2022) and differences in treatment timing (Goodman-Bacon, 2021).

identified by a unique identifier and categorized by store type. Though in Connecticut, grocery stores cannot sell liquor, and liquor stores cannot sell most food items, we found the following breakdown of stores that had liquor sales (identified as a UPC with a Product Group Description of "Liquor"). There are 65 Food stores with liquor sales (Table 1), primarily due to low-proof alcohol coolers treated as beer for retail license purposes. However, even after filtering for stores with 100+ liquor UPCs, we still see 13 establishments categorized as Food stores.

Rather than rely on the potentially problematic default store categorizations, we instead identified stores based on their product sales. We categorized a store as Food if it sold over 100 fresh produce items and a store as Liquor if it had at least 100 liquor UPCs or 500 alcohol UPCs (generally beer and wine). Stores falling outside these criteria were most likely drug or convenience stores and were excluded from our analysis.

National Establishment Time Series (NETS)

NETS is a micro-level business dataset prepared by Walls & Associates using Dun & Bradstreet's archival data (DUNS). It covers all U.S. businesses at the establishment level from 2000 to 2021 (Barnatchez, Crane, and Decker, 2017). Each establishment is assigned a unique DUNS number, which follows that establishment over time, relocations, and acquisitions. NETS provides the North American Industry Classification System (NAICS) codes, which are self-reported by each establishment. The NAICS codes in our NETS version are from the 2017 NAICS classification. We use NAICS codes 445310 (Beer, Wine, and Liquor Stores) and 445110 (Supermarkets and Other Grocery (except Convenience) Stores) for the analysis. Barnatchez, Crane, and Decker (2017) find that NETS correlates strongly with official statistics but does not entirely cover the same universe of firms for certain sub-industries.

Selection of control groups

Since prohibition ended in the United States, regulating alcohol sales and distribution has primarily occurred at the state level. Laws vary between states, including minimum pricing laws, excise taxes, availability of permits, and legal hours of operation (Byrne and Nizovtsev, 2017). To develop a series of control states for Connecticut, we concentrate on three major types of alcohol regulations:

(1) Sunday alcohol sales: We excluded states that had some form of prohibition on off-premises Sunday alcohol sales between 2000 and 2021. Data was collected from the Alcohol Policy Information dataset on Sunday sales (APIS, 2023) and augmented with primary news sources.
(2) Grocery alcohol sales: As Connecticut allows beer to be sold in grocery stores, and we will assess beer sales at food retailers, we only included states that allowed some form of alcohol to be sold in grocery stores. Our data comes from the National Alcohol Beverage Control Association, and we updated the time series through 2021 (NABCA, 2016).
(3) Dry counties: We excluded any states with at least one dry county, as there are no dry counties in Connecticut; states may have a small number of rural, dry

Table 1. Stores selling liquor in Connecticut

Nielsen store category	Number of stores with 1+ liquor UPCs	Number with 100+ liquor UPCs
Drug store	2	0
Food store	65	13
Liquor store	6	6
Mass merchandiser	20	0

Note: "Nielsen store category" refers to the categories used by Nielsen.

Table 2. Summary statistics

	Type	Connecticut		Control States	
		Pre	Post	Pre	Post
Nielsen					
Beer Sales	Grocery	3,759.3 (2,311.8)	6,115.4 (4,109.7)	8,440.9 (7,661.1)	10,727.1 (10,040.4)
	Liquor	12,070.3 (5,945.2)	16,299.0 (7,381.7)	5,249.1 (5,231.5)	6,084.8 (6,966.2)
NETS					
Survival	Grocery		0.42 (.49)		0.42 (.49)
	Liquor		.52 (.50)		.48 (.50)
Sales	Grocery	4,916,346.6 (37,842,602.8)	8,181,050.3 (58,052,182.8)	2,940,842.5 (19,222,342.2)	4,166,068.0 (27,889,657.2)
	Liquor	506,535.3 (682,972.6)	544,204.1 (683,184.8)	626,386.2 (3,544,679.5)	670,649.0 (4,970,876.9)
Employment	Grocery	15.9 (44.1)	18.1 (46.4)	15.3 (38.1)	17.7 (44.6)
	Liquor	3.1 (3.3)	3.3 (3.3)	4.1 (9.8)	4.30 (9.9)
		Store counts		Store counts	
Nielsen	Grocery	68		5,545	
	Liquor	17		1,386	
NETS	Grocery	5,774		212,141	
	Liquor	2,464		51,756	

Notes: Nielsen data values are for beer sales specifically, while the NETS dataset provides only overall sales data.

towns or municipalities, as data at this sub-county level is not readily available. States with dry counties between 2000 and 2021 were identified from data provided by the National Alcohol Beverage Control Association (NABCA, 2017).

This selection results in 24 control states.[2] Table 2 presents a summary of our data.

[2]AZ, CA, DC, IA, ID, LA, MA, MD, ME, MI, MO, MT, NH, NJ, NY, ND, NV, OH, OR, PA, VT, WA, WI, and WY.

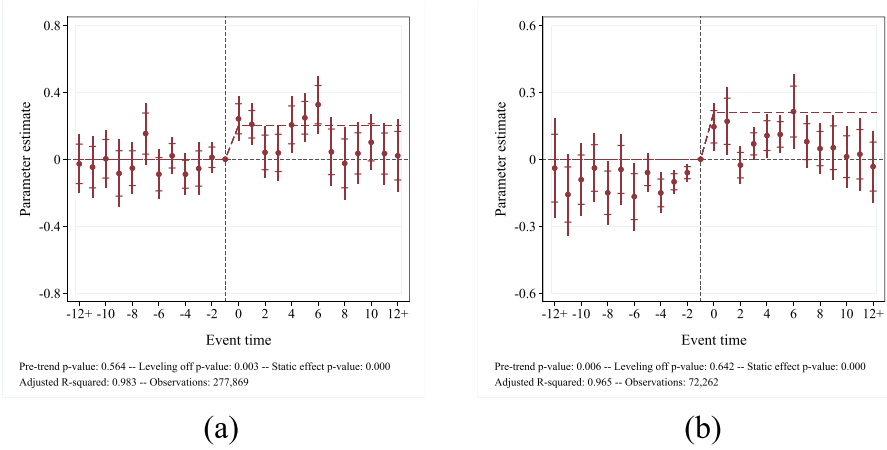


Figure 1. Short-run sales effects of repealing Sunday blue laws in Connecticut. (a) Sales, grocery retailers, (b) Sales, liquor stores.

Notes: The figure shows event study regression estimates, which include establishment and week fixed effects and linear market trends. Standard errors are adjusted for within-cluster correlation at the establishment level. Results from a static regression model are overlaid as a dashed line.

III. Results and discussion

Figures 1 to 3 present event studies for the outcomes of interest, including the dynamic treatment parameters, 95% confidence intervals, and uniform sup-t bands for the event time of the outcome (Freyaldenhoven et al., 2021).[3] We find no evidence of significant pre-trends for the survival, employment, and sales specifications of grocery retailers and liquor stores. Since the pre-trend tests are statistically insignificant and the treatment pathways in the pre-treatment period are flat, the research design is validated. The fixed effects accurately account for unobservables unrelated to the treatment but predictive of the outcome. We also conduct a Wald test for the null hypothesis that treatment dynamics change in the long run. This is important because the treatment effect could be dynamic at the endpoints of the event window. The Wald tests provide no statistical support for leveling-off treatment effects at conventional levels of statistical significance for all outcomes.

A. Retail sales

The event study estimates for the short-term (12-week) impact of repealing Sunday blue laws can be seen in Figure 1. As Connecticut only allows beer sales in grocery stores, we focus on this outcome in our empirical analysis. While a static model finds a positive impact of the policy change for both types of stores, this treatment effect masks the underlying heterogeneity uncovered in the event study framework, which demonstrates no evidence of negative impacts on beer sales in liquor stores. Instead,

[3] Although various simultaneous confidence bands are available, there exists little theory to select among them. We follow Montiel Olea and Plagborg-Møller (2019) and use a Bayesian sup-t band with exact finite-sample simultaneous credibility.

for both store formats, there is an initial bump in sales, possibly due to the novelty of the policy. This impact levels off after the initial month, with no discernible effect on sales after the seventh week. Thus, the policy change has no negative impact on the beer sales of liquor stores.

B. Business activities

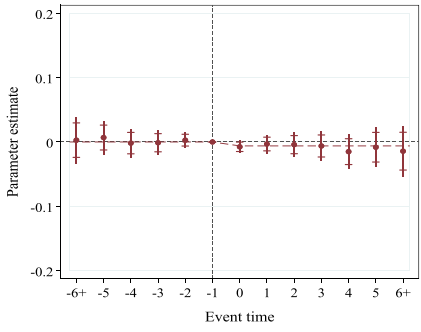
We present event study estimates for the impact of repealing Sunday blue laws in Connecticut on the survival, employment, and sales of grocery retailers and liquor stores in Figure 2. The event study estimates reveal intriguing patterns regarding the relationship between Sunday blue laws and the survival, employment, and sales of grocery retailers and liquor stores.

First, we find no evidence that the response to the policy shift is anticipated or delayed, with the exit probability being indifferent to zero for grocery retailers and liquor stores across all post-treatment years. In contrast to the concerns raised by the retail liquor industry, we find that the number of liquor stores increases beyond the counterfactual level six years after treatment, though these estimates are statistically insignificant.

Second, we turn to the employment effects of repealing Sunday blue laws in Connecticut. This is an essential margin of potential adjustment to changes in competition caused by the policy shift. One could expect grocery retailers to increase employment (at the margin) in response to the increasing demand, while liquor stores should experience a decline in employment. As for the establishment survival analysis, we find no evidence of statistically significant treatment effects after the event.

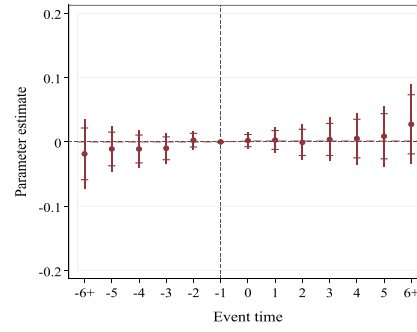
Third, we turn to the impact of the policy change on establishment-level sales. If the policy had impacted business activities in the long run, one could expect higher sales for grocery retailers and lower ones for liquor stores. Interestingly, there is no evidence of adverse treatment effects on the sales of both business types. Therefore, we conclude that the liberalization of Sunday blue laws had no discernible long-term consequences for the economic outcomes of the average liquor store in Connecticut. These results contribute to the ongoing policy discussions surrounding Sunday blue laws and their implications for the liquor retail sector (Kshetri and Bebenroth, 2012).

Next, we focus on differences in the treatment effects for chain and standalone liquor stores because the economic importance of sole proprietor liquor stores for community development is often cited in policy discussions (e.g., Palardy et al., 2023). We identified chain liquor stores as those companies with two or more locations. We use an interaction effect to assess treatment differences, as presented in Figure 3. We find no evidence for statistically significant pre-trends for all outcomes. There is also no evidence for leveling-off treatment effects. Notably, we find some evidence of an adverse response in chain liquor store employment and sales four years after the repealing of Sunday laws in Connecticut. Their employment and sales are about 30 percent below the counterfactual. In contrast, no evidence exists of such adverse treatment effects for standalone liquor stores in the post-event period. Their probability of exiting is unaffected by the policy shift. A similar pattern is observable for their employment and sales, indicating that the liberalization of Sunday alcohol sales did not cause heterogeneous and adverse consequences for the economic outcomes of standalone liquor stores in Connecticut.



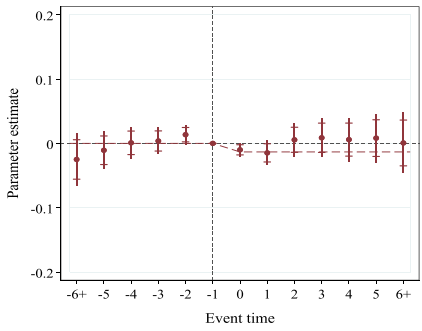
Pre-trend p-value: 0.811 -- Leveling off p-value: 0.261 -- Static effect p-value: 0.370
Adjusted R-squared: 0.378 -- Observations: 4,794,130

(a)



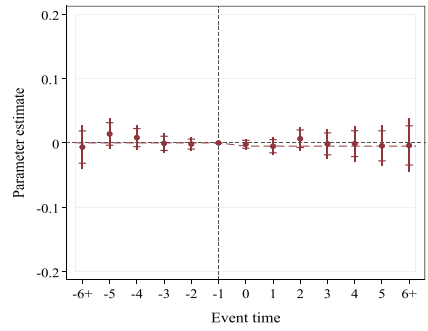
Pre-trend p-value: 0.426 -- Leveling off p-value: 0.028 -- Static effect p-value: 0.880
Adjusted R-squared: 0.441 -- Observations: 1,192,840

(b)



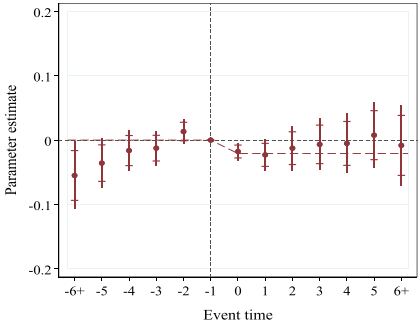
Pre-trend p-value: 0.818 -- Leveling off p-value: 0.151 -- Static effect p-value: 0.026
Adjusted R-squared: 0.949 -- Observations: 1,917,283

(c)



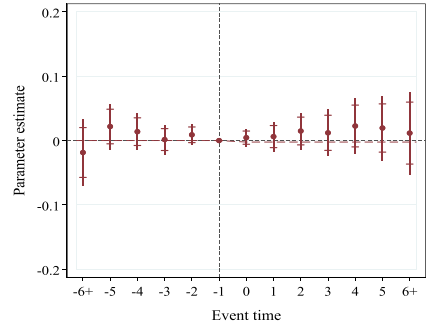
Pre-trend p-value: 0.410 -- Leveling off p-value: 0.886 -- Static effect p-value: 0.363
Adjusted R-squared: 0.893 -- Observations: 573,186

(d)



Pre-trend p-value: 0.212 -- Leveling off p-value: 0.035 -- Static effect p-value: 0.012
Adjusted R-squared: 0.950 -- Observations: 1,916,281

(e)



Pre-trend p-value: 0.209 -- Leveling off p-value: 0.296 -- Static effect p-value: 0.794
Adjusted R-squared: 0.880 -- Observations: 572,573

(f)

Figure 2. Long-run treatment effects of repealing Sunday blue laws in Connecticut on survival, employment, and sales of grocery retailers and liquor stores. (a) Survival, grocery retailers, (b) Survival, liquor stores, (c) Employment, grocery retailers, (d) Employment, liquor stores, (e) Sales, grocery retailers, (f) Sales, liquor stores.

Notes: The figure shows event study regression estimates, which include establishment and week fixed effects and linear market trends. Standard errors are adjusted for within-cluster correlation at the establishment level. Results from a static regression model are overlaid as a dashed line.

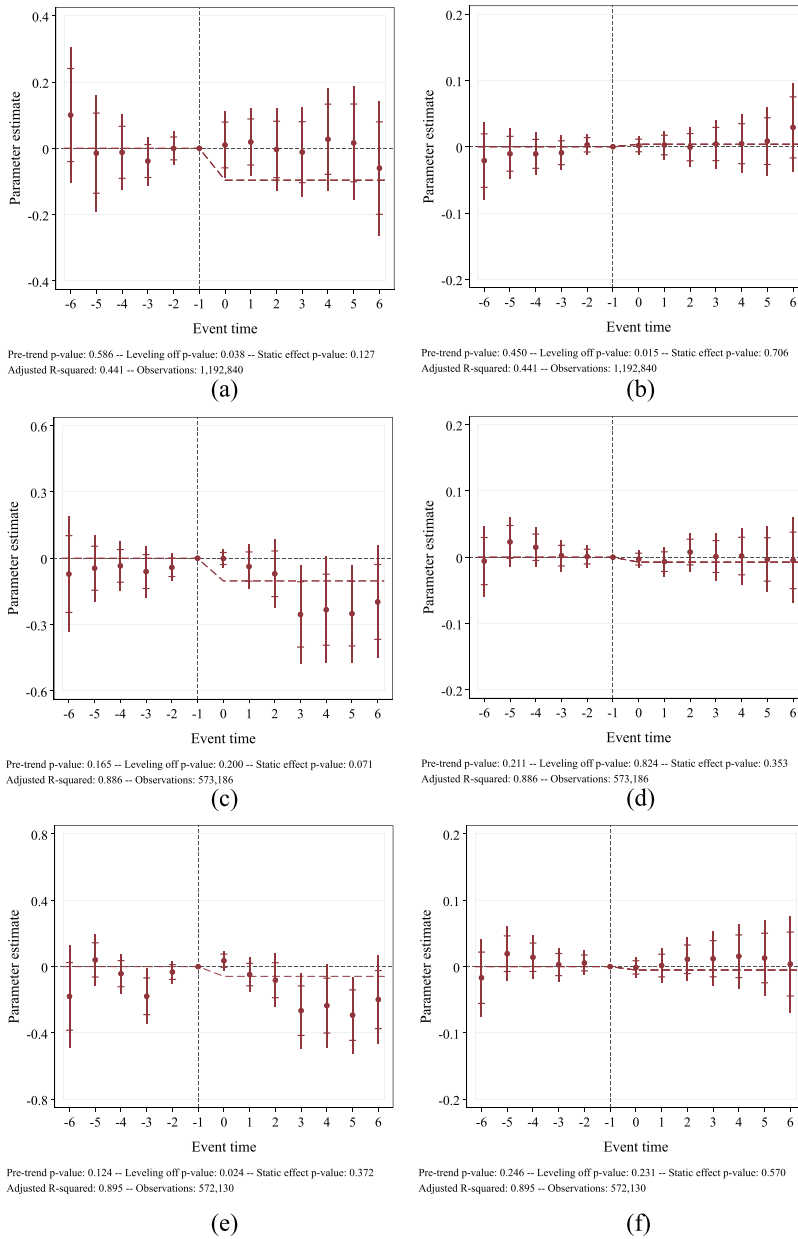


Figure 3. Treatment differences for chain and standalone liquor stores in Connecticut. (a) Survival, chain liquor stores, (b) Survival, standalone liquor stores, (c) Employment, chain liquor stores, (d) Employment, standalone liquor stores, (e) Sales, chain liquor stores, (f) Sales, standalone liquor stores.
Notes: The figure shows event study regression estimates, which include establishment and week fixed effects and linear market trends. Standard errors are adjusted for within-cluster correlation at the establishment level. Results from a static regression model are overlaid as a dashed line.

IV. Conclusion

Sunday blue laws, which restrict or prohibit certain alcohol sales on Sundays, have long been debated in various states across the United States. One area where these laws have garnered attention is the sale of alcoholic beverages, particularly in grocery stores. This paper focuses on Connecticut, where a Sunday blue law was repealed in 2012, enabling grocery retailers to sell beer on Sunday and liquor stores to remain open that seventh day. By leveraging a comprehensive dataset and employing an established empirical framework (Lopez, Marchesi, and Steinbach, 2023), the paper provides novel insights regarding the consequences of this policy change on alcohol sales and retail competition.

We utilize a detailed scanner dataset and establishment-level business information covering 2004 to 2021 to assess the impact of repealing the Sunday blue laws. Our analysis employs event studies to examine the short-term effects of the policy change on beer sales at grocery stores. Additionally, we investigate the long-term business performance of grocery retailers and liquor stores. We conduct a heterogeneity analysis to examine potential differences across chain and standalone liquor retailers. The baseline event studies reveal an immediate increase in beer sales at both grocery and liquor stores during the first seven weeks following the repeal of the Sunday blue sales law. However, the dynamic treatment effects become statistically insignificant beyond this initial period. Furthermore, our analysis finds no statistical evidence supporting adverse or positive treatment effects on the long-run economic outcomes for grocery retailers and liquor stores. These findings are consistent across the chain and standalone grocery and liquor retailers.

The results of our study suggest that the liberalization of alcohol sales, specifically the repeal of Sunday blue laws, had primarily (positive) short-term implications for the performance and conduct of firms operating in the retail liquor industry. While the immediate increase in beer sales at both grocery and liquor stores is noteworthy, the absence of long-term effects on economic outcomes for these retailers indicates that the policy change did not significantly alter the competitive landscape or market behavior in the liquor industry. These results refute the general argument brought forward by local liquor store associations (Austermuhle, 2012), including the Connecticut Liquor Store Association (CPSA, 2010), that liberalizing alcohol sales would harm their businesses. They also contrast lobbying statements by food retailers, who have an economic incentive to support these policies as they are already open during the days and times restricted by alcohol blue laws, that these policy changes will have large, positive economic impacts (CFA, 2010). However, these results do mirror those of a study that suggested states restricting alcohol sales to specific retail formats had generally similar levels of employment, establishments, and sales as those that did not (Byrne & Nizovtsev, 2017).[4] Proposals to liberalize alcohol sales are popular with consumers (Carstensen et al., 2022), and our study suggests it is possible to repeal Sunday blue law restrictions without negatively impacting liquor (or grocery) stores.

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[4]Specifically, they found no impact in the grocery and convenience store sectors and a positive impact in the liquor sector only if all alcohol types (beer, wine, and liquor) were restricted to liquor stores.

Consumer LLC and marketing databases provided through the NielsenIQ Datasets at the Kilts Center for Marketing Data Center at The University of Chicago Booth School of Business. The conclusions drawn from the NielsenIQ data are those of the researcher(s) and do not reflect the views of NielsenIQ. NielsenIQ is not responsible for, had no role in, and was not involved in analyzing and preparing the results reported herein. This work benefited from a data award provided by the College of Agriculture, Health, and Natural Resources at the University of Connecticut and partial funding from the Connecticut Center for Economic Analysis.

Competing interests declaration. The authors declare none.

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