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Does Online Advertising Offset the Effectiveness of Offline Alcohol Advertising Regulation?

Xi He

**PhD student at Department of Agricultural and Resource Economics, University of Connecticut
xi.he@uconn.edu**

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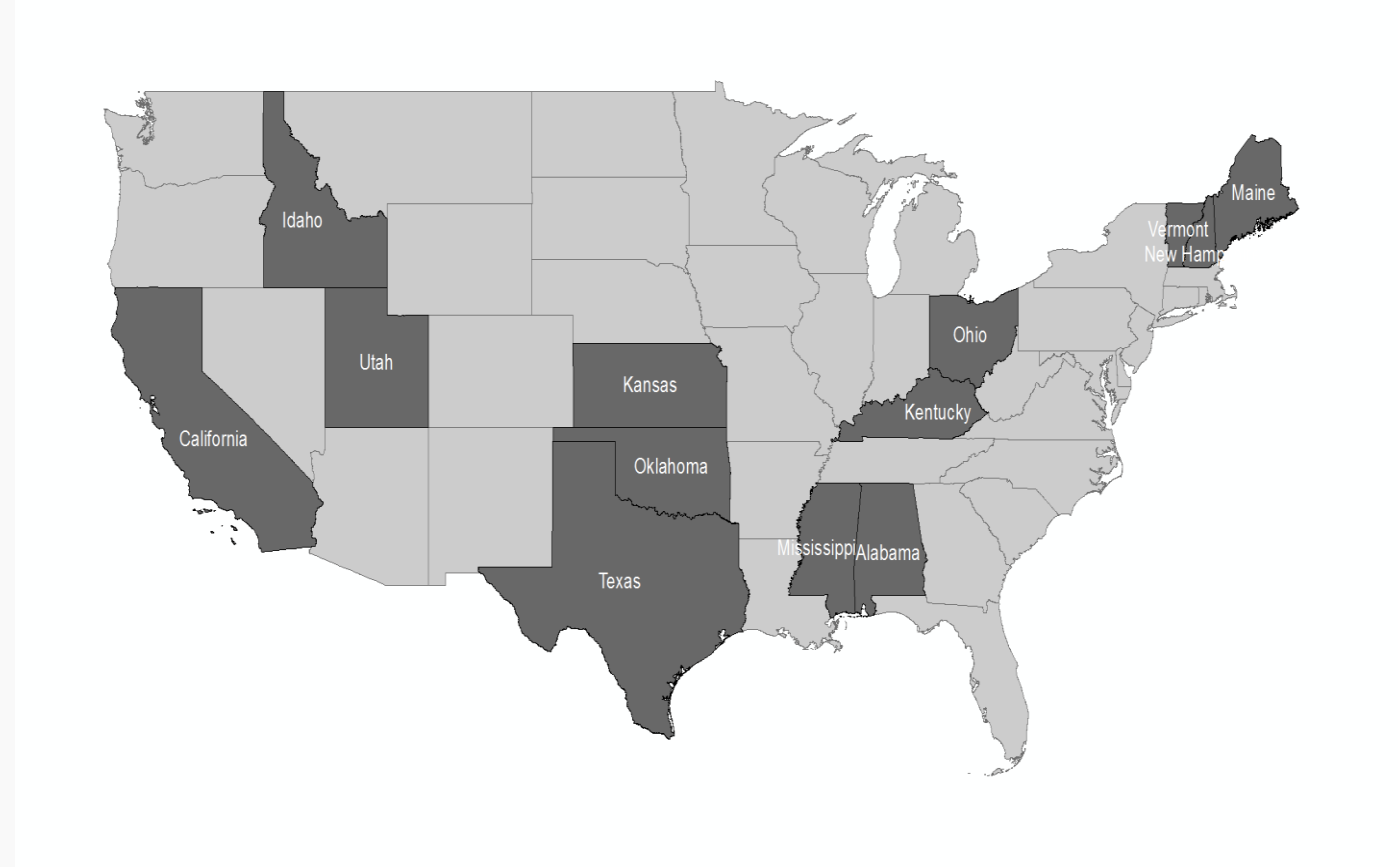
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INTRODUCTION

- In 2015, alcoholic beverage was the third largest beverage category in the U.S., accounting for 13.3% of total beverage consumption in terms of sales volume and taking up 60% of the total U.S. beverage market in terms of sales value. The U.S. government has taken various measures to regulate alcohol consumption; 15 U.S. states ban outdoor alcohol advertising.



- Alcohol producers are shifting to online platforms to avoid offline alcohol restrictions, and they direct 7.9% of the ad expenditures to digital marketing in 2014 (FTC). However, little existing literature has investigated the impact of online ads on the effectiveness of traditional offline marketing regulation.
- Following Dube et al (2010) and Shapiro (2015), I use a quasi-experiment geographic discontinuity design to measure the causal impact of offline ad regulation on alcohol consumption and the causal impact of online ad on the effectiveness of offline ad regulation

DATA USED

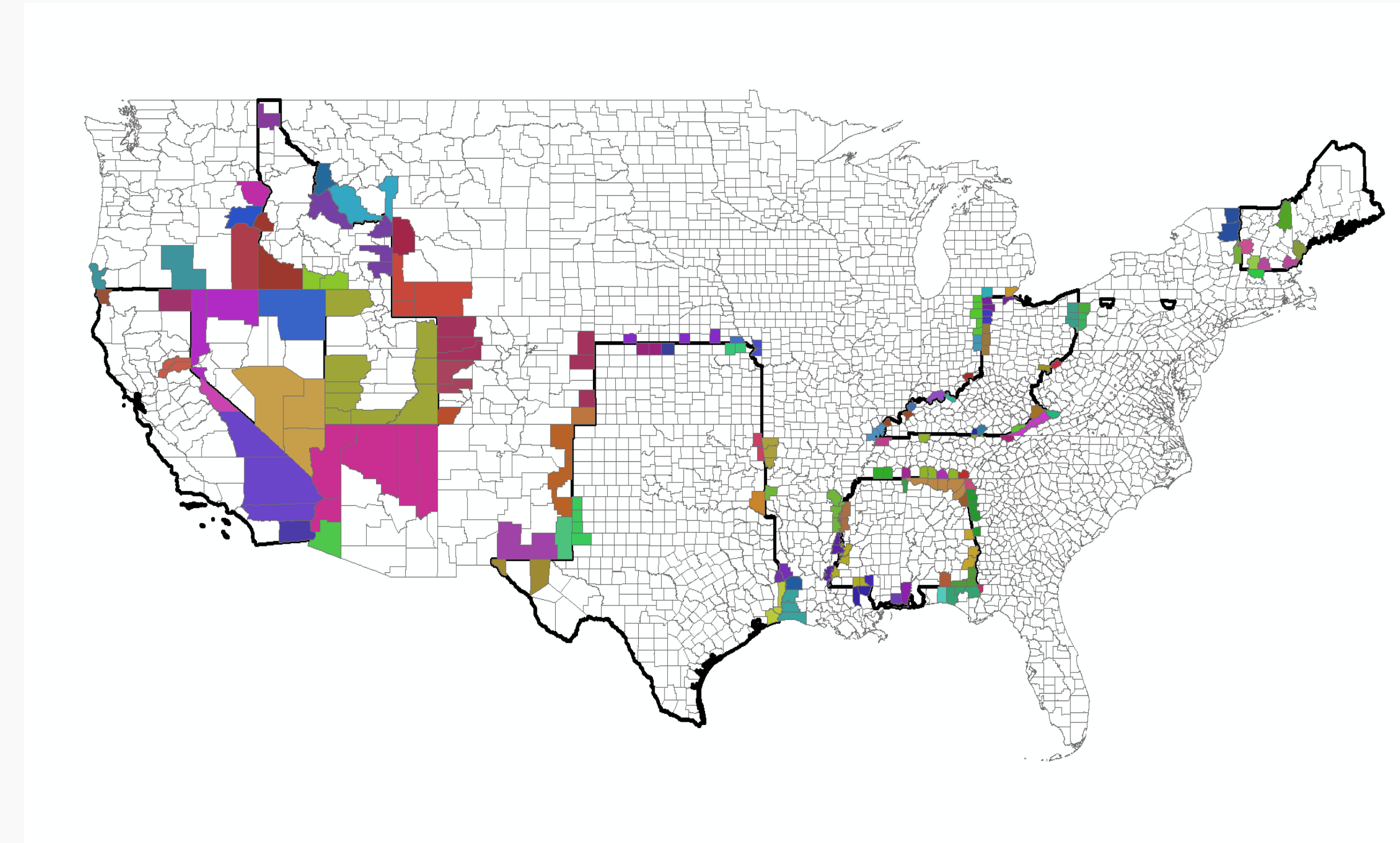
- Sales data
A.C. Nielsen scanner data from Kilts center at the Booth School of Business at University of Chicago; Both retail scanne and consumer scanner data;
- Advertising expenditures data
Kantar Media Strategy; Advertising expenditures data across 17 media types for 125 DMAs.
- Supplementary Data
United States Census Bureau.
- Sample
I focus on brands that are active throughout the period 2007-2014 and exclude brands that enter or exit the market during this period. I use monthly sales and advertising data for 98 brands from 2007 to 2014.

IDENTIFICATION PROBLEM

- The major identification problem is that local ads and ad regulation are not assigned randomly. I address the endogeneity problems by taking advantage of geographic discontinuities in both the local advertising markets and state borders.
- Two Identification Assumptions
Assumption 1: Similarity on observables
Border county pairs are identical in terms of observables
Assumption 2: Common trend assumption
The consumption in regulated areas will be parallel if no brands have taken up online advertising.

RESEARCH DESIGN

- I focus analysis on contiguous county pairs that straddle state/Designated Market Area (DMA) borders;



- 213 bordering counties, 81 DMAs and 34 states, 70 state/DMA border county pairs
- Concern 1: Similarity on observables*

Do a balance test of the observables between the selected border county pairs. I analyze two types of variables: socioeconomic variables, like population, education, age, etc., and geographical variables, like number of lakes, whether there are mountains within a county, temperature, precipitation, etc.

- Concern 2: Common trend assumption*

The basic idea of the placebo test is that I focus on data from 2007 to 2010 and treat brands that adopted online advertising after 2010 as controls while regard brands that adopted online ads before 2010 as treatments.

EMPIRICAL ANALYSIS-SUBCATEGORY LEVEL

$$Q_{ibst} = \delta Q_{ibst-1} + \alpha_1 on_{ibst} + \alpha_2 off_{ibst} + \alpha_3 on_{ibst} * Reg_{bs} + \alpha_4 off_{ibst} * Reg_{bs} + \beta X_{bst} + \theta_{bs} + \theta_{bt} + v_{bst}. \quad (1)$$

- Q_{ibst} : per capita sales of subcategory (brand) i at border b state s in period t
- $on_{ibst} = \log(1 + online_{ibst})$, $off_{ibst} = \log(1 + offline_{ibst})$;
- $online_{ibst}$ and $offline_{ibst}$ denote online and offline ad expenditures, respectively;
- θ_{bs} : border-state fixed effects;
- θ_{bt} : border-time fixed effects;

Variables	Coefficient	Specification (1)		
		Beer	Liquor	Wine
Q_{bst-1}	δ	-0.0965 (0.072)	0.175 (0.197)	0.0297 (0.103)
on_{bst}	α_1	-2.230* (1.176)	-0.587** (0.204)	-0.733** (0.333)
off_{bst}	α_2	2.441* (1.191)	0.635*** (0.157)	0.545*** (0.188)
$on_{bst} * Reg_{bs}$	α_3	4.121*** (1.242)	0.690** (0.292)	0.517 (0.635)
$off_{bst} * Reg_{bs}$	α_4	1.302 (1.106)	0.0356 (0.126)	0.234 (0.230)
Controls				
Border-state FEs	θ_{bs}	Y	Y	Y
Border-quarter FEs	θ_{bt}	Y	Y	Y
Observations		3230	2470	3230
R-squared		0.956	0.952	0.966

EMPIRICAL ANALYSIS-BRAND LEVEL

- About 41% (40) brands adopted online advertising in 2007, and many big brands in beer industry, like Bud light and Budweiser, adopted online advertising in 2011, which is manifested in the peak in 2011.

$$q_{jbst} = \delta q_{jbst-1} + \beta_1 on_{jbst} + \beta_2 off_{jbst} + \beta_3 off_{jbst} * Adoption_{jbst} + \beta_4 off_{jbst} * Reg_{bs} + \beta_5 off_{jbst} * Reg_{bs} * Adoption_{jbst} + \phi X_{jbst} + \sigma_{jbs} + \sigma_{jbt} + \sigma_{jbst}. \quad (2)$$

- $Adoption_{jbst} = 1$ if brand adopted online at time t ;

Variables	Specification (2)		
	Beer	Liquor	Wine
q_{jbst-1}	0.799*** (0.051)	0.484*** (0.083)	0.125*** (0.039)
$price_{jbst}$	-3.286* (1.765)	0.00436 (0.003)	-0.0350* (0.018)
off_{jbst}	0.0781** (0.028)	0.00422*** (0.000)	0.00632** (0.003)
on_{jbst}	-0.0585 (0.044)	0.00414* (0.002)	0.000798 (0.009)
$off_{jbst} * Adoption_{jbst}$	-0.0180*** (0.005)	-0.00321*** (0.001)	-0.000150 (0.003)
$off_{jbst} * Reg_{bs}$	-0.0957** (0.036)	-0.00326*** (0.001)	-0.00287 (0.003)
$off_{jbst} * Reg_{bs} * Adoption_{jbst}$	0.0228** (0.008)	0.00227*** (0.001)	-0.000452 (0.003)
Controls			
Border-brand FEs	Y	Y	Y
Border-quarter FEs	Y	Y	Y
Number of observations	78375	9880	8930
R-squared	0.939	0.860	0.667

CONCLUSIONS

- Conclusion 1:* Online advertising is significantly more effective in regulated areas than in unregulated areas, and offline advertising in regulated areas is significantly less effective than that in unregulated areas;
- Conclusion 2:* The emergence of online advertising weakens the effectiveness of alcohol marketing restrictions for beer and liquor by 23.8% and 69.6%, respectively.
- Further Analysis:* Consumer heterogeneity

REFERENCES

- Dube, A., Lester, T. W., and Reich, M. 2010. Minimum wage effects across state borders: Estimates using contiguous counties. The Review of Economics and Statistics, 92(4), 945-964.
- Shapiro, B. 2015. Positive spillovers and free riding in advertising of prescription pharmaceuticals: The case of antidepressants. Available at SSRN 2477877.

* Xi He is Ph.D. student at the Department of Agricultural Economics at University of Connecticut, contact: xi.he@uconn.edu