SUBSTITUTION BETWEEN OFFLINE AND ONLINE ADVERTISING MARKETS
Journal of Competition Law & Economics (2011) 7(1): 37-44

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Summarize two studies

How offline advertising affects how effective online advertising is:

• *Advertising Bans and the Substitutability of Online and Offline Advertising*, Journal of Marketing Research, (2011)

How offline advertising influences the pricing of online advertising:

HOW OFFLINE ADVERTISING AFFECTS HOW WELL ONLINE ADVERTISING WORKS
GO NATURAL

SKYY INFUSIONS
ALL NATURAL GINGER
Setting

• Regulatory setting
  – Alcohol advertising bans are relatively common in the United States
  – Out of home advertising of alcohol is restricted in 17 states
  – Several municipalities also restrict alcohol advertising

• Data
  – Our data come from field studies of the effectiveness of 275 different online display ad campaigns for alcoholic products (beer, wine, and spirits) between 2001 and 2008
  – For each campaign, an average of 223 web users were surveyed on purchase intention and ad recall, half had seen the ad and half were in a control group
  – Data contain zip code of respondent, product awareness, and whether the product is new

  ➢ “Diff-in-diff”:
    • Difference between treatment and control groups in field studies
    • Difference between states with bans and states without

  ➢ “Diff-in-diff-diff”:
    • Difference between treatment and control groups in field studies
    • Difference before and after four local regulations
    • Difference between these places and nearby other places without such regulatory changes
Advertising effectiveness data

- Repeated cross-section survey data from 275 field tests of online banner ads for alcohol in the United States
- Collected by a media measurement agency to examine the effectiveness of different ad campaigns.
- Advertiser initiates contact with marketing metrics company to evaluate banner ad performance beyond click-through
- Anonymized benchmarking data shared with other advertisers
- Randomized exposed and control allocation.
Methodology

*Both groups are random samples from the same population (they are statistically the same people).*
Methodology

Ben Stapelman’s band, Surefire (imagine early Tom Petty crossed with Coldplay), has built a rabid following on MySpace and now plays sold-out gigs at the Bowery Ballroom.

5. Abigail Dawn DeVille, 24, artist.
This FIT junior mixes many media—painting, sculpture, collage—on gargantuan ten-by-twelve-foot canvases. Last year she won the school’s Frank Shapiro Award for excellence and a spot on gallerist Jeffrey Deitch’s new reality show, Art Star.

He’s helped Philip Glass edit his movie scores, sessioned with Björk, and collaborated with Antony and the Johnsons. In March, he releases his first CD, Speaks Volumes, an album of chamber music with electronic instruments and sounds.

The Lion King was Mitchell’s introduction to Broadway. He originated the parts of Travis in A Raisin in the Sun and Billy Ray in On Golden Pond. This month he takes a break from the stage for a guest spot on The Sopranos.

This fall, Thorgeirsson (and producing partner Joe E. Morton) called Learegardess, which started at Columbia, Chelsea. Now they’re opening the Syrup Room, a theater space in a postmodern version of Chekhov’s The Cherry Orchard.

Designsponge.blogspot.com keeps 10,000 design insiders informed on where to score the
Dependent Variables

• We focus on “purchase intention”
  – Response to “how likely are you to purchase” on a five point scale
    • This is weaker than actual purchase data (for example, use in Reiley & Lewis 2009)
      – But a study like Reiley & Lewis is impossible for alcohol

• For each of analysis we discretize this measure into a binary indicator of whether likely or very likely to purchase. But results are robust to scale.

• We show robustness to favorability and ad recall
STATE-LEVEL RESULTS
Formalize these statistics in regression framework

- Ads increase purchase intent by 3% in states without a ban and 8% in states with a ban
- Results are robust to a battery of controls
- No statistical difference in the ads seen, no statistical difference in respondent demographics
- No similar difference for other “sin” products.

Effect is related to product awareness (ads are informative)

- The result is stronger for new products/products with low levels of awareness
- Little difference for well-known products
LOCAL-LEVEL RESULTS
Four time-varying regulations

1. The enactment of a law in Philadelphia prohibiting alcohol advertising from public property

2. The repeal of a law in Pennsylvania restricting the ability of student newspapers to publish alcohol advertising

3. A toughening of regulations by the San Francisco public transit authority meaning that alcohol advertising would be fined at $5,000 a day

4. A loosening of a self-imposed policy, which meant that one broadcast TV affiliate in New York City started showing liquor ads.
Table 10: Case studies of instances where alcohol advertising bans changed in our sample period

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purchase Intent</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposed × Ad Ban × Affected Group</td>
<td>0.881*</td>
<td>1.791***</td>
<td>2.310**</td>
<td>1.005*</td>
<td>0.563***</td>
</tr>
<tr>
<td></td>
<td>(0.489)</td>
<td>(0.666)</td>
<td>(0.943)</td>
<td>(0.581)</td>
<td>(0.215)</td>
</tr>
<tr>
<td>Exposed</td>
<td>0.045</td>
<td>0.0958</td>
<td>0.0958</td>
<td>0.909***</td>
<td>0.191</td>
</tr>
<tr>
<td></td>
<td>(0.447)</td>
<td>(0.159)</td>
<td>(0.948)</td>
<td>(0.502)</td>
<td>(0.0838)</td>
</tr>
<tr>
<td>Exposed × Ad Ban</td>
<td>-0.662</td>
<td>-0.0978</td>
<td>-0.469*</td>
<td>-0.940***</td>
<td>-0.219*</td>
</tr>
<tr>
<td></td>
<td>(0.508)</td>
<td>(0.253)</td>
<td>(0.284)</td>
<td>(0.326)</td>
<td>(0.131)</td>
</tr>
<tr>
<td>Exposed × Affected Group</td>
<td>-0.678*</td>
<td>-0.657</td>
<td>-0.0740</td>
<td>-0.886</td>
<td>-0.287</td>
</tr>
<tr>
<td></td>
<td>(0.411)</td>
<td>(0.434)</td>
<td>(0.483)</td>
<td>(0.541)</td>
<td>(0.187)</td>
</tr>
<tr>
<td>Ad Ban</td>
<td>-0.572</td>
<td>0.822**</td>
<td>0.115</td>
<td>0.712***</td>
<td>0.0573</td>
</tr>
<tr>
<td></td>
<td>(0.552)</td>
<td>(0.365)</td>
<td>(0.269)</td>
<td>(0.218)</td>
<td>(0.0956)</td>
</tr>
<tr>
<td>Ad Ban × Affected Group</td>
<td>-0.445</td>
<td>-0.412</td>
<td>-0.439</td>
<td>-0.256</td>
<td>-0.178</td>
</tr>
<tr>
<td></td>
<td>(0.430)</td>
<td>(0.590)</td>
<td>(0.885)</td>
<td>(0.351)</td>
<td>(0.156)</td>
</tr>
<tr>
<td>Campaign Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Demographics</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>County fixed effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>1429</td>
<td>1957</td>
<td>2524</td>
<td>1991</td>
<td>7927</td>
</tr>
<tr>
<td>Log-Likelihood</td>
<td>-781.5</td>
<td>-1063.0</td>
<td>-1430.0</td>
<td>-1172.0</td>
<td>-4552.4</td>
</tr>
<tr>
<td>Date of change</td>
<td>December 2003</td>
<td>End July 2004</td>
<td>December 2007</td>
<td>November 2007</td>
<td>Combined</td>
</tr>
<tr>
<td>Change in Regulation</td>
<td>Ban of alcohol advertising on Philadelphia’s public property</td>
<td>Law banning alcohol ads in student newspapers struck down</td>
<td>Stiff fines for alcohol advertising on San Francisco public transportation</td>
<td>NBC affiliate in New York resinds self-imposed ban on airing hard liquor ads</td>
<td>Combined</td>
</tr>
<tr>
<td>Affected Sample</td>
<td>Respondents in Philadelphia</td>
<td>Respondents in college towns in PA</td>
<td>Respondents in San Francisco</td>
<td>New York respondents asked about liquor campaigns</td>
<td>Combined</td>
</tr>
<tr>
<td>Control Group</td>
<td>Respondents in Camden, NJ and Wilmington-Newark, DE</td>
<td>Respondents outside of Philadelphia in non-college towns in PA</td>
<td>Respondents in Los Angeles and San Jose, CA</td>
<td>New York respondents asked about beer campaigns</td>
<td>Combined</td>
</tr>
</tbody>
</table>

Scale is comparable—column 5 suggests a 4.1 percentage point increase in ad effectiveness compared to earlier 4.0 percentage point increase.
Robust to...

- Shorter windows around the policy change (table 11)
- No controls
- Linear probability
- OLS using the full scale
- Ordered logit using the full scale
- Favorable opinion as the dependent variable
- The same falsification tests as above
- Excluding wine
- Looking only at those exposed once
Summary and implications

1. Online display advertising had the largest impact in locations with restrictions on out-of-home advertising

2. Suggests that the internet reduces the effectiveness of local regulations, a subject of much speculation but little empirical examination outside of tax policy

3. Suggests that online advertising substitutes for offline advertising (in contrast to the European Commission’s conclusion in the Microsoft-Yahoo merger)
HOW OFFLINE ADVERTISING AFFECTS PRICING OF ONLINE ADVERTISING
Search Advertising Platforms

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Personal Injury Lawyer

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Sponsored Links
Data: Trial Lawyers ($40 billion)

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Empirical strategy

• Use natural experiment in advertising for lawyer services.
  – State-level variation in “ambulance-chaser” regulation
    • States with regulation and without
    • Personal Injury vs non-Personal Injury

• Note that this is an `infinite’ price change
  – But we believe it is still informative about market boundaries
## Estimated Prices for 139 “keywords” in 195 local markets

<table>
<thead>
<tr>
<th>Keyword</th>
<th>City</th>
<th>Cost Per Click-Mid Point</th>
<th>Search Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bankruptcy Attorney</td>
<td>Baton Rouge</td>
<td>4.43</td>
<td>0</td>
</tr>
<tr>
<td>Birth Injury Attorney</td>
<td>Baton Rouge</td>
<td>42.135</td>
<td>0</td>
</tr>
<tr>
<td>Brain Injury Attorney</td>
<td>Baton Rouge</td>
<td>12.185</td>
<td>0</td>
</tr>
<tr>
<td>Car Accident Attorney</td>
<td>Baton Rouge</td>
<td>13.095</td>
<td>1</td>
</tr>
<tr>
<td>Child Support Attorney</td>
<td>Baton Rouge</td>
<td>1.81</td>
<td>0</td>
</tr>
<tr>
<td>Contract Attorney</td>
<td>Baton Rouge</td>
<td>3.3</td>
<td>0</td>
</tr>
<tr>
<td>Custody Attorney</td>
<td>Baton Rouge</td>
<td>2.99</td>
<td>0</td>
</tr>
<tr>
<td>Divorce Attorney</td>
<td>Baton Rouge</td>
<td>7.945</td>
<td>2</td>
</tr>
</tbody>
</table>
## Identification: Solicitation

<table>
<thead>
<tr>
<th>State</th>
<th>Personal injury laws/rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>No written communication allowed 30 days for personal injury or wrongful death</td>
</tr>
<tr>
<td>Arizona</td>
<td>No written communication allowed 30 days for personal injury or wrongful death</td>
</tr>
<tr>
<td>Arkansas</td>
<td>No written communication allowed 30 days for wrongful death</td>
</tr>
<tr>
<td>Colorado</td>
<td>No written communication allowed 30 days for personal injury or death</td>
</tr>
<tr>
<td>Connecticut</td>
<td>No written communication allowed 40 days for personal injury or death</td>
</tr>
<tr>
<td>Florida</td>
<td>No written communication allowed 30 days for personal injury or wrongful death</td>
</tr>
<tr>
<td>Georgia</td>
<td>No written communication allowed 30 days for personal injury or wrongful death</td>
</tr>
<tr>
<td>Hawaii</td>
<td>No written communication allowed 30 days for personal injury or wrongful death</td>
</tr>
<tr>
<td>Louisiana</td>
<td>No written communication allowed 30 days for personal injury or wrongful death</td>
</tr>
<tr>
<td>Missouri</td>
<td>No written communication allowed 30 days for personal injury or wrongful death (accident or disaster)</td>
</tr>
<tr>
<td>Nevada</td>
<td>Must wait 45 days after any known event before written communication</td>
</tr>
<tr>
<td>New York</td>
<td>No written communication for 30 days for personal injury or wrongful death unless law says need to file in 30 days in which case cannot solicit for 15 days</td>
</tr>
<tr>
<td>South Carolina</td>
<td>No written communication allowed 30 days for personal injury or wrongful death</td>
</tr>
<tr>
<td>Tennessee</td>
<td>No written communication allowed 30 days for workers’ comp, personal injury, or wrongful death</td>
</tr>
<tr>
<td>Wyoming</td>
<td>For written communications, need to wait 30 days after &quot;occurrence&quot; before soliciting a specific client</td>
</tr>
</tbody>
</table>
Method

Natural experiment
(“diff-in-diff”)

Cost Per Click\(_{kl}\) =
\[ \beta \cdot (\text{Ambulance chasing word}_k) \times (\text{Solicitation restricted}_l) \]
+ \( \text{keyword}_k + \text{location}_l + e_{kl} \)

keyword \( k \) in location \( l \)
# Main Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal injury keyword and Law</td>
<td>1.013**</td>
</tr>
<tr>
<td>restricting solicitation</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>12271</td>
</tr>
</tbody>
</table>

Fixed effects for 195 cities and 139 keywords included  
Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1
ROBUSTNESS CHECKS
Robustness

• Show effect is strongest in “thin” markets
• Different functional forms
• Different definitions of personal injury
• Different control groups
• Controls for state legal characteristics (such as number of lawyers, judicial hellholes, number of civil cases)
• Concerns about endogeneity of state law
  – Falsification test with similarly motivated law
Summary

• We find evidence that search engines charge higher prices when online and off-line match difficulty is greatest
TO SUM UP THE TWO STUDIES
Summary

- Offline advertising appears to regulate both the effectiveness and pricing of online advertising.
- Echos a broader literature in economics, strategy and marketing that has emphasized the interaction between the online and offline worlds
Empirical Strategy

For person $i$ who was exposed to advertising campaign $j$ in state $s$, their purchase intent reflects

$$\text{Intent}_{ij}^s = I(\alpha \text{Exposure}_{ij} + \beta \text{Exposure}_{ij} \times \text{AdBan}_{i}^s + \theta X_{ij} + \gamma^s + \delta_j + \epsilon_{ij} > 0)$$

• Logit regressions with state and campaign fixed effects

• Identifying assumption: There are no systematic differences in alcohol ad effectiveness between states with and without bans
  – We show robustness to controls for state characteristics such as alcohol consumption and abuse
  – We show no similar effect for other CPG categories
  – Later, we examine changes in 4 local regulations
Ads are more effective in ad ban states

- The effectiveness is different on purchase intention.
- Results are robust to controlling for many state-level characteristics (Table 8)
- Ads are remembered equally
Empirical Strategy

\[ Intent_{ijt} = I(\alpha \text{Exposure}_{ij} + \beta_1 \text{Exposure}_{ij} \times \text{AffectedGroup}_{i}^l \times \text{AdBanPeriod}_{it} + \beta_2 \text{Exposure}_{ij} \times \text{AffectedGroup}_{i}^l + \beta_3 \text{Exposure}_{ij} \times \text{AdBanPeriod}_{it} + \lambda \text{AdBanPeriod}_{it} + \eta \text{AffectedGroup}_{i}^l \times \text{AdBanPeriod}_{it} + \theta X_{ij} + \gamma^l + \delta_j + \epsilon_{ij} > 0) \]

• Logit regressions with location and campaign fixed effects

• Identifying assumption: There are no systematic changes in alcohol ad effectiveness in locations that added or repealed a ban except those caused by the ban
  – Helps overcome worries that, despite the above checks for underlying state-level heterogeneity and the falsification test, there still may be unobserved heterogeneity in advertising responsiveness that is specific to the alcohol sector