Dynamic Platform Competition in a Two-Sided Market: Evidence from the Online Daily Deals Promotion Industry

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Motivation

- Numerous theoretical studies on two (or multi)-sided markets
  - Most concern optimal pricing and payment structures that induce “getting the two (or multiple) sides on board” (Rocher & Tirole 2006)

- Scanty empirical studies on the topic
  - Rysman (2004): a pioneering empirical investigation on platform (network) competition (Yellow Pages)
  - Seamans & Zhu (2010): competition between traditional- and new-type platforms (local newspapers vs. Craigslist)
  - Zhu & Iansiti (2012): platform entry in a national market (Videogame console)

→ No study on dynamic platform competition between same type of platforms involving many disaggregated markets (cf. Roson 2005, Edelman 2012)
Our Study

- Asks the following research questions:
  - How do platforms compete dynamically in a multi-sided market?
  - How does such competition affect platform performance?

- Exploits a unique empirical setting to examine these questions
  - Duopoly by two national players, operating in 150+ regional markets
  - Precise deal-level performance metrics (number of coupons sold, sales revenue), a very rare opportunity (Edelman, 2012)
  - Entire deal information from the birth of industry (2008-2011), publicly available on the web
  - Limited differentiation between promotion sites (Dholakia 2011), leading to low switching costs
  - Multiple promotions by merchants and frequent changes in merchant-platform matching

- Offers a first examination of dynamic platform competition in a new type of two-sided market, focusing on the role of open information structure in merchant poaching and platform performance
Data and Sample

- Online deals data
  - All deals by Groupon and LivingSocial for 2008/11 – 2011/11
  - Deal-level data such as product & service descriptions, terms of offer, merchant information and deal outcomes
  - Collected through exhaustive web-scraping using a web-crawler

- Demographics data (Census/FCC)
  - County-level population, household income, age group (esp. 20-29), high-speed internet access → controls for local socio-economic factors

- Sample construction
  - Limit to 2009/7 (LivingSocial entry) – 2011/10
  - Exclude non-U.S. deals, deals not “tipped” (7%; unrealized), nation-wide franchise deals (20%; no merchant information)
  → 143,525 deals in final sample (Groupon 73%, LivingSocial 27%)
Online Daily Deals: Example (Groupon)
Online Daily Deals: Example (LivingSocial)
Online Daily Deals Promotion

1. Contract at specific terms
2. Promotion
3. Up-front payment
4. Coupon redemption
5. Product/service provision
6. Payout of merchant’s share
Incumbent Advantage in Deal Performance

- Incumbent commands performance advantage
  - For a comparable deal, Groupon sells 23% more coupons
  - This advantage is likely due to greater consumer network size

<table>
<thead>
<tr>
<th></th>
<th>1 (Log) Sold quantity</th>
<th>2 (Log) Sold quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Dummy) Groupon deal</td>
<td>0.231**</td>
<td>0.029</td>
</tr>
<tr>
<td></td>
<td>(0.030)</td>
<td>(0.040)</td>
</tr>
<tr>
<td>Relative platform reputation</td>
<td></td>
<td>-0.153**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.020)</td>
</tr>
<tr>
<td>Groupon dummy × Relative platform reputation</td>
<td></td>
<td>0.132**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.018)</td>
</tr>
<tr>
<td>$N$</td>
<td>143,210</td>
<td>143,210</td>
</tr>
<tr>
<td>F-stat</td>
<td>166.70</td>
<td>161.81</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.319</td>
<td>0.320</td>
</tr>
</tbody>
</table>

Note: Not a full table (various controls such as deal terms, competitive intensities, demographics, division-category- and time-fixed effects are included but not shown). Robust standard errors, clustered by division-category, are in parentheses. †, *, ** denotes statistical significance at 10%, 5%, and 1%, respectively.
Nonetheless, Entrant Penetrates Rapidly...
Which Side to Conquer First?

- One possible strategy for an entrant to enter into a two-sided market is to “divide and conquer” (Jullien 2011)
  - Focus on one side of the market and leverage it through cross-side network externalities
- Successful entry implies that LivingSocial had managed to attain a foothold on either the consumer side or the merchant side
Competition on the Consumer Side?

- No meaningful difference in deal terms between two platforms
  - If any, incumbent offers greater discounts and higher value deals
  - Robust to controls of other factors

<table>
<thead>
<tr>
<th></th>
<th>Discount rate</th>
<th>Value</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Groupon</strong></td>
<td>0.436**</td>
<td>2.160*</td>
<td>-0.047</td>
</tr>
<tr>
<td></td>
<td>(0.077)</td>
<td>(0.895)</td>
<td>(0.244)</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>55.787**</td>
<td>95.199**</td>
<td>34.337**</td>
</tr>
<tr>
<td></td>
<td>(0.056)</td>
<td>(0.653)</td>
<td>(0.177)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>(N)</th>
<th>(R^2)</th>
<th>(R^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(N)</td>
<td>142,121</td>
<td>142,173</td>
<td>142,140</td>
</tr>
<tr>
<td><strong>Adj. (R^2)</strong></td>
<td>0.265</td>
<td>0.230</td>
<td>0.272</td>
</tr>
</tbody>
</table>

Note: Division-category-year-month fixed effects are included in all models. Robust standard errors clustered by division-category are in parentheses. †, *, ** denotes statistical significance at 10%, 5%, and 1%, respectively.
**Competition on the Consumer Side?**

- Differences in deal terms come entirely from the first year of entry
  - Changes in constant terms suggest imitative action-reactions between two platforms

- Entry appears to have benefited consumers
  - Consumers purchase higher value goods at relatively lower prices

<table>
<thead>
<tr>
<th></th>
<th>Discount rate</th>
<th>Value</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Within 1 year)</td>
<td>(After 1 year)</td>
<td>(Within)</td>
</tr>
<tr>
<td>Groupon</td>
<td>0.707** (0.099)</td>
<td>0.175 (0.114)</td>
<td>3.854** (1.225)</td>
</tr>
<tr>
<td>Constant</td>
<td>55.479** (0.071)</td>
<td>56.178** (0.081)</td>
<td>90.274** (0.877)</td>
</tr>
<tr>
<td>N</td>
<td>70,784</td>
<td>62,869</td>
<td>71,042</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.280</td>
<td>0.250</td>
<td>0.253</td>
</tr>
</tbody>
</table>

Note: Division-category-year-month fixed effects are included in all models. Robust standard errors, clustered by division-category, are in parentheses. †, *, ** denotes statistical significance at 10%, 5%, and 1%, respectively.
Competition on the Merchant Side?

- Entrant’s increased penetration unlikely came through aggressive deal terms on the consumer side.

- Merchant side likely a “competitive bottleneck” (Armstrong 2006)
  - Prevalence of consumer multihoming (Edison Research 2012)
    - 69%(37%) of LivingSocial(Groupon) subscribers also use the rival platform
  - Rapid convergence of deal terms over time
    → Critical for platforms to develop new merchants to stay competitive

- “Open information structure” might encourage merchant poaching by entrant to overcome initial disadvantages
  - Identity of experienced merchants and detailed information on individual deals publicly available (→ platforms’ attempt to induce both consumers and merchants on board)
  - Use of such information helps quickly build business due to:
    - Reductions in search cost (revealed preference for online daily deals)
    - Merchant learning (no need to educate on business model/deal process)
    - Reduced uncertainty in deal performance (track records known)
Merchant Poaching as Entry Strategy

- Considerable merchant poaching by entrant observed
  - Ratio of poached deals continues to increase (>25% after two years)

* “Poaching” defined as first-time merchant that had prior deals with rival platform

**Poaching Probability (LivingSocial)**

- Months Since Entry
  - 1 7 13 19 25
  - Poaching Probability (%)
    - 10% 15% 20% 25% 30%
Poached Merchants Perform Better

Performance Comparison: Own vs. Poached (LivingSocial)

<table>
<thead>
<tr>
<th>Group</th>
<th>Obs.</th>
<th>Mean</th>
<th>Std. Err.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own</td>
<td>24,825</td>
<td>-0.0531</td>
<td>0.0077</td>
</tr>
<tr>
<td>Poached</td>
<td>6,232</td>
<td>0.0413</td>
<td>0.0159</td>
</tr>
<tr>
<td>Difference (=Own−Poached)</td>
<td>-0.0945**</td>
<td>0.0173</td>
<td></td>
</tr>
</tbody>
</table>

Note: ** denotes statistical significance at 1%.

![Image of kernel density plots]

<table>
<thead>
<tr>
<th></th>
<th>Quantile regression</th>
<th></th>
<th>Inter-quantile regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.05</td>
<td>0.25</td>
<td>0.50</td>
</tr>
<tr>
<td>(Dummy) Poached by LS</td>
<td>0.239**</td>
<td>0.080**</td>
<td>0.017</td>
</tr>
<tr>
<td></td>
<td>(0.044)</td>
<td>(0.025)</td>
<td>(0.020)</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.174**</td>
<td>-0.804**</td>
<td>0.016†</td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.011)</td>
<td>(0.009)</td>
</tr>
</tbody>
</table>

Note: †, *, ** denotes statistical significance at 10%, 5%, and 1%, respectively.
Merchant Poaching as Entry Strategy

- For entrant, poached deals on average generate about 9% more coupon sales than deals developed internally.

- This performance improvement through poaching comes from both:
  - Reduction in the left-tail of sales distribution, and
  - Increase in right-tail outcomes

→ The availability of merchant-level information appears to facilitate entries and business development by late movers.
Incumbent Retaliates: Merchant Poaching by Groupon

Poaching Probability upon Entry by Platform

- Groupon
- LivingSocial

Months since entry

Poaching Probability (%)

0 7 14 21 28

0 6 12 18 24
Merchant Poaching Even More Profitable for Incumbent

Performance Comparison: Own vs. Poached (Groupon)

<table>
<thead>
<tr>
<th>Group</th>
<th>Obs.</th>
<th>Mean</th>
<th>Std. Err.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own</td>
<td>52,710</td>
<td>0.1423</td>
<td>0.0053</td>
</tr>
<tr>
<td>Poached</td>
<td>4,408</td>
<td>0.3217</td>
<td>0.0177</td>
</tr>
<tr>
<td>Difference</td>
<td></td>
<td>-0.1794**</td>
<td>0.0189</td>
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</tbody>
</table>

Note: ** denotes statistical significance at 1%.

Quantile regression

<table>
<thead>
<tr>
<th>(Dummy) Poached by GP</th>
<th>0.05</th>
<th>0.25</th>
<th>0.50</th>
<th>0.75</th>
<th>0.95</th>
<th>Inter-quantile regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.95-0.05</td>
</tr>
<tr>
<td>(Dummy) Poached by GP</td>
<td>0.385**</td>
<td>0.228**</td>
<td>0.128**</td>
<td>-0.018</td>
<td>0.226**</td>
<td>-0.159</td>
</tr>
<tr>
<td>(Dummy) Poached by GP</td>
<td>(0.057)</td>
<td>(0.029)</td>
<td>(0.023)</td>
<td>(0.021)</td>
<td>(0.021)</td>
<td>(0.104)</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.098**</td>
<td>-0.590**</td>
<td>0.299**</td>
<td>1.079**</td>
<td>1.719**</td>
<td>3.817**</td>
</tr>
<tr>
<td>Constant</td>
<td>(0.016)</td>
<td>(0.008)</td>
<td>(0.007)</td>
<td>(0.006)</td>
<td>(0.006)</td>
<td>(0.012)</td>
</tr>
</tbody>
</table>

Note: †, *, ** denotes statistical significance at 10%, 5%, and 1%, respectively.
Poaching as Incumbent’s Strategic Response

- Entrant’s strategic exploitation of incumbent business does not go unnoticed
  - Incumbent responds by also poaching merchant from entrant

- For incumbent, poached deals prove even more successful
  - Generate 18% higher sales than internally developed deals
  - Primarily helped by significant reductions in left-tail outcomes

- Information-based poaching, which initially provides foothold for entrant, becomes increasingly ineffective as a vehicle for catching up with incumbent
  - In fact, it appears to intensify competition over time
Summary

- Many insightful scholarly works, mostly theoretical, shedding light on platform competition in two-sided markets

- General dearth of empirical studies addressing questions such as:
  - How do platforms compete dynamically?
  - How does a new platform overcome initial disadvantages owing to smaller network size?
  - How does an incumbent platform respond to entry challenges?
Summary

- Examining the deal-of-the-day market, we find:
  - Significant advantage accrues to incumbent due to greater network size
  - Any differentiation on consumer side quickly dissipates due to imitative action-reactions between incumbent and entrant
  - A fundamental dilemma in open information structure
    - The very vehicle for incumbent to build up business promotes competitive entries through merchant poaching
  - Over time, information-based poaching turns into a competition-intensifying channel as incumbent fights back with the same strategy
  - Increased competition likely enhances consumer welfare by making a greater variety of deals available at more favorable terms

- Findings generalizable to burgeoning web-based intermediary platforms that link between online and offline economic activities with open information structure
  - E.g., online vacation rental industry (Airbnb, VRBO, etc.)