Competitive Mobile Targeting

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What’s location-based mobile targeting?

- Pinpoint consumers’ locations and provide location-specific advertisements on their mobile devices.

- Spending from $2.9 billion in 2013 to $4.9 billion 2014.
- Top two categories: restaurants and retail
- Push (e.g., SMS) or Pull (mobile apps); Opt-in or Opt-Out
Geo-fencing around one’s own store(s)

- Starbucks, Toys R Us, Talbots, Peets Café, Kohls
Geo-conquering example

- The Outback campaign used 5 and 10 mile geofences around various competitor restaurant locations
- Dunkin donuts
General effects of targeting

- Expand demand

- With competition: intensifies price competition within each consumer segment (e.g., at each location)

- Net effect often negative (e.g., Thisse and Vivies 1988, Shaffer and Zhang 1995)
Related literature

- Competitive targeting
  - Often backfires (e.g., Thisse and Vives 1988, Shaffer and Zhang 1995)
  - Lal and Rao (1997) multidimensional targeting strategies
  - Shaffer and Zhang (2002) one-to-one promotions with asymmetric firms

- Behavior-based pricing (BBP)
  - Prisoner’s dilemma (Fudenberg and Tirole 2000, Villas-Boas 1999, Zhang 2011)
  - Benefits of BBP (Pazgal and Soberman 2008, Shin and Sudhir 2010)

- Mobile marketing
  - Ghose, Goldfarb and Han (2013)
  - Luo et al. (2014), Fong, Fang and Luo (2014)
How is mobile different?

- Price/discount is based on real-time locations

- A consumer can change his/her “segment” by moving across different locations

- Firms need to think about how to “guide” such movements by balancing prices across locations ➔ reduced competition ➔ increased profitability of targeting
Are consumers strategic?

- 54% have used mobile coupons
- 60% of coupon users travelled to obtain a coupon
- Would you be willing to travel to a particular location to obtain such a coupon?
  - Yes (28%)
  - It depends on the value of the coupon and the distance I have to travel (62%)
  - No (10%)
A model of mobile targeting

- Sellers A and B located at the two ends of the Hotelling line
- 3 unit masses of consumers, one at each end of the line and one in the middle
- Preferences are uniformly distributed between the two sellers with mismatch cost $s$ within consumers at each location. Consumers incur travel cost $t$ per unit distance travelled
- Firms can offer a different price at each of the three locations under mobile targeting

\[ u_A^i = V - s y_A^i - t d_A^i - p_A^i \]
\[ u_B^i = V - s(1 - y_A^i) - t d_B^i - p_B^i \]
### Table 1: Consumers’ Total Cost of Buying under Mobile Targeting

<table>
<thead>
<tr>
<th></th>
<th>Consumers at location 0</th>
<th>Consumers at location ( \frac{1}{2} )</th>
<th>Consumers at location 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Firm 1’s price:</strong></td>
<td></td>
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<tr>
<td>Cost of buying from</td>
<td>( p_0 )</td>
<td>( p_{1/2} )</td>
<td>( p_1 )</td>
</tr>
<tr>
<td>Firm 1</td>
<td>( p_0, p_{1/2} + t, p_1 + 2t )</td>
<td>( p_0 + t, p_{1/2} + t, p_1 + 2t )</td>
<td>( p_0, p_{1/2} + 2t, p_1 + 2t )</td>
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<tr>
<td><strong>Firm 2’s price:</strong></td>
<td></td>
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<tr>
<td>Cost of buying from</td>
<td>( p_1 )</td>
<td>( p_{1/2} )</td>
<td>( p_0 )</td>
</tr>
<tr>
<td>Firm 2</td>
<td>( p_0 + 2t, p_{1/2} + 2t, p_1 + 2t )</td>
<td>( p_0 + t, p_{1/2} + t, p_1 + 2t )</td>
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Assumptions

- Existence of pure-strategy equilibrium w/ mobile targeting: $t<4s$
  - Otherwise firms fight over middle consumers very aggressively
- Cherry-picking option matters: $2s<t$
  - Otherwise prices are too similar across locations for consumers to cherry pick
- Local monopolies under uniform pricing: $V<2t+s$
- Possibility of geo-conquering: $V>2t$

- Combined: $2s<t<4s$, $2t<V<2t+s$
What happens under uniform pricing?

- Each firm remains a local monopoly and all local consumers are served. Price and profit are both V-s

- If mobile targeting technology is available for free, uniform pricing equilibrium breaks down
  - If uniform price is high, charge lower price at middle to increase demand
  - If uniform price is low, charge higher price at base to increase margin
Avoiding consumers’ cherry picking under MT

- If consumers cannot travel, optimal prices are $2t - s$ at distance 1 and $s$ at distance $\frac{1}{2}$. At these prices, consumers at 0 have an incentive to cherry pick.
  - Firm can increase profit by preventing travel and pocketing their travel cost

- At least one cherry-picking constraint has to bind
  - Firm fights competitor out of its home base: $p_1 = 0$ and $p_0 = 2t - s$
  - $p_0 = p_{1/2} + t$ is binding
Equilibrium outcomes

- MT Prices: 2t-s, t-s, 0 to consumers located at distance 0, ½, 1; profit (5t-3s)/2.
  - The reason why mobile is more profitable than coupons: t-s>s in the middle

- All consumers are served in equilibrium.

- A firm’s equilibrium price and profit under mobile targeting increase with t and decrease with s.
  - When t increases, harder for consumers to cherry pick and firms increase prices.
  - When s increases, firms lower home prices to keep all local customers
Profit comparison with uniform pricing

- Mobile targeting increases profit from uniform pricing if \( V < (5t - s)/2 \)
  - Profit under UP is low when \( V \) is low
  - When \( t \) is high and \( s \) is low, price on mobile is higher
  - Fits restaurants and movies
  - “Since demand goes up by 50%, profit goes up as long as price drops less than 33%.” – David Soberman

- Consumers are strictly better off under mobile targeting than under uniform pricing. (more buy, lower price everywhere)
Extension I: naïve consumers

- When many naïve consumers are unaware of offers outside of their home locations, intra-firm competition is weaker and prices are closer across locations → informed residents travel to the middle to make a purchase in equilibrium

- Profit may decrease with the fraction of informed residents in early stages of MT

- The general intuition that MT could outperform UP for low WTP categories continues to hold
Extension II: consumers travel for external reasons

- Prices at 0 and 1 increase and become higher than the price at the middle location
  - Poaching at distance 1 is too damaging to home-base profit
  - Price lowest at the middle to accommodate travel cost

- Equilibrium profit under MT is weakly higher than under UP
  - If all consumers travel for external reasons, we are back to UP
Extension III: tracing down consumers’ base locations

Note: the third region above (T<M<U) appears only if $t<3s$. 
Summary

- Mobile targeting may increase profitability when compared with coupon targeting and uniform pricing
  - Consumers’ real time location is a new dimension to price discriminate
  - Firms benefit from consumers’ strategic behavior
  - Firms’ incentive to limit intrafirm competition has a positive impact on interfirm competition
- Profitability depends on
  - Fraction of strategic consumers; distribution of consumers across locations; category willingness to pay; consumers’ preference strength and transportation costs
Thank you!