Do Smokers have Differential Demand for Conventional, Very Low Nicotine, and Electronic Cigarettes?

Bryan W. Heckman¹, K. Michael Cummings¹, Gera E. Nagelhout², Ron Borland³, Richard J. O’Connor⁴, & Matthew J. Carpenter¹

¹Medical University of South Carolina; ²Maastricht University; ³Cancer Council Victoria; ⁴Roswell Park Cancer Institute

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heckmanb@musc.edu
Impact of Price

(Jha, 2009)

WHO FCTC, Article 6: Price and Tax Measures to Reduce the Demand for Tobacco
Impact of Price

Never smokers/experimenters
- Reduced initiation
- Reduced transition

Smokers
- Increased quitting
- Reduced consumption
- Substitution of alternative products

Former Smokers
- Relapse prevention
Macroeconomic Approach

- Population-level data on consumption and price
  - Elasticity = change in consumption relative to 1% increase in price
    - >1 = elastic
    - <1 = inelastic

- Varies by
  - Country: developed (-.4) < developing (-.6)
  - Age: adult (-.4) < youth (-.9)
  - Income: lower < higher

- Primary limitation: range in price
Behavioral Economic Approach

- Individual-level data on consumption across a range of prices (Hursh & Silberberg, 2008)

\[
\log Q = \log Q_0 + k\left(e^{-\alpha Q_0 C} - 1\right)
\]

- Elasticity ($\alpha$) = slope of the demand curve
- Translational framework to quantify reinforcement

Grebenstein et al., 2013  
Bickel & Madden, 1999  
MacKillop et al., 2012
Purchase Tasks
(Bickel/MacKillop/Murphy)

- Intensity (consumption at zero cost)
- Omax (maximum financial expenditure)
- Pmax (price at which expenditure is maximized)
- Breakpoint (first price at which consumption is zero)
- Elasticity (sensitivity of consumption to increased cost)
Estimating Demand for Alternatives to Cigarettes with Online Purchase Tasks

Mean Exponential Demand Curves for Cigarettes and Alternative Products

Consumption (# Units)

Price

- Cigarettes
- Dissolvables
- Lozenges
- Snus

Richard J. O’Connor, PhD; Kristie M. June, MA; Maansi Bansal-Travers, PhD; Matthew C. Rousu, PhD; James F. Thrasher, PhD; Andrew Hyland, PhD; K. Michael Cummings, PhD, MPH

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Modified Risk Tobacco Products

• “any tobacco product that is sold or distributed for use to reduce harm or the risk of tobacco-related disease associated with commercially marketed tobacco products”
  – Abuse liability (e.g., nicotine levels)
  – Toxicant exposure (e.g., non-combustible)

• Family Smoking Prevention and Tobacco Control Act was passed in 2009
  – FDA authority to regulate tobacco products
Current Study

Predicting consumer interest in using a very low nicotine cigarette (VLNC)

• Parent study included 2000 smokers and 1000 non-smokers from the Netherlands
• Subsample of 1215 daily smokers
  – 14 CPD (SD=7); 24% had used e-cig within 30 days
  – 51% female; 44% age 16-24 (M=38; SD=12)
  – 14% had bachelor’s degree; Mdn income of €22,500
  – 30% had made quit attempt in last 6 months, and 5% intended to do so within the next 3 months
Differential Demand

- How many ___ cigarettes would you smoke over the next 24 hours if they were €__ each?

**Product:** ordinary factory made (FM), nicotine free (NF), electronic (10 puffs = 1 EC)

**Price:** .00, .05, .15, .30, .45, .60, .90, 1.20, 3, 30

### Table

<table>
<thead>
<tr>
<th>Product</th>
<th>FM</th>
<th>NF</th>
<th>EC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensity</td>
<td>14.7</td>
<td>9.6</td>
<td>8.8</td>
</tr>
<tr>
<td>Omax</td>
<td>12.2</td>
<td>5.6</td>
<td>4.3</td>
</tr>
<tr>
<td>Pmax</td>
<td>4.5</td>
<td>2.2</td>
<td>2.0</td>
</tr>
<tr>
<td>Breakpoint</td>
<td>16.4</td>
<td>11.8</td>
<td>11.9</td>
</tr>
<tr>
<td>Elasticity</td>
<td>0.05</td>
<td>0.22</td>
<td>0.24</td>
</tr>
</tbody>
</table>

***All FM vs. NF and FM vs. EC comparisons significant at p < .001***
Moderators

• Candidates
  – Age, gender, income, education, CPD, EC use, & motivation to quit

• FM vs. NF
  – Greater differential demand among those who were younger, heavier smokers, and less educated

• FM vs. EC
  – Greater differential demand among heavier smokers, and those who had not used an EC recently (30 days)
Conclusions & Future Directions

• MRTPs (NF and EC) are more sensitive to cost

• Substitution rates likely to be low, unless cost is substantially lower for MRTPs
  – Price: tax by harm, retail sales polices
  – Non-price: availability, appeal, relative risk information

• Cross-price elasticity studies

• Sampling studies

• Translational paradigm
  – animal laboratory, human laboratory, human clinical, human marketplace
Thanks for listening!

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heckmanb@musc.edu