Consumer Response to Package Downsizing: An Application to the Chicago Ice Cream Market

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Introduction

- Package downsizing is the practice of reducing the volume of product per package such that the new size replaces the old one.
- Downsizing is commonly observed in U.S. consumer goods markets, and has been especially common in food manufacturing.

Objective: To provide empirical evidence on the economic reasons and consequences of downsizing.

Research Questions

- What is the consumer response to downsizing?
- How does it compare to the consumer response to price changes?

The US Bulk Ice Cream Industry

- Typical of oligopolistic differentiated product markets.
  - Top 6 brands account for the half market.
  - Downsizing is frequently observed.
  - Unit price changes with downsizing.

The Data

- A panel of households on half gallon ice cream purchases in Chicago, 1998-2007, provided by Nielsen Homescan.
- Four major brands: Three national brands, one store brand
- Information on price, package size, promotion and household demographics.

Descriptive Statistics

<table>
<thead>
<tr>
<th>Brand</th>
<th>Choice Share</th>
<th>Price (Dollars)</th>
<th>Package Size (1/2 gal.)</th>
<th>Promotion (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Brand 1</td>
<td>0.26</td>
<td>3.36</td>
<td>0.91</td>
<td>76</td>
</tr>
<tr>
<td>National Brand 2</td>
<td>0.23</td>
<td>3.44</td>
<td>0.92</td>
<td>79</td>
</tr>
<tr>
<td>Store Brand 2</td>
<td>0.04</td>
<td>3.17</td>
<td>0.96</td>
<td>75</td>
</tr>
<tr>
<td>National Brand 8</td>
<td>0.17</td>
<td>3.10</td>
<td>0.99</td>
<td>80</td>
</tr>
</tbody>
</table>

Source: Nielsen Homescan

The Package and Unit Price Trends of Top Two Brands


The Econometric Model

- A simultaneous demand and supply model of market with differentiated products.
  - Demand: random coefficient logit
  - Supply: reduced form

- The model incorporates consumer heterogeneity, controls for price endogeneity, and copes with unbalanced panel nature of data.
- Estimation: We adopt a Bayesian approach for estimation.

Results

- Average price elasticity of bulk ice cream demand is -0.5
- Average package size elasticity is 0.12
- Store brand’s pricing affects national brands’ demand considerably less than the effect of national brands’ pricing on store brand’s demand.
- In the event of downsizing households switch more heavily to larger products.
- Households sensitivity to price and package size changes varies by demographics
  - Smaller households, households with higher income and education are less sensitive to price changes
  - Households with an employed household head are less sensitive to package size changes

Conclusions

- Consumers are less responsive to package size than to package price: the demand elasticity with respect to package size is approximately one-fourth of the magnitude of the demand elasticity with respect to price.
- Manufacturers can use downsizing as a hidden price increase in order to pass through increases in production costs, i.e., cost of raw materials, and maintain or increase their profits.