The Effect of Sell-by Dates on Purchase Volume and Food Waste

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Why study sell-by dates?

1. Food Waste Reduction:
   - Play a key role in perishable food consumption.
   - **Consumers**: often misinterpret them as “food safety” labels.
   - **Regulations**: not all state regulations are up-to-date.

2. Methodologically:
   - As an **identification strategy** to estimate changes in food waste.
The theoretical model

• A theoretical model of utility maximization:
  ○ Focuses on one perishable product.
  ○ Household choose how much to purchase and how much to waste.
  ○ It is costly to reduce food waste.

• Results:
  ○ If demand is price-inelastic, then a longer sell-by date reduces purchase volume and increases actual consumption.
  ○ Food waste is reduced more than purchase volumes.
Comparative statics

$p$

Actual Consumption

$x(p, L_0)$  $x(p, L_1)$

Observed Demand

$q(p, L_1)$  $q(p, L_0)$

$\Delta x^* > 0$

$\Delta q^* < 0$

$p_0$

$q$

$x_0^*$  $x_1^*$  $q_1^*$  $q_0^*$
Empirical case

- Before September 2010, milk has to be sold within 9 days after pasteurization in NYC.
- In Connecticut, New Jersey, and other part of New York State, it’s typically 14-15 days.
## Changes in yearly sales volumes

<table>
<thead>
<tr>
<th>Counties</th>
<th>No. of Stores</th>
<th>Before</th>
<th>After</th>
<th>Change</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kings</td>
<td>131</td>
<td>715.6</td>
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<tr>
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<td>Region Total</td>
<td>443</td>
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## Changes in yearly sales volumes

### New York City

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### Hartford Area

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<th>After</th>
<th>Change</th>
<th>% Change</th>
</tr>
</thead>
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<tr>
<td>Hartford</td>
<td>72</td>
<td>521.9</td>
<td>554.4</td>
<td>32.50</td>
<td>6.2%</td>
</tr>
<tr>
<td>Middlesex</td>
<td>15</td>
<td>101.6</td>
<td>97.8</td>
<td>-3.82</td>
<td>-3.8%</td>
</tr>
<tr>
<td>New London</td>
<td>22</td>
<td>170.3</td>
<td>170.5</td>
<td>0.15</td>
<td>0.01%</td>
</tr>
<tr>
<td>Tolland</td>
<td>7</td>
<td>63.7</td>
<td>55.4</td>
<td>-8.27</td>
<td>-13.0%</td>
</tr>
<tr>
<td>Region Total</td>
<td>116</td>
<td>857.5</td>
<td>878.0</td>
<td>20.56</td>
<td>2.4%</td>
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Monthly sales volumes

NYC

Hartford

[Bar charts showing monthly sales volumes for NYC and Hartford, with data for September 2009 to September 2010 and September 2010 to September 2011]
Empirical estimations

We looked at:

- Sales volumes at the retail level
- Purchase volumes at the household level.
- Data source: Nielsen Retail Scanner and Consumer Panel.
- Methods: Difference-in-Difference, Synthetic Control.

We found:

1. Purchase volume decreased by about 10% (min. 9% max. 13%).

2. Price elasticity of milk demand is about 0.65.
Implications for food waste

• NYC’s new policy reduces food waste by at least 10%.

• If previously 30% of milk is wasted, now it’s less than 20%.

• This reduction represents 5.2 million pounds of milk $3.4 million dollars annually in NYC.

• Consumers now drink more milk while spending less.
Market-level implications

How does an extension in sell-by dates affect supply side?

- Loss-leading Strategy
  - Longer sell-by dates reduce the effectiveness of loss-leading strategy.

- Market Power
  - Longer sell-by dates help small retailers mitigate inventory cost.
  - Also help out-of-state milk distributors reduce transportation cost.
Takeaways from the study:

• We need to keep regulations up-to-date.

• Improve consumer education, e.g., how to interpret date labels.
Thank You!