Willingness to Pay for Eco-labeled Fresh Strawberry: Are All Environmentally Friendly Techniques Equal?

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Introduction

- The United States was the world’s largest producer of strawberries, accounting for over 40 percent of the global total production. Strawberry is one of the most popular fresh fruits in the United States (Norman 2005).
- Concerns about environmental degradation due to excessive use of chemical fertilizers and pesticides have grown as farmers have increased reliance on these chemicals to maintain or increase crop yields.
- Growers could potentially use labels to differentiate products produced with different environmentally friendly methods from conventional techniques.
- Prior studies have confirmed that consumers are willing to pay more for food produced with environmentally friendly methods such as those with eco-labels.

We want to estimate consumer WTP for fresh strawberries produced with different environmentally friendly techniques, so that more differentiated markets can be identified.

Methods and Data

Survey and Data

- A national online survey was conducted across the United States in June and July of 2014.
- After data cleaning, about 2,418 responses were used for analysis.

Method and Questionnaire

- Open-ended contingent valuation method (CVM) was employed to estimate consumers’ willingness to pay.
- Cheap talk and reference market price were provided to reduce the hypothetical bias associated with “name your own price” task.
- Six types of fresh strawberries: 1) Reduced negative impact on air quality; 2) Reduced negative impact on soil quality; 3) Reduced negative impact on water quality; 4) Less fertilizer; 5) Conventional methods; 6) Less pesticide.

Discussion

- Conventional strawberries had the lowest WTP.
- WTP for strawberries produced with less pesticide was significantly higher than all the other eco-labeled strawberries. There is no significant difference in the WTP for all other eco-labeled strawberries.
- In both models, price paid for strawberries in market, knowledge about fresh strawberry, and awareness of GMO-free strawberries were all positively influencing both the absolute WTP and price premium for eco-labeled fresh strawberries.

- In multivariate Tobit, income showed significant impact on WTP for all types of fresh strawberries.
- In SUR, age and education significantly affect the price premium of eco-labeled fresh strawberries, although they had different impact. Females had higher price premium for all eco-labeled fresh strawberries than males.

Model

- Multivariate Tobit model was employed to determine the impacts of demographics, knowledge, and purchase behavior on consumers’ willingness to pay for each type of fresh strawberries:

\[
\begin{align*}
\text{WTP}_{\text{Reduced negatives on air}} & = \beta_0 + \beta_1 X_i + \epsilon_i \\
\text{WTP}_{\text{Reduced negatives on soil}} & = \gamma_0 + \gamma_1 X_i + \epsilon_i \\
\text{WTP}_{\text{Reduced negatives on water}} & = \epsilon_0 + \epsilon_1 X_i + \epsilon_i \\
\text{WTP}_{\text{Less fertilizer}} & = \phi_0 + \phi_1 X_i + \phi_i \\
\text{WTP}_{\text{Less pesticide}} & = \chi_0 + \chi_1 X_i + \chi_i \\
\end{align*}
\]

Where \(X_i\) is a vector of demographics, knowledge, and purchase behavior variables.

Seemingly unrelated regression (SUR) model was used to determine whether the independent variables were significantly affecting the price premiums of eco-label over the conventional fresh strawberries (GMO-free):

\[
\begin{align*}
\text{Premium}_{\text{Reduced negatives on air}} & = \alpha_0 + \alpha_1 X_i + \alpha_i \\
\text{Premium}_{\text{Reduced negatives on soil}} & = \xi_0 + \xi_1 X_i + \xi_i \\
\text{Premium}_{\text{Reduced negatives on water}} & = \zeta_0 + \zeta_1 X_i + \zeta_i \\
\end{align*}
\]

Where \(X_i\) is a vector of demographics, knowledge, and some purchase behavior as independent variables.

Findings

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Reduced negatives on air quality</th>
<th>Reduced negatives on soil quality</th>
<th>Reduced negatives on water quality</th>
<th>Less fertilizer</th>
<th>Less pesticide</th>
<th>Conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>2.221***</td>
<td>2.221***</td>
<td>2.275***</td>
<td>2.196**</td>
<td>2.246***</td>
<td>2.359***</td>
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<tr>
<td>Age</td>
<td>-0.014*</td>
<td>-0.011</td>
<td>-0.015**</td>
<td>-0.005</td>
<td>-0.005</td>
<td>0.006</td>
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<tr>
<td>Income</td>
<td>0.047***</td>
<td>0.046***</td>
<td>0.062***</td>
<td>0.058**</td>
<td>0.050**</td>
<td>0.061***</td>
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<tr>
<td>Education</td>
<td>-0.008</td>
<td>-0.009</td>
<td>-0.011</td>
<td>-0.010</td>
<td>-0.018</td>
<td>-0.032**</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.018</td>
<td>0.027</td>
<td>-0.018</td>
<td>0.014</td>
<td>0.083*</td>
<td>-0.108***</td>
</tr>
<tr>
<td>Kids</td>
<td>0.017</td>
<td>0.010</td>
<td>-0.001</td>
<td>0.022</td>
<td>0.035</td>
<td>0.023</td>
</tr>
<tr>
<td>Spending on Strawberries</td>
<td>-0.001</td>
<td>-0.001*</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td>Price paid for strawberries</td>
<td>0.089***</td>
<td>0.093***</td>
<td>0.094***</td>
<td>0.087**</td>
<td>0.084**</td>
<td>0.065***</td>
</tr>
<tr>
<td>Knowledge</td>
<td>0.047***</td>
<td>0.056***</td>
<td>0.058**</td>
<td>0.038**</td>
<td>0.049**</td>
<td>0.005</td>
</tr>
<tr>
<td>Awareness of GMO-free strawberries</td>
<td>-0.175***</td>
<td>-0.161***</td>
<td>-0.196***</td>
<td>-0.157***</td>
<td>-0.211***</td>
<td>-0.074**</td>
</tr>
</tbody>
</table>

Multivariate Tobit model regression results

References


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