Farm Level Demand for Fresh and Processed Stone Fruit in the United States

Xiaojiao Jiang\textsuperscript{1} and Thomas L. Marsh\textsuperscript{2}

School of Economic Sciences
Washington State University, Pullman, WA 99163

1. email: xiaojiao.jiang@email.wsu.edu
2. email: tl_marsh@wsu.edu

\textit{Selected Poster prepared for presentation at the Agricultural and Applied Economic Association’s 2012 AAEA Meeting, Seattle, Washington, August 12-14, 2012}

Copyright 2012 by Xiaojiao Jiang and Thomas L. Marsh. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided this copyright notice appears on all such copies.
From 1980 to 2009 the share of stone fruit for the fresh market has increased, while the share of stone fruit for the processed market decreased. Stone fruit included apples, cherries, peaches, and peaches/hectoliters.

A novel economic model is used for the demand analysis. The LaFrance and Pope (2011) implicit cost system approach is applied to improve preciseness and accuracy of parameter estimates. New and improved empirical estimates better explain changes in trends and elasticities for fresh and processed stone fruit.

**MODEL**

Given the restricted cost function as follows:

\[ C(p, y) = \min \{ p \cdot x \cdot x \in V(y) \} \]

where \( p \in R^m_+ \) is prices for inputs \( x \in R^n \) is the inputs, \( y \in R^m \) is the fixed netputs (output), \( V(y) \) is the input requirement sets for \( y \).

LaFrance and Pope (2011) introduced netputs in implicit form from a partial differential equation approach based on all available data:

\[ x = \frac{\partial C}{\partial p} = g(p, y, C) \]

- Properties
  1) \( g_p^2 + g_y^2 C = 0 \) (homogeneity)
  2) \( p^r x = C \) (adding up)
  3) \( g_p^r + g_x^r C^r \) symmetric, negative semidefinite (concavity)

- A Rank 2 PIGL functional form

\[
\begin{align*}
\{ x(p, y, C) = \frac{\partial (p y)}{\partial p} &\, C + \beta(p y) \frac{\partial (p y)}{\partial p} C^1 - \kappa \\
\beta &\, p \, \partial x / \partial p \, \partial y/ \partial p = \beta, \kappa \neq 0
\end{align*}
\]

**ECONOMETRIC APPROACH**

- The estimating equations of the PIGL form are

\[ x = \Delta(p^{-0.71}) \{ C \} + \sum_{\tau=1}^{\kappa} p_{\tau} \delta (\ln p + \ln y) C^{1-\kappa} \]

- The stochastic specification of the netput equations in share form are

\[ s_t \equiv C_t^{-1}\Delta(p_t) x_t = \sum_{\tau=1}^{\kappa} p_{\tau} \delta (\ln p_t + \ln y_t) C_t^{1-\kappa} + v_t, \quad t = 1980 \ldots 2009 \]

**RESULTS**

<table>
<thead>
<tr>
<th>Factor equation</th>
<th>Code</th>
<th>Fresh stone fruit price</th>
<th>Processed stone fruit price</th>
<th>Other fruit price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh stone fruit price</td>
<td>0.3867***</td>
<td>0.0245</td>
<td>-0.4112</td>
<td></td>
</tr>
<tr>
<td>Processed stone fruit price</td>
<td>0.0245</td>
<td>0.1709***</td>
<td>-0.1954</td>
<td></td>
</tr>
<tr>
<td>Other fruit price</td>
<td>-0.4112***</td>
<td>-0.1954***</td>
<td>0.6066</td>
<td></td>
</tr>
<tr>
<td>Fresh stone fruit prod</td>
<td>0.3312***</td>
<td>-0.0378***</td>
<td>-0.2934</td>
<td></td>
</tr>
<tr>
<td>Processed stone fruit prod</td>
<td>-0.0366***</td>
<td>0.1081***</td>
<td>-0.0715</td>
<td></td>
</tr>
<tr>
<td>Other fruit prod</td>
<td>-0.3783***</td>
<td>-0.1665***</td>
<td>0.5448</td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>0.7914***</td>
<td>0.6580***</td>
<td>-0.4494</td>
<td></td>
</tr>
</tbody>
</table>

**CONCLUSIONS AND DISCUSSION**

- The share of stone fruit for the fresh market has increased, while the share of stone fruit for the processed market decreased.
- Stone fruit included apples, cherries, peaches, and peaches/hectoliters.
- The LaFrance and Pope (2011) implicit cost system approach is applied to improve preciseness and accuracy of parameter estimates.
- New and improved empirical estimates better explain changes in trends and elasticities for fresh and processed stone fruit.

**REFERENCE**