Is Stabilization of Potato Price and Supply Effective?
Empirical Evidence from Idaho

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Objective

- To evaluate the effectiveness of programs and strategies implemented by the United Fresh Potato Growers of Idaho (UFPGI)
  - A marketing cooperative of potato growers

UFPGI
- Founded in November 2004
- Represents 85% of fresh potato growers in Idaho
- Goal to stabilize supply of fresh potatoes in Idaho to provide fair returns to potato growers
- Copper-Volstead Act
  - Ag producers are allowed to act collectively
Potato Industry Outlook

- High fresh potato price volatility
- Declining demand for fresh potatoes
- Low level of potato growers’ returns
  - Do not cover potato production costs
- Idaho’s share in the national value of fall potato production is 28% (2007)
- Idaho is a leading producer of Russet Burbank
  - 66% of all potato acres in Idaho (2006)
  - Almost 50% of fall potato acres planted nationally (2006)
  - Versatility of Russet Burbank
    - Fresh potato market & processed potato product market: French Fry and dehydrated potato products

UFPGI: Potato Supply Management Program

(1) Potato acreage management program
- Is used to control the number of acres of fresh potatoes planted
  - The fresh potato acreage was reduced by 15% in Spring 2005 relative to the 2004 base
  - Bid buy-down program

(2) Secondary marketing programs
- Divert excess supply of already produced potatoes
  - 2004 crop was diverted to charities and food banks
  - USDA procurement contracts
- Limit the flow of potatoes to the market when prices are low
  - Coordination of potato shipments throughout the marketing year
Other Strategies to Ensure Success

- Processing and seed potato growers joined UFPGI as independent districts
  - Processing, seed and fresh potato markets are interdependent

- Implementation of the potato supply management program nationally
  - United Potato Growers of America (March 2005)
  - Similar cooperatives in other potato growing regions in the US
  - United Potato Growers of Canada

Procedure

To evaluate the effectiveness of the programs and policies of the United Fresh Potato Growers of Idaho we analyze

- Fresh potato price level and volatility during two periods
  - Pre-Coop Period
  - Coop Period; begins in October 2005 --- new marketing year
Empirical Models: 
Extended ARCH (m) and GARCH (r,m)

- ARCH(1) and GARCH (1;2) mean equation
  \[ p_t = \psi_0 + \psi_1 p_{t-1} + \lambda p_{t-1} \text{Coop}_t + \chi \text{Coop}_t + u_t \]
- ARCH (1) variance equation
  \[ u_t^2 = \alpha_0 + \alpha_1 u_{t-1}^2 + \eta \text{Coop}_t + w_t \]
- GARCH (1;2) variance equation
  \[ h_t = \xi + \delta_1 h_{t-1} + \gamma_1 u_{t-1}^2 + \gamma_2 u_{t-2}^2 + \mu \text{Coop}_t \]

Hypotheses

Effective implementation of the potato supply management program would lead to higher and less volatile fresh potato prices

H1: Fresh potato prices are higher in the Coop period relative to the Pre-Coop period
  \[ \rightarrow \text{The estimated coefficient for the COOP binary variable in the conditional mean equation is positive} \]

H2: Fresh potato prices are less volatile in the Coop period relative to the Pre-Coop period
  \[ \rightarrow \text{The estimated coefficient for the COOP binary variable in the conditional variance equation is negative} \]
Data

*Monthly* fresh potato prices for Idaho and US

- Prices received by potato growers
- Aggregated over all potato varieties
- *Source:* USDA National Ag Statistics Service
- 2 monthly price series; prices are in $/cwt

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Data (cont.)

*Weekly* Russet Burbank shipping point prices

- Upper Valley Twin Falls – Burley, District Idaho
  - major potato shipping point in Idaho
- Prices received by potato shippers: potato growers-shippers and independent potato shippers
- *Source:* USDA Ag Marketing Service
- *Data period:* October 2002 – March 2008
  - 13 weekly Russet Burbank price series; prices are in $ per a 50 pound pack
Data: Shipping Point Prices

US No 1 potatoes
- Size A: 50 pound cartons
  - 40, 50, 60, 70, 80, 90 or 100 counts per carton
- Non-size A: 50 lbs bales of film or mesh bags
  - Five 10 lbs film bags; Ten 5 lbs film bags
  - Five 10 lbs mesh bags; Ten 5 lbs mesh bags

US No 2 potatoes: 50 pound bags
- Min 6 ounces each potato
- Min 10 ounces each potato

US and ID Monthly Fresh Potato Prices

[Graph showing monthly potato prices with Pre-Coop and Coop periods]
### Monthly US and ID Fresh Potato Prices

<table>
<thead>
<tr>
<th>Period</th>
<th>US</th>
<th>Idaho</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>The min and max potato production costs are in the parentheses ($/cwt)</td>
</tr>
<tr>
<td><strong>Price Level ($/cwt)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Coop period</td>
<td>7.78</td>
<td>3.89 (4.63 – 5.23)</td>
</tr>
<tr>
<td>Coop period</td>
<td>10.19</td>
<td>6.63 (5.17 – 5.96)</td>
</tr>
<tr>
<td><strong>Coop Price/Pre-Coop Price</strong></td>
<td>1.31</td>
<td>1.70 (1.10 – 1.16)</td>
</tr>
<tr>
<td><strong>Price Variance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Coop period</td>
<td>2.27</td>
<td>1.12</td>
</tr>
<tr>
<td>Coop period</td>
<td>3.21</td>
<td>0.56</td>
</tr>
<tr>
<td><strong>Coop Var./Pre-Coop Var.</strong></td>
<td>1.42</td>
<td>0.50</td>
</tr>
<tr>
<td><strong>Coefficient of Variation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Coop period</td>
<td>0.19</td>
<td>0.27</td>
</tr>
<tr>
<td>Coop period</td>
<td>0.18</td>
<td>0.11</td>
</tr>
<tr>
<td><strong>Coop CV/Pre-Coop CV</strong></td>
<td>0.95</td>
<td>0.41</td>
</tr>
</tbody>
</table>

### ARCH & GARCH Estimation Results: Summary

*Coop period* prices vs. *Pre-Coop period* prices

- **Idaho monthly** fresh potato prices
  - Price increase; statistically significant
  - Price variance decrease; statistically significant

- **US monthly** fresh potato prices
  - Price increase; statistically significant
  - Price variance increase; statistically significant
ARCH & GARCH Estimation Results:
Summary (cont.)
Russet Burbank shipping point prices (13 series)
- **Price increase;** statistically significant
  → 9 price series
- **Price increase;** not statistically significant
  → 2 price series
- **Price variance increase;** not statistically significant
  → 7 price series
  → fail to reject a negative variance shift under a one-sided Z-test
- **Price variance decrease;** statistically significant
  → 1 price series

ARCH & GARCH Models:
Selected Estimation Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>US ID Russet Burbank, monthly prices</th>
<th>US No 1 Non-size A US No 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>US ID weekly shipping point prices</td>
<td></td>
</tr>
<tr>
<td>$/cwt</td>
<td>$/5 baled 10 lbs mesh bags $/5 baled 10 lbs film bags $/10 baled 5 lbs film bags $/50 lbs bags; min 10 oz counts</td>
<td></td>
</tr>
<tr>
<td>Price Level Equation</td>
<td>ARCH(1) GARCH(2;1)</td>
<td></td>
</tr>
<tr>
<td>The estimated coefficient for the Coop binary variable</td>
<td>3.56a (1.98) 2.53a (2.24) 0.31a (2.10) 0.28a (2.19) 0.25a (1.68) 0.35a (3.68)</td>
<td></td>
</tr>
<tr>
<td>Price Variance Equation</td>
<td>ARCH(1) GARCH(2;1)</td>
<td></td>
</tr>
<tr>
<td>The estimated coefficient for the Coop binary variable</td>
<td>1.443a (2.40) -0.336a (-2.19) 0.003 (0.64) 0.002 (0.45) 0.0003 (0.06) 0.008 (1.11)</td>
<td></td>
</tr>
</tbody>
</table>

Z-statistics are in the parentheses.

\(^a\) Indicates a statistical significance at a 10% alpha level using a two-sided Z-test.
ARCH & GARCH Models: Selection Estimation Results (cont.)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Russet Burbank US No 1 Size A, ID weekly shipping point prices; $/50 lbs carton</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50 counts</td>
</tr>
<tr>
<td></td>
<td>ARCH(1)</td>
</tr>
<tr>
<td></td>
<td>(1;2)</td>
</tr>
</tbody>
</table>

### Price Level Equation

The estimated coefficient for the Coop binary variable:

- $-1.87^a$ (-11.90)
- $0.58^a$ (2.68)
- $0.59^a$ (5.67)
- $0.48^b$ (1.51)
- $0.33^b$ (1.63)

### Price Variance Equation

The estimated coefficient for the Coop binary variable:

- $-0.056^a$ (-2.25)
- $0.001$ (0.03)
- $0.011^a$ (3.53)
- $0.001^b$ (1.38)
- $0.011^b$ (1.32)

Z-statistics are in the parentheses.

- $^a$ Indicates a statistical significance at a 10% alpha level using a two-sided Z-test.
- $^b$ Indicates a statistical significance at a 10% alpha level using a one-sided Z-test.

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**Conclusion**

- The programs and strategies implemented by the United Fresh Potato Growers of Idaho have been successful thus far.
- All fresh potato growers received higher prices since 2005.
- Implementation of the potato supply management program nationally led to:
  - higher fresh potato prices received by growers
  - reduced price risk for potato growers
Questions???

Comments...

Thank You

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