Analysis of Yield and Revenue Insurance for California Vegetables

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Main Points

• Government is trying to find “insurance programs” for fresh vegetables

• Existing programs are unlikely to indemnify growers
Recent Developments in U.S. Crop Insurance

• Late 1999--RMA pursuing development of pilot program for California fresh vegetables: broccoli, cauliflower, celery, and lettuce
Recent Developments in U.S. Crop Insurance

- Agricultural Risk Protection Act 2000
  - Additional $8.2 billion for crop insurance over 5 years
  - Changes existing programs
  - Encourages expansion into “under-served” areas and crops
Case Study-California Broccoli

• Revenue from broccoli accounts for about 25% of broccoli grower income (USDA, 1994)

• Broccoli growers are diversified across vegetable crops
  – Most grow 5 or 6 different vegetables
  – Some grow 15 to 20 different vegetables
  – The most common complements to broccoli are lettuce, celery, and cauliflower
Industry Observers Note:

- Mid 1990’s saw wide-scale adoption of drip irrigation and transplanting.

- Results:
  - More harvests
  - Consistently higher yields
  - Lower prices
  - Less price variability
California Broccoli Average Yield and Gross Revenue per Acre, 1984-1998
## Structural Change in the Industry

<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Mean</td>
<td>28.96</td>
<td>26.94</td>
</tr>
<tr>
<td>Percent Variation</td>
<td>31%</td>
<td>20%</td>
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</table>
Analysis--Important Caveats

- Used county level data for lack of individual grower data.
- Small sample--14 years
Current Insurance Tools for Vegetable Crops

- Non-insured Assistance Program (NAP)
  - Technically not insurance--no premiums
  - Disaster Insurance for Yields
  - Applies Nationally
  - Area Trigger--65%
  - Individual Trigger--50%
  - Indemnity at 60% of USDA set price
Current Insurance Tools for Vegetable Crops

• Non-insured Assistance Program (NAP)
  – Technically not insurance—no premiums ($100 per crop, per county fee--ARPA)
  – Disaster Insurance for Yields
  – Applies Nationally
  – Area Trigger—65% (eliminated by ARPA)
  – Individual Trigger—50%
  – Indemnity at 60% of USDA set price
Policy Analysis--NAP

- Beta distribution of yields, 1984-1998, for Monterey, Santa Barbara, San Luis Obispo, and Imperial.

- Found a low probability of yield trigger being met.
## Beta Distribution--NAP

### Probability of Yield Trigger Being Met for Broccoli, 1999

<table>
<thead>
<tr>
<th>% of Mean</th>
<th>Imperial</th>
<th>Monterey</th>
<th>San Luis Obispo</th>
<th>Santa Barbara</th>
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<tbody>
<tr>
<td>NAP 65</td>
<td>0.003</td>
<td>0.00062</td>
<td>0.00491</td>
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<td>75</td>
<td>0.124</td>
<td>0.008</td>
<td>0.026</td>
<td>0.000</td>
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<tr>
<td>85</td>
<td>0.195</td>
<td>0.062</td>
<td>0.099</td>
<td>0.011</td>
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<tr>
<td>95</td>
<td>0.287</td>
<td>0.271</td>
<td>0.288</td>
<td>0.155</td>
</tr>
<tr>
<td>100</td>
<td>0.341</td>
<td>0.463</td>
<td>0.442</td>
<td>0.427</td>
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</table>
Is there a Natural Hedge?

• Yes--After detrending there was significant negative correlation between yield and price (good evidence for natural hedge)

• So, yield insurance may not make sense anyway
Current Pilot Programs for Vegetable Crops

- Adjusted Gross Revenue (AGR)
  - Whole farm gross revenue insurance
  - Pilot program for selected counties across U.S.
  - Not currently applicable in California
  - 5-Year average of gross revenue reported to IRS
  - Coverage levels differ by number of crops
  - 75% payment rate
Policy Analysis--Monterey AGR

• Beta distribution of per acre revenue 1986-1998

• Three tiers of diversification: 5 vegetables, 8 vegetables, all vegetables

• 25% of total acreage in broccoli
## Beta Distributions--AGR Monterey

### Probability of AGR Trigger Being Met for Broccoli, 1999
(25% of acres in broccoli)

<table>
<thead>
<tr>
<th>Trigger</th>
<th>5 vegetables</th>
<th>8 vegetables</th>
<th>all vegetables</th>
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</thead>
<tbody>
<tr>
<td>0.75</td>
<td>0.012</td>
<td>0.002</td>
<td>0.002</td>
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<tr>
<td>0.8</td>
<td>0.035</td>
<td>0.006</td>
<td>0.008</td>
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<tr>
<td>0.85</td>
<td>0.090</td>
<td>0.018</td>
<td>0.028</td>
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<tr>
<td>0.9</td>
<td>0.326</td>
<td>0.049</td>
<td>0.083</td>
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<tr>
<td>0.95</td>
<td>0.565</td>
<td>0.123</td>
<td>0.209</td>
</tr>
</tbody>
</table>
AGR Summary

• Roughly 1 out of 100 acres will fall below the existing revenue trigger

• Diversification across vegetables decreased probability of indemnification
NAP & AGR Complications

• Little incentive for the “average” farmer to enroll

• Farmers who do enroll:
  – Will be those most likely to fall below the trigger
  – Will have an incentive to grow riskier crops or to undertake riskier practices
Vegetable Insurance Summary

- Structural change has reduced variability in yields and revenues
- Existing yield and revenue triggers would have low expected payouts
Vegetable Insurance Summary

• How do you design an insurance program to indemnify growers with low variability?
  – We don’t know

* A more comprehensive analysis might use individual farm data, and a larger sample size