How Does Crop Insurance Purchase Affect Marketing Contracts Participation: The Case of Peanut

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How Does Crop Insurance Purchase Affect Marketing Contracts Participation: The Case of Peanut
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Background
- Marketing Contracts: specify the quantity and quality of the designated crop, and set a predetermined price for the crop. Integrators share price risks with farmers.
- Yield insurance, e.g., Actual Production History (APH) insurance. Aim to help farmers managing their financial risk.
- From farmer’s perspective, contract farming and crop insurance can be substitutes as they are both risk management tools.
- Just et al. (1999) showed that farmers are mostly interested in getting the subsidy effect of the insurance program.

Empirical Strategy
We use a 2SLS model:

\[ MP_{cat} = \beta I_{cat} + X_{cat}^{\gamma} + u_{cat} + \varepsilon_{cat} \] (6)

\[ I_{cat} = IV_{cat} \delta + X_{cat}^{\eta} + v_{cat} + \varepsilon_{cat} \] (7)

- \( MP \) is the value of peanut production under marketing contract.
- \( I \) is the expenditure on crop insurance, which is generated by calculating the difference of total premium and subsidy.
- \( IV \) denotes the instrumental variables.
- \( X \) is a set of control variables.
- \( \gamma \) denotes the county c, state s, and time t.
- \( u_{cat} \) and \( v_{cat} \) are state by year fixed effects.
- We want to test whether \( \beta \) is significantly positive or negative.

Data
- We merge the data by county \( \times \) year id.
- We use PEANUT as the target crop, because marketing contract is widely used and yield insurance (APH) is available for peanut.

Results

<table>
<thead>
<tr>
<th>Insurance</th>
<th>IV: Weather</th>
<th>IV: Subsidy</th>
<th>IV: Weather</th>
<th>IV: Subsidy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenditure</td>
<td>0.74** (0.217)</td>
<td>0.43* (0.249)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lagged Subsidy</td>
<td>0.36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min Temp.</td>
<td>-1218.93 (699,088)</td>
<td>-1618.11 (1126,129)</td>
<td>303.26</td>
<td>360.87</td>
</tr>
<tr>
<td>Max Temp.</td>
<td>1299.06 (873,120)</td>
<td>1345.17 (1171,391)</td>
<td>6477.44* (3641,118)</td>
<td></td>
</tr>
<tr>
<td>Precipitation</td>
<td>-4.19 (16.798)</td>
<td>17.47** (5.962)</td>
<td>-44.30</td>
<td>28.36</td>
</tr>
<tr>
<td>Gross Income</td>
<td>0.01*** (0.002)</td>
<td>0.01*** (0.000)</td>
<td>0.01*** (0.005)</td>
<td>0.01*** (0.005)</td>
</tr>
<tr>
<td>Acres Operated</td>
<td>-0.04 (0.464)</td>
<td>2.17 (2.208)</td>
<td>0.89</td>
<td>-11.42*** (2.479)</td>
</tr>
<tr>
<td>Harvested Acres</td>
<td>17.38*** (2.541)</td>
<td>24.93*** (10.315)</td>
<td>5.30</td>
<td>369.22*** (20.164)</td>
</tr>
</tbody>
</table>

We consider two instrumenting strategies: using the weather IV and using lagged crop insurance subsidy as IV.

| Constant | -189584.3 (23348.18) | -219124.2 (389501.2) | 782745.0 (281557.3) | 3380174.0 (1068668.3) |
| \( N \) | 961 | 587 | 961 | 587 |
| \( R^2 \) | 0.572 | 0.423 | 0.104 | 0.514 |

Identification
- We consider two instrumenting strategies: using the weather variables as IVs and using lagged crop insurance subsidy as IV.
- We control the state by year fixed effects and cluster the standard error by state.
- The local average treatment effect (LATE) can be identified if the variation in the instrumental variables within a state and a given year is as good as random.

Conclusion
- Considering both weather IV and lagged insurance subsidy IV, results consistently report a positive impact of insurance purchase on value of production under marketing contracts.
- The results are consistent with our theoretic predictions.
- The significant causal effect for peanut is robust under falsification test and can be extended to corn growers.
- Both our theoretic and empirical results suggest that crop insurance and contracting could be complementary tools for farmers.

References

Propositions
- Proposition 1 Let \( w^*(q) \) denote the payment schedule without crop insurance. Then under crop insurance, the new payment schedule \( w^{**}(q) \) pays more than \( w^*(q) \) for realized \( q \) that are higher than insured level \( b \), and pays less than \( w^*(q) \) for realized \( q \) that are less than insured level, i.e.,

\[ |w^{**}(q) - w^*(q)| > 0 \] for \( q \in \{0, q_{US} \} \). (5)

- Proposition 2 Under the assumption that farmers’ utility functions are Constant Absolute Risk Aversion (CARA), then as crop insurance becomes more expensive, the payment schedule \( u(q) \) is lower for all \( q \in [0, q_{US}] \).