Agricultural Technology Intervention, Health Information and Pesticide Use among Farmers: Evidence from China

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 Selected Paper prepared for presentation at the 2017 Agricultural & Applied Economics Association Annual Meeting, Chicago, Illinois, July 30-August 1

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Introduction

- While pesticide use greatly increases agricultural yield, farmers in China have been often accused of overusing pesticides in crop production.
- In China, pesticide overuse may be due to farmers’ lack of knowledge in terms of crop protection, which may be further attributed to poor public agricultural extension services.
- Poor medical facilities in rural China provide poor health information to farmers, which may lead them to be over-optimistic about their health status and continue to intensively use pesticides in crop production.
- In the context of current agricultural extension system, could conventional agricultural technology or health information interventions contribute to pesticide reduction in China?

Data and Model

- **Health examination and health information feedback**
  - Blood complete counts
  - Blood chemistry panel
  - Conventional nerve conduction studies
- **Household survey and data collection**
  - Annual household survey: characteristics and other variables
  - Longitudinal survey: record of pesticide use
  - Training session on how to make desired records
  - Semimonthly or monthly checks
- **Difference-in-differences modeling**
  - The difference-in-differences (DD) model is developed as follows:
  \[
  Q_t^{\text{IT}} - Q_t^{\text{C}} = \alpha + \beta T + \gamma D + \delta \cdot \text{other variables} + \epsilon_t
  \]
  - \(Q_t\): the amount of pesticide use per hectare
  - \(T\): a dummy variable for treatment (e.g., technology intervention)
  - \(D\): a dummy variable for year after treatment
  - \(\alpha\): the number of abnormal health indicators
  - \(\beta\): a group of other control variables
  - Individual characteristics: male, age, education, cadre
  - Household characteristics: labors endowment, cropping structure
  - Risk perception: pests occurring in the preceding year
  - Other variables: villages, and planting season
  - \(\delta\): the time-invariant effect
  - \(\epsilon_t\): the random error term

Objectives

The objectives are as follows:
- To determine the effect of health information intervention on pesticide use;
- To determine the effect of the health information intervention on pesticide use;
- To identify the other factors influencing pesticide use.

Objectives

- **Research duration**: March 2012 to December 2014
- **Intervention duration**: January 2013 to December 2014
- **Locations**: Guangdong, Jiangxi and Hebei

Agricultural Technology Intervention, Experimental Design

- **Research area**: Hebei, Jiangxi, and Guangdong, each 2012 to 2014
- **Observations**: 420 villages among farmers

Household survey and data collection

- **Annual household survey**: characteristics and other variables
- **Longitudinal survey**: record of pesticide use
- **Training session**: on how to make desired records
- **Semimonthly or monthly checks**

Health examinations


Results

<table>
<thead>
<tr>
<th>Year</th>
<th>Treatment 2013</th>
<th>Control 2013</th>
<th>Treatment 2014</th>
<th>Control 2014</th>
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<tr>
<td>2012</td>
<td>12.0</td>
<td>10.3</td>
<td>9.0</td>
<td>6.6</td>
</tr>
<tr>
<td>2013</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td></td>
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</tr>
</tbody>
</table>

**Notes:** * denotes statistical significance at the 10%, 5%, and 1% levels, respectively. \(T\) denotes health indicators. Other control variables are included but not reported. The amount of pesticide use is measured by kg/ha.

Discussion and Conclusions

- Conventional agricultural technology intervention in the context of current agricultural extension system may be ineffective in leading farmers in China to use less pesticide.
- Health information feedback significantly affects farmers’ pesticide use, but the probability of heterogeneity should be further investigated.
- Individual and household characteristics, and risk perception may also affect farmers’ pesticide use.

References