Recent Advances in Impact Analysis Methods for Ex-post Impact Assessments of Agricultural Technology: Options for the CGIAR

Discussion Points
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Two Major Points for Discussion

• Microeconomic methods of impact evaluation
  – Issues around ‘adoption’ of technology
  – Practicality issues
• Microeconomic methods of impact evaluation vs. long-term/aggregate ex post IA of agricultural research

Microeconomic Methods of IA: Suggested by the authors

• Randomized experiments where the village or community is the unit of randomization
• Supply-side interventions where the new technology is introduced to entire villages
  – Leverage public-private-civil society partnerships to perform supply-side interventions
• Natural experiments: exploiting randomness in the rollout, geographic discontinuity

Issues of “adoption” and practical challenges in doing experimentation

• Reality: In the initial stages (when the suggested methods are most applicable), farmers may not adopt a technology 100% on their farm.
  – How to experiment when adoption may not be a binary decision but a continuous variable?
  – What is the average effect really measuring when the ‘treatment’ group will have partial adopters?
• Reality: Farmers often adopt a package of inputs and practices rather than a single technology
  – What is the average effect really measuring when the ‘treatment’ group will have adopters adopting different packages?
Issues of “adoption” and practical challenges in doing experimentation

- Reality: Adoption can occur as a result of spontaneous uptake or a result of planned outreach efforts done by entities other than the research organization
  - How practical it is to leverage public-private-NGO partnership to implement supply-side interventions?
  - How to control the effects of “outreach” efforts? How to ensure that the only difference between a treatment and control village is the “technology”?

Second point

- Microeconomic methods of impact evaluation vs. long-term/aggregate ex post IA of agricultural research

 Characteristics of agricultural R4D

- Long time from research to development impacts
- Realization of ‘development impacts’ requires large scale adoption of research outputs
- Adoption— a necessary condition—but not directly controlled by researchers
  - Many other factors interact and influence adoption decision
- Very few research outputs are sustainably adopted at large scale
- Which outputs will be adopted on a large scale cannot be known a priori
### Impact Pathway of Agricultural R4D

![Impact Pathway Diagram](impact_pathway.png)

### Salient Features of Ex Post Impact Assessment (CGIAR’s perspective)

<table>
<thead>
<tr>
<th>Features</th>
<th>Ex post Impact Assessment (epIA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus of the analysis</td>
<td>Impact indicators</td>
</tr>
<tr>
<td>Timing</td>
<td>Conducted at the stage when research outputs are already scaled-up and scaled out either through spontaneous uptake/adoptive or deliberate outreach efforts (i.e., reached GE effects)</td>
</tr>
<tr>
<td>Main evaluation question addressed</td>
<td>What are the total program impacts (benefits and costs) generated over space and time as a result of output uptake and adoption?</td>
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<tr>
<td>Main impact parameters estimated</td>
<td>Total effect as a function of $E_s$ (effect size) and $E_c$ (effect scale). Parameters $E_s$ and $E_c$ may be sourced from other independent studies/assessments (including microeconomic methods).</td>
</tr>
<tr>
<td>Unit of impact analysis</td>
<td>Project, program or system (spanning many geographic areas and time periods)</td>
</tr>
<tr>
<td>Main evaluation function (from research management perspective)</td>
<td>Accountability and strategic validation; Aim is to obtain plausible range of total impacts (lower bound estimates)</td>
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### Methods used in ex post IA (to assess long-term aggregate impacts)

Briefly discussed in the paper:

- Panel data analysis
- Extrapolating micro results with partial equilibrium simulation models
- Poverty simulation
- Computing aggregate impacts with general equilibrium simulation models
What goes in and comes out of impact analysis?

Ex post IA (long-term, aggregate)
Inputs:
- Simulations/models
- Theory
- Assumptions
- Extrapolation
- Sensitivity analysis
- Secondary data
Outputs (what is pursued):
- **Plausible** orders of magnitude of aggregate effects (GE effects)

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Microeconomic methods of Impact evaluation
Inputs:
- Comparison of outcome indicators between adopters and non-adopters
- Counterfactual
- Survey data
Outputs:
- Causality between adoption and outcomes (partial equil. Effects)

One of the challenges faced by epIA

- How to increase the **rigor** of the analysis?

Impact Pathway of Agricultural R4D

![Impact Pathway Diagram]
1. Definition of ‘Rigor’

According to proponents of ‘evidence-based policy,’ the key to defining rigor and scientific quality of studies that assess cause and effect relationship is the ability of a method to eliminate spurious causality and bias

– Can this definition of rigor be applied to ex post IA focused on long-term aggregate impacts?
– If not, how is ‘rigor’ defined and pursued in epIA?
– If yes—what is the rationale for doing epIA (because ‘causality’ is difficult to establish ex post of large scale adoption)

2. The paper suggests several options to increase the rigor of estimating the average effect of a technology using microeconomic methods of IE

3. But these methods are not without costs

Therefore:

– Will increasing the rigor in estimating the average treatment effect necessarily increase the rigor of aggregate level epIA?