The Agricultural Sector in the Analysis of the Poverty Impact of Macro Policies and Shocks: Issues and Technique

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Introduction

• Important topic for PEP Network: Agriculture is the main income source for poor people
• Vast topic — drawing on IFPRI work, some aspects will be covered.
• Outline
  – Data
  – Producer behavior
  – Model structure
  – Policy issues
  – Concluding remarks
Data

- SAMs for poverty analysis should include a detailed disaggregation of
  - poor and near-poor households; and
  - the factors, activities, and commodities that are important in their income generation and consumption.

- Typically, many of these households, factors, activities, and commodities are agriculture-related.

- Consistent datasets showing base-year payment flows also useful starting point for partial models.
(cont.) Data

• Structure of agriculture-focused SAMs for poverty analysis:
  – For any commodity, often multiple activities (with related factors) disaggregated by:
    • Farm size
    • Region
    • Basic technology (rain-fed vs. irrigated)
  – For some activities, multiple commodities (animal vs. human consumption)
  – Transactions costs
  – Home consumption vs. market sales
## Figure. SAM Structure

<table>
<thead>
<tr>
<th>Receipts</th>
<th>Activities</th>
<th>Commodities</th>
<th>Factors</th>
<th>Domestic Institutions</th>
<th>Rest of World</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>Activity income</td>
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<td>Activities</td>
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<tr>
<td>Commodities</td>
<td>Intermediate inputs</td>
<td>Market sales</td>
<td>Home consumption</td>
<td></td>
<td></td>
<td>Commodity demand</td>
</tr>
<tr>
<td>Factors</td>
<td>Value added</td>
<td></td>
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<td>Factor income</td>
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<tr>
<td>Domestic Institutions</td>
<td>Taxes</td>
<td>Tariffs, Taxes</td>
<td>Transfers, Taxes, Savings</td>
<td></td>
<td></td>
<td>Institution income</td>
</tr>
<tr>
<td>Rest of World</td>
<td></td>
<td>Imports</td>
<td>Transfers, Savings</td>
<td></td>
<td></td>
<td>Foreign exchange outflow</td>
</tr>
<tr>
<td>Totals</td>
<td>Activity spending</td>
<td>Commodity supply</td>
<td>Factor spending</td>
<td>Institution spending</td>
<td></td>
<td>Foreign exchange inflow</td>
</tr>
</tbody>
</table>
(cont.) Data

– Disaggregation relevant to policies (current or potential)
– Factor disaggregation sensitive to institutional structure

• Entropy techniques for SAM estimation

… a SAM is only a database … what about agent behavior
Producer behavior

• Default: profit-maximization subject to nested production technology (CES for value-added, Leontief for intermediates, …)

• Often not the best approach when modeling agricultural producers:
  – Too limited input substitutability
  – Difficult to incorporate available data (elasticities, output and input quantities per land unit)
  – Activities cannot (dis)appear
(cont.) Producer behavior

• Alternatives:
  – Different nesting (not full separation between factors and intermediates)
  – More flexible neoclassical functional forms
  – Activity analysis

• Activity analysis requires MCP (Mixed-Complementarity Programming)
Digression: MCP

- Simultaneous system of equations including
  - strict equalities and/or
  - inequalities linked to non-negative variables in complementary slackness conditions
- Kuhn-Tucker conditions and standard CGE models as special cases.
- Every LP and NLP model can be formulated as an MCP model ➔ possible to draw on a rich literature in agricultural economics while avoiding some drawbacks.
(cont.) Digression: MCP

• Examples of applications:
  – Activity analysis

\[
MC_a \geq MR_a \\
QA_a \geq 0 \\
(MC_a - MR_a)QA_a = 0
\]

– Multiple (sub)activities for any base activity (to capture substitutability), incorporating data from agricultural economists
(cont.) Digression: MCP

- Application to production:
  - analysis of structural change (in technology or production pattern)

- Other applications:
  - Regime switches in trade (for household, region, country)
  - Non-scarce resources
  - Price floor and price ceilings with buffer stocks
  - TRQs
Model structure

- A CGE model adds value if economywide feedbacks significantly condition the impact of the policy or shock that is considered.
- Potential drawbacks of CGE approach
  - More costly in terms of time, data, and analytical skills
  - Weaker representation of policies and sectors of interest
  - More difficult to interpret results
- Trade-offs can be mitigated if CGE modelers learn from sector analysis and make analysis transparent.
(cont.) Model structure

- Often, a CGE model calibrated to an appropriately structured SAM provides a good starting point for analyzing the impact of macro and sector policies on poverty and welfare.
- IFPRI standard model (background document)
- Alternative approaches to generating poverty and inequality data.
(cont.) Model structure

- Key modeling issues and challenges
  - Treatment of factor markets
  - Farm household as integrated producer-consumer
  - Regional aspects
  - Risk
  - Impact of public spending
  - Dynamics
Key Policy Issues

• Impact of interventions on the poor (male and female) in general and the rural poor in particular:
  – Agricultural R&D and extension
  – Infrastructure
  – Market access (domestic, regional, global)
  – Risk mitigation
  – Trade-offs in public spending (education, health, agricultural R&D, ….)
Concluding remarks

• Data is a severe constraint

• Need for increased emphasis on:
  – Empirical policy and sector detail
  – Increasing effectiveness and efficiency of model-based policy analysis (data, time, transparency, packaging)
Selected Readings

• See separate list.