An Overview of India COSIMO Model

Shesadri Banerjee (NCAER), Shashanka Bhide (MIDS), Bhaskar Goswami (FAO)

Presented at the Workshop on

The Future of Indian Agriculture: Policy Options for Competitive, Inclusive, and Sustainable Growth

New Delhi, April 8-9, 2015
Scheme of Presentation

- AGLINK – Commodity Simulation Model (COSIMO)
- India Stand Alone COSIMO Model
  - Constituents of the Model
  - Solving the Model
  - Scenario Analysis
- Further Work
The AGLINK-COSIMO model

- is an integrated system to generate short, medium and long term projections for major agricultural commodities.

- is used to assess global supply, demand and trade, and their driving factors.

- can generate various scenarios to analyze emerging market and policy issues.

- aims to develop a ‘consensus analyses’on the future evolution of international commodity markets.
AGLINK–COSIMO Framework

Key features of the model:

- Supply-Demand equilibrium.

- Interactions between domestic and international markets.

- Provides the ‘baseline’ for comparison and forming expectation.

- Comprehensive coverage of both crop and livestock commodities.

- Flexible to incorporate a number of policy features.

- Suitable for policy simulations.
AGLINK–COSIMO Framework

Aglink-Cosimo model

FAOSTAT/OECD Database
Time series for production, consumption, stocks, GDP, tariffs, exchange rates, prices, costs...

Population
Income
Consumption (food, feed, other use)
Ending stocks
Exports

Domestic price (internal market clearing)

Production
Opening stocks
Imports
Area/livestock
Yield

Net trade (exports – imports)

World trade balance
\[ \sum EX = \sum IM \]

Equilibrium world price
Advantages of the model:

- it provides scope for the disaggregated analysis.

- the structure of the model is flexible for any modification and extension.

- it has minimal data requirement.
## India COSIMO Model

<table>
<thead>
<tr>
<th>AGLINK</th>
<th>COSIMO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Algeria</td>
</tr>
<tr>
<td></td>
<td>Malaysia</td>
</tr>
<tr>
<td></td>
<td>Uruguay</td>
</tr>
<tr>
<td>Argentina</td>
<td>Bangladesh</td>
</tr>
<tr>
<td></td>
<td>Mozambique</td>
</tr>
<tr>
<td></td>
<td>Vietnam</td>
</tr>
<tr>
<td>Brazil</td>
<td>Chile</td>
</tr>
<tr>
<td></td>
<td>Pakistan</td>
</tr>
<tr>
<td></td>
<td>Zambia</td>
</tr>
<tr>
<td>Canada</td>
<td>Colombia</td>
</tr>
<tr>
<td></td>
<td>Paraguay</td>
</tr>
<tr>
<td>China</td>
<td>Egypt</td>
</tr>
<tr>
<td></td>
<td>Peru</td>
</tr>
<tr>
<td>EU-27</td>
<td>Ethiopia</td>
</tr>
<tr>
<td></td>
<td>Philippines</td>
</tr>
<tr>
<td>Japan</td>
<td>Ghana</td>
</tr>
<tr>
<td></td>
<td>Saudi Arabia</td>
</tr>
<tr>
<td>South Korea</td>
<td>India</td>
</tr>
<tr>
<td></td>
<td>South Africa</td>
</tr>
<tr>
<td>Mexico</td>
<td>Indonesia</td>
</tr>
<tr>
<td></td>
<td>Sudan</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Iran</td>
</tr>
<tr>
<td></td>
<td>Tanzania</td>
</tr>
<tr>
<td>USA</td>
<td>Israel</td>
</tr>
<tr>
<td></td>
<td>Thailand</td>
</tr>
<tr>
<td>Norway</td>
<td>Kazakhstan</td>
</tr>
<tr>
<td></td>
<td>Turkey</td>
</tr>
<tr>
<td>Switzerland</td>
<td>Nigeria</td>
</tr>
<tr>
<td></td>
<td>Ukraine</td>
</tr>
</tbody>
</table>
## Constituents of the Model

### List of Commodities

<table>
<thead>
<tr>
<th>Wheat</th>
<th>Beef</th>
<th>Skim Milk Powder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coarse Grains</td>
<td>Sheep Meat</td>
<td>Whole Milk Powder</td>
</tr>
<tr>
<td>Rice</td>
<td>Pig Meat</td>
<td>Cheese</td>
</tr>
<tr>
<td>Oilseeds</td>
<td>Poultry</td>
<td>Butter</td>
</tr>
<tr>
<td>Vegetable Oils</td>
<td>Eggs</td>
<td>Fresh Dairy Products</td>
</tr>
<tr>
<td>Oilseed Meals</td>
<td>Cotton</td>
<td>Bio-fuels</td>
</tr>
<tr>
<td>Roots and Tubers</td>
<td>Sugar</td>
<td></td>
</tr>
</tbody>
</table>
Behavioural structure of the India COSIMO Model

Supply Side

- Crop production: Cropped area, Yield, and Production

- Oilseed products
  - Oilseed meal production, Protein meal production
  - Oilseed oil production, Vegetable oil production

- Meat production: Livestock Inventory and Indigenous meat production

- Milk production: Cow Inventory, Cow yield, Milk production, and Milk products

- Beginning Stock

- Imports
COSIMO Model Constituents

Demand Side

- Food demand
- Feed demand
- Bio-fuel crop feedstock demand
- Crop other use
- Ending Stock
- Exports
COSIMO Model Constituents

- **Prices**
  
  Export price = world price * (1+export wedge) * exchange rate  
  Import price = world price * (1+tariff+import wedge) * exchange rate

  Producer price: Domestic market clearing  
  Production + Stocks (-1) + Imports = Consumption + Stocks + Exports

  Consumer price: Consumer price = f (producer price, deflator)

- **Parameters**
  - capture interrelationships among the variables  
  - determine the properties of the model  
  - ensure stability of the solution

- **Data Requirements**: Annual time series for the endogenous (1983 – 2014) and exogenous variables are used (1983 – 2014 are historic and 2015 – 2024 are projected).
Solving the Model

- Endogenous
- Exogenous
- Data
- Model
- Parameters
- Projections
Scenario Analysis
Scope for Future Works

- More inputs on the elasticity coefficients and share parameters.
- A new block on ‘Pulses’.
- A new segment of Public Distribution System (PDS) to address the impact of National Food Security programme.
Comments and Suggestions