Lecture 1.1:

An Introduction to General Equilibrium Policy Modeling

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Computable General Equilibrium (CGE) Model Training Workshop
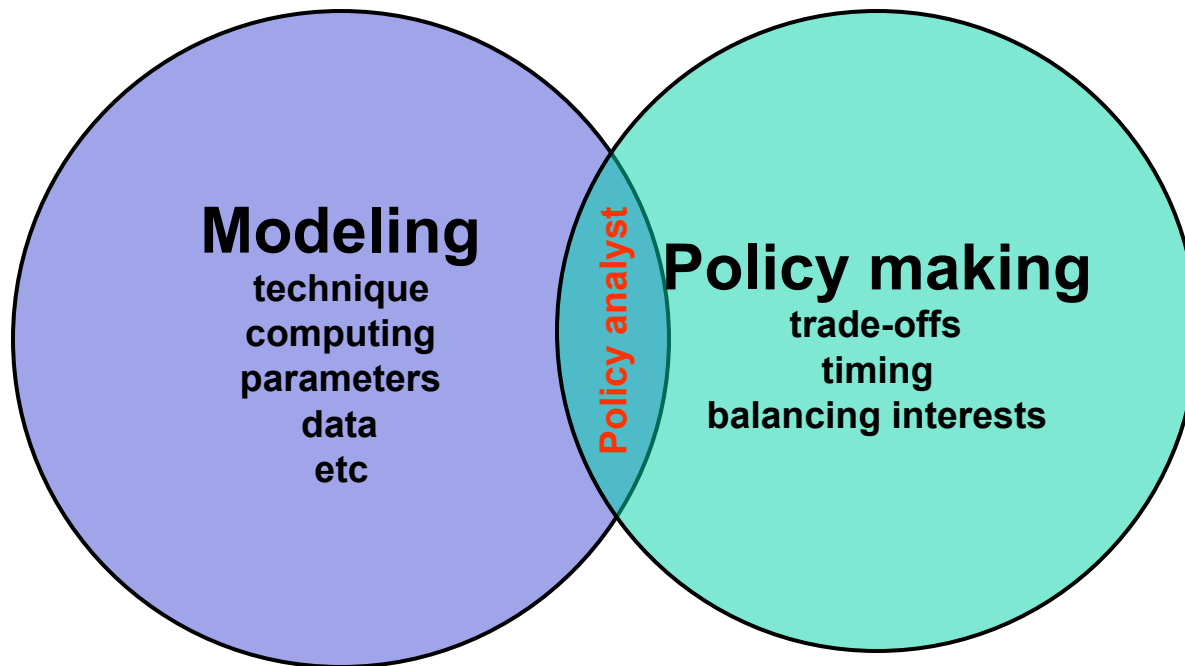Workshop on Regional Economic Cooperation Database and Modeling
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Contents

1. General considerations for policy modeling
2. Examples of CGE applications
3. Overview of Social Accounting Methods
4. Overview of CGE Modeling

Policy analyst's balancing act

Modeling
technique
computing
parameters
data
etc

Policy analyst

Policy making
trade-offs
timing
balancing interests

CGE Modeling Offers

The modern economy is far too complex for simple rules of thumb to achieve anything approaching optimality.

To support more effective responses, Computable General Equilibrium (CGE) models improve visibility for policy makers in three important areas:

- Linkages and Indirect (and otherwise invisible) effects – these may significantly outweigh direct effects

- Tradeoffs and Substitution patterns – ex ante assessment

- Effects of resource and other constraints

Preliminaries

- Study the problem and how it has been addressed in the past
- Study the things that most concern the policy maker

Modeling

- Think about the General Equilibrium aspects of the problem
  - Why are we using a GE model for this issue?
- Get the modeling right
  - Make sure the problem is represented in the model
  - eg must have base tariffs if they are to be removed
- Understand and explore the results
  - What key parameters or data drive the results
  - How do changes in these change the results

Communication

- Explain without any technical detail
- Address policy makers concerns
- Repeat all the steps as necessary

Examples of GE Applications

- Agricultural Policy
- Resource Development
- Trade policy
- Public Finance
- Infrastructure Investment
- Environmental Policy
- Poverty and Inequality

- The issue
  - What does agriculture contribute to the economy and what does the (domestic and international) economy contribute to agriculture
  - What are the detailed effects of agriculture policy?
- Why a CGE model?
  - Agriculture remains a dominant sector in China, the most important source of income for the poor, and will experience many transitions in the next generation
- Key insights
  - Agriculture can be a main driver for growth and poverty alleviation, but the composition of this growth will be very complex
  - Big contrast with partial equilibrium analysis

- The issue
  - How do bilateral, regional, and global policies influence domestic employment and income?
- Why a CGE model?
  - Trade policy is the classic GE problem
- Key insights
  - In most regional and global supply chains, there is a rich story about how the benefits and costs of trade policy are distributed.

- The issue
  - How do taxes and public goods affect behavior and wealth?
- Why a CGE model?
  - Indirect effects can far outweigh direct ones
- Key insights
  - Overall gains very small and
  - Very sensitive to some key assumptions

Environmental regulation

- ## The issue
  - Effects of regulations such as:
    - pollution
    - Resource (water, fisheries, forestry) policy
- ## Why a CGE model?
  - Still emerging in a live policy debate
  - Energy and water, for example, key inputs to all production processes
- ## Key insights
  - Environmental policies have many indirect effects

Poverty and Inequality

- ## The issue
  - How to influence the real composition of income and growth?

- ## Why a CGE model?
  - Institutional detail is essential
  - Relative incomes are determined by relative prices
  - Constraints play a major role in incidence and distribution

- ## Key insights
  - Who are the winners and how can they be enlisted to support policy?
  - Who are the losers and how can they be compensated?

Why Model?

- It may seem obvious why modeling is important, but I want to emphasize that economic and other policy modeling is not limited to just forecasting.

- As (and if not more) importantly, modeling can provide policymakers with the visibility to
  - identify opportunities and potential challenges before policies are implemented (ex ante)
  - address problems that may arise after implementation (ex post).

- An example will help to illustrate this point.

- Consider the case of a poor country that is considering whether to build a new highway to support foreign tourism.

- Based on current characteristics of tourism, demand forecasts, and extrapolation, the country's economists predict that the new road will increase the country's GDP by 10%.

- Should the country build the road?

- If the influx of tourists drove up food prices for the country's majority urban poor, that would undermine the country's poverty alleviation goals.

- If sufficient detail is included in structural models, policymakers can anticipate problems and plan for them.

- In this example, the country's policymakers might respond by building the road, but adjusting agricultural and import policies to lessen constraints on food supplies.

Policy makers need visibility about trends and linkages.

Economic models make a lasting contribution to this under three conditions:

1. They must incorporate advanced data and methods.

2. Results must be transparent.

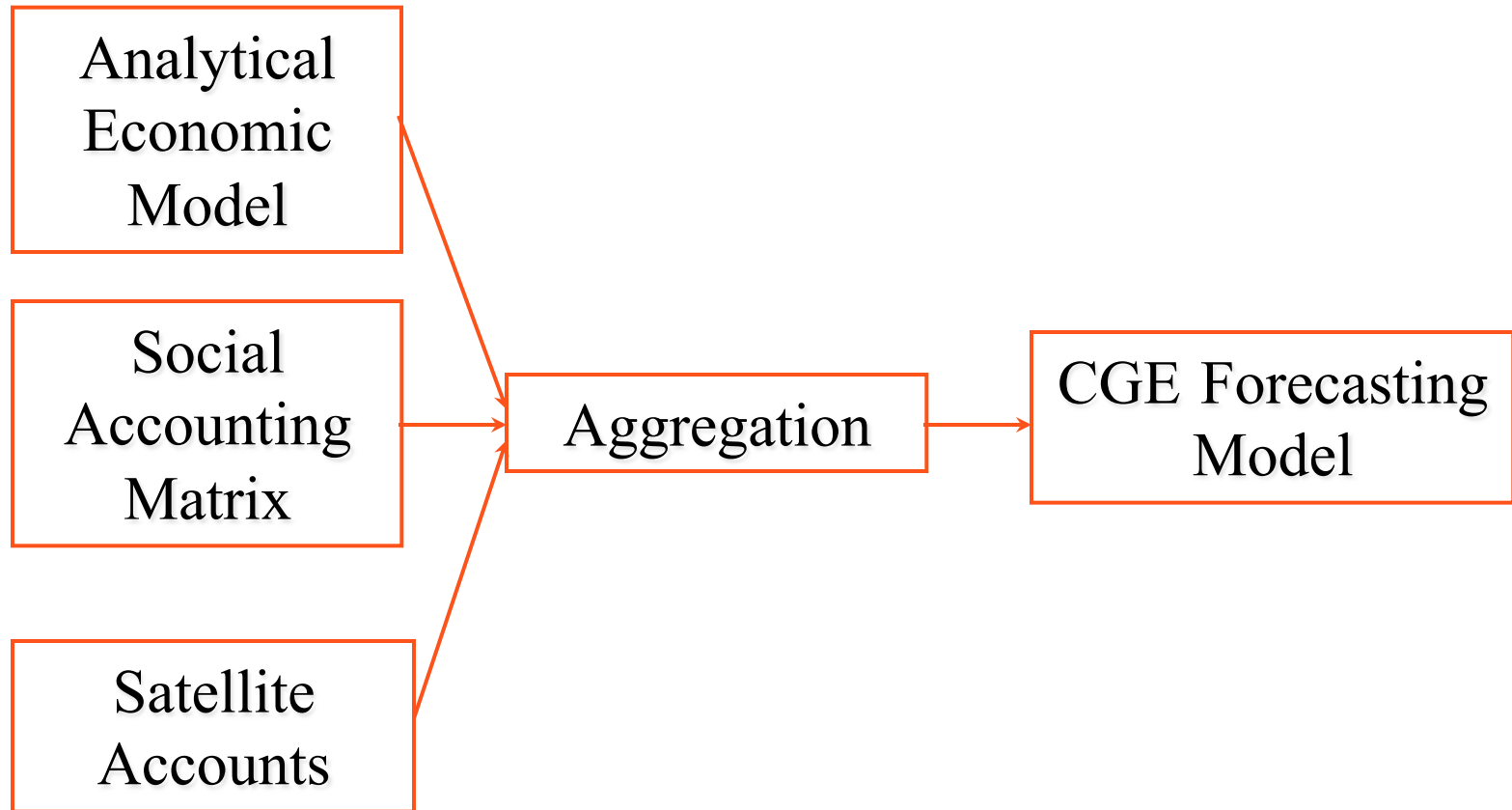3. Should be locally implemented.

1. Static CGE – Comparative Static
   1. Advantages – Simple
   2. Disadvantage – Simple, time ambiguous
2. Dynamic CGE
   1. Advantage – more timely for policy work
   2. Disadvantage – more data intensive
3. Stochastic CGE
   1. Advantage – Explicitly models uncertainty
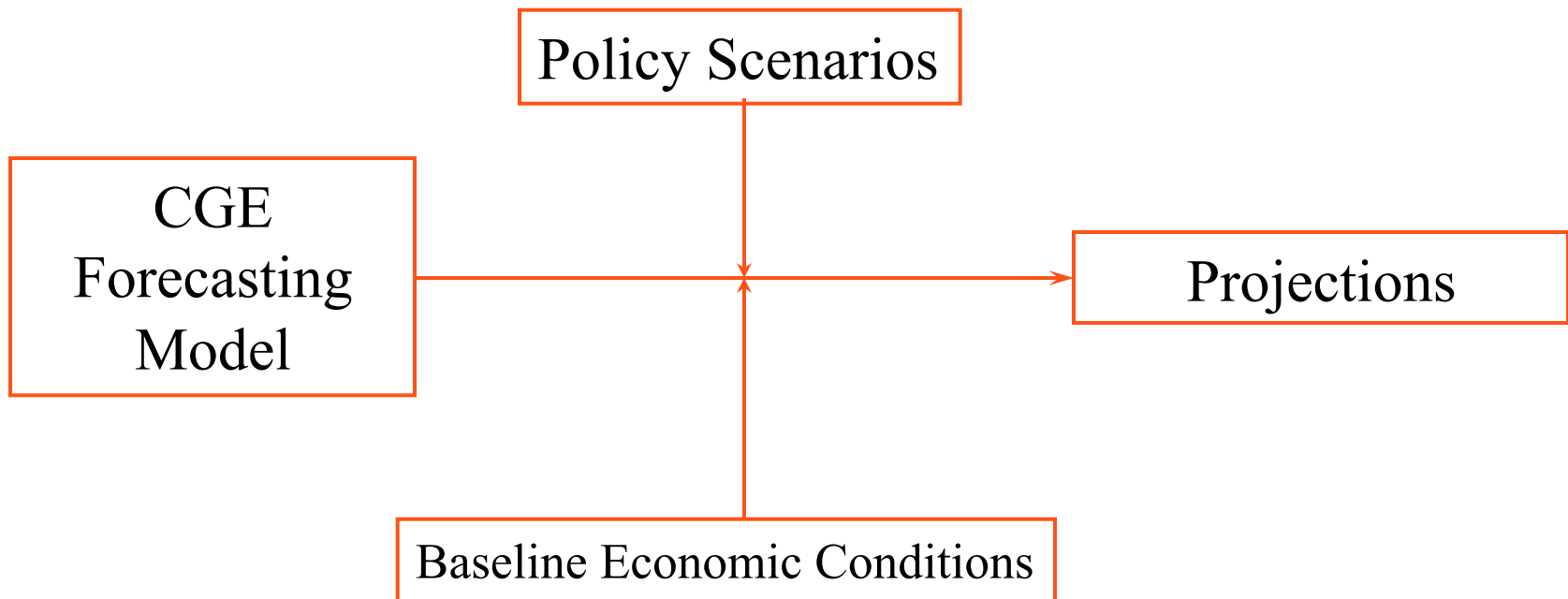   2. Disadvantage – very intensive

1. **National research prototype model** – A state-of-the-art single country CGE model, exist now for over 70 countries

2. **Multiregional and Multi-national models** – A model based on a multi-country framework, with flexible regional aggregation.

    1. Examples

        1. GTAP – Global (124 countries, 57 sectors)

        2. EAGLE– US (50 states, 509 sectors)

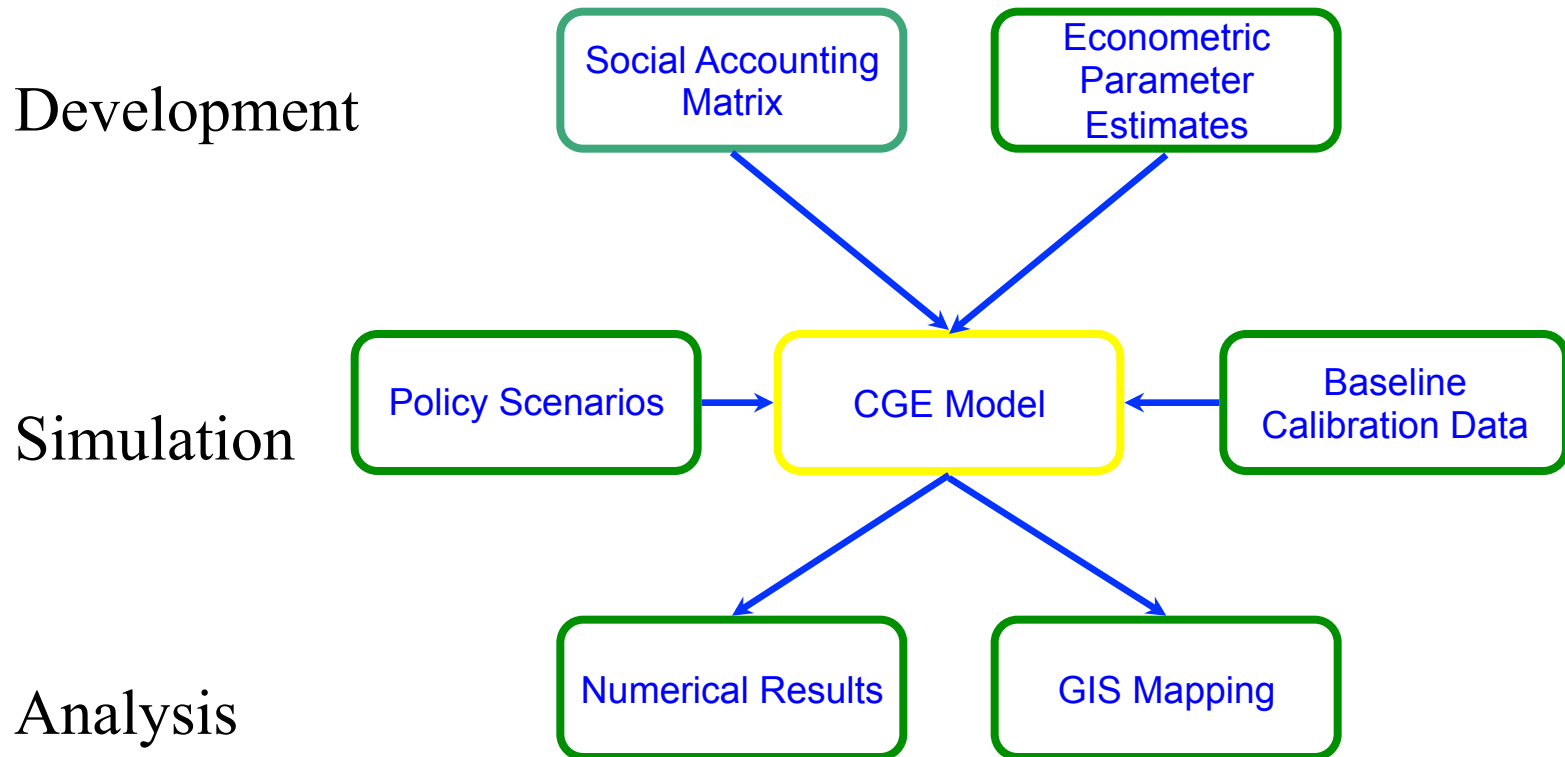   3. Cargo – CAREC economies, Rest of the World

Policy Scenarios

CGE Forecasting Model

Projections

Baseline Economic Conditions

Single Country Model: A Schematic View

Development

Social Accounting Matrix

Econometric Parameter Estimates

Simulation

Policy Scenarios → CGE Model ← Baseline Calibration Data

Analysis

Numerical Results

GIS Mapping

Box Color Key to Software Implementation:
Green – Microsoft Excel
Yellow – GAMS

Discussion?