Approaches to Measuring the Effects of Trade Agreements

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“Ask five economists and you'll get five different answers – six if one went to Harvard.”

Edgar R. Fiedler

An Abundance of Answers

- Abundance of economic approaches to measuring effects of trade agreements
- Different approaches often give very different results
- Creates confusion and undermines credibility among policy-makers and the public

Goals of This Presentation

- Lay out criteria for choosing among modeling approaches
- Describe the key approaches to measuring the effects of trade agreements
- Focus on the relative strengths and weaknesses of each approach

Choosing Among Approaches

- Wrong: Which economic approach is the best one?
- Right: Which economic approach is the best one to answer the questions that I have?

No “One Size Fits All” Model

- No single economic model can fully capture all the impacts of a complex trade agreement
- Different models are designed for different purposes
- A model must ultimately be judged on whether it answers the questions it was designed to answer

Extraneous Considerations

- Which approach is my agency (or am I) the most familiar with?
- In which approach have we invested the most resources?
- Which approach is intellectually fashionable at the moment?

Qualitative or Quantitative?

- In some cases a qualitative approach using economic theory and intuition is sufficient
- In other cases only a quantitative approach will suffice
  - "How big" or "how small" questions
  - When economic theory can't say whether something goes up or down

Models vs. Modeling Approaches

- This presentation focuses on modeling approaches, not on specific models
  - Example: CGE modeling in general, not the GTAP model
- A specific model may or may not show a modeling approach in the best light

Judge Based on Past Performance?

- Modellers can learn from past failures to accurately project effects of trade agreements
  - Erroneous NAFTA projections
- Every model can always be improved
- Each key modeling approach has had enough success to prove its worth

Key Modeling Approaches

- Econometric Modeling
- Simulation Modeling

Common to Both Approaches

- A system of mathematical equations that depict selected relationships in an economy or group of economies
- Parameters in each equation that influence how one economic variable is related to another
  - Positive or negative relationship
  - Strong or weak relationship

Difference Between Approaches

- Econometric: parameter values are estimated using statistical techniques
- Simulation: parameter values are drawn from a variety of sources
  - Prior econometric studies
  - Other simulation models
  - Intuition and judgment

Hybrid Models

- Econometric models in which some estimated parameters are adjusted based on intuition and judgment
- Simulation models in which some parameters are econometrically estimated
  - Example: estimated Armington elasticities in GTAP model

Benefits of Parameter Estimation

- Parameter estimates come with confidence intervals, so modeller can see precision of estimates
- Parameters drawn from other studies may not be right for the model at hand
  - Example: parameters estimated at higher or lower level of product aggregation than in model

Drawbacks of Parameter Estimation

- Intensive in research resources that could be used elsewhere
- Most parameter estimation methods lock in a particular product/sectoring scheme
- What happens if the parameter estimates are unsatisfactory?

Types of Econometric Models

- Models of trade flows between countries (gravity model)
- Models of the economic impacts of trade
  - Employment and wages
  - Productivity
  - Competition
  - Firm survival and exit

Gravity Model

- Seeks to explain bilateral trade flows between countries
- Trade flows proportional to the product of the national incomes of the two countries
- Trade flows inversely related to either global income or to the distance between the two countries

Distance in the Gravity Model

- Not just physical distance but economic "distance" created by:
  - Trade barriers
  - Presence of absence of customs unions, common borders
  - Economic and political institutions
  - Differences in languages, ethnicities or religions
  - Other factors

Success of the Gravity Model

- One of the great success stories in empirical economics
- Originally thought to have no real theoretical foundation
- Now proven to be consistent with a variety of economic theories of international trade

Models of Economic Impacts of Trade

- Some designed to shed light on short-term costs of trade (unemployment, plant closings)
- Others designed to shed light on longer-term effects of trade on competition and productivity
  - Effects missing from most standard models of trade impacts

Advantages of Econometric Models

- Real data and, assuming a study is methodologically sound, real results
- Provide an opportunity to learn from recent economic history

Drawbacks of Econometric Models

- Results are often specific to one country or one pair of countries
  - Example: How relevant are CUSTA study results for countries other than Canada and the US?
- Results are specific to some trade agreement already in place
  - May not apply to a trade agreement with different terms

Drawbacks of Econometric Models

- Results are historical in nature, and may no longer be relevant
  - A new trade agreement may lead to a new economic environment where historical relationships no longer hold
  - “Economic history is all about structural change and econometrics is all about avoiding it.” (Richard Just)

Types of Simulation Models

- Partial equilibrium (PE) models
- Computable general equilibrium (CGE) models
  - Also known as applied general equilibrium (AGE) models

Partial Equilibrium Models

- Model the agricultural sector or part of it in one country or a group of countries
- Consider the agricultural sector as a closed system that doesn't have significant effects on the rest of the economy
  - The rest of the economy can still affect the agricultural sector

CGE Models

- Model all goods and services in an economy simultaneously for one country or a group of countries
- Consider the agricultural sector as an open system that can potentially have significant effects on the rest of the economy

PE vs. CGE: Economy-Wide Linkages

- CGE models capture linkages among all sectors of an economy
- The agricultural sector could have significant effects on national income (and in turn food demand), exchange rates, wage rates, and other economy-wide variables

PE vs. CGE: Economy-Wide Linkages

- Economy-wide linkages are important for developing countries where production agriculture is a large percentage of economy
- Also important if studying food processing sectors in any economy

PE vs. CGE: Conceptual Consistency

- CGE models force conceptual consistency by acknowledging a fixed resource base (land, labour, and capital)
- CGE models also include budget constraints for households and the government
- PE models generally lack budget and resource constraints

PE vs. CGE: Consistency with Theory

- CGE models are designed from the ground up to be consistent with economic theory
- Most PE models are not consistent with theory on either supply or demand sides
- CGE models more appropriate for social welfare calculations

PE vs. CGE: Complexity

- CGE models are highly intensive in data and parameters
  - Social accounting matrix (SAM) showing all transactions among sectors of an economy
- This complexity may yield only marginal gains over insights from simpler PE models

PE vs. CGE: Disaggregation

- Disaggregating a model to a fine level of product detail is more feasible in a PE model
- Generally lack the data to disaggregate a SAM to a very fine level of product detail
  - Example: corn disaggregated to GM and non-GM

PE vs. CGE: Policy Representation

- Agricultural policies should be represented in a model:
  - Accurately
  - Tractably
  - Consistently with economic theory
- Agricultural policies are complex
- These three goals often come into conflict

PE vs. CGE: Policy Representation

- CGE models seek consistency with theory, sometimes at the expense of accuracy
  - Price “wedges”
- PE models can sacrifice theoretical purity when essential for accuracy and tractability

PE vs. CGE: Timeliness

- Most SAMs are out of date even before they're released
  - GTAP's newly-released (version 6) database is for 2001
- PE models are often used for projections where up-to-date data are essential

PE vs. CGE: Length of Run

- Most CGE models make assumptions that are long-run in nature
  - Perfect factor mobility (labour, capital, materials) among sectors
  - Fairly high substitutability among inputs into production

PE vs. CGE: Length of Run

- Supply elasticities in PE models tend to be much lower than those implied by CGE models
- CGE models better for long-run analyses, PE models for short-run analyses

PE vs. CGE Scorecard

	CGE	PE
Economy-Wide Linkages	✓	
Conceptual Consistency	✓	
Consistency with Theory	✓	
Complexity		✓
Disaggregation		✓
Policy Representation		✓
Timeliness		✓
Length of Run	✓	✓

Studies Comparing PE vs. CGE

- Several studies have attempted to compare PE and CGE results
- Should compare like with like
  - PE model should be similar in structure to the agricultural sectors of a CGE model
- Studies comparing like with like find similar results between the two approaches

The Bottom Line

- Different models are designed for different purposes
- Use the modeling approach best suited to answer the questions that you have

Econometric Models: Bottom Line

Use econometric models to:

- Help settle debates over existing trade agreements
- Better understand short-run and long-run consequences of trade agreements not included in most existing simulation models

CGE Models: Bottom Line

Use CGE models to:

- Analyze developing countries
- Analyze food processing sectors
- Study effects on employment
- Perform aggregate social welfare calculations
- Analyze long-run effects

PE Models: Bottom Line

Use partial equilibrium models to:

- Study products at fine level of detail
- Accurately represent complex agricultural policies
- Meet clients' needs when up-to-date data are essential
- Analyze short-run effects