

Exploring the Relations between Input-Output Models and Computable General Equilibrium Models

Topic: 516C Special session: Exploring the Interface between IOA and CGE

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The square matrices A and $(I - A)^{-1}$ are calculated historically from a flow table in money values for a past year. This origin assures that $x = (I - A)^{-1} y$, the equality that comprises the basic input-output model. The accounting database describes the past, and the basic model is able to reveal underlying linkages in that economy. New values for x or p can be calculated for assumed changes in y or v , but the model provides no basis for making these assumptions. Analyzing scenarios about the future requires shifting the framework from description to explanation of key relationships among consumption, production, and exchange activities.

My research has involved formulation of the World Trade Model and the Rectangular Choice-of-Technology Model (with S. Levine), both formulated as constrained optimization models reflecting the theory of comparative advantage. Both offer choices among alternative technologies subject to physical constraints on production. Demand impacts prices of both factors and goods, while (the exogenous portion of) factor prices impact production choices among technologies and among geographic regions. Our dynamic input-output model (with D. Szyld) imposes inter-temporal inter-sectoral consistency and assures that the profits of a sector, plus any borrowing from other income streams, cover money outlays for built capital. These models extend the explanatory power of the basic model. Global CGE models, with their foundation in neoclassical economic theory, are also suited for analysis of scenarios about the future but on the basis of substantially different assumptions.

Even when there is general agreement on theory (as there is for comparative advantage), there is no unique way to reflect it in a formal model, which depends on the choice of key variables and the functional forms for the equations that relate them to each other. This presentation focuses on a few of the fundamental ways in which the conceptual basis for contemporary input-output models differs from that of CGE models and discusses the rationale for the input-output approach:

- Model transparency
- Objective: Minimizing resource use or environmental degradation, or maximizing consumption or growth
- Mechanism of price formation: relation between changes in resource adequacy and changes in prices of goods
- Functional forms: logical relationships or computational tractability
- Parameters: vectors of inputs per unit of output or elasticities of substitution
- Technological options: choice among alternative technologies, or (nested) substitutions among individual factors of production
- Resource endowments: Impacts on prices of full vs. partial utilization
- Dynamics of investment in built capital and of stocks of non-renewable resources: inter-sectoral as well as inter-temporal consistency
- Ways to (and not to) make consumption endogenous.