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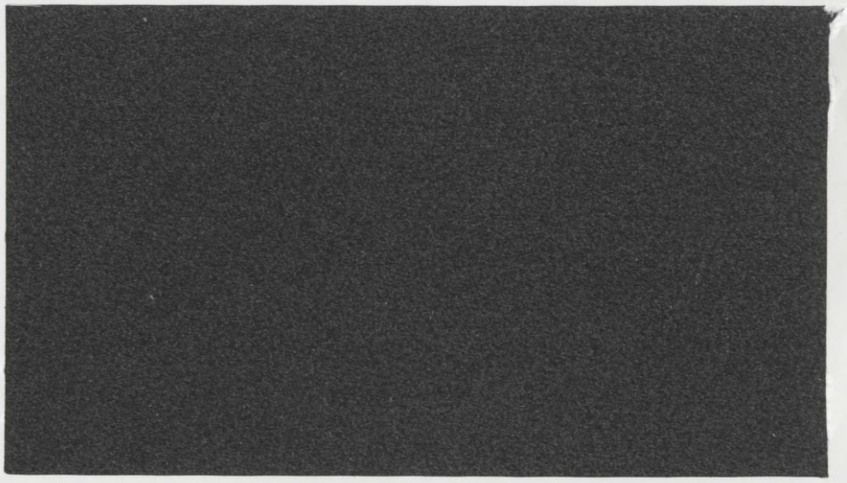

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Doable General Equilibrium Models:

Comments on Three Papers Presented
to the AAEA Summer Meetings 1986

by S. R. Johnson

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Adelman, I., and S. Robinson. "The Application of General Equilibrium Models to Analyze U.S. Agriculture."

Clarete, R.L., and J.A. Roumasset. "Competitive Equilibrium Models and Development Policy Analysis: Problems, Pitfalls, and Challenges."

Derpanopoulos, J. "Optimal Control of General Equilibrium Models."

The three papers listed above are different yet have a common theme: the application of computable general equilibrium (CGE) modeling in agricultural policy analysis. Adelman and Robinson emphasize the agricultural sector in a social accounting matrix (SAM) for the United States. Derpanopoulos provides an optimal control formulation for CGE-like models. Clarete and Roumasset review lessons from experiences in applied CGE modeling. It is interesting and telling that the papers, although advocating the CGE approach, are about models only partially incorporating the associated concepts (Scarf 1983). After some general comments on CGE modeling, brief observations are offered on the three papers.

Applications of CGE models in policy research raise a number of important questions on specification, estimation, solution approaches, and the selection of appropriate policy exercises. CGE models are static and have high prior information content. The separability and other assumptions on preferences and technology required to limit parameters and facilitate solutions are most plausible for more aggregate models. These aggregated specifications limit the policy exercises that can be successfully undertaken with CGE models. "Extensions" to include dynamics in CGE-like structures are at present ad hoc and inconsistent with the CGE approach.

There is interest presently in econometrically estimating CGE models (see Scarf and Shoven collection). But CGE models have high prior relative to
empirical information content. If the empirical information content of the models is limited, then calibration and other estimation schemes that may not take best advantage of the data can be justified. Careful econometric estimation is most important for models with high empirical content. Since these models have high prior content, refinements in the way empirical information is introduced may have little impact on model outcomes. Arguments for calibration are better justified on this basis.

Presently, it is possible to solve CGE models using readily available non-linear programming algorithms. In fact, given the behavioral and technical underpinnings, the dimensions of models solvable with the available technology are probably larger than can be justified. Of course, currently available solution algorithms can be improved and extended to other general equilibrium models (Derpanopoulos). It is important, however, to separate these extensions from the now standard approaches for solving static CGE models.

Important restrictions on the policy applications for CGE models are suggested by these observations on specification, estimation, and solution methods. Generally, the appropriate policy problems are longer term and relate to structural aspects of the economy or broad questions of policy design. Tinkering with loan rates in a CGE model, for example, is an improper use of the whole concept. In contrast, technical change, sectoral linkages, terms of trade, etc., are attractive candidates for CGE experiments. Unfortunately even in the development literature where CGE models have been widely applied, uses have been made of these models that are inconsistent with their general structures to analyze policy questions. Of course, other general equilibrium models more empirical and dynamic in nature and less conditioned by primitive behavioral and technical concepts can be applied for these policy problems.

Adelman and Robinson present a SAM model for the U.S. economy. Their effort, beginning with a SAM model on the way to a CGE modeling exercise, is to be applauded. SAM models are flexible local approximations of complete systems that incorporate little prior information. But the policy questions amenable to analysis by SAM and CGE models are similar. Adelman and Robinson study agricultural sector linkages and policies for increasing agricultural income and altering the income distribution. The policy exercises are consistent with those that can be successfully addressed by SAM and CGE modeling. Their results on structural limitations of present programs to raise farm income provide valuable insights and indicate fundamental problems with U.S. farm income and stabilization policies.

The optimal control paper by Derpanopoulos develops a solution approach for dynamic general equilibrium models. But theory underlying dynamics and the dynamic structure of the system are not clearly indicated. If the dynamic model is simply a CGE-like model linked temporally, it is not likely that the policy exercises supported by the algorithm can be useful. The difficulties with the experience solution approach may be more related to the dynamic structure of the model than the algorithm per se. Apparently, erratic solution paths were obtained in the application. The presentation, more than the text of the paper, revealed that these problems stemmed from simplistic temporal linkages.

The problems, pitfalls, and challenges indicated by Clarete and Roumasset are important to CGE modeling. As the authors move into their discussion of the Philippines experience, some excess baggage appears. Again, CGE models are static and provide long-run equilibrium results. Adding ad hoc specifications to reflect dynamics, monetary sectors, and other features that may be important for applied policy analysis make it extremely difficult to rationalize the underlying structure. CGE models can provide important perspectives for economic policy. But limitations of the theory must be recognized in adapting CGE and other modeling frameworks for applied policy analysis. Clarete's and Roumasset's comments on estimation are somewhat inconsistent with the above observations. Econometric estimation of traditional CGE models is potentially valuable; but, given the empirical content of the models, the opportunity cost for applications of highly sophisticated techniques to obtain estimates from data that include dynamic elements may have a high opportunity cost.

In conclusion, it is important in agricultural economics, where policy analysis resources are scarce and have high potential payoff, that they not be devoted to topical exercises inconsistent with the concepts on which the associated models rest. Applied policy analysts in economics and agricultural economics have exhibited an unfortunate tendency to become enthralled with faddish modeling approaches. In all instances to date, the results of such approaches have been unfortunate.

Economic theory and econometrics provide economists with a broad array of alternative policy analysis models, and none of these is the model for all occasions. When fads spread, modeling approaches tend to be carried far beyond the bounds implied by their foundations. The papers discussed here are generally interesting; however, except for the analysis by Adelman and Robinson, they exhibit these worrisome tendencies.

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