

CGE Approaches to Policy Analysis in Developing Countries: Issues and Perspectives

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CGE modelling in LDCs

- The CGE models for a wide range of problems in the development field: choice of development strategy, income distribution, trade policy, structural adjustments to external shocks, tax policy and long-term growth and structural changes; since the beginning of the 1990's also for analysis of environmental policy and natural resource management issues.
- Government expenditure policies including subsidies are another area of concern in fiscal policy modelling.
- Careful consideration of the development strategies is an essential part of the policy analysis in LDCs; CGE models capture both stabilization and structural adjustment features.
- Another important area of interest concerns the agricultural trade liberalization.

- In terms of the number of models, and studies based on these models, CGE modeling has expanded very significantly.
- The majority of CGE models have been used to simulate comparative static results of a change in a particular policy or a group of policies.
- Some attempts to incorporate dynamic elements with two distinct approaches employed: *myopic* (recursive) and *clairvoyant* (intertemporal dynamics). In the applications in LDCs, the intertemporal approach has been widely used.
- Another important feature of the models applied to LDCs is the usage of different 'closure'. In the majority of studies the classical closure has been used.
- Instead of perfect competition, applied CGE models often incorporate macroeconomic imbalances, structural and institutional rigidities typical of developing economies.

- Few applications show specification of intertemporal aspects of the development process.
- CGE models almost always are focused on the real side of the economy and thus do not include markets for financial assets.
- A more “realistic“ approach could postulate the possibility of unemployment, informal labour markets, financial markets for various assets and their relation to the real sectors.
- Some problems linked to the analysis of agriculture in LDCs: consumer demand; substitution among intermediate inputs and between intermediate and primary inputs; specification of farm technology; factor mobility, farm land in particular but also family labour, farm structures, and some types of capital.

Some applications in LDCs.

- The interest generated by CGE modelling in LDCs is explained by several factors:
 - a) approach appropriate to analyse various policy changes and external shocks which have economy-wide effects;
 - b) development of the relevant statistical data bases in LDCs;
 - c) advances made in efficient numerical solution techniques.
- The numerous applications of CGE models during the past decades can be categorized with respect to their scope into:
 - single versus multi-country (regional) CGE models;
 - single-period versus dynamic CGE models;
 - non-financial (real economy) versus financial CGE models;
 - national versus village CGE models.

-Foreign exchange shortages, the vulnerability of domestic economies to external shocks, primary commodity dependence, continuous external debt problems and income disparities are major problems in LDCs; also the impacts of trade liberalization on economic growth and poverty reduction. The majority of applications of CGE models have focused on these issues.

-A representative household assumption and fixed distributional coefficients for the household income distribution: therefore, the analysis of poor households was necessarily rough into the first and second generation models.

-Now, in the third generation of CGE models poverty impact has been modeled explicitly, utilizing the information in household income and expenditure surveys.

- The growth effect on poverty reduction is given by some estimated growth-poverty elasticity.
- In any case, economic modellers apparently do not agree regarding what elements of general equilibrium models are essential. This is evident particularly in developing countries.
- One of the features of agricultural policy analysis is the high degree of public intervention in the farm and food sector.
- Important advantages offered by this approach to policy analysis for agriculture. Traditional agricultural economic analysis has tended to focus on commodities, and associated factor returns. In contrast, CGE models deals also with households.
- Another important field of research regards the analysis of interindustry linkages that can be very important.

-CGE analysis also has an important role to play in the political economy of reforming agricultural and trade policies. We can observe a large body of literature concerning the impacts of agricultural trade reforms in developing countries.

-Some works have focused on the importance of “dynamic gains” from trade liberalization.

-These gains are likely due also to the institutional innovations.

-In any case, protection, especially in industrialized countries, can limit export opportunities. The impact on special interest groups can be a very significant fraction of their income. Much of the focus of adjustment policy is on compensating these losers so that liberalization becomes politically feasible.

-Agricultural trade reforms can also negatively affect rural welfare in LDCs, in the cases in which the removal of protection has made by the LDC itself.

-Assessing rural welfare effects of agricultural trade reforms is particularly complex in a general equilibrium setting, because both quantities and prices are changing.

- Demand for analyses of the impact of agricultural and trade policies on the environment has been rapidly increasing.

-The theme of product differentiation has come to play an increasingly important role in analysis of agricultural trade policies.

-Future research in GE modelling for agriculture for more appropriate solutions ,among others, in these fields: a) agriculture as a multiproduct industry; b) producer heterogeneity; c) treatment of land; d) the role of water; e) modelling policies that affect agriculture.

Limitations of CGE modelling.

-GE models have become quite popular among policy analysts in LDCs on the recent past. However, there is still considerable debate regarding the value and appropriateness of using CGE models for policy analysis.

- Some of the key criticisms in literature: unrealistic neo-classical assumption; absence of the role of money and so on.

This criticism is less actual now with the incorporation, for example, of oligopolistic pricing and economies of scale into CGE models.

-Perhaps the most important criticism is related to data and parameter values. There are many problems in relation to consistency, reality and adequacy of data in the LDCs.

-New developments in CGE modelling can be considered as the responses to earlier criticisms. CGE models are now well-suited to analyse a wide range of policy issues in LDCs in the short-run and the medium-run.

-However, CGE models are rather weak in modelling long-run processes of development and change.

-Because development is a process, both a clearly defined real time frame and an account of how the economy shifts forward in time are needed.

-While the comparative static approach to the movement of the economy through time is unsatisfactory, it is not clear that there are more appealing alternatives.

-Referring to money, economic development is invariably accompanied by increasing monetization in very poor countries and progressively more elaborate system of financial intermediation, markets, and institutions. Until now, the chances of introducing inflationary processes into these models in a credible way are problematic.

- Referring to agricultural and rural issues other critical considerations: the heterogeneity of rural households and the diversification of these households' activities and income sources.
- Technological heterogeneity across households, like differences in market access, is generally absent from aggregate economy-wide models.
- Whalley emphasizes the need to move from general to special-purpose models if CGE analysis is to become more policy relevant.

Perspectives for CGE modelling.

- In the developing world the interest goes to the connection between growth and other phenomena including income distribution.

-The choice of factor and household disaggregations has an impact on the political insights that can be obtained.

Therefore, complementing microsimulation with CGE or macroeconomic models ("micro-macro" links) is an area of great current interest.

-Approaches and techniques are still under development, and in some cases (e.g. with regard to economic growth) are in initial stages.

-Anyway, although the interest in microsimulation and CGE integration, there are still only a small number of completed studies.

-All these can constitute paths for future improvements in CGE modelling.

Some requirements

- In CGE modelling, data requirements are enormous.
- The selection of parameter values for the functional forms are extremely important determining the results of various policy simulation.
- The starting point for the development of any CGE model is the construction of a micro-consistent benchmark dataset.
- One problem with calibration is the general unavailability of social accounting matrices and of econometric estimates of key models parameters in developing countries.
- The calibration procedure itself determines all of the parameters in a model.

-To overcome the obvious defects of calibration approach, some researchers have developed CGE models based on the econometric approach. Although the econometric approach has some obvious advantages, it has some disadvantages, particularly in relation to LDCs. For this approach time series data are required and the required number of parameters rises with the increase in number of sectors in the model. Because of this limitations many CGE models applied to LDCs have followed the calibration approach.

-One of the main problems that arises in LDCs is the lack of empirically estimated elasticity parameters. The estimation of the necessary parameters is a difficult task due to the unavailability of data. The most common practice in selecting elasticities is the literature search.

-The need of larger data set has increased with the analysis aimed to evaluate the impact of different policy strategies on poverty.

-From the point of view of welfare analysis, disaggregation of households in the economy is probably even more important than sectoral disaggregation. Unfortunately, data on factor payments to households is difficult to obtain.

-Also a regional disaggregation frequently is required to adequately capture the impact of agricultural and resource policies. Such disaggregation can take place at the sub-national level. A major challenge arises from the scarcity of state-level social accounting matrices or input output tables.

Some conclusions.

- CGE modelling has made significant progress in terms of the size and complexity of the models that can be solved.
- Yet complexity should never be an end in itself in CGE modeling. Much of the usefulness of a CGE model stems from its solid foundation in basic economic theory.
- The addition of non-standard features, such as imperfect competition on product and factor markets, price rigidities and inter-temporal relations, may make the model more “realistic”.
- CGE applications in LDCs lead to some suggestions for further research and advancements in both methodological and analytical aspects.

- The household budget survey should be designed as a real income-expenditure survey. It should also collect detailed information on formal and informal income.

- Future research should also include more advanced estimation techniques for the response parameters of the CGE model.

- Recent work has attempted to bring together microsimulation, CGE, and macro models. Different combinations are appropriate for different kinds of problems.

Income distribution issues have been a major concern of development policy in LDCs since the 1970s.

- Another possible extension of the CGE model could exploit its microeconomic foundation and combine it with a village CGE model to analyse the effect of macroeconomic policies on a village economy and the agents involved.

-With time, the degree of integration between micro- and macro- analyses should tighten.

-Determining the poverty impacts of trade policy change, some works underline the evidence of dominance of earnings-side impacts over consumption side effects. This is problematic, since household surveys are notable for their under-reporting of income. The poverty impacts of trade reform often depend crucially on how well the increased demand for labour in one part of the economy is transmitted to the rest of the economy. Further econometric research aimed at discriminating between competing factor mobility hypotheses is needed.

-There are other prospective improvements through the introduction of non-competitive behaviour (while agriculture and certain service sectors are competitive, other sectors of the economy are manifestly not so) and various forms of rationing.

-The CGE models used in policy work vary widely in size, complexity, and domain of applicability but all are designed to analyse the links between policy choices and economic outcomes. The questions driving the policy debate also must drive the models.

-Estimation of the numerical values of key parameters such as elasticities is an important area of research required for the future development of more realistic CGE models.

-Because of the size relative to GNP and the role of agriculture as the major employer in low income countries, investment in agriculture should not be ignored in development policy. Therefore, future research has to deepen the focus on rural areas and the role of institutions.

-The findings of more recent works highlight the importance of using a disaggregated modelling approach with a focus on rural households to explore the impacts of agricultural trade reforms on rural welfare.

One of the improvements in CGE analyses of agricultural policies over the coming decade will be through increased collaboration with economists working on partial equilibrium studies.

-To be useful for policy analysis, economic models should have a number of desirable features to have an utility in policy debates: policy relevance, transparency, up to date, validation and estimation, diversity of approaches.

-In sum, while much remains to be done to overcome the limitations of CGE modelling, we can expect CGE models to play an increasingly important role in the future.

-However, the work to compare model performance to economic history, so addressing the criticism that models have little relationship to reality, should have a high priority for future research.

-All the improvements in any CGE model are, however, conditioned by the availability of a consistent database.

-An attention to informational and computational costs is also needed.