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On the Use(fulness) of CGE Modelling in Trade Negotiations and Policy*

Renato G. Flôres Jr.

Escola de Pós-Graduação em Economia / FGV, Rio de Janeiro, Brasil

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Abstract

This paper discusses a series of issues related to the use and different possible applications of CGE modelling in trade negotiations. The points addressed range from practical to methodological questions: when to use the models, what they provide the users and how far the model structure and assumptions should be explained to them, the complementary roles of partial and general equilibrium modelling, areas to be improved and data questions. The relevance of the modeller as the final decision maker in all these instances is also highlighted.

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I. INTRODUCTION

International trade negotiations and policy are becoming increasingly complex and encompassing, leaving no room for those unprepared. Past issues, involving trade in goods, tariffs and a few contingent protection measures, have given way to a multiplicity of questions, in different and highly specialised domains. In the domestic arena, awareness has been raised on a variety of repercussions and impacts, and increasing demand, both from governments and segments of the civil society, is putting high pressure on all those responsible for the formulation and conduct of trade policy.

My purpose in this paper is to address a selected number of points I consider relevant for transforming CGE¹ modelling into a really effective tool for negotiators and decision makers involved in trade negotiations and policy. The points range from issues regarding the interaction of the modelling activities – and the communication of their results – with the negotiations process, to specific methodological questions that should deserve more attention and, hopefully, improvement. My ideas and suggestions are often very simple, though some perhaps a bit controversial, and most bring no novelty at all. Indeed, I should maybe apologise to my mathematically and theoretically inclined colleagues for presenting such an array of elementary considerations. However, policy differs from academics, in needs and priorities, and if we do not take into account simple guidelines as the ones below, we risk losing key opportunities to make our work, results and, even, theoretical developments, of use in the demanding field of trade negotiations, specially those related to regional integration agreements.

The structure of the paper follows the different issues I address. After a short consideration *when* models should enter or participate in the negotiating process, I say a few words on the misleading partial *versus* general equilibrium

modelling debate, before addressing, in section IV, *what* we are really selling and *how* we should do it. Section V illustrates and enlarges this point, with a few technical examples; data issues are discussed in a next section. An important and neglected application, for Trade Related Capacity Building is then mentioned, and the paper concludes by reminding the fundamental role of the modeller himself in assembling and using all the available advice.

II. A TIMING PROBLEM

I start with something that may seem a non-problem: when should CGE enter as a tool ? or, when, during the negotiating process, is CGE modelling most effective and helpful ?

In most occasions, CGE exercises are performed *before* the actual start of a negotiation, or *before* each of its rounds, when the offers at stake are contrasted and possible alternative scenarios are evaluated as well. It is much less frequent to see it used *during* the negotiations, with a CGE team next door to the meeting room, performing on the spot simulations for each of the more likely combinations discussed during the day. Rarely seen, unfortunately, are the uses *after* negotiations have been concluded and sufficient time has elapsed since their implementation.

Help in the preparatory stages seems unquestionable, an important point being the creative construction of alternative scenarios, beyond those directly related to the information on the table. Though meaningless in many instances – given the difference between the level of detail in the discussions and that of the model –, more attention should be given to the possibilities during the negotiating process. Indeed, either a reduced or, contrariwise, a more focussed model could be helpful – in a more or less on-the-spot mode – in cases when the changes imposed by the talks can be quickly translated into broader policy lines.

¹ CGE = Computable General Equilibrium.

Ex post evaluations, in spite of its methodological difficulties, are dearly needed and, if performed more frequently, would greatly contribute to the credibility of CGE modelling. Kehoe [1994] is one the few who has consistently advocated such exercises. They, of course, require a minimum degree of continuity, if not of the modelling team itself at least of the modelling *concern*, and imply a more mature approach to the activity as a whole. Evaluation of the initial predictions and results may also provide insightful clues to the improvement of different model aspects in general.

III. THE TWO COMPLEMENTARY APPROACHES OR A MISLEADING DICHOTOMY

I start with two dichotomies usually considered to mirror each other. In the side of the users, it seems reasonable to separate them into two broad groups. The first comprises the top negotiators, Ministers, Ambassadors, qualified people who lead the delegations and, many times, have the mandate to eventually sign the final agreement. This group needs global figures and global pictures: overall impacts on GDP, GNI, wages and employment, winning and losing sectors. The second group is made up of technical staff who participate in the nitty-gritty of the negotiations, business concerns, class associations, special lobbies and organised segments of the civil society, going down to sometimes a single chief executive or important entrepreneur. They are interested in detailed gains and losses at very specific levels, be it a product, a service or a social group.

Traditionally, and for obvious reasons, we associate CGE models to the former and partial equilibrium modelling to the latter. However, my contention is that reality is not exactly like this, and such practice entails a considerable weakening in our possible roles. The reason is twofold.

First, top negotiators are many times interested in a specified sector – the subject of a great lobby pressure they might be experiencing - or on impacts in selected areas as, for instance, certain segments of the labour force, considered, be

it for political or social reasons, strategic. On the other hand, specific groups may want to combine the several separate evaluations, to give an idea for a larger sector or part of the economy, or produce an aggregate figure of gains *or* losses to put pressure on the top negotiators.

As both methodological approaches are incomplete, concentrating on each of them for each group will make us unable to answer the additional questions that will certainly be posed. CGE usually produces low percentage figures, which relate to high absolute values, while partial equilibrium may give high percentage results, linked to low values, in relative terms. Ironically, negotiators are often disappointed by both the low percentages and values, forgetting that they come from different sources and, both, have a more appealing translation.

No methodology is thus ideal, as they complement each other. The obvious solution is to incorporate, in either of the approaches, the possibility of linking it to the other. When designing the CGE model, an effort should be made, from the very start, to leave open the possibility of grafting on it a few partial equilibrium models to answer the specific and more relevant (disaggregate) concerns at stake. Balancing the classification may be instrumental for allowing further links. At the same time, partial equilibrium exercises should be conducted with a view on future possibilities of aggregation; what many times will mean control of the compatibility options in terms, again, of product and sector classification, and the use of common mechanisms and basic variables.

Combining the two approaches in the above way is not so simple, as it should take simultaneously into account the structure of the CGE model and those of the particular partial equilibrium exercises. It is a challenge that must be addressed in each individual case. Moreover, this dual way of tackling the problem should be conveyed to the main users, to help them in interpreting the two sets of answers. But this leads us to our next point.

IV. WHAT ARE WE SELLING, AND HOW ?

What kinds of answers are we providing ? How should we explain their meaning ? CGE is a tool for *signalling trends*, which are highly dependent on the assumptions used. In static modelling, the results will “come true” when the new equilibrium is achieved, something rather elusive in practical terms, as well as tricky to be translated in a time horizon.

A clear understanding of this signalling notion is crucial. It also brings forth the utter need for sensitivity analyses. Actually, we should perhaps always communicate results in terms of confidence intervals or bands, where the magnitudes of the changes investigated are likely to occur. Though this attitude was beginning to gain support in the late eighties, it has been since relatively disregarded by the profession. Attempts to incorporate in the sensitivity analyses the ideas and methods of the statistical design of experiments, as in the ingenious example in Harrison and Vinod [1992], had – to the extent of our knowledge – no significant follow-up. One reason is certainly the time and mind consuming efforts needed to build up a consistent grid, analyse and summarise the ensuing outcomes, while users are demanding results “for yesterday”. Such an activity is however necessary, not only from a methodological viewpoint, but as a way of putting the answers provided by the model into a more realistic perspective².

At the side of the *what*, the *how* question is nearly as important. Instead of cramming any CGE report with tables & tables, many more pictures, diagrams and graphs should be used to pass information to the users. Modellers, maybe all of us, often act as *Pirandellian*³ characters, dutifully producing myriads of complex tables that, for sure, *nobody but (perhaps) a few other specialists is going to read*.

² Fortunately, exceptions happen, and not very seldom, though in a frequency far from the desirable one. For avoiding not doing justice to all serious modellers who conduct sensitivity analyses, I shall not single out my favourite examples.

³ Luigi Pirandello (1867-1936), Italian playwright, winner of the 1934 Nobel on Literature and pioneer of the Theatre of the Absurd, whose main authors, like Eugène Ionesco, he greatly influenced. Characters in his most famous plays usually behave as if living in a world of their own, with no connection to reality.

Even as regards the tables themselves, they often recall me an observation by the late Sir Maurice Kendall. Sir Maurice, with his acute statistical good sense, liked to remind practitioners that the layman very rarely grasps the information in a table bigger than, say, a 6x4 matrix, where entries are figures with four digits or more. CGE modellers, when communicating their findings, pay due disregard (or ignorance) to this wise remark.

It must be said that the above situation has been improving, as many reports by international organisations, aimed at a wider audience, have substantially increased their use of graphical or visual displays for presenting technical results. Notwithstanding, much is still to be done as regards the specific area of CGE.

Apart from more convenient ways to communicate the findings, the quest for synthetic measures that would in a single figure – or in a simple analysis – uncover an important property hidden in the diverse simulations should be given top priority. An interesting example is the concept of *structural congruence*, suggested by van der Mensbrugghe y Roland-Holst [2002], to ascertain how far from the effects of multilateral liberalisation would a (regional) preferential agreement be.

Lastly, a clear explanation of the model assumptions seems mandatory. This contributes not only to a better use of the results, but as well for making users conscious of the main changes that may affect these very results. Obscure or poorly understood hypotheses surely account for a modest usage of powerful theoretical developments. Perhaps the best example is the scarcity of significant dynamic models in trade. Though dynamic models in general may rely on sound theoretical accomplishments like overlapping generations, their findings – beyond relating to even more aggregate descriptions of the economy – are heavily dependent on how dynamics is portrayed. Unfortunately, contrary to what happens in other areas of application, like pensions and social security planning, where the hypotheses are fairly standard, sharing a reasonable degree of agreement, the manifold possibilities for triggering dynamics in a trade context, not rarely in very

debatable ways, are responsible for a large quantity of exercises of no real value, mainly discarded by their unclear or *ad hoc* characteristics.

This last point raises a certain controversy, as many think that technical explanations to users should be kept to a minimum, being the realm of modellers themselves. We do not share this view, believing that – with, of course, the always needed good sense – enlightened users are *better* users and can even contribute, in subsequent steps of the modelling process, to its perfecting. Anyhow, this argument is deepened in the following section, which deals with concrete technical examples.

Out of the discussions so far, a *design dimension* of the modelling activity becomes apparent. Ideally, a CGE model is not a task that finishes when the first set of numbers is produced. It is rather a process to be carefully designed, taking into consideration the immediate needs and relevant linkages as well as likely future developments. It is sometimes closer to an engineering project than to economic research.

V. WHAT DO WE NOT TELL, SHOULD TELL OR ARE TRYING TO TELL ?

A few specific examples should be enough to highlight areas where either lack of consensus or poor (general purpose) explanation leads to discredit among actual and prospective users.

Market structure

This may perhaps seem an old-fashioned contention but it is still a key aspect in CGE modelling of trade issues. Far more than half of the models produced nowadays still follow the perfect competition framework; however, it is agreed that the majority of sectors doesn't behave under this pattern. Modern agribusiness sectors are a striking example of how an oligopolistic structure has imposed itself on a traditionally perfect competition segment of the economy. The point here is that not only *more* efforts to move to the imperfect competition framework should

be pursued but also that a careful auditing of the alternatives at hand is necessary. The reason for the latter is that we have different, sometimes conflicting and many times confusing approaches to handle less competitive structures with scale effects. If, from an absolute or scientific standpoint, variety is positive, for CGE *users*, this variety, which can produce results widely apart, and where not all alternatives are theoretically sound, is an extra nuisance to discredit the instrument. Perhaps it would be a good idea to perform a thorough evaluation of the existing methods and provide a ranking that would guide the choice - and help the settling - of the (actually few) best options⁴.

Armington trees and the CES machinery

It seems that, for many years ahead, we shall continue to be hostages to the Armington trees combined with the constant elasticity of substitution (CES) analytics, for drawing up the skeleton of the demand side in our models. Seasoned practitioners know that a shrewd combination of elasticities at different branches (or levels) of the tree can make true a surprisingly diversity of results, even contradictory ones ! Many are drawing attention to these and other possible distortions inherent to the approach (see MacDaniel and Balistreri [2003], as a good example). In the line of the previous section, it is all but fair that the power of the Armington+CES machinery, for good or evil, be communicated to the users, and the choices made, and their robustness, clearly explained. Harrison et al. [1996] is a fine example of showing, in a very didactic way, how the results can vary with the chosen elasticities.

Services

North-south negotiations are becoming rather unbalanced, with developed countries focussing on services while goods, specially commodities, still constitute developing countries key concern. This imbalance has an ironic reflection in the

⁴ Beyond pioneering approaches, like Cox and Harris [1985], Roland-Holst [2003] mentions five families of approaches, with variations within, which, in our view, don't represent a complete account of the existing alternatives yet. Even so, the need for a better knowledge of their pros and cons seems already evident.

methodological area, where services, though a new and exciting theme, still challenge modellers. If Brown and Stern [2001], Dee and Hanslow [2001], Dee et al. [2000] and Markusen et al. [2000], among others, represent promising lines of research, matching their achievements to most current models is still lagging. The consequences are drastic: in the absence, or ignorance, of ways to ascertain the impact of services liberalisation, developing countries many times become more conservative than should, leading to a vicious circle in which developed economies, given the strong opposition found, heighten their pressure on the subject. A recent example of this “dialog of the deaf” has been a large part of the Free Trade Area of the Americas – FTAA negotiations, with the US sticking to their services (and new themes) interests, while the majority of the 33 remaining prospective partners were mostly concerned with market access for their commodities and traditional manufactures.

This situation calls for a greater effort in incorporating ways to adequately include the different features of services into the structure of our CGE models, a not easy task.

Rules of Origin (RoO)

Brenton and Manchin [2002], among others, have stressed the impact of RoO in actual trade flows. Notwithstanding, this is another area where we are lagging far behind reality, most models being run as if RoO did not exist ! This absence, specially when evaluating preferential agreements, can lead to serious mistakes, as Estevadeordal and Robertson [2004] pointed out. Again, due consideration of RoO is not very simple, specially given the non-linear effects it may trigger. Gasiorrek et al. [2001] and Bouët et al. [2003] are examples of dealing with them within a CGE framework; definitely they are attempts that should be pursued.

VI. DATA (AS ALWAYS!)

Raising the *data issue* may look unfair. George Stigler, in a little *chef-d'oeuvre*, Stigler [1977], presented a series of questions that could be safely asked in any economics seminar or conference. I would modestly add data criticism to the list, as it is something that can be used even when you have peacefully slept during the whole seminar ... In order to avoid the cliché, and the blame of a superficial, standard comment, I shall concentrate on two priorities, out of the many things that can be said:

i) the description of the trade protection structure – ideally, as known, we try to transform, for each product, all the existing barriers into a “tariff equivalent” that, in the best possible way, would represent the whole set of protection measures at stake. Needless to say, the multiplicity of protection instruments⁵, with their different nature and impacts, make the tariff equivalent a mostly elusive if not unfit summary of the situation. Coupled with the high product aggregation level of the majority of the models, I suspect this is the main cause for the lack of allure of the CGE methodology among all sorts of negotiators. They rightfully claim that the models analyse unrealistic products under surrealistic tariffs.

But, since aggregation is unavoidable, the synthesis is useful, and so it makes sense to try it or improve it. The only way to achieve credibility then, and figures close to reliable, is to make available, to the widest possible number of modellers and users, specific institutional or individual attempts. Only thus, through exhaustive usage, analysis and criticism of the options chosen, and the numbers arrived at, shall we build widespread confidence on these key numbers. I’m afraid the few existing, serious and labour-intensive, alternatives should pay heed to this advice.

⁵ Quotas, tariffs in and outside quotas (TRQs), export and production subsidies, special price policies, rules of origin, technical non-tariff barriers (NTBs), the simultaneity and variety of the preferential agreements – specially in the case of the EU and the US; just to name a few of the most common ones ...

ii) compatibility with the (national) official statistical offices data – the huge data-collecting task involved in serious and more disaggregate model building naturally acts as an incentive to the creation of commonly shared data bases, that would wisely exploit scale economies in this modelling step. Unfortunately, it is not uncommon to find in these convenient sources, for some countries, discrepancies of the order of 25 to 30 per cent, or even more, in relation to official data; a range already raising a flag. It is very disturbing to use data that bear such strong disparities. Officially published statistics are, in principle, tested data, beyond being benchmarks known and used by (national) policy makers and authorities. Corrections to them can be of need, when serious or evident errors are at stake, or widely accepted adjustments are common practice. Outside these instances, we should remain as close as possible to the official values. Once again, this is a simple but crucial property our models should have, when their results are explained to negotiators and chief members of the Executive. Constant concern, in either a private or widely shared data base, with the accuracy, compatibility and conformity of its files to official country data, *particularly as regards trade flows and input-output matrices*, should never be neglected and is in dire need in some cases nowadays.

VII. CGE AND TRADE RELATED CAPACITY BUILDING (TRCB)

We claimed, in section V, that evaluation of the performance of models, *after* the agreement was concluded, or the effects of it began to be apparent, was mandatory. Moreover, the mechanisms triggered when concessions start to be effective can be quite unexpected, calling for new simulations and analyses. Implicit in all this is the capacity of the country or region in coping with these technical demands. Academia and private institutions, by forming people, producing independent analyses and providing technical support to specific segments of society, may play an important role. This however does not eliminate

the need to have well-equipped government officials, who will ultimately be (in most countries) the major actors in the negotiations.

One of the most positive consequences of the encompassing influence of the WTO, together with the recent waves of regional integrations, is the awareness among less developed or small countries of the need to have people well trained in all aspects of trade theory and policy. International organisms have been promoting special training courses to cope with such demand. In this context, CGE modelling can be a wonderful tool for explaining the mechanisms involved in trade liberalisation and concessions. Reduced models, or *maquettes*⁶, targeted at describing the global interaction between a few aggregate sectors, or unveiling special mechanisms, like labour force adjustment or increasing returns, can be of extreme teaching value. The design of such instruments – not necessarily a trivial activity - certainly is a supplementary way in which CGE can contribute to improve trade policy in specific countries.

VIII. CODA: THE IMPORTANCE OF BEING (AN) EARNEST (AND REASONABLE MODELLER!)

Suppose there exists a modeller who, after going through these lines and – even less likely - being entirely in agreement with them, would carefully try to follow all the suggestions and recommendations they contain, judiciously explaining to his users his assumptions, steps, doubts and methods. Either he will never finish the model he's been asked to or he might run the risk of leading his users to infinite boredom and confusion. A modeller's good sense as regards the do's and don'ts, on how far he could push a given approximation or mix sounder procedures with less established ones, will ever be foremost. It is also up to him to set the limits to how much, under the spirit of section III, will be passed to the

users in order that his results become really powerful in their hands. In the language of section IV's last paragraph, he is the mastermind required for both the design and project management activities.

In the previous sections I listed a series of points that are either responsible for the sometimes low credibility of CGE modelling among negotiators or make for a low-key role of this instrument in actual trade policy. How to combine ingredients and which ones to discard is always a prerogative of the *chef*. Hope some of them will be useful to most colleagues.

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⁶ I'm using the French word for such reduced versions of bigger models; a common practice at, for instance, the CGE school led by Jean Waelbroeck, for more than twenty years, at the *Université Libre de Bruxelles*, Belgium.

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