Interstate Trade and Regional Development:
An (Integrated) Interregional CGE Approach

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Abstract. This paper presents a progress report on an ongoing research project developed at FIPE-USP. The focus of the research is to develop a flexible analytical framework, based on sound and consistent economic theory and data, in order to assess the likely state/sectoral/income effects of policy changes in Brazil. We present the general structure of an integrated interregional system (CGE module), considering also its integration with a micro-simulation module. To illustrate the analytical capability of the CGE module, we present a simulation, which evaluates the regional impacts of a decrease in barriers to trade in the form of tariffs. Further developments of this integrated system are listed at the end.

1. Introduction

As the process of global integration has reached the boundaries of developing countries, there has been concern about the role to be played by these nations in the new world economic order. In many parts of the developing world, efforts are being made to intensify economic activities so as to increase international competitiveness. Market-oriented policies have been generally adopted, supported by the recognition of the distortionary effects of government intervention.

Distributional effects of such policies have been neglected on the grounds that greater efficiency would lead to rapid growth, which would ultimately benefit the population in the lower income groups (Baer and Maloney, 1997). At the regional level, the desire to maximize economic growth, implied by the aim of increasing international competitiveness, is very likely to deteriorate the distribution of income among regions in developing countries (Baer *et al.*, 1998). As these countries present strong evidence of regional dualism, the more developed regions are those that concentrate the resources, which can foster export-led national growth.

Recent research on trade and location has proposed different approaches to analyze the effects of globalization on industrial location.[1] Considering its two main driving forces – trade liberalization and technical progress – the globalization process is responsible for important shifts in the economic centers of gravity not only in the world economy but also within the national economies. In the latter case, the question one poses addresses equity concerns: are regional inequalities likely to widen or narrow?

Although it is agreed that there are inherent unpredictability created by some of the forces involved in the globalization process, the research agenda seeks to use new techniques to illuminate at least some of the forces at work reshaping the economic geography of the world and provide an empirical work to quantify these forces (Venables, 1998). In this research we focus on the regional impacts of one of these driving forces in a national economy, namely, the one related to *barriers to trade in the form of tariffs*.

A cost-competitiveness approach, based on relative changes in the sectoral and regional cost and demand structures, is adopted to *isolate the likely state/sectoral/income effects of further tariff*

reductions in Brazil.[2] It tackles the three basis for the analytical framework proposed in the literature: comparative advantage is grasped through the use of differential regional production technologies; geographical advantage is verified through the explicit modeling of the transportation services and the costs of moving products based on origin-destination pairs, as well as increasing returns associated to agglomeration economies; and cumulative causation appears through the operation of internal and external multipliers and interregional spillover effects in comparative-static experiments, such as those proposed here.

2. Literature Survey: The Brazilian Case

Brazil was late in its efforts towards the integration of the country in the global network, as was the case of most Latin American countries until the 1990s. Among the measures adopted in the trade reform, initiated in the late 1980s, the restructuring of the tariff schedule played an important role. Between 1988 and 1998, average tariff was reduced from 45.0% to 16.7% (Table 1).

Table 1. Brazil: Average Nominal Import Tariff Rates

Year	Average % Rate
1988	45.0
1989	41.0
1990	32.2
1991	25.3
1992	21.2
1993	17.1
1994	14.2
1996	13.6
1997	13.8
1998	16.7
2006*	11.4

* Target

The effects of trade reforms have been extensively studied in the international trade literature. Trade liberalization processes are said to have long-run economic benefits derived from gains in the production side and the consumption side, as well as non-economic benefits (Devlin and French-Davis, 1997, and Whalley, 1997). However, the trade liberalization process also involves two kinds of short-run costs to the economy: distributional costs (protected sectors tend to lose), and balance of payments pressures due to the rapid increase in imports (Bruno, 1987). These costs, which can be considered the "first-round" impacts of a trade liberalization process, can be perceived in a time span long enough for local prices of imports to fully adjust to tariff changes, for major import users to decide whether or not to switch to domestic suppliers, for domestic suppliers to hire labor and to expand output with their existing plant, for new investment plans to be made but not completed, and for price increases to be passed onto wages and wage increases passed back to prices (Dixon *et al.*, 1982).

In the Brazilian case, the impacts of trade liberalization, in general, and regional integration, in particular, have been assessed in different contexts.[3] Partial equilibrium studies have focused on the impacts of regional integration on trade flows related to Brazil's international trade (Carvalho and

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[2] It has been argued that there are still areas where further structural reforms are needed in Latin America, including scaling back remaining high tariffs (World Economic Outlook, April 2003).
[3] For a survey, see Bonelli and Hahn (2000).

Parente, 1999, Maciente, 2000). Although data requirements are relatively low, these studies generate detailed information on product-specific trade flows. However, they fail to recognize that regional integration is a complex general equilibrium phenomenon, producing biased estimates.

Other attempts to assess the impacts of trade liberalization policies in Brazil have considered the general equilibrium approach. Most of them addressed issues related to Mercosur policies with gentle methodological twists (Campos-Filho, 1998, Flores, 1997); others also looked at unilateral liberalization issues and their implications for resource allocation (Haddad, 1999, Haddad and Azzoni, 2001, Campos-Filho, 1998). The common feature of these studies refers to the timing of the analysis: they all consider benchmarks at the early stages of the liberalization process, precluding the further analysis of the process of regional integration. In order to fill this gap, taking as the benchmark a more recent year, Haddad *et al*. (2002ab) evaluated the state effect of new initiatives of trade arrangements in Brazil.

Distributional aspects of trade liberalization were evaluated by Barros *et al*. (2000), using a CGE framework with a fairly detailed structure of transfers to different household groups. They found a relatively robust deterioration of the poverty indicators in the period 1985-1995, due to changes in the external conditions in the period.

Harrison *et al*. (2002) looked at the impact of trade policy options (e.g. FTAA and Mercosur-European Union free trade area) on the poor, employing a global CGE framework with detailed treatment of factor shares and income mapping in Brazil. Contrasting to Barros *et al*. (2000), they found that most of the trade policy options for Brazil could result in a distribution of the gains that is progressive, so that the poorest households experienced the greatest percentage increase in their incomes.

A recent body of research has been focusing its attention on the transmission mechanisms between macro shocks (including external shocks) and poverty. The basic idea is to use a macroeconomic model, with a disaggregated labor market structure, integrated to a household survey. Pioneering works for Brazil include Agénor *et al*. (2002), Deliberalli (2002), and Ferreira *et al*. (2003).

3. Regional Modeling

The specification of linkages between the national and regional economy represents an interesting theoretical issue in regional modeling. Two basic approaches are prevalent – top-down and bottom-up –, and the choice between them usually reflects a trade-off between theoretical sophistication and data requirements.

The top-down approach consists of the disaggregation of national results to regional levels, on an *ad hoc* basis. The disaggregation can proceed in different steps (e.g. country-state → state-municipality), enhancing a very fine level of regional divisions.[4] The desired adding-up property in a multi-step procedure is that, at each stage, the disaggregated projections have to be consistent with the results at the immediately higher level. The starting point of top-down models is economy-wide projections. The mapping to regional dimensions occurs without feedback from the region; in this sense, effects of policies originating in the regions are precluded. In accordance with the lack of theoretical refinement in terms of modeling the behavior of regional agents, most top-down models are not as data demanding as bottom-up models.

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[4] Adams and Dixon (1995) report regionally disaggregated projections for 56 statistical divisions in Australia derived from national forecasts of the MONASH Model; FIPE (2002) disaggregate state projections for almost 5000 municipalities in Brazil.

In the bottom-up approach, agents' behavior is explicitly modeled at the regional level. A fully interdependent system is specified in which national-regional feedback may occur in both directions. Thus, analysis of policies originating at the regional level is facilitated. The adding-up property is fully recognized, since national results are obtained from the aggregation of regional results. In order to make such highly sophisticated theoretical models operational, data requirements are very demanding. To start with, an interregional input-output database is usually required, with full specification of interregional flows. Data also include interregional trade elasticities and other regional parameters, for which econometric estimates are not often available in the literature.

The strategy to be adopted in this research utilizes an interregional (bottom-up) computable general equilibrium model – B-MARIA – to evaluate shifts in the economic center of gravity and regional specialization in the Brazilian economy due to further liberal tariff policies.

4. The B-MARIA Model

The **B**razilian **M**ultisectoral **A**nd **R**egional/**I**nterregional **A**nalysis Model (B-MARIA) is the first fully operational interregional CGE model for Brazil.[5] The model is based on the MONASH-MRF Model, which is the latest development in the ORANI suite of CGE models of the Australian economy. The state version of B-MARIA, to be used in this research, contains over 900,000 equations, and it is designed for forecasting and policy analysis. Agents' behavior is modeled at the regional level, accommodating variations in the structure of regional economies. The model recognizes the economies of 27 Brazilian states. Results are based on a bottom-up approach – national results are obtained from the aggregation of regional results. The model identifies 8 sectors in each state producing 8 commodities, six households in each state, regional governments and one federal government, and a single foreign consumer who trades with each region. Special groups of equations define government finances, accumulation relations, and regional labor markets. The model is calibrated for 1996; a rather complete data set is available for 1996, which is the year of the last publication of the full national input-output tables that served as the basis for the estimation of the interstate input-output database (Haddad *et al*., 2002), facilitating the choice of the base year.

B-MARIA has been widely used for policy analysis (Haddad 1999; Haddad and Hewings, 1999, 2000, 2001; Haddad and Azzoni, 2001).

4.1. General Features of B-MARIA

CGE Core Module

The basic structure of the CGE core module comprises three main blocks of equations determining demand and supply relations, and market clearing conditions. In addition, various regional and national aggregates, such as aggregate employment, aggregate price level, and balance of trade, are defined here. Nested production functions and household demand functions are employed; for production, firms are assumed to use fixed proportion combinations of intermediate inputs and primary factors are assumed in the first level while, in the second level, substitution is possible between domestically produced and imported intermediate inputs, on the one hand, and between capital, labor and land, on the other. At the third level, bundles of domestically produced inputs are formed as combinations of inputs from different regional sources. The modeling procedure adopted

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[5] The complete specification of the model is available in Haddad and Hewings (1997) and Haddad (1999).

in B-MARIA uses a constant elasticity of substitution (CES) specification in the lower levels to combine goods from different sources.

The treatment of the household demand structure is based on a nested CES/linear expenditure system (LES) preference function. Demand equations are derived from a utility maximization problem, whose solution follows hierarchical steps. The structure of household demand follows a nesting pattern that enables different elasticities of substitution to be used. At the bottom level, substitution occurs across different domestic sources of supply. Utility derived from the consumption of domestic composite goods is maximized. In the subsequent upper-level, substitution occurs between domestic composite and imported goods.

Equations for other final demand for commodities include the specification of export demand and government demand. Exports are divided into two groups: traditional exports (agriculture, mining, coffee, and sugar), and non-traditional exports. The former faces downward sloping demand curves, indicating that traditional exports are a negative function of their prices in the world market. Non-traditional exports form a composite tradable bundle, in which commodity shares are fixed. Demand is related to the average price of this bundle.

One new feature presented in B-MARIA refers to the government demand for public goods. The nature of the input-output data enables the isolation of the consumption of public goods by both the federal and regional governments. However, productive activities carried out by the public sector cannot be isolated from those by the private sector. Thus, government entrepreneurial behavior is dictated by the same cost minimization assumptions adopted by the private sector.

A unique feature of B-MARIA is the explicit modeling of the transportation services and the costs of moving products based on origin-destination pairs. The model is calibrated taking into account the specific transportation structure cost of each commodity flow, providing spatial price differentiation, which indirectly addresses the issue related to regional transportation infrastructure efficiency. Other definitions in the CGE core module include: tax rates, basic and purchase prices of commodities, tax revenues, margins, components of real and nominal GRP/GDP, regional and national price indices, money wage settings, factor prices, and employment aggregates.

Figure1. Schematic Representation of the Main Commodity Flows in the B-MARIA Framework:
A Two-Region Version
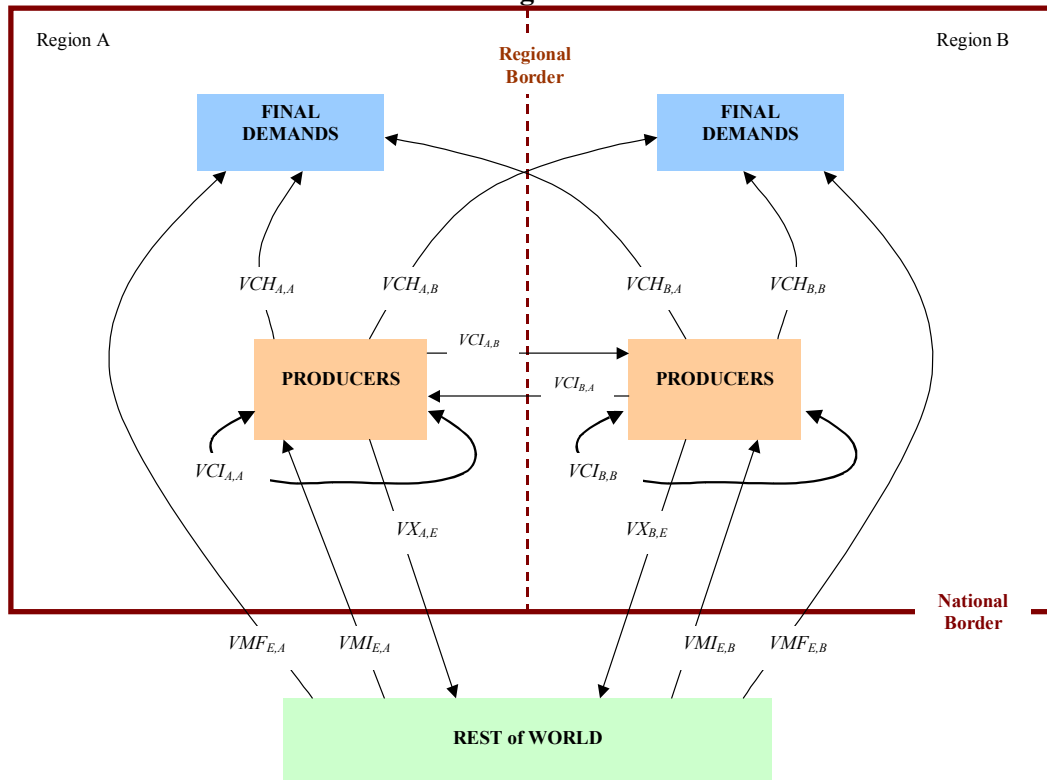
colocar legenda dos fluxos

Government Finance Module

The government finance module incorporates equations determining the gross regional product (GRP), expenditure and income side, for each region, through the decomposition and modeling of its components. The budget deficits of regional governments and the federal government are also determined here. Another important definition in this block of equations refers to the specification of the regional aggregate household consumption functions. They are defined as a function of household disposable income, which is *disaggregated into its main sources of income*, and the respective tax duties.

Capital Accumulation and Investment Module

Capital stock and investment relationships are defined in this module; however, only the comparative-static version of the model produces reliable results, restricting the use of the model to short-run and long-run policy analysis. When running the model in the comparative-static mode, there is no fixed relationship between capital and investment. The user decides the required relationship on the basis of the requirements of the specific simulation.[6]

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[6] For example, it is typical in long-run comparative-static simulations to assume that the growth in capital and investment are equal (see Peter *et al*., 1996).

Foreign Debt Accumulation Module

This module is based on the specification proposed in ORANI-F (Horridge *et al*., 1993), in which the nation's foreign debt is linearly related to accumulated balance-of-trade deficits. In summary, trade deficits are financed by increases in the external debt.

Labor Market and Regional Migration Module

In this module, regional population is defined through the interaction of demographic variables, including rural-urban and interstate migration. Links between regional population and regional labor supply are provided. Labor market segmentation is explicit modeled, considering rural workers, urban informal workers, urban formal workers, and urban skilled workers. The labor market specification follows closely the one proposed in Agénor *et al*. (2000), adapted to Brazil in Agénor *et al*. (2002).

Closures

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5. Structural Database

The CGE core database requires detailed sectoral and regional information about the Brazilian economy. National data (such as input-output tables, foreign trade, taxes, margins and tariffs) are available from the Brazilian Statistics Bureau (IBGE). At the regional level, a full set of state-level accounts were developed at FIPE-USP (Haddad *et al*., 2002). These two sets of information need to be put together in a balanced interregional absorption matrix. Previous work in this task has been successfully implemented in interregional CGE models for Brazil (e.g. Haddad, 1999; Domingues, 2002; Gilhoto *et al*., 2002).

6. Application

As an example of the type of results that can be generated for policy analysis within this framework, a simulation of the effects of tariff-barriers decrease will be presented in this section. The interstate CGE model is applied to analyze the effects on the Brazilian economy of a uniform 25% decrease in all tariff rates. All exogenous variables were set equal to zero, except the changes in the power of tariffs, i.e., one plus the tariff rates, which were set such that the percentage change decrease in each tariff rate were 25%. Preliminary results of the simulation computed via multi-step Euler procedure, under short-run (fixed capital stocks) and long-run closures, are presented in Tables 1-3. The analysis is concentrated on the effects on regional activity, and the role played by increasing returns in the manufacturing sector. Three sets of results are presented, considering a) constant returns in the manufacturing sector, b) increasing returns in the manufacturing sector, with the parameters being econometrically estimated from industrial survey data, and c) constant returns in the manufacturing sector with "stronger" substitution.

Table 1 presents GDP components results. In the short-run, further tariff reduction in Brazil presents, in general, relatively small positive impacts. Isolated effect of tariff decrease of manufactured products indicates the relevance of manufacture in the liberalization process. In the

long-run, further tariff reduction in Brazil presents relatively big impact on investment and a marginal surplus on foreign trade (exports grows faster than imports). Federal government expenses reduces in order to keep the marginal budget deficit, because revenue on tariffs has decreased.

Table 1. GDP Components Effects of a 25% Across-the-board Tariff Cut
(Percentage Changes)

| | *Short Run* | | | *Long Run* | | |
	Total	*Subtotal**	*%*	*Total*	*Subtotal**	*%*
Consumption	0.065	0.063	95.5	-0.157	-0.161	102.5
Investment	-	-	-	0.708	0.661	93.4
Regional Government	-	-	-	0.481	0.452	93.9
Federal Government	-	-	-	-0.157	-0.161	102.5
Exports	0.423	0.400	94.7	1.565	1.417	90.6
Imports	0.540	0.512	94.8	0.528	0.476	90.3
GDP	0.034	0.032	95.6	0.108	0.089	81.9

* Isolated effect of tariff decrease of manufactured products

Table 2 shows Gross State Product effects of a 25% across-the-board tariff cut results. Three models were implemented to explore different assumptions about returns and substitution. Model 1 is the basic model, with constant returns to scale and "low" elasticities. Model 2 is the basic model with increasing returns in the manufacturing sector. Model 3 comprises the basic model with "stronger" substitution. In the long-run, potential gainers and losers are more clearly indicated by the simulation results. In this case,

Regarding the introduction of increasing returns in the manufacturing sector, two groups of results can be perceived: in the short-run, it does not seem to play an important role, while in the long-run, it affects positively both national and state performance.

Table 2. Real GSP Effects of a 25% Across-the-board Tariff Cut
(Percentage Changes)

	Short-Run			Long-Run		
	Model 1	*Model 2*	*Model 3*	*Model 1*	*Model 2*	*Model 3*
AC	0.009	0.009	0.005	-0.720	-0.671	-2.378
AP	0.019	0.019	0.018	-0.134	-0.110	0.381
AM	0.053	0.053	0.045	0.446	0.487	-0.155
PA	0.020	0.020	0.015	0.727	0.726	-1.552
RO	0.015	0.015	0.016	0.684	0.705	0.468
RR	0.041	0.042	0.056	2.976	3.092	4.170
TO	0.009	0.010	0.000	1.298	1.188	-0.848
AL	0.020	0.020	0.014	-3.831	-4.098	4.198
BA	0.019	0.018	0.012	0.094	0.084	-0.241
CE	0.010	0.010	0.005	0.692	0.689	-1.303
MA	0.050	0.049	0.066	0.331	0.352	0.593
PB	0.020	0.020	0.021	-0.834	-0.731	-2.302
PE	0.010	0.010	0.003	-0.686	-0.662	-0.622
PI	-0.002	-0.002	-0.001	-2.600	-2.451	4.788
RN	0.011	0.011	0.006	-0.137	-0.200	-0.125
SE	0.009	0.009	0.004	0.810	-0.166	5.840
ES	0.036	0.037	0.011	0.882	0.838	1.001
MG	0.008	0.008	-0.002	0.372	0.381	0.549
RJ	0.027	0.027	0.023	-0.415	-0.380	-0.430
SP	0.040	0.040	0.028	0.017	0.053	0.603
PR	0.015	0.015	0.008	-0.511	-0.407	0.403
SC	0.018	0.018	0.006	0.768	0.635	-1.093
RS	0.019	0.019	0.012	-0.162	-0.119	0.674
DF	0.031	0.032	0.034	0.138	0.145	-0.322
GO	0.013	0.013	0.009	4.887	5.042	-7.905
MT	0.032	0.032	0.032	0.499	0.514	0.023
MS	0.016	0.016	0.010	0.452	0.497	0.679
Brazil	0.033	0.034	0.032	0.108	0.127	0.213

The results presented above are very relevant for the understanding of an integrated interregional system. The model produces results at the state level, fully recognizing the general equilibrium nature of economic interdependence and the fact that the policy impacts in various regional markets differ. In the Brazilian federalism, states play an important role, and, thus, for many policy purposes state disaggregation may be required.

The Moving Picture: Locational Implications

The Brazilian economy is highly concentrated in geographical terms. The state of São Paulo, with only 2.9 % of territory, hosts 35.3% of national GDP and 21.7% of population; the Northeast region, with 28.5% of national population and 18.3% of national territory, produces only 13.5% of national GDP (1996 figures). Starting in 1939, when state GDP statistics started being calculated, there was a clear trend towards regional concentration in the Southeast until the mid-1970's. From then on, some signs of polarization reversal were present, leading some analysts to predict the future de-concentration of the national production (Haddad, 1999). Since financial problems affecting the data collection agencies precluded the production of updated regional GDP figures, this belief remained in all analysis of regional concentration in Brazil until recently. However, new

data released indicate that re-concentration took place after the mid-1980's, relating to production restructuring, the liberalization of the national economy, the weakening of the public sector (downgrading all kinds of regional policies), the creation of a free trade area with Argentina, Uruguay and Paraguay, etc.

Table 4 presents summary measures of the impacts of the tariff cut on regional inequality. It points to different impacts in the short and long-run. Basically, in the short-run, regional inequality tends to increase while in the long-run there appears a trend towards regional de-concentration.

Table 3. Summary of Spatial Impacts
(Based on Changes in the Williamson Coefficient of Variation)

	Williamson coefficient of variation	Impact on regional inequality
BASE YEAR	0.444482	
Constant returns (Model 1)		
Short-run	0.444528	"+"
Long-run	0.443628	"-"
Increasing returns (Model 2)		
Short-run	0.444524	"+"
Long-run	0.443446	"-"

7. Final Remarks

The purpose of this paper was threefold. First, we presented a flexible analytical framework, based on sound and consistent economic theory and data, in order to assess the likely state/sectoral/income effects of policy changes in Brazil. This is the first fully operational interstate CGE model implemented for the Brazilian economy, based on previous work by the authors and associates (Haddad, 1999; Haddad and Hewings, 2001; Haddad and Domingues, 2001; Domingues, 2002). Among the features embedded in this framework, modeling of scale economies and transportation costs provides an innovative way of dealing explicitly with theoretical issues related to integrated regional systems. Results seemed to reinforce the need to better specifying spatial interactions in interregional CGE models.

Second, in order to illustrate the analytical capability of the CGE module, we presented a simulation, which evaluated the regional impacts of a decrease in barriers to trade in the form of tariffs, in accordance with recent policy recommendations foreseen by international organizations. Rather than providing a critical evaluation of this debate, we intended to emphasize the likely structural impacts of such policies (exemplified by a further scaling back in tariffs). Focus on spatial effects under federalism allowed us to capture differential impacts on the economies of the key players in the decision making process with implications for future negotiations.

Third, previous diagnostics (Haddad et. al. 2002) suggested the need to make a more in-depth analysis of trade flows between the Brazilian states, potentially leading to generalizations regarding the type of trade involved, changes in its composition through time as the Brazilian economy develops, and the implications of these structural differences in the coordination and implementation of development policies. In order to address this issue we gave interregional trade its proper place by taking into account a fully specified interstate system of accounts specially developed for the purpose of calibrating the CGE model.

Next Steps: Micro-Macro Integration

If one is interested in income distribution analysis (relative poverty), a "pure macro" CGE multi-agent model is sufficient. However, to analyze absolute poverty, a link with a survey is essential. As the households' responses to economy-wide changes vary across sectors and regions – the growth process is not uniform spatially – the redistribution mechanism will not be homogenous. Increasing focus on welfare, poverty and income distribution calls for strengthened links between macro and household level analysis, so that linkage of macro data and household surveys will contribute to the design of more effective poverty reduction policies and programs.[7]

In this sense, to analyze absolute poverty, a link with household survey is essential. The way this link is operational becomes a major research question. First, national/state accounts data and household level information is complementary, though not always consistent. To reconcile the various databases requires special attention to issues related to, for instance: a) year and time of implementation of the survey and construction of national/state core database; b) reference period; c) differences in corrections and adjustment factors used in both household surveys and national/state accounts estimation.

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[7] See Agénor *et al.* (2000).

The next purpose of this research is to *analyze the impact of trade liberalization policies on household wealth*, in general, through the impacts on wage and non-wage household incomes. Brazil's economy is not homogenous internally, presenting strong variations across sectors, regions and income groups. Considering together these three dimensions for the analysis – spatial, sectoral and personal – is very important for a country like Brazil, where, for instance, in 1996, according to PNAD data consolidated with the State Accounts, average labor income in the richest state of São Paulo was 4.5 times higher than that verified in the poorest state of Piauí; average labor income in the manufacturing sector was 1.8 times higher than in the services sector; skilled workers earned, on average, 2.7 times more than unskilled workers in the formal economy and 4.9 times more than unskilled workers in the informal sector. Considering the weight of labor income in different geographical areas, it varies from around 25% in the state of Amazonas to 65% in Paraná, where non-labor income plays a lesser role. Financial wealth is also relevant for some household groups.[8]

The CGE model can provide detailed results on the impacts mapped to household income. Moreover, the macro-state results will be used to feed a micro-simulation module in order to assess the poverty effects of the tariff policy. The approach to be used is based on Agénor *et al*. (2000) and proceeds as follows:

> <u>Step 1</u>. Use the information provided in the household survey to classify the available sample into B-MARIA's categories of households, so as to establish an interface between the model's simulation results and actual household income
>
> <u>Step 2</u>. Following a shock to the model (tariff reduction), calculate real growth rates in per capita disposable income for the categories of households
>
> <u>Step 3</u>. Apply these growth rates separately to each individual per capita (disposable) income observation in each of the groups of households in the survey. This gives absolute income and consumption levels for each household, in each group, following the shock.
>
> <u>Step 4</u>. Given rural and urban poverty lines (expressed in monetary units and rising at the rural and urban unskilled CPI growth rates), and using the new absolute levels of income, calculate: a) post-shock poverty indicators; b) income distribution indicators.
>
> <u>Step 5</u>. Compare post-shock indicators with baseline values to assess impact of the shock on poverty and income distribution, *both at the national and state levels*.

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[8] The proposed analysis, still underway, will not consider real assets.

Figure . Link Between B-MARIA and Household Survey
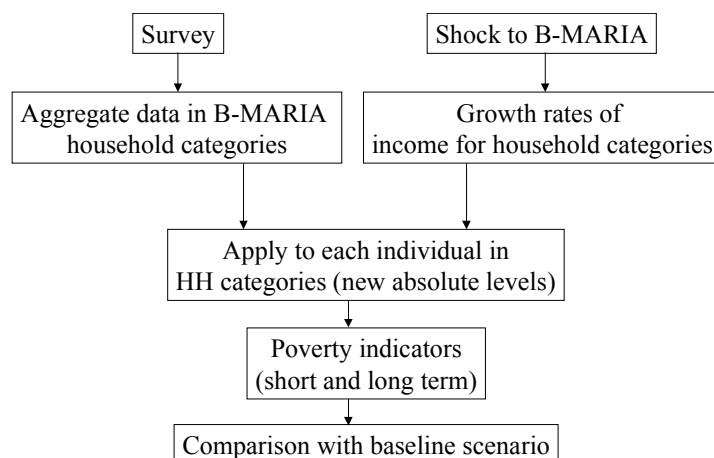
In addition to micro-macro link ongoing research focuses on two other modeling issues. First, as interregional substitution and factor mobility have been found to be the key mechanisms that drive the model's results, one should take closer attention to the labor market and regional migration module and to the estimated regional trade elasticities. In the former case, progress in the specification /implementation of a more detailed structure based on empirical results from cutting-edge research on the fields of regional labor markets and demography is underway. In the latter case, the usual way such elasticities are employed in regional CGE models has been challenged. Recent work by Bilgic *et al.* (2002) tends to refute the often adopted hypothesis that international trade elasticities are lower bound for regional trade elasticities for comparable goods. If that is the case, modelers should pay even more attention to such parameters. As information for proper estimation is rarely available, qualitative sensitivity analysis should be designed and used together with systematic quantitative sensitivity analysis. In our research strategy, however, efforts are being directed to the estimation of regional trade elasticities for Brazil based on recently published information on interstate trade flows (citar TD IPEA) and regional price differentials (citar Azzoni Menezes e Carmos EE)

In summary, regional interactions need to continue to be studied to gain a better understanding of how regional economies are affected. This ongoing project attempts to contribute to fill this gap, emphasizing not only the regional macro aspects but also the micro-macro links involved in the spatial interaction.

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