Chapter 3

Are Export Promotion and Trade Liberalization Good for Latin America's Poor? A Comparative Macro-Micro CGE Analysis

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1. Macro-micro modeling of trade reforms

Trade reforms have economy-wide effects requiring a general equilibrium approach in order to be able to assess the full impact of such reforms. In this chapter we use a standardized Computable General Equilibrium (CGE) model to compare the impact of trade reforms (and external shocks) on relative prices, sectoral output and employment, household income and consumption and their interactions. The model framework allows us to isolate the impact of specific policies and external shocks. Country-specific Social Accounting Matrices were constructed defining the economic structure of each country case and the accounting framework for each country model. For poverty and income distribution analysis, a drawback of the typical CGE model is that income distribution is captured as between-group differentials for relatively aggregate labor categories and household groups. This makes it difficult to get at the impact of, say, trade reforms on poverty, since we need the full distribution. To overcome this, we apply a 'top down' multiple modeling framework with the CGE model as the first layer and a methodology of microsimulations as the second layer. The latter translates the general equilibrium effects of trade reform on the labor market onto household incomes allowing one to derive an estimate of the impact on poverty and inequality of macroeconomic changes making use of the full income distribution from micro (household survey) data.

Section 2 details the methodology and underlying assumptions of this approach and thereby also its limitations. Section 3 describes the main findings of the CGE simulations. In order to make the analysis as comparable as possible, we have standardized the simulations imposed on each country model as well as the so-called "closure rules" of the models which define the macroeconomic adjustment of the corresponding economies and the nature of the labor market. This way, differences in simulation results per country are reduced to differences in economic structure and capacity to respond to relative price changes. Subsequently, we compare the results of this exercise in "elasticity structuralism" with the simulation results obtained from the country models with the nature of macroeconomic and labor market adjustment defined specifically for each economy by the country authors. Section 4 reports on the poverty and inequality outcomes as obtained from the application of the microsimulation approach. In Section 5 we conclude, that trade liberalization, as isolated from other policies and factors of influence, appears to have a poverty-reducing effect in most of the Latin American economies. The same applies for multilateral trade scenarios, like the Free Trade Area of the Americas and the worldwide adaptation of WTO rules. Poverty reduction from further trade reform is rather small however, such that the present analysis leads us to conclude that export-led growth stimulated this way is no panacea and does not suffice to give the region the economic shot in the arm it needs to lift itself from poverty and do away with its deeply rooted inequality.

2. CGE Model Strategy

The country studies in this project have all used a common economy-wide, multi-sector modeling framework: a computable general equilibrium (CGE) model. The model is a "standard" CGE model described in detail in Löfgren, Harris, and Robinson (2002).[1] Such models are used extensively in policy analysis, and provide a framework for capturing linkages between economy-wide changes or shocks; the sectoral structures of production, trade, and employment; and distributional outcomes. A CGE model captures the circular flow of income in an economy, as shown in Figure 1. The circular flow framework and models based on it are closed in the sense that the framework accounts for all flows of goods and services across markets, the corresponding flows of payments, and all other transfers among agents. All economic transactions in the economy are captured, and the accounts of each agent in the model must balance.

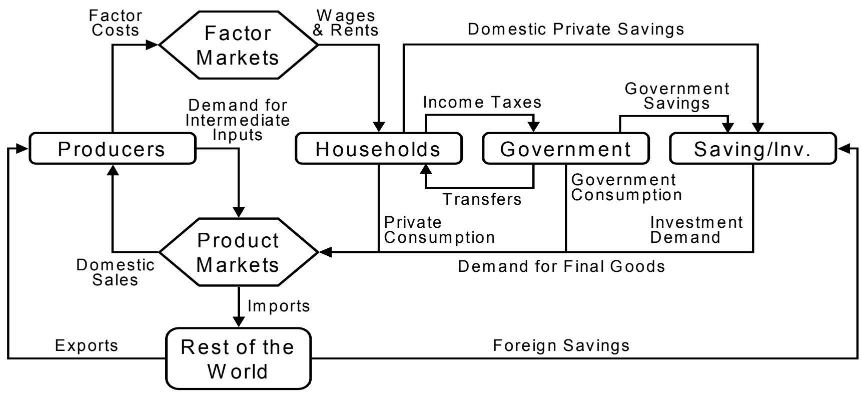
2.1 Social Accounting Matrix

The accounts of the various agents, and much of the underlying data for a CGE model, can conveniently be summarized in the form of a Social Accounting Matrix (SAM) — see Figure 2. A SAM is a square matrix that, for a period of time (typically a year), accounts for the economy-wide circular flow of incomes and payments. Each entry represents a payment by a column account to a row account. Since the income-expenditure accounts of each agent must balance, the corresponding row and column accounts in the SAM must also balance exactly. Although SAMs are most commonly constructed for countries, they may be applied at widely different levels of aggregation: households, villages, regions, countries, and the entire world. A SAM summarizes the structure of an economy, including its internal and external links, and the roles of different actors and sectors. A national SAM brings disparate data (including input-output

[1] The model is in the family of trade-focused CGE models developed by Dervis, de Melo, and Robinson (1982) and Robinson et al. (1999). The model is implemented in the GAMS modeling language. The description below draws on the monograph by Löfgren, Harris, and Robinson (2002).

tables, household surveys, producer surveys, trade statistics, national accounts data, balance of payments statistics, and government budget information) into a unified framework, and provides the underlying conceptual framework for the system of national accounts (SNA).

Figure 1: Circular Flow in a SAM/CGE model



The "agents" in a CGE model based on the SAM in Figure 2 include producers, factors of production, households, enterprises, government, savings-investment, and the rest of the world. The aggregate "savings-investment" account collects savings and purchases capital goods — a macro agent that essentially represents the financial system and the loanable funds market. The SAM is a compact way to present the national accounts, and nicely traces out the circular flow from production activities to factor payments to incomes of "institutions" and back to demand for commodities.

The SAM incorporates the three macro balances: government deficit, trade deficit, and savings-investment balance. The macro balances are expressed as flows — the SAM does not include asset accounts — and any macro relationship in this framework will be in flow terms. All models in the SAM framework must "explain" how balance is achieved in the three macro accounts. Given that the SAM is always balanced, determining two of the macro balances necessarily determines the third. The SAM represents a closed system — all economic transactions are included — and models in this framework will incorporate Walras' Law in some form. They need (indeed, only can) explain one less than the total number of accounts in the SAM.

Figure 2. National SAM used in the CGE model

Receipts	Expenditures								
	Activities	Commodities	Factors	Households	Enterprises	Government	Savings-Investment	Rest of the World	TOTAL
Activities		marketed outputs							Activity income
Commodities	intermediate inputs			private consumption		government consumption	investment	exports	Demand
Factors	value-added								factor income
Households			factor income to households	inter-household transfers	surplus to households	transfers to households		transfers to households	household income
Enterprises			factor income to enterprises			transfers to enterprises		transfers to enterprises	enterprise income
Government	producer and value-added tax	sales taxes, tariffs, export taxes	factor taxes	transfers, direct taxes	direct taxes			transfers to government	government income
Savings-Investment				household savings	enterprise savings	government savings		foreign savings	savings
Rest of the World (RoW)		imports	factor income to RoW		surplus to RoW	government transfers			foreign exchange outflow
TOTAL	activity expenditures	commodity supply	factor expenditures	household expenditures	enterprise expenditures	government expenditures	investment	foreign exchange inflow	

Source: Adapted from Löfgren, Harris, and Robinson (2002).

2.2 The 'Standard' CGE Model[2]

Producers ("activities" in the SAM) and consumers interact across product and factor markets, buying and selling goods and services. Producers are assumed to maximize profits, purchasing inputs and selling outputs in competitive markets, constrained by their production technology. In the model, production functions include intermediate inputs according to fixed input-output coefficients and primary factors (capital, labor, and land) according to constant elasticity of substitution (CES) functions (see Annex Table A3.1, equations 11-15). Households receive factor income (wages and profits) from producers, pay taxes, save, and spend the rest to consume goods and services ("commodities" in the SAM). Households are assumed to maximize utility, and their demand for commodities is given by the linear expenditure system (LES) (see Table A3.1, equations 33-34).

A CGE model is Walrasian in spirit, incorporating all the flows in the SAM, including production, distribution, and demand; and determining equilibrium wages and prices by simulating the operation of all markets. The model is an empirical special case of the neoclassical Arrow-Debreu general equilibrium model. The model can only determine relative prices, and some price or price index is chosen as numéraire — the consumer price index in the models used in this project. The absolute price level is undetermined and must be specified exogenously. The supply and demand equations in the model are all homogeneous of degree zero in prices — double all prices and equilibrium production and demand do not change — so the absolute price level does not matter to the real side. In macro terminology, the model displays strong neutrality of money. Introducing some mechanism to determine the absolute level of prices such as a simple transactions demand for money plus a fixed money supply would determine the absolute price level, but would not affect relative prices or any real magnitudes.

Typically, classic CGE models specify fixed supplies of primary factors of production (e.g., labor and capital) and assume that all markets "clear" in that prices and wages (defined broadly to include rental rates for all factors) adjust to achieve supply-demand equilibrium in all product and factor markets. In macro terms, the model will always generate full employment of all factors and hence the economy is always operating on the production possibility frontier. Many applications of CGE models focus on introducing various distortions to the price system and calculating the resulting inefficiencies and loss of welfare. Assuming full employment, however, "inefficiency" is always in terms of being at the wrong place on the production possibility frontier, not from ending up at some point inside the frontier.

To capture the characteristics of labor markets in developing countries, it is common to specify an alternative treatment of the labor market. Instead of a fixed labor supply, some labor categories are assumed to be available in unlimited supplies at a fixed real wage. This treatment is consistent with the dual economy models of Lewis and Ranis and Fei, and has been used in most of the country models in this project.[3] In this specification, any changes in the economic environment that would normally lead to a rise in the real wage will instead lead to an increase in employment and aggregate GDP.

[2] See Annex Table A3.1 for a formal description of the model.
[3] See Lewis (1954) and Ranis and Fei (1961).

Imports, Exports, and the Balance of Trade

Extending the classic Walrasian CGE model to incorporate foreign trade was a major part of the work program in the development of CGE models. The specification in the standard model follows what has become a broad consensus for "trade focused" CGE models and incorporates imperfect substitutability between domestically produced and traded goods, citing early work on specifying import demand functions by Paul Armington.[4] The Armington insight is extended to the treatment of exports, and the model specifies import demand based on sectoral CES (constant elasticity of substitution) "import aggregation" functions and export supply based on sectoral CET (constant elasticity of transformation) "export transformation" functions (see respectively equations 24 and 21 of Annex Table A3.1). This model is an extension of the Salter-Swan model and is a theoretically consistent generalization of the "standard" trade model with non-traded goods, introducing degrees of substitutability and transformability rather than assuming a rigid dichotomy between tradable and non-tradable goods. The theoretical properties of this model have been worked out in detail.[5]

Adding exports, imports, and the trade balance also raises the issue of how the receipt-expenditure account of the new actor, the world, is brought into balance, or equilibrated. As with the Salter-Swan model, trade-focused CGE models include a new equilibrating variable, the real exchange rate, which is the relative price of aggregates of traded and non-traded goods. There is an implicit functional relationship between the real exchange rate and the trade balance. Increasing foreign savings always yields an appreciation of the real exchange rate — the price of non-traded goods rises relative to the price of traded goods (exports and imports).[6] Exports fall as producers shift production toward domestic markets and imports rise as consumers shift demand in favor of imports, bringing the trade balance into equilibrium with the new exogenous higher level of foreign savings.

Most, trade-focused CGE models, and the standard model, introduce the exchange rate as an explicit variable, with units of domestic currency per unit of foreign currency. However, the "currency" is not money but simply defines the units of domestic and world prices — domestic prices in local currency units and world prices in foreign currency units (e.g. dollars). The model still contains no assets or money, and the exchange rate is not a "financial" variable in any sense. Changes in the exchange rate work only by changing the relative prices of traded to non-traded goods on domestic markets, affecting export supply and import demand.

Savings, Investment, and Government

In addition to the trade balance, CGE models applied to actual economies incorporate savings and the demand for investment goods. The introduction of the S-I account, which collects savings and purchases investment goods, is standard. A new flow equilibrium condition is added to the model — the flow of savings must be made to equal the flow demand for investment goods — and some mechanism is introduced to achieve savings-

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[4] Armington (1969).

[5] See, for example, Dervis, de Melo, and Robinson (1982); de Melo and Robinson (1989); Devarajan, Lewis, and Robinson (1990, 1993); de Melo and Tarr (1992); and Thierfelder and Robinson (2002).

[6] The theoretical properties of the real exchange rate in this model are worked out in Devarajan, Lewis, and Robinson (1993).

investment balance (see equation 45 of Annex Table A3.1). Typically, CGE models specify fixed savings rates by households and assume that whatever is saved is then spent on investment goods. The result is a "savings-driven" model of aggregate investment demand.[7]

The government in a classic CGE model collects taxes, makes and receives transfer payments, and purchases goods and services. It is hard to see the government as being a utility maximizing actor; so most CGE models treat government as following specified rules of behavior.[8] For example, a common specification is that government expenditure is fixed in real terms, including transfers; government revenue is determined by fixed tax rates; and government savings is determined residually as the gap between revenue and expenditure. The model treats the government deficit or surplus as coming from the loanable funds market, and so any government deficit "crowds out" private investment.

The discussion above has described a typical CGE model that achieves macro balances (or macro "closure") in a particular way, which can be termed "neoclassical macro closure." The model assumes full employment, with wages and prices adjusting to achieve equilibrium in factor and product markets. The balance of trade is fixed exogenously, which determines foreign savings. The real exchange adjusts to achieve the specified trade balance through its affect on aggregate imports and exports. The government has a simple rule-based specification: fixed real expenditure, fixed tax rates, and government savings determined residually. Households and firms have fixed savings rates, which determine private savings. Finally, given that all the components of savings are determined by various rules and behavioral parameters, aggregate investment is specified as "savings driven" and equal to the sum of private, government, and foreign savings.

Macro Closure

There is a large literature on issues of macro closure of CGE models.[9] The issue is how the model achieves flow equilibrium in the three macro balances: savings-investment, government deficit, and the balance of trade. Since the model satisfies Walras' Law, the macro closure issue is to specify equilibrating mechanisms for achieving balance in two of the three accounts — the third account will then necessarily balance as well.

The standard model offers a number of different choices of macro closure. For the trade balance, one can either assume that the trade balance is fixed and the real exchange rate adjusts to equilibrate aggregate exports and imports or that the real exchange rate is fixed and the trade balance is endogenous. For savings-investment balance, one can assume that the model is "savings-driven" as discussed, above with fixed savings rates for various actors determining aggregate savings, which in turn determines investment. Alternatively, one can assume that aggregate investment is either fixed or set by some macro relationship and that the savings rate of some actor or actors adjusts to generate the

[7] This is an example of a macro "closure" of the CGE model. Other examples will be discussed below.
[8] There are exceptions in the public finance literature where government is treated as analogous to a household, with its own utility function. See Shoven and Whalley (1992).
[9] See, for example, Sen (1963), Taylor (1983, 1990), Rattsø (1982), Robinson (1989, 1991), and Dewatripont and Michel (1987). For a recent discussion of macro closure issues in CGE models, see Robinson (2003).

savings required to finance aggregate investment — the model is "investment-driven". Similarly, government expenditure can either be assumed to be fixed or set by some macro relationship, and that government savings is determined residually as the difference between government earnings and expenditure. Alternatively, one can assume that government savings is fixed and that some tax instruments are determined endogenously to generate the needed funds.

In general, both the extreme savings-driven or investment-driven macro closures seem unrealistic, forcing all macro adjustment in either aggregate savings or aggregate investment. Looking at the historical experience of countries undergoing macro shocks and structural adjustment programs, a specification of some kind of "balanced" macro closure seems more realistic, spreading the macro adjustment burden evenly among aggregate investment, consumption, and government expenditure. Specification of such a balanced closure is an option in the standard model, and was used in about a quarter of the country studies in the project.

"Labor market closures"

These various macro closures can be linked to different specifications of the operation of factor markets to generate a rich menu of possible macro-employment interactions. The essential issue is that the classic Walrasian CGE model, in which all markets clear, yields a full-employment equilibrium and market-clearing prices and wages, while short-run macro models typically involve wage and price rigidities, partial adjustment mechanisms, and equilibrium without market clearing, including unemployment. The two paradigms embody very different notions of equilibrium.[10] If the CGE model assumes factor markets clear, then any choice of macro closure will have no effect on aggregate employment and little or no effect on aggregate GDP. In this situation, different macro closures will have "compositional" effects — the balance between aggregate investment, consumption, government spending, and the trade balance — but no effect on the level of real economic activity and employment.

There is a literature on "structuralist" CGE models, which embody elements of short-run macro models, including "demand-driven" Keynesian models that yield equilibria with unemployment.[11] These models do not explicitly incorporate financial variables and asset markets, but manage to work within the flow-equilibrium structure of CGE models. They effectively impose a macro story onto the CGE model structure that involves the assumption that labor markets do not clear and that macro shocks can have effects on aggregate employment and GDP. Most structuralist models start from the assumption that the labor market does not clear with flexible wages, but is limited it its adjustment. In a Keynesian structuralist model, the labor market is driven by macro phenomena, and employment is affected by aggregate demand via a Keynesian multiplier process. In such a model, the real wage is viewed as a macro-equilibrating variable, with employment determined only by the demand for labor.[12]

[10] Malinvaud (1977) discusses the different notions of "equilibrium" in macro and general equilibrium models.

[11] See Taylor (1983, 1990).

[12] The multiplier process works through changes in the real wage. An increase in final demand (e.g., investment or government demand) requires an increase in savings, which requires an increase in income, which requires an increase in output, which requires an increase in employment, which requires a decrease in the real wage (since firms are assumed to be on their demand curves for labor).

Most of the country studies in this project specify a combination of structuralist features in the labor market and Keynesian multipliers. The comparative analysis described in Section 3, define a set of 'standardized' closure rules for all countries, using a 'balanced' macroeconomic closure, i.e. with weak Keynesian demand adjustment, and a fixed real wage in all sectors assuming an unlimited supply of labor at that wage. The implication, as described above, is that any change that would normally lead to an increase in the real wage (e.g., increased productivity or capital stock growth) will instead lead to an increase in the demand for labor and higher aggregate employment.

2.3 Macro-micro linkages: Economy-wide Shocks, Distribution, and Poverty

A major focus of the country studies has been to translate changes at the macro or economy-wide level to resulting impacts on the distribution of income and poverty. The studies have all used household survey data and microsimulation methods, which are described further below, to analyze distributional impacts. The methodological issue facing the various studies is how to track the mechanisms by which economy-wide shocks involving macro variables work their way through the economy, finally affecting household livelihoods. Figure 3 provides a schematic picture of the mechanisms involved.

The 'top-down' causal chain works from macro shocks through the operation of factor and product markets yielding prices, wages, and employment, and finally to household income and expenditure. A crucial part of analyzing and modeling distributional outcomes at the household level, is the specification of the various sources of income at the household level and how those sources are linked to the operation of factor and product markets. In terms of the SAM data framework and SAM-based analysis, it is crucial to disaggregate the factor markets, including data on the ownership of factors by households. In various settings, it may be important to disaggregate production and employment by categories such as region, sector, skill category, gender, age, and nature of employment (e.g., self employed, informal sector, or formal sector), all of which could be relevant in determining how households earn their income. In addition, the extent to which households operate in commercial or formal markets can be important — for example, home consumption can represent a significant part of real income and consumption for poor farmers.

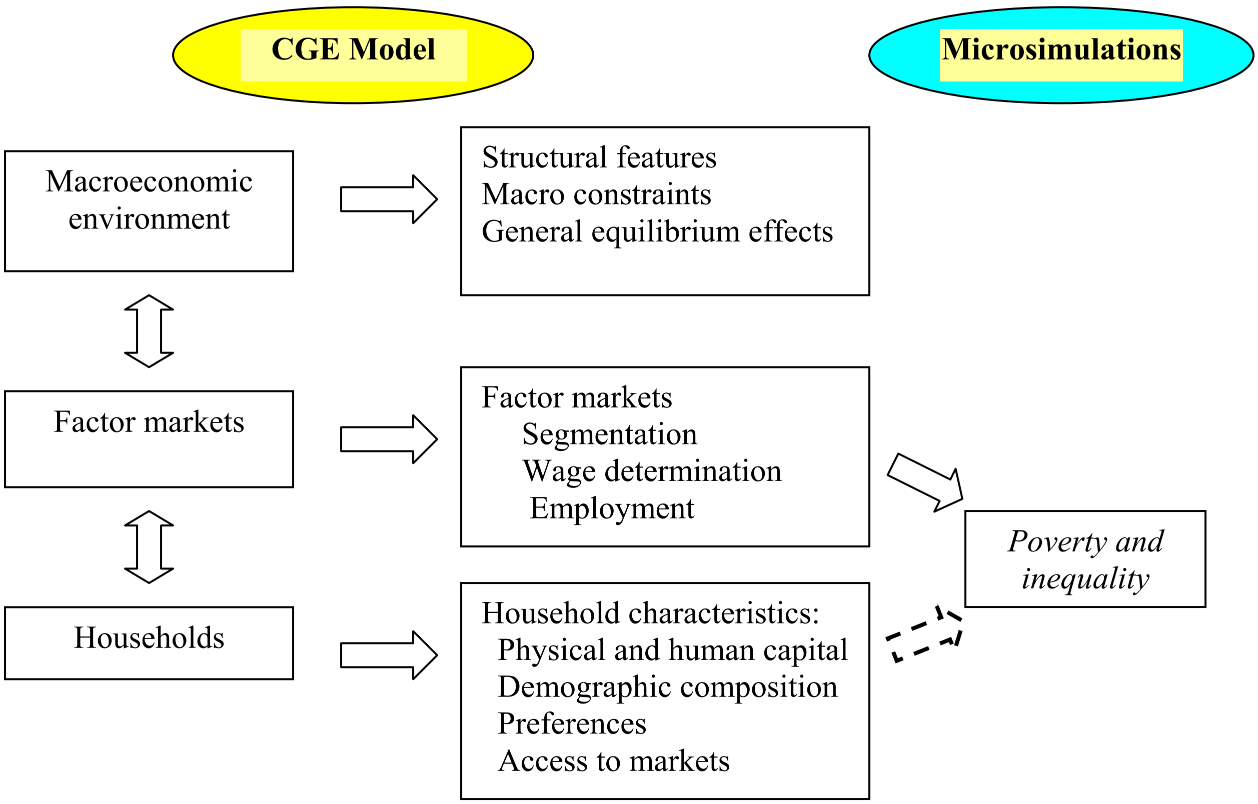
The country studies vary widely in the extent to which they have been able to disaggregate the sources and uses of household income — essentially limited by data availability. All the studies were able to use household survey data, but vary in their ability to link household income to changes at the macro and economy-wide levels. The modeling framework can accommodate such analysis, but estimating the underlying SAM was always the binding constraint.

In the country studies, the analysis is 'top down' in that the goal was to translate from economy-wide changes to outcomes at the household level. No attempt was made to determine feedbacks from changes at the household level back through the operation of factor markets to macro variables.[13] A major advantage of the top-down approach is that

[13] To the extent the CGE differentiates various groups of households, it does account for the feedback effects of changes in their relative incomes and consumption levels on the rest of the economy through differences in spending behavior across those household groups.

the analysis and modeling of households, based on survey data, can be done separately from the economy-wide analysis, and there is no need to reconcile the household data with the national data. The communication between the two strands is in the form of information about changes in prices, wages, and employment — there is no need to reconcile data on levels.[14] The microsimulation analysis at the household level is discussed in more detail below.

Figure 3: Mapping From Macro Changes to Poverty Outcomes



2.4 Microsimulation methodology

The country analyses in this study focus on the labor market as the main transmission channel of the modeled impact of trade reforms on poverty and distribution. To go from the counterfactual labor market effects simulated with the CGE model to poverty and income distribution at the household level we need to deal with two methodological issues. First, how to incorporate both between and within group effects into the distribution analysis? That is, how can we account for the full distribution and thus for the heterogeneity of the population within households when assessing the poverty and inequality effects? Second, people may change position in the labor market (hence also

[14] Such an integrated analysis requires a modeling framework that can accommodate many households, using the household survey data. It is not necessary to model all the households in a sample survey. For a discussion of the use of "representative" households in models, see Löfgren, Robinson, and El-Said (2003).

affecting household income) due to trade reforms, external shocks or other simulated macro changes. Workers may shift from one sector to another, change occupation or lose their job. The methodological issue is to find a procedure that can account for such labor market shifts and identify which individuals are most likely to shift position in order to be able to simulate a new, counterfactual income distribution.

Various microsimulation methodologies have been proposed in the literature to deal with these problems.[15] We mention two types that try to answer the type of questions raised in this study. The first involves the estimation of a microeconomic, partial-equilibrium household income generation model through a system of equations that determine occupational choice, returns to labor and human capital, consumer prices, and other household (individual) income components (see for instance, Bourguignon, Fournier and Gurgand 2001, Bourguignon, Ferreira and Lustig 2001). Combining this methodology in "top-down" fashion with a CGE model has been probed by Bourguignon, Robilliard, and Robinson (2002) for the case of Indonesia.

A second microsimulation approach of less modeling intensity assumes that occupational shifts may be proxied by a random selection procedure within a segmented labor market structure. This procedure allows one to impose counterfactual changes in key labor market parameters (participation rate, unemployment, employment composition by sectors, wage structure, etc.) on a given distribution derived from household survey data and estimate the impact of each change on poverty and income distribution at the household level. This type of methodology of counterfactual microsimulations originated with Orcutt (1957) for tax incidence analysis in developed countries and Oaxaca (1973) and Blinder (1973) for between-group differentials in mean earnings and, more recently, with Almeida dos Reis and Paes de Barros (1991) for an analysis of inequality in the full distribution of earnings.[16] The latter approach was subsequently generalized to analyze total per capita household income inequality and poverty (see Paes de Barros and Leite, 1998; Paes de Barros, 1999; Frenkel and González, 2000; and Ganuza, Paes de Barros and Vos, 2002).

In both types of methods, total per capita household income is defined as:

$$ypc_{hi} = \frac{1}{n_h}\left[\sum_{i=1}^{n_h} yp_{hi} + yq_h\right] \qquad (1)$$

where n_h is the size of household h, yp_{hi} the labor income of member i of household h, and yq_h the sum of all non-labor incomes of the household, defined as:

[15] See Bourguignon, Pereira da Silva and Stern (2002) for an overview of related methods. It should be noted that the approach is fairly new in its application to developing country context, but that combinations of macro or CGE policy models and microsimulations, for instance to assess distributional effects of tax reforms, are quite common in applications in developed countries.

[16] It should be noted that both Orcutt and Oaxaca-Blinder essentially involve accounting methods assuming fixed positions of workers and household groups. For a recent overview of applications of microsimulation approaches for assessing the impact of government policies in OECD countries, see Gupta and Kapur (2000).

$$yq_h = \sum_{i=1}^{n_h} yqp_{hi} + yqt_h \qquad (2)$$

In equation (2), yqp_{hi} = individual non-labor income of member i of household h and yqt_h = other household incomes. In the simulations yp_{hi} is altered for some individuals i of household h as a result of changes in the labor market parameters.

The second microsimulation approach as applied in Ganuza, Barros and Vos (2002) is followed in most country studies and defines the labor market structure in terms of rates of economic participation (P_j) and unemployment (U_j) among different groups j of the population at working age defined according to sex and skill, the structure of employment (defined according to sector of activity S and occupational category O) and remuneration W_1, as well as overall level of remuneration W_2. The skill composition of the population is represented by variable M. The labor market structure can be written as $\pi = \pi(P,U,S,O,W_1,W_2,M)$.

For all types of individuals, the unemployment rates determine part of the labor market structure. The latter is further determined by the structure of employment. The employed workforce is classified according to segment k, defined on the basis of sector of activity and occupational category. For both skill groups within segments k in the labor market, the average remuneration is calculated and these averages are expressed as a ratio of the overall average. The effect of alteration of parameters of the labor market structure on poverty and inequality can now be analyzed using the accounting identities of equations (1) and (2). The impact of changes in the labor market can be analyzed both separately and sequentially.

The Ganuza-Barros-Vos approach introduces a number of important assumptions about the labor market. First, as indicated, for lack of a full model of the labor market, a randomized process is applied to simulate the effects of changes in the labor market structure. That is, random numbers are used to determine: which persons at working age change their labor force status; who will change occupational category; which employed persons obtain a different level of education; and how are new mean labor incomes assigned to individuals in the sample. Hence, the assumption is that, on average, the effect of the random changes correctly reflects the impact of the actual changes in the labor market.[17] Because of the introduction of a process of random assignation, the microsimulations are repeated a large number of times in Monte Carlo fashion.[18] This allows constructing 95% confidence intervals for the indices of inequality and poverty, except in the case of the simulations of the effect of change in the structure and level of remuneration, which do not involve random numbers. In each simulation, the incidence, depth and severity of poverty and the Gini and Theil coefficients of the distribution of both per capita income and primary incomes ar calculated.[19]

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[17] The possibility of incorporating conditional probabilities to decide which individuals change status within the labor force will be explored in future research.

[18] Experiments with the methodology for several household survey data sets show that about 30 iterations are sufficient. Repeating the simulations a larger number of times does not alter the results.

[19] Mean incomes per decile are calculated in the simulations. These means are subsequently assigned to new employed or to already employed persons who changed sector of employment, occupational category or moved from one educational group to another. In principle, to assess the impact of changes in the labor market structure, one would have to calibrate the data base prior to simulating the effect of said changes –

It should be noted that the case studies of Argentina and Mexico follow a hybrid approach to the microsimulations. Rather than randomly selecting the individuals in the simulations as done by Ganuza et al. (2002), a probability function is estimated to determine who, given personal characteristics, is most likely to move and which is the likely income he or she will obtain as a result of the shift. Subsequently, the estimated parameters replace the randomized procedure in the Ganuza et al. methodology, thereby moving closer to the first type of microsimulations. In terms of Figure 3, there is a *closed-line* arrow from labor market outcomes to poverty and inequality at the household level, representing the link as established through the Ganuza-Barros-Vos approach. The alternative microsimulation approach as in Bourguignon, Robilliard and Robinson (2002) would add a probabilistic specification of household labor supply behavior, adding an additional link as represented by the arrow with the *dotted* lines in Figure 3.

Below in section 4 and in the country studies we report results for the poverty incidence (P_0) and the Gini coefficients for labor and per capita household incomes. Unless reported otherwise, directions of change of the microsimulations are the same for all alternative poverty and distribution measures.

3. Macro CGE simulations: counterfactual analysis of effects of trade reforms and external shocks

3.1 Standardized simulations

In this section we report the main findings of the CGE simulations for alternative trade reform and trade integration scenarios and a number of external shocks for the 16 Latin American countries in our sample. In order to make the outcomes as comparable as possible we ran the same simulations (with shocks of equal size) in two steps. First, we apply the policy shocks for a standardized set of "macro" and labor-market" closures. Second, we then compare those outcomes with the "actual" closures as used by the country studies. Since we have a "standard" model, imposing standardized closures implies that in the first set of simulations we focus on differences in outcomes of the imposed policy changes and shocks which are due to differences in economic structure and the capacity of markets to respond to relative price shifts. One could call this an exercise in "elasticity structuralism" as we assume roughly identical behavior and functioning of the economies. The country-specific closures should identify how macro and labor market adjustment is working out in reality as justified in the country studies and differences in outcomes of the simulations are a result of both differences in economic structure and adjustment behavior.

The standardized closure rules involve: (a) alternatively, a *fixed* or *endogenous* level of foreign savings for the external balance (i.e. respectively corresponding to a flexible and a fixed exchange rate regime); (b) a balanced savings-investment closure rule (see section 2); and (c) endogenous government savings (i.e. fixed tax rates). For the labor market closure, we assume a fixed real wage for all labor categories, implying that all adjustment falls on quantities (employment), rather than prices (wages).

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that is, replace the original labor incomes by mean incomes per decile. A test showed that both the direction of change and the magnitude of the effect do not change if one uses the original values of the labor incomes instead of calibrated values.

The country-specific closures in half of the cases involve a fixed exchange rate regime and the other half assumed a flexible regime.[20] Most countries (except Argentina, Brazil and Venezuela) had the same government balance closure as in the standard simulations, but only four countries (Bolivia, El Salvador, Mexico and Paraguay) used a 'balanced' S-I closure. Two countries assumed a neo-classical macro closure (Peru, Brazil) and the rest (10) assumed a Keynesian, investment-driven closure. In most cases, factor market closures assumed segmented markets with different adjustment mechanisms by type of factor, mostly allowing for unemployment in the formal and unskilled labor segments and with price (wage) adjustment predominating in the informal and/or skilled labor segments. The various closure mechanisms are summarized in Annex Table A3.2.

Given the structure of the CGE model, we expect that trade liberalization with flexible exchange rates will cause a real devaluation and a shift of relative prices in favor of tradables. If the tradable goods sector has a higher average productivity and labor-intensity than non-traded activities, this should lead to an expansion of aggregate output and employment along the lines of the dependent-economy model. If the exchange rate is fixed, trade liberalization will be accompanied by an inflow of foreign capital assuming as is generally the case that imports rise by more than exports. That compounds the expansionary effect of trade liberalization in the short run, by reduced import cost and increasing aggregate demand. Thus, if the given conditions hold we would expect a stronger expansionary effect of trade liberalization under a fixed-exchange rate regime as in this case rising domestic demand and a widening external balance will not hit a foreign exchange constraint. The ensuing real exchange rate appreciation depresses the positive impact on exports and traded-goods output, but if trade elasticities are relatively low (which would hold in particular for point-sourced primary exporters, such as Bolivia, Ecuador, Venezuela and several other cases) the foreign capital impulse and expansion of non-traded goods tend to outweigh the effects on export production. For similar reasons, devaluations tend to be contractionary. Under a flexible exchange-rate regime, we allow the real exchange rate to depreciate to accommodate a rising trade deficit triggered by import liberalization and keep the level of foreign savings fixed. If all the other conditions are the same as indicated above, the expected result would now be a strengthening of the export drive and tradable goods output and employment, but more restricted aggregate demand growth as access to external borrowing is restricted.

The employment effects of trade liberalization under the standard closure rules will depend on the labor and skill intensity of the main sectors in the economy. Recall that we assume (unrealistically) a fixed labor supply and fixed real wages in all sectors, such that all labor market adjustment falls on shifts in quantities of labor. Standard trade theory would predict trade liberalization to lead to rising demand for unskilled labor if that is the abundant factor and rising overall employment assuming the country will specialize in the production for which it has a comparative advantage. However, many of the countries in our sample may equally be defined as natural resource abundant and probably are less unskilled-labor abundant than competitors in Asia for world market production. Point-source natural resource abundant countries, alike those mentioned above, likely have relatively low labor intensity in export production and have weak or

[20] The external closure in the Cuban model is slightly more complex as it assumes a dual foreign exchange market. The exchange rate is fixed in the official market and flexible in the informal segment.

negative employment gains from trade liberalization, while skill-intensity may rise if the non-traded sector is high on demand for more educated workers. As suggested above, the latter effect may be stronger if we assume that the inflow of foreign capital is endogenous. These effects may differ in economies with more diffuse natural resource endowments (i.e. more diversified primary exports and predominance of small holders in exports, such as coffee) and a basis for manufacturing exports (including *maquila*). Such conditions would fit Mexico and the Central American countries, for instance. Positive employment effects are likely stronger under these conditions, even though skill-intensity may still rise if the average level of education of workers in the mentioned activities is higher than the average for the rest of the economy.

The results for the key macroeconomic variables and employment for the standardized simulations are displayed in Tables 1, 2 and 3. Results for simulation results for the country-specific closure rules are in Table 4.

We begin the discussion with policies such as tariff reduction, export subsidies, devaluations and foreign capital inflows that are related to liberalization of trade and capital flows, and export promotion. Next to these scenarios of unilateral trade reform, we study the effects of two multilateral trade agreements: a WTO scenario of free trade and worldwide elimination of export subsidies and the much debated option of a Free Trade Area of the Americas (FTAA). We then look at two exogenous trade-related issues, namely terms of trade shock, represented here by a rise in the price of all imports, and the impact of an across the board increase in productivity, which is a quick way of exploring the effect of long term growth on poverty reduction and income distribution.

3.2 Macroeconomic simulations results

Tariff reduction

In this experiment we reduce tariffs by ten percent relative to their base period level. Since base levels vary significantly between countries, the absolute size of the impact of this trade liberalization on output, employment and poverty will also differ across countries. The impact of trade liberalization is unambiguously expansionary in every country in our sample except for Brazil. Total output and employment both increase and by non-trivial amounts. Exports are the engine of growth in all the simulations in which we fix foreign saving, and they lag behind overall growth when we fix the exchange rate, and in fact decline absolutely in three countries. The opposite is true for fixed investment. When the exchange rate is fixed and tariffs are reduced, there is an increase in imports financed mainly by an increase in foreign saving. If foreign saving is fixed the increase in import demand has to be financed by an increase in exports. That requires a real devaluation. Since an increase in foreign saving or an exchange rate appreciation is itself expansionary, as we will see in a moment, the impact of the tariff reduction on output and employment is larger in the fixed rate case than it is with fixed foreign saving in all but the Dominican Republic.

All of this is relevant to understanding the history of trade liberalization in Latin America. With fixed foreign saving, when tariffs are reduced there is a real devaluation and export led growth, which is just what the advocates of trade liberalization expect. But if the exchange rate is fixed instead there is even faster growth but it is not led by exports. In Chapter 2 we pointed out that in many countries exports have not been growing very rapidly. One of the reasons for that is that the reduction in tariffs was accompanied by a large inflow of foreign capital. That inflow permitted the monetary authorities to fix the exchange rate to help control inflationary pressures. Investment and consumption grew rapidly, but exports lagged behind. The fact that trade liberalization did not bring fast, export-led growth in Latin America is not merely due to a competitive failure of Latin-American export industries as some have claimed, since one cannot ignore the importance of the fact that liberalization was accompanied by a big inflow of foreign capital or equivalently of exchange rate appreciation.

Devaluation and an increase in foreign saving

Here we look at two policies, which should have opposing effects on the economy. In the first experiment we devalue the nominal exchange rate by ten percent. In the second we treat foreign saving as exogenous and increase it by ten percent of the value of exports in the base run.[21] In all countries except the Dominican Republic, devaluation is contractionary and an increase in foreign saving (or exchange rate appreciation) is expansionary. Employment falls in the one case and rises in the other.

These results may seem surprising, but one must think carefully about what the model is telling us. Recall that this is a comparative static result. We are asking what will happen if there is a permanent increase in the equilibrium inflow of foreign saving. This is not a temporary or one-time increase, but a permanent shock. When there is such an increase in equilibrium inflows, there will be an equilibrium or permanent increase in absorption, a real exchange rate appreciation and a shift in production away from traded goods. Total output and employment will both be higher. Similarly, in this comparative statics exercise a devaluation operates as a permanent policy shock, lowering the level of foreign capital inflow structurally depressing aggregate demand and thus output and employment.

The model does not tell us anything about the short-run costs of adjusting to the change in production structure. When there is a change in relative prices, factors must be transferred between sectors. But that takes time, partly because it will require capital formation, but also because labor has to be found, hired and trained. That may well mean that during the adjustment process output may fall even it is going to be higher in the new long-run equilibrium solution.

What lessons does all this hold for Latin America? The main one is that foreign saving or capital inflows far from being constant as assumed in the general equilibrium solution, are actually highly variable. Many countries reduced tariffs and enjoyed big capital inflows until the late 1990s. Output and employment increased just as the theory predicts that it should. But the problem was that these inflows were not sustainable. When foreign exchange crises hit in Mexico in 1994, then in Russia and Brazil in 1998, and Argentina in 1999, these capital flows abruptly reversed. That forced exchange-rate devaluations in countries with a flexible regime or heavy domestic demand cuts in those with a fixed regime; both provoking a sharp decline in growth rates all over the region, again just as the theory would predict. The lesson here is that if a country is liberalizing trade with variable foreign saving, it should try to keep its exchange rate at a level at

[21] We did the experiment this way because the base-year level of foreign saving was positive in some countries and negative in others.

which the level of foreign saving required in equilibrium is also sustainable in fact. If it is able to do that, trade liberalization will be expansionary.

Export Subsidies
In this experiment we increased export subsidies uniformly by ten percent of their base period level. Where the subsidies were negative, we made them ten percent less negative. Subsidizing exports is expansionary in every country in either closure (fixed or flexible exchange rates) except for Brazil in both closures and Argentina for the fixed exchange rate case. Not surprisingly growth is led by exports, which appear to be quite sensitive to this kind of subsidy in most countries of the region. When foreign saving is fixed (i.e. under a flexible exchange rate), the real exchange rate appreciates enough to raise imports and cut back the growth of exports. When the exchange rate rather than foreign saving is fixed, the growth in exports is far greater and the growth in imports far less. But the increase in total output (while still positive in all but Brazil and Argentina) is smaller than it is with the subsidy and fixed foreign saving. In effect, there is a reduction in foreign saving and a large improvement in the current account balance all of which is reflected by a reduction in absorption in most countries.

WTO
In this experiment we eliminated all domestic tariffs and export subsidies and we used a vector of the hypothetical world prices for major traded goods groups under a scenario worldwide enforcement of WTO regulations (See Annex Table A3.3). The new set of world traded goods prices was generated by simulating such a scenario using the GTAP world model.[22] In the WTO scenario generally higher (agricultural) commodity prices are expected as subsidies to agricultural production in the developed countries would disappear, which – depending on the export structure – may compensate producers for the loss of export subsidies in the Latin American countries. Each country author applied the new price vector in accordance with the commodity breakdown in his or her country SAM/CGE. The world price increases produce a substantial positive impact to agriculture in those Latin American countries where agriculture is neither protected nor subsidized.

Indeed, in most of the countries of the region (9/15) moving to full free trade is expansionary under either fixed or flexible exchange rates. The main exceptions are: Mexico and the Dominican Republic each of whom has special trading relationships with the United States whose value disappears under full free trade; Cuba, Paraguay and Venezuela who would lose protection of domestic agriculture without benefiting sufficiently from higher world prices; and Brazil for whom free trade has little effect one way or the other. For most other countries agricultural production rises, however, and if foreign saving is fixed, they become more open, with a rise in both exports and imports and a real appreciation of the exchange rate. If the exchange rate is fixed the overall growth is similar but the composition is different. In about half of the countries there is a fall in the trade deficit (i.e. a reduction in foreign saving) as the growth rate of exports at higher world prices exceeds the effect of the fall in domestic protection. That is the case

[22] We are grateful to E. Diaz Bonilla and X. Diao of IFPRI for generating this vector of world market prices. For a description of the GTAP model, see Hertel and Tsigas (1997).

in Argentina, Costa Rica, Honduras, Paraguay, Peru and Uruguay where agricultural products are an important component of exports.

FTAA

The second multilateral trade agreement simulation is a scenario of the creation of a Free Trade Area of the Americas (FTAA). As in the WTO simulation we used the hypothetical vector of world prices for traded goods calculated by the GTAP world model that would be observed if Latin America and the United States successfully created a hemisphere-wide free trade area. Here each of the Latin American countries was assumed to reduce its tariffs on trade with other countries in the region, which we approximated by reducing average tariffs by the proportion of each sector's imports coming from other Latin American countries.

Because the impact of this partial move toward full free trade on world commodity markets is far smaller than the WTO, the changes in world prices are much smaller. These results are based on a scenario where all tariffs between countries in the Western Hemisphere are eliminated, but producer subsidies are left at the current levels. In particular, average world agricultural prices go up by less than 0.009% (there is an increase in the agricultural prices but a decrease in the manufacturing prices) rather than 5% as they do in the WTO simulation. This does not imply as one might expect, that output would rise by more under WTO. In fact in five countries (Chile, El Salvador, Mexico, Paraguay, Venezuela and the Dominican Republic) the reverse is true. For Mexico and the Dominican Republic as noted above that is because going to the full WTO reduces output rather than increasing it. In Paraguay and Venezuela FTAA negatively affects output as under the WTO scenario, but less so under the former.

In all cases the FTAA causes a big rise in imports and a smaller rise in exports. With a fixed exchange rate there is an expansionary rise in foreign saving and absorption whereas if foreign saving is fixed there is a devaluation and a bigger increase in exports. It is likely that this simulation underestimates the full effect of a FTAA on exports within the region. By assumption, in almost all countries all sector commodity markets are treated as homogeneous. That means that each sector in each country is assumed to see its output at world prices adjusted by tariffs or subsidies. How much is consumed nationally and how much is exported depends on internal demand elasticities. No distinction is made for the nationality of the buyer.

Terms-of-Trade Shock

We simulate an adverse terms-of-trade shock represented by a uniform 10% increase in import prices. Not surprisingly an increase in the price of imports is highly contractionary in every country, whether we fixed the exchange rate or foreign saving. Absorption, investment and employment all fall and there is a significant depreciation of the real exchange rate. With fixed foreign saving there is also a substantial reduction in exports as domestic productive capacity is switched to the production of import substitutes.

Productivity Shock

Our CGE models are not dynamic. They do not link changes in the sectoral production functions to investment or the growth in labor. To obtain a simple approximation of dynamic growth effects we increase the constant term (technology parameter) in each sector's production function by ten percent (it works as a parallel shift in the production function). This, of course, generates a large positive impact on output, employment and poverty. The magnitude of the impact depends in part on our assumption that all labor supplies are endogenous, so that any increase in productivity permits a large increase in employment, virtually doubling the effect of the change in productivity on output. Exports grow rapidly under either closure, but if the nominal exchange rate is fixed imports and foreign saving grow even more rapidly.

It is not at all surprising that productivity growth would have such a large growth effect given the assumptions underlying the model. However, the size of the impacts on poverty, which are larger than any of the trade-related shocks or reforms serve to remind us of the crucial importance of investment and growth in the struggle to reduce poverty.

Country-specific closures

The country studies have used a mixture of country closure, but the key difference of most is the use of a Keynesian macro closure with investment driving savings adjustments through income multiplier effects. Under the specifications of the CGE model, this implies an independent investment function which leaves the level of investment fixed under the given closure rule. The upshot is that despite the demand-driven macroeconomic adjustment imposed by this closure rule, output effects tend to be smaller than under the balanced savings-investment closure of the standardized simulations, as this allows for some endogenous investment adjustment. Otherwise the macroeconomic results under the country-specific results are broadly consistent with the findings above, showing expansionary effects of both unilateral trade liberalization (tariff cuts) and the FTAA scenario in all cases but Brazil and Venezuela (the latter only in case of FTAA). The same countries plus Mexico also would lose (mildly) under the WTO scenario.

3.3 Skill-Intensity and the total demand for labor under different scenarios:

We find that in almost all cases removing barriers to trade and increasing openness lead to an equilibrium increase in output and, as we will see, an increase in total employment. The question we wish to address here is what the change in production structure does to skill-intensity. That is does increased openness imply an increase in the relative demand for skilled labor or does it favor Latin America's more abundant unskilled labor. Under the standardized labor market closure rule we use the simplifying assumption that there is an excess supply of all types of labor, or in other words that relative wages are fixed at their base period level in each country. Therefore, in the simulations reported here, the results will be stated in terms of increases in the quantity demanded of labor. When we speak of an increase or decrease in skill-intensity, we mean that this is what would happen if relative wages were constant. If we were to drop that assumption, an increase in skill-intensity would also be reflected in a rise in earnings differentials by skills. In the country case studies, a variety of different assumptions were used. In some cases, all of labor supply was assumed fixed; in others, the supply of *skilled* labor was exogenous and fixed and *unskilled* labor was flexible and demand-determined. When we discuss the simulation results for poverty and distribution, derived from the country studies, we will revert to the country assumptions on labor market closures.

Table 1 CGE simulations – Standardized closures: Macroeconomic indicators

(Real values and percentage change from base)

Foreign Savings fixed (flexible exchange rate)

BASE	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	274	38	74388		2907	1218	2979	28424	1091	70	2424	20090	98	118	126	20687
Absorption	276	40	74777		2927	1290	3092	28464	1223	67	2370	27893	94	124	124	23757
Household consumption	205	28	48422		1747	825	2166	19869	937	46	1694	20939	65	100	91	18767
Investment	48	6	14888		819	254	538	5412	178	16	488	5420	21	21	18	3477
Government consumption	23	5	11466		361	210	389	3182	109	5	189	1534	9	4	15	1513
Exports	16	8	5546		852	180	1220	7128	271	26	999	3604	13	47	22	10370
Imports	23	11	7148		1139	266	1422	8127	419	37	968	13946	22	57	25	6083
Real exchange rate	100	90	97		94	100	100	100	100	91	100	93	87	100	100	90

Tariff cut	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)		0.8	-0.1		1.1	4.7	0.9	1.6	0.1	1.5	0.4	0.1	0.4	0.8	0.6	0.6
Absorption	0.1	0.8	-0.3		1.2	4.3	0.9	1.5	0.2	1.6	0.4	0.5	0.5	1.1	0.6	0.5
Household consumption	0.1	0.8	0.2		1.2	4.4	0.9	1.6	0.2	1.5	0.4	0.5	0.4	0.8	0.6	0.4
Investment	0.5	1.5	-0.8		1.4	4.3	1.3	1.6	0.5	1.7	0.4	0.0	1.1	2.7	1.1	0.5
Government consumption		0.3	0.0		0.5	3.8	0.0	0.7	-0.1	1.7	0.3	1.3	0.2	1.5	0.3	0.0
Exports	2.8	2.2	1.1		2.5	7.4	2.1	2.6	1.6	3.3	0.5	1.8	4.0	5.6	1.8	0.9
Imports	2.4	1.8	0.7		2.1	5.3	1.9	2.4	1.1	2.8	0.5	0.9	3.3	5.1	1.6	0.9
Real exchange rate	2.4	1.4	0.5		1.3	1.4	1.1	2.1	0.9	0.7	0.3	1.3	1.4	0.7	1.0	3.4

Foreign savings increase	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	0.4	1.0	0.0		0.8	1.6	0.7	1.2	0.5	2.2	3.1	1.6	0.1	-0.3	0.3	4.2
Absorption	1.0	2.9	0.0		3.6	2.7	4.5	3.8	2.3	5.5	7.2	2.1	1.3	3.3	2.1	4.7
Household consumption	0.9	2.9	0.0		3.5	2.8	4.4	3.4	2.3	5.1	7.2	2.0	1.2	3.1	1.8	0.0
Investment	1.2	3.4	0.0		4.0	2.7	5.1	5.3	2.7	6.4	7.6	2.3	1.6	4.7	3.9	12.2
Government consumption	0.9	2.9	0.0		3.1	2.6	4.0	3.0	1.7	6.6	6.0	2.0	1.3	2.6	1.9	0.0
Exports	-5.1	-4.2	0.0		-5.1	-3.7	-4.9	-3.5	-3.8	-5.3	-5.5	-2.4	-6.2	-12.7	-5.5	-6.2
Imports	3.8	4.8	0.0		4.3	4.5	4.6	6.1	4.2	3.8	4.8	2.6	3.1	-2.0	4.2	10.7
Real exchange rate	-4.7	-3.9	0.0		-4.8	-2.3	-3.0	-5.4	-3.2	-5.3	-6.9	-2.7	-3.7	-5.4	-4.8	-3.3

Terms-of-trade shock: Import price increase	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	-1.4	-6.2	-0.1		-6.6	-16.5	-7.4	-8.2	-4.6	-11.8	-11.8	-9.3	-2.3	-8.4	-4.2	-3.2
Absorption	-1.5	-5.9	-1.1		-6.6	-15.1	-7.2	-8.0	-4.4	-11.3	-11.9	-7.1	-2.5	-8.2	-4.5	-13.0
Household consumption	-1.3	-5.6	-1.6		-6.6	-15.4	-7.2	-8.0	-4.4	-10.8	-12.1	-6.9	-2.2	-7.3	-4.1	-12.2
Investment	-2.1	-8.0	-0.2		-7.3	-15.2	-8.7	-9.9	-5.1	-12.3	-12.0	-8.2	-3.7	-12.2	-7.4	-17.2
Government consumption	-1.3	-4.6	0.0		-5.0	-13.7	-4.8	-5.3	-4.0	-12.6	-10.0	-6.9	-2.2	-9.6	-3.5	0.0
Exports	1.7	-2.2	5.4		-1.1	-17.2	-0.9	-3.8	-2.2	-5.0	-0.8	-2.2	1.5	-26.1	-0.6	-8.9
Imports	-8.0	-10.7	-6.1		-9.4	-20.2	-9.8	-12.3	-10.5	-12.6	-9.9	-9.8	-8.2	-29.4	-9.6	-17.2
Real exchange rate	7.7	5.3	-11.6		6.2	3.6	5.5	4.3	5.8	8.7	7.9	8.9	6.6	13.5	6.6	-9.1

Terms-of-trade shock: Export price increase	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	1.2	6.0	0.0		6.6	21.0	7.4	8.3	4.7	11.3	11.9	6.9	2.3	8.5	4.2	1.3
Absorption	1.2	5.4	0.0		6.5	18.7	6.9	8.1	3.6	10.3	12.1	3.7	2.2	8.5	4.3	-3.3
Household consumption	1.1	5.2	0.0		6.6	19.2	7.0	8.1	3.5	10.0	12.4	3.6	1.9	7.5	3.9	-0.9
Investment	1.8	7.6	0.0		7.2	18.7	8.5	10.1	4.1	11.1	12.2	4.4	3.3	13.1	7.1	7.0
Government consumption	1.0	3.9	0.0		4.7	16.8	4.3	4.9	3.3	11.6	9.8	3.5	1.9	9.8	3.3	0.0
Exports	-0.3	2.9	0.0		1.3	23.8	1.3	4.0	4.3	4.4	0.4	6.4	0.2	17.1	1.0	-10.0
Imports	7.6	10.8	0.0		10.0	25.8	10.4	13.5	9.9	12.5	11.0	6.0	8.3	25.4	10.1	7.1
Real exchange rate	-5.7	-4.1	0.0		-5.4	-2.7	-4.8	-4.0	-4.0	-7.4	-7.3	-3.6	-5.4	-14.2	-5.6	-13.0

Productivity shock	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	15.0	18.5	10.1		20.7	81.6	14.9	27.6	14.9	23.0	26.9	12.4	13.8	13.9	23.0	10.1
Absorption	15.7	18.2	9.6		20.8	76.9	14.8	26.8	13.7	21.6	27.0	10.8	13.9	13.8	23.7	14.5
Household consumption	14.8	18.0	7.1		20.3	77.6	14.4	27.5	13.4	22.2	27.5	10.9	13.4	13.3	22.9	13.6
Investment	16.7	17.4	25.4		21.1	74.0	15.1	25.6	14.7	21.1	23.9	10.0	14.5	14.5	26.5	19.8
Government consumption	21.4	20.0	0.0		22.1	77.6	16.4	24.3	14.1	17.6	30.5	12.0	16.3	22.0	25.0	0.0
Exports	19.2	21.2	13.7		20.6	100.0	15.6	27.1	19.7	22.1	18.9	25.5	17.0	21.0	22.4	12.0
Imports	14.9	17.4	8.4		19.6	71.5	14.2	25.2	13.2	19.4	20.0	8.9	13.4	18.4	20.5	13.9
Real exchange rate	1.0	4.3	-6.3		2.2	4.2	1.2	6.6	1.6	2.0	5.6	8.5	1.1	-0.7	2.0	2.8

Export subsidy increase	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	0.3	2.8	-0.1		3.2	17.8	2.7	5.0	1.8	5.3	5.4	3.2	1.0	5.0	2.2	1.4
Absorption	0.3	2.5	-0.1		3.0	15.9	2.4	4.6	1.2	4.8	5.4	1.6	0.9	5.0	2.2	-2.8
Household consumption	0.2	2.3	0.8		3.2	16.3	2.5	4.9	1.1	4.8	5.7	1.5	0.7	4.3	2.1	-3.1
Investment	0.6	4.3	-3.0		3.3	15.9	3.4	5.1	1.4	4.8	5.1	2.0	1.8	8.0	3.3	3.9
Government consumption	0.1	1.0	0.0		1.7	14.1	0.4	2.0	1.6	5.0	4.1	1.5	0.6	7.2	1.5	0.0
Exports	4.9	7.3	3.6		6.9	29.3	6.1	8.2	8.7	10.4	6.3	9.2	7.2	33.8	6.6	2.0
Imports	3.9	6.0	2.2		6.0	20.9	5.7	7.6	5.9	8.9	6.7	3.3	5.8	29.2	6.0	1.9
Real exchange rate	-5.5	-4.8	2.0		-5.9	-4.5	-6.6	-3.4	-5.2	-6.9	-6.1	-3.4	-7.0	-12.6	-5.7	-3.7

FTAA scenario	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	0.1	1.2	0.0		1.1	7.6	1.3	2.4	0.3	2.2	0.3	-0.3	0.4	1.1	0.7	-0.9
Absorption	0.2	1.3	0.0		1.1	7.0	1.2	2.3	0.4	2.2	0.3	0.5	0.6	1.7	0.8	-4.6
Household consumption	0.1	1.2	0.2		1.2	7.2	1.3	2.4	0.4	2.1	0.3	0.6	0.3	1.2	0.7	-0.3
Investment	0.5	2.2	-0.7		1.3	7.0	1.9	2.8	0.6	2.3	0.2	-0.3	1.7	3.9	1.2	-11.5
Government consumption	0.1	0.5	0.0		0.5	6.2	0.1	1.1	-0.1	2.4	0.2	2.0	0.0	2.1	0.4	0.0
Exports	3.0	3.2	0.9		2.5	12.0	2.8	3.5	2.2	4.1	0.2	2.9	7.7	7.7	2.0	-1.6
Imports	2.6	2.8	0.7		2.0	8.7	2.8	3.5	1.6	3.7	0.3	1.1	5.4	7.1	2.0	-1.1
Real exchange rate	2.3	2.2	0.6		1.4	2.2	1.2	2.4	1.1	0.4	0.1	2.6	2.8	0.6	1.0	-1.5

WTO scenario	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	0.9	4.2	0.0		0.5	13.9	2.5	6.7	-0.1	10.3	-0.9	-2.1	2.4	0.2	2.5	-1.7
Absorption	1.0	3.8	-0.1		0.5	11.3	2.4	6.3	0.1	9.5	-0.6	-1.2	1.8	1.0	2.5	-6.2
Household consumption	0.8	3.9	0.4		0.6	11.7	2.4	6.6	0.1	9.4	-0.9	-1.0	1.0	0.4	2.5	-1.6
Investment	2.1	4.9	-1.6		0.7	11.2	3.9	7.2	0.7	9.8	0.3	-2.6	4.5	4.2	3.2	-14.2
Government consumption	0.6	2.3	0.0		-0.4	9.7	0.0	2.9	-0.2	9.5	-0.7	0.7	1.3	0.4	1.3	0.0
Exports	7.6	4.4	2.2		5.1	17.7	3.9	8.3	2.5	8.1	-0.4	4.6	8.9	4.6	4.0	-1.5
Imports	10.3	6.8	1.5		1.7	14.6	5.2	9.7	1.0	12.0	-0.6	-0.9	22.8	4.2	7.1	-3.7
Real exchange rate	-0.6	2.7	1.2		4.3	2.4	-0.9	3.0	2.1	-2.8	-0.8	6.3	-20.7	2.0	-0.8	-0.5

Source: Authors' calculations.

Note: Cuba was not included in this exercise because it is not realistic to assume a flexible exchange rate.

Table 2 CGE simulations – Standardized closures: Macroeconomic indicators
(Real values and percentage change from base)

Exchange rate fixed

BASE	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	274	38	74388	29	2907	1218	2979	28424	1091	70	2424	20090	98	118	126	20687
Absorption	276	40	74777	30	2927	1290	3092	28464	1223	67	2370	27893	94	124	124	23757
Household consumption	205	28	48422	22	1747	825	2166	19869	937	46	1694	20939	65	100	91	18767
Investment	48	6	14888	2	819	254	538	5412	178	16	488	5420	21	21	18	3477
Government consumption	23	5	11466	6	361	210	389	3182	109	5	189	1534	9	4	15	1513
Exports	16	8	5546	4	852	180	1220	7128	271	26	999	3604	13	47	22	10370
Imports	23	11	7148	5	1139	266	1422	8127	419	37	968	13946	22	57	25	6083
Real exchange rate	100	90	97		94	100	100	100	100	91	100	93	87	100	100	90

Tariff cut	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	0.2	1.3	0.0	-0.1	1.4	6.2	1.4	2.1	0.3	2.0	0.6	1.1	0.4	0.6	0.0	0.9
Absorption	0.6	2.3	0.1	-0.7	2.7	7.0	4.6	3.3	1.3	2.9	0.9	1.9	1.3	2.2	1.2	0.7
Household consumption	0.5	2.2	0.3	-0.7	2.7	7.1	4.6	3.2	1.3	2.8	0.9	1.9	1.1	1.8	1.1	0.3
Investment	1.1	3.2	-0.5	0.1	3.0	7.0	5.6	4.2	1.7	3.2	1.0	1.6	2.0	4.1	2.2	0.0
Government consumption	0.5	1.8	0.0	-1.1	1.8	6.3	3.4	2.2	0.7	3.3	0.7	2.7	1.0	2.3	0.8	0.0
Exports	0.0	0.0	0.2	0.0	0.2	3.4	-1.9	0.7	-0.2	1.9	0.1	0.1	-0.3	1.8	0.2	0.4
Imports	4.4	4.2	1.2	0.3	3.8	9.8	5.8	5.4	2.9	3.7	0.9	2.6	4.9	4.5	2.8	0.7
Real exchange rate	-0.2	-0.5	1.7		-0.6	-0.9	-1.4	-0.6	-0.4	-0.6	-0.2	-0.6	-0.5	-0.8	-0.3	-2.6

Devaluation	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	-0.8	-2.7	-0.1	1.7	-1.4	-2.6	-2.1	-2.1	-1.0	-3.7	-3.7	-6.7	-0.1	2.0	-0.3	-2.3
Absorption	-2.2	-9.8	-1.1	1.0	-16.3	-10.9	-22.6	-7.8	-11.3	-11.9	-12.1	-9.6	-4.4	-9.2	-5.1	-14.6
Household consumption	-2.1	-9.6	-0.7	1.1	-15.9	-11.0	-22.2	-7.2	-11.4	-11.0	-12.1	-9.4	-4.2	-8.7	-4.4	-10.0
Investment	-2.7	-10.6	-3.0	-1.4	-17.4	-10.8	-24.9	-10.6	-12.8	-13.8	-12.6	-10.8	-5.1	-11.9	-8.9	-44.6
Government consumption	-2.1	-10.0	0.0	1.6	-15.5	-10.7	-21.5	-7.2	-8.3	-14.0	-10.7	-9.3	-4.3	-7.4	-4.7	0.0
Exports	12.1	15.7	8.4	10.0	32.7	35.6	25.1	8.3	23.9	12.6	11.2	12.3	23.6	33.1	15.0	6.6
Imports	-7.5	-13.6	-3.7	7.1	-12.9	-17.2	-19.8	-11.2	-16.3	-7.0	-6.4	-11.4	-8.5	4.4	-8.2	-17.9
Real exchange rate	10.5	12.4	-8.8		12.1	12.4	12.8	11.1	13.1	11.7	11.5	13.7	11.4	10.9	10.9	-8.4

Terms-of-trade shock: Import price increase	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	-1.3	-6.7	0.0	-10.4	-6.8	-18.8	-8.2	-8.9	-4.6	-11.5	-11.8	-10.4	-2.3	-8.3	-4.2	-2.3
Absorption	-1.1	-7.4	-0.3	-10.6	-7.3	-19.7	-13.1	-10.0	-6.5	-10.4	-11.2	-8.6	-2.3	-3.0	-4.4	-9.6
Household consumption	-1.0	-7.1	-1.0	-8.4	-7.3	-20.0	-13.1	-9.8	-6.4	-10.0	-11.4	-8.3	-2.0	-2.4	-4.0	-10.2
Investment	-1.7	-9.7	1.8	0.4	-8.1	-19.8	-15.3	-12.4	-7.5	-11.3	-11.3	-9.8	-3.5	-5.4	-7.2	-5.7
Government consumption	-1.0	-6.2	0.0	-23.3	-5.6	-18.1	-10.5	-7.1	-5.6	-11.6	-9.4	-8.3	-2.1	-5.3	-3.5	0.0
Exports	-0.1	0.1	-0.5	0.0		-8.1	5.8	-2.1	1.5	-5.8	-1.4	-0.5	0.4	-41.3	-0.8	-8.1
Imports	-6.9	-12.9	-3.5	0.6	-10.2	-27.1	-15.0	-15.0	-13.7	-12.1	-9.5	-11.5	-8.0	-29.9	-9.4	-12.8
Real exchange rate	6.0	7.4	-5.5		7.1	9.0	9.4	7.1	8.8	7.7	7.1	11.0	6.5	6.3	6.4	-7.6

Terms-of-trade shock: Export price increase	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	0.4	4.0	0.0	0.3	5.7	18.5	6.0	7.5	3.9	7.5	7.9	3.7	2.2	14.3	4.0	4.0
Absorption	-1.0	-2.0	0.0	-0.5	-4.9	11.7	-7.7	3.0	-4.3	-2.4	-1.0	-1.1	-2.1	-5.8	-0.7	-4.6
Household consumption	-1.0	-2.0	0.0	-1.4	-4.5	12.1	-7.4	3.4	-4.4	-1.9	-0.7	-1.1	-2.2	-5.8	-0.4	-4.2
Investment	-0.9	-0.6	0.0	-0.9	-5.2	11.7	-7.9	2.7	-4.8	-3.5	-1.6	-1.0	-1.6	-6.3	-1.7	-6.3
Government consumption	-1.1	-3.5	0.0	3.3	-5.7	10.0	-8.9	0.5	-2.3	-3.4	-1.5	-1.1	-2.3	-1.3	-1.2	
Exports	12.1	14.5	0.0	2.9	22.4	41.2	17.0	10.5	20.5	18.6	12.6	12.7	23.1	77.9	15.8	1.0
Imports	-0.7	-0.6	0.0	1.6	-1.0	13.6	-4.1	4.9	-2.4	4.8	3.2	0.0	-0.5	36.9	1.3	-3.4
Real exchange rate	4.5	4.9	0.0		4.9	3.4	3.6	3.9	4.2	3.9	4.3	2.6	4.9	4.6	4.4	5.4

Productivity shock	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	15.1	19.7	10.1	20.2	21.1	88.2	15.1	28.7	15.1	24.9	30.2	17.6	13.8	14.1	23.1	7.5
Absorption	15.9	21.6	10.5	19.8	23.0	87.8	16.6	32.5	14.9	26.6	34.9	18.0	14.3	12.9	24.8	5.3
Household consumption	15.0	21.3	7.7	40.3	22.5	88.6	16.2	32.7	14.7	26.9	35.4	17.9	13.7	12.5	23.8	9.3
Investment	16.9	21.3	27.8	25.6	23.6	84.7	17.3	33.8	16.2	26.8	32.1	18.1	15.0	13.4	28.5	11.4
Government consumption	21.6	23.5	0.0	-59.3	24.1	88.2	18.1	28.9	15.1	23.4	37.4	19.1	16.7	21.3	26.0	0.0
Exports	17.4	16.4	6.9	0.0	17.3	87.1	13.6	19.7	17.3	17.2	12.6	16.5	15.0	24.1	19.4	12.1
Imports	15.5	22.8	11.7	5.3	22.1	88.4	16.1	34.5	15.3	22.7	24.8	17.7	14.1	18.9	22.6	0.7
Real exchange rate	0.4	0.4	0.6		-0.1	-0.6	0.0	-0.8	0.2	-2.0	-0.5	-0.1	0.4	0.3	-0.1	0.9

Export subsidy increase	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	-0.3	1.4	-0.1	1.6	2.1	16.4	1.1	4.7	0.9	2.8	3.3	1.3	0.6	7.2	2.0	0.3
Absorption	-1.0	-2.0	-0.8	-0.4	-4.9	11.7	-8.1	2.9	-4.3	-2.4	-1.0	-1.1	-2.1	-5.8	-0.6	-7.4
Household consumption	-1.0	-2.0	0.3	-0.2	-4.5	12.1	-7.8	3.4	-4.4	-1.9	-0.8	-1.1	-2.2	-5.9	-0.3	-9.9
Investment	-0.9	-0.6	-5.1	-0.1	-5.2	11.7	-8.3	2.6	-4.8	-3.5	-1.6	-1.0	-1.6	-6.3	-1.6	-8.0
Government consumption	-1.1	-3.5	0.0	-0.9	-5.7	10.0	-9.2	0.5	-2.3	-3.4	-1.5	-1.1	-2.3	-1.3	-1.1	0.0
Exports	12.1	14.5	8.9	8.4	22.4	41.2	17.4	10.5	20.5	18.7	12.8	12.7	23.1	78.6	15.1	5.1
Imports	-0.7	-0.6	-0.2	-0.9	-1.0	13.6	-4.3	4.9	-2.4	4.8	3.2	0.0	-0.5	37.4	1.3	-5.3
Real exchange rate	0.1	0.4	-3.6		0.0	-0.8	-1.1	-0.9	0.2	-0.8	-0.8	0.0	0.4	-0.1	-0.3	-3.5

FTAA scenario	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	0.3	2.0	0.0	1.7	1.4	10.2	1.9	2.9	0.5	2.6	0.4	1.4	0.3	0.9	0.8	0.7
Absorption	0.7	3.7	0.1	1.0	2.8	11.6	6.0	4.5	1.8	3.3	0.6	2.8	1.1	2.9	1.4	-6.9
Household consumption	0.6	3.5	0.3	1.4	2.8	11.9	6.0	4.3	1.8	3.2	0.6	2.8	0.7	2.3	1.3	-1.5
Investment	1.1	5.0	-0.4	0.5	3.1	11.6	7.3	5.9	2.2	3.6	0.6	2.2	2.3	5.6	2.4	-18.9
Government consumption	0.6	2.8	0.0	-0.1	1.9	10.5	4.3	2.9	0.9	3.8	0.5	4.2	0.5	3.0	1.0	0.0
Exports	0.2	-0.3	0.1	0.0	-0.1	5.4	-2.3	1.2	-0.2	2.9	0.0	0.2	4.4	3.0	0.2	-1.5
Imports	4.6	6.6	1.1	0.2	3.9	16.5	7.8	7.0	4.1	4.4	0.5	4.0	5.8	6.4	3.2	-4.7
Real exchange rate	-0.2	-1.0	1.5		-0.7	-1.5	-2.0	-0.9	-0.7	-0.7	-0.3	-0.5	2.6	-1.2	-0.5	-0.9

WTO scenario	Argentina	Bolivia	Brasil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Rep.	Uruguay	Venezuela
GDP (factor prices)	0.7	4.3	0.0	-2.9	0.7	13.9	2.4	6.9	0.1	9.0	-1.8	-1.5	0.3	-0.1	2.5	0.9
Absorption	0.2	4.3	0.2	-3.5	1.9	13.5	0.8	8.1	1.1	5.2	-3.1	0.0	-6.4	2.9	1.4	-6.7
Household consumption	0.1	4.3	0.6	-3.2	2.0	14.0	0.9	8.2	1.0	5.5	-3.4	-0.2	-6.3	2.1	1.6	-1.9
Investment	1.1	5.5	-1.0	-0.5	2.2	13.4	2.1	9.8	1.9	4.9	-2.4	-1.6	-6.5	6.7	1.3	-15.9
Government consumption	-0.2	2.8	0.0	-5.8	0.9	11.7	-1.4	4.4	0.5	4.3	-2.8	1.5	-6.3	2.1	0.4	0.0
Exports	13.9	3.7	0.3	1.5	2.8	14.7	5.7	6.0	0.8	12.8	1.7	3.6	32.7	-1.5	6.8	-1.5
Imports	7.5	7.7	2.5	1.0	3.3	18.3	3.7	12.8	2.7	9.1	-2.1	0.1	-8.9	3.7	5.2	-4.5
Real exchange rate	2.5	1.9	3.4		2.5	0.7	0.0	0.1	0.7	1.2	1.7	5.1	20.3	-0.5	1.3	-0.9

Source: Authors' calculations.

Skill-intensity may rise or fall following trade opening depending on whether skilled or unskilled labor is more important in traded goods sectors. Our CGE models can shed important light on these questions because they are based on observed, sector-specific production functions and skill-intensities. Each country has a different disaggregation of labor, but in all cases the disaggregation permits us to separate factor demand by skill, generally defined in terms of education level. In some cases rural and urban labor are reported separately so that we can see what happens to rural-urban differentials in addition to what happens for the entire economy or in the urban sector considered separately. In most countries there was a finer disaggregation of labor than we show here. In Table 3 we have chosen one category of urban (male) labor, generally defined as unskilled salaried male labor in the formal sector and compared it to skilled salaried labor in the formal sector. Where there is a disaggregation into rural and urban labor, we have compared the change in the demand for rural unskilled labor to urban unskilled labor.

Table 3 CGE Simulations – Standardized closure rules: Changes in skill intensity of urban and rural labor

	Tariff reduction				**Increase Foreign Savings**		**Increase export subsidies**			
	Urban unskilled/Agr. unskilled		*Urban skilled/unskilled*		*Urban / rural unskilled*	*Urban skilled/un-skilled*	*Urban unskilled/Agr. unskilled*		*Urban skilled/unskilled*	
	Fixed ER	***Flex ER***	***Fixed ER***	***Flex ER***	***Flex ER***	***Flex ER***	***Fixed ER***	***Flex ER***	***Fixed ER***	***Flex ER***
Argentina	rises	rises	falls	falls	falls	falls	rises	rises	rises	falls
Bolivia			no change	falls		rises			falls	falls
Brazil			rises	rises						
Chile			falls	falls		rises			falls	falls
Colombia			rises	rises		falls				rises
Costa Rica	rises	falls	rises	falls	rises	rises	falls	falls	falls	falls
Ecuador			falls	falls		no change			falls	falls
El Salvador			falls	rises		falls				rises
Honduras	falls		rises	rises	rises	falls	rises	rises	rises	rises
Mexico	rises	rises	rises	no change	rises	rises	falls	rises	rises	rises
Paraguay			rises	no change		no change			no change	rises
Peru	rises	rises	falls	falls	falls	rises	rises	rises	falls	falls
Dom. Rep.	rises	rises	falls	rises	rises	rises	rises	rises	falls	falls
Uruguay			falls	falls		rises			falls	falls
Venezuela										

Note: Directions of change refer to relative growth rates in demand for labor categories. They tell whether growth was relatively skill intensive or whether it favored unskilled urban or rural workers. Since classifications of factors in the country CGE models do not always exactly coincide with those of this table, we take for agriculture/non-agriculture specifications in country CGE's unskilled formal sector labor relative to agricultural unskilled labor. For urban breakdowns we use formal sector skilled relative to formal sector unskilled. Where there is a gender breakdown, we use the series for males.

Does trade liberalization or reducing tariffs increase skill-intensity? According to the left-hand columns of Table 3, the short answer is that it depends. In about half of our countries it does while in the other half it does not. Recall that when foreign saving is fixed, tariff reductions lead to a depreciation of the real exchange rate and export-led growth. When trade liberalization occurs with fixed exchange rates there is an increase in foreign saving, an appreciation of the real exchange rate and growth is led by non-traded goods as well as investment. But despite this difference in the composition of growth, factor intensity moves in the same direction in all but two cases. Essentially the pattern depends on skill intensities in the traded goods industries, both those producing exports and import substitutes. For the fixed exchange rate regime, the result depends as well on factor intensities in the non-traded goods and investment sectors, both of which lead the response to tariff reduction when the nominal exchange rate is fixed.

One further pattern is that in all but one of the cases where we have information on rural labor, trade liberalization increased the demand for urban labor relative to rural or agricultural labor. While the demand for agricultural labor seldom falls absolutely, it rises by significantly less than either of the urban labor categories. In this way, trade liberalization is likely to be accompanied by rising labor and income inequality even though the expansion in total output will reduce poverty at the same time.

Are traded or non-traded goods more skill intensive? We can address that question by seeing what happens to labor demand when there is an either a devaluation or an appreciation of the real exchange rate in response to a rise in foreign saving. Results show that skill intensity widens in eight countries and falls in four as the economy shifts over to the production of more non-traded goods in response to the rise in foreign saving. Rural workers lose in most of the countries for which we have information because they are dependent on agricultural traded goods production.

Traded goods can, of course, be either import substitutes or exports. In the right hand column of Table 3, we show the results of the simulation in which we increased all export subsidies by 10%. When we do that there is an expansion of employment in those sectors producing exports. Skill intensity falls in eight countries and rises in five. In all but two of those cases the changes in skill intensity are the opposite of what was observed with the increase in foreign saving. That is, increasing export production has the opposite effect on skill intensity of increasing non-traded goods. That says that there is no important difference in most cases between the import-substituting part of tradables and the exporting part. The experiment also tells us that in most countries exports are not relatively skill-intensive which implies that pursing export-led growth should not increase inequality.

However, when introducing the country-specific segmented labor market assumptions, this picture remains equally mixed and does not show an across-the-board widening of the earnings gap between skilled and unskilled workers due to trade liberalization (unilaterally or multilaterally). If countries apply a uniform tariff cut, the earnings gap between skilled and unskilled workers is expected to increase in six country cases (Brazil, Cuba, Costa Rica, Ecuador, El Salvador and Dominican Republic) and only in Honduras, Mexico and Uruguay a smaller earnings gap is expected (see Table 4). In all other countries, the simulation of further unilateral trade opening shows no substantial shifts in skill inequality. The multilateral trade liberalization scenarios show a somewhat stronger upward skill bias, partly compounded by negative effects on agricultural employment. Under the FTAA scenario, Peru is added to the country cases with rising wage gap between skilled and unskilled workers and under WTO scenario this also is the outcome for Argentina. Average real wage levels increase almost without exception in all trade opening scenarios for the country-specific labor market closures as a consequence of the generally expansionary effect on the economy. The poverty effects of these labor market outcomes will depend on the net impact of these shifts in aggregate and sector employment, mean earnings and earnings differentials. This we take up in the next section.

Table 4 CGE Macro-micro simulations – Country-specific closures
(changes represent deviations from base)

	Macro outcomes		Labor demand				Wages		Microsimulations	
	Output	Exports	Employ-ment	Unskilled	Skilled	Skill intensity	Average	Skill diff.	Poverty	Inequality
Devaluation										
Argentina	-0.9	57.6	+	+	+	**+/0**	+	**+/0**	1.6	0.4
Bolivia	-1.1	6.3	-	-	-	+	**0**	**0**	1.3	0.9
Brazil	-0.04	9.0	-	-	-	-	-	**+/0**	-0.2	-0.2
Cuba	0.9	0.0	+	+	+	**+/0**	+	+	-0.10	-0.01
Chile	-0.6	7.7	-	-	-	-	**-/0**	**-/0**	1.4	0.8
Colombia	-1.2	31.5	**0**	**0**	**0**	**0**	-	**-/0**	0.6	0
Costa Rica	-0.1	6.5	-	-	-	-	-	-	1.6	-0.2
Ecuador	0.0	5.7	-	-	**0**	+	-	-	0.4	-0.7
El Salvador	-0.7	17.3	+	+	-	-	-	-	5.1	1.8
Honduras	-10.4	15.5	-	--	+	+	-	+	4.8	2.3
Mexico	-0.1	22.1	-	-	**0**	+	-	+	1.9	-0.1
Paraguay	-3.7	11.3	-	-	-	**0**	**0**	**0**	4.8	1.4
Peru	-1.5	40.5	-	-	-	-	+	**0**	1.2	0.3
R. Dom	1.2	27.3	+	+	-	--	+	+	-2.8	-0.5
Uruguay	-1.7	12.5	**0**	**0**	**0**	**0**	-	+	0.4	-0.44
Venezuela	1.5	-9.4	-	-	-	+	-	**0**	1.2	-0.3
Tariff cut										
Argentina	0.3	4.2	+	+	+	**0**	-	**-/0**	-0.9	0.3
Bolivia	0.8	0.3	+	+	+	**0**	**0**	**0**	-1.8	0.7
Brazil	-0.1	0.1	+	+	+	+	+	**+/0**	-1.2	-0.2
Cuba	0.0	0.0	**-/0**	**-/0**	**-/0**	**0**	**-/0**	**+/0**	n.a	n.a.
Chile	0.7	1.8	+	+	+	**-/0**	**+/0**	**0**	-4.5	-0.3
Colombia	0.3	3.8	**0**	**0**	**0**	**0**	+	**-/0**	-5.6	0.0
Costa Rica	0.3	-0.4	+	+	+	**+/0**	+	+	-0.3	0.1
Ecuador	0.3	0.1	+	+	**0**	-	+	+	0.3	0.2
El Salvador	0.3	-0.2	+	+	+	+	+	+	-0.7	-1.0
Honduras	1.9	1.3	+	+	+	-	+	-	-1.3	-0.5
Mexico	0.1	0.4	**+/0**	**+/0**	**0**	-	+	-	-0.3	-0.1
Paraguay	1.1	0.1	+	+	+	-	**0**	**0**	-2.4	-0.6
Peru	0.4	3.4	+	+	+	-	+	**0**	-1.3	0.7
R. Dom	0.7	6.8	+	+	-	-	+	+	-1.4	-0.2
Uruguay	0.0	1.8	**0**	**0**	**0**	**0**	+	-	-0.4	-0.1
Venezuela	0.1	0.5	+	+	+	+	+	**0**	-1.0	-0.1
Export subsidy increase										
Argentina	0.3	5.7	+	+	+	-	++	**0**	2.5	0.5
Bolivia	1.2	7.2	+	+	+	+	**0**	**0**	-4.2	-1.8
Brazil	-0.5	-3.1	**+/0**	**+/0**	**+/0**	**-/0**	+	+	-4.4	-0.2
Cuba	1.0	5.4	+	+	+	-	**+/0**	+	-0.11	-0.01
Chile	1.9	5.0	+	+	+	-	+	**-/0**	-11.9	-0.9
Colombia	0.6	8.9	**0**	**0**	**0**	**0**	+	-	-1.0	0.0
Costa Rica	0.0	0.4	**+/0**	**+/0**	**+/0**	**-/0**	**+/0**	**-/0**	-0.1	0.1
Ecuador	0.2	0.6	+	+	**0**	-	**+/0**	+	0.0	-0.1
El Salvador	1.1	15.4	+	+	+	-	**+/0**	-	1.6	-3.1
Honduras	-0.04	0.2	**-/0**	**-/0**	**0**	**+/0**	**+/0**	**0**	0.1	0.1
Mexico	0.9	1.5	+	+	**0**	-	+	-	-2.4	-0.5
Paraguay	1.3	12.0	+	+	+	-	**0**	**0**	-4.0	-1.1
Peru										
R. Dom	1.3	16.4	+	+	-	-	+	+	-3.1	-0.7
Uruguay	0.0	0.3	**0**	**0**	**0**	**0**	**+/0**	**0**	-0.1	0.0
Venezuela	0.2	3.2	-	-	-	-	+	**0**	-2.0	0.2

	Macro outcomes		Labor demand				Wages		Microsimulations	
	Output	**Exports**	**Employ-ment**	**Unskilled**	**Skilled**	**Skill intensity**	**Average**	**Skill diff.**	**Poverty**	**Inequality**
FTAA										
Argentina	0.4	4.3	+	+	+	**0**	-	**0**	-1.7	0.3
Bolivia	1.2	0.5	+	+	++	+	**0**	**0**	-3.9	-2.3
Brazil	-0.4	1.0	+	+	+	+	+	+	-1.2	-0.3
Cuba	0.1	5.4	+	+	+	**0**	+	+	n.a	n.a.
Chile	0.7	1.6	+	+	+	-	+	**-/0**	-4.9	-0.3
Colombia	0.4	5.9	**0**	**0**	**0**	**0**	+	**-/0**	-6.9	0.0
Costa Rica	0.2	4.7	+	+	+	+	+	+	-0.4	0.3
Ecuador	0.4	3.4	+	+	**0**	-	+	+	0.2	0.1
El Salvador	0.5	-0.2	+	+	+	-	+	+	-1.3	-0.7
Honduras	1.2	2.4	+	+	+	-	+	-	-0.7	-0.3
Mexico	0.1	0.6	**+/0**	**+/0**	**0**	-	+	-	-0.3	-0.1
Paraguay	0.3	0.0	+	+	+	+	**0**	**0**	0.7	0.4
Peru	0.6	4.8	+	+	+	-	+	+	-1.6	0.4
R. Dom	1.0	9.7	+	+	**0**	-	+	+	-2.7	-0.3
Uruguay	0.0	2.2	**0**	**0**	**0**	**0**	+	-	-0.6	0.0
Venezuela	-0.1	-0.4	-	-	-	**0**	-	**0**	0.3	-0.4
WTO										
Argentina	1.7	10.0	+	+	+	+	++	+	-1.2	0.1
Bolivia	1.1	5.3	+	+	++	+	**0**	**0**	-3.1	-3.2
Brazil	-0.4	2.0	+	+	+	+	+	+	-1.4	-0.2
Cuba	0.1	5.4	+	+	+	**-/0**	+	+	n.a.	n.a.
Chile	0.9	3.9	+	+	+	-	+	**-/0**	-6.0	-0.5
Colombia	0.4	7.8	**0**	**0**	**0**	**0**	+	-	-7.4	0.0
Costa Rica	0.1	-1.2	**0**	-	+	+	+	+	0.9	0.6
Ecuador	1.0	2.6	+	+	**0**	-	+	++	0.2	0.3
El Salvador	0.5	0.9	+	+	+	+	+	-	-1.0	-0.7
Honduras	2.2	9.8	+	+	+	-	+	-	-1.2	-0.4
Mexico	-0.2	-1.9	**-/0**	**-/0**	**0**	+	-	+	0.0	-0.1
Paraguay	0.5	4.0	+	+	+	-	**0**	**0**	0.1	-0.3
Peru	0.5	6.5	+	+	+	-	+	+	-2.0	0.9
R. Dom	1.2	8.1	+	++	+	--	+	+	-3.8	-1.2
Uruguay	0.0	5.0	**0**	**0**	**0**	**0**	+	-	-2.0	-0.3
Venezuela	-0.3	1.6	-	-	-	+	+	**0**	0.2	-0.1
Foreign Savings Increase										
Argentina	0.3	-7.4	**0**	**0**	**0**	**0**	+	**-/0**	1.3	0.5
Bolivia	0.1	0.5	+	+	+	+	**0**	**0**	-0.1	-0.8
Brazil	n.a.	n.a.	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	n.a.	n.a.
Cuba	n.a.	n.a.	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	n.a.	n.a.
Chile	0.1	-0.7	**+/0**	**+/0**	**+/0**	**+/0**	**0**	**0**	-0.4	0.0
Colombia	0.2	-2.0	**0**	**0**	**0**	**0**	+	-	-0.2	0.0
Costa Rica	0.1	-0.4	+	+	+	+	+	+	0.2	0.1
Ecuador	0.1	-3.8	+	+	**0**	-	+	++	0.6	0.3
El Salvador	4.0	-26.8	++	++	++	+	+	+	-4.6	-5.0
Honduras	2.1	-3.4	+	+	-	-	+	-	-1.4	-0.5
Mexico	-0.5	-10.3	+	+	**0**	-	+	-	-1.9	-0.4
Paraguay	0.8	-2.3	+	+	+	**0**	**0**	**0**	-1.5	-0.4
Peru	0.1	-2.7	**+/0**	**+/0**	**+/0**	**0**	**-/0**	**0**	-0.1	0.1
R. Dom	n.a.	n.a.	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	n.a.	n.a.
Uruguay	1.5	-19.8	**0**	**0**	**0**	**0**	+	+	-3.2	0.4
Venezuela	1.9	-3.3	++	+	+	-	+	**0**	-3.1	-1.0

Note
+ = increase
+/0 = slight increase (could be insignificant)
++ = strong increase
0 = no (significant) change
- = decrease
-/0 = slight decrease (could be insignificant)
-- = strong decrease

4. The impact of policy simulations on poverty and inequality

4.1 Observed trends in the 1990s

It is useful to begin the discussion of poverty and inequality with an overview of observed trends in those two variables. We have used the ECLAC estimations on household data to preserve comparability. ECLAC uses poverty lines that reflect the cost of a market purchased basket of necessities and they make a correction for underreporting of survey-based incomes and for income in kind, which was generally not done by our country authors. For these reasons the country level estimates shown in Annex Table A3.4 may differ from the poverty estimates in the country papers. That is of less concern to us here because what we want to determine are the trends in poverty over the 1990s rather than the levels of poverty. For that the estimates shown in the table are useful. For the region as a whole the total and extreme poverty incidence are presented in Table 5 for the period 1980-1999, including estimations for 2002.[23]

Table 5 Poverty in Latin America

	Total Poverty		Extreme Poverty	
	Millions	Percent	Millions	Percent
1980	136	40.5	62	18.6
1990	200	48.3	93	22.5
1997	204	43.5	89	19.0
1999	211	43.8	89	18.5
2002	221	44.0	99	20.0

Source: ECLAC (2002).

Overall, both in absolute and in relative terms, total poverty and extreme poverty worsened between 1980 and 1990.and then improved somewhat in the period before 1997. But even in the early 1990s the numbers in poverty continued to increase even though there was a decline in the headcount ratio. The table also suggests that after 1997 there was no further progress in reducing either poverty or indigence. Reducing current extreme poverty rates by half toward 2015 has been defined as the central objective of the United Nation's Millennium declaration. Reaching this goal will require a major effort for many countries in the region (UNDP, ECLAC, IPEA, 2003).

The region totals for the 1990s shown in Table 5 hide a great deal of heterogeneity among the different countries (see Annex Table A3.4). Brazil, Chile, Costa Rica, Guatemala, Panama and Uruguay all made significant progress in poverty reduction, particularly between 1990 and 1997, while Argentina, Paraguay, Ecuador, and Venezuela had large increases in poverty particularly after 1997. Because of its size, Brazil's good performance makes the performance for the region seem better than it for most of the other countries. Between 1990 and 1999 Brazil cut its indigent population by

[23] Information detailed by country can be found in the Annex Table A3.5. Estimations may differ from official national estimates, as well as to those reported by the country authors, due to adjustments made by ECLAC to keep income definitions comparable over time (and as much as possible, across countries), to deal with non-reported incomes, to deal with statistical discrepancies between household surveys and national accounts data and are, last but not in the least due to differences in poverty lines. The direction of change should be emphasized therefore, rather than the precise estimates.

13 million people. Indigence in the rest of Latin America rose by nine million. Thus for most countries observed trends in poverty followed the performance of the economy. Countries in crisis after 1997 such as Argentina, Ecuador, Paraguay and Uruguay of Mexico in 1995-96 had big increases in poverty whereas poverty fell rapidly in countries growing rapidly like Chile, the Dominican Republic and Mexico after 1996.

The region did not manage to decrease inequality in per capita household income distribution during the 1990s, with the sub-continent remaining the world's most unequal area (ECLAC, 2002). Measuring inequality by the Gini coefficient, the available evidence shows that inequality increased further in at least 11 out of 18 countries between 1990 and 1999 (see Annex Table A3.4). Two countries (Honduras and Uruguay) show decreasing inequality, while it is unchanged in four countries (Chile, Guatemala, Nicaragua and Panama).

4.2 Effects of export-led economic strategies on poverty and inequality

We have seen what happened to output, employment, and earnings differentials in the simulations reported in Section 3. What we now want to know is what these changes might mean for poverty and the distribution of income at the household level. As explained in Section 2, we do this by taking the CGE model simulation outcomes and applying these through the microsimulation approach as counterfactuals to the observed labor market parameters using the full distribution as given by household surveys of each country case.

We report the comparative results of the microsimulations in two ways. First, the final two columns of Table 4 above report the poverty and income inequality effects as percentage changes from the base for each of the policy simulations using the country-specific closures for the CGE models. Second, since the absolute changes in policy variables and the distribution of income differ across countries we also report the changes as elasticities, defined as the percentage change in poverty or inequality per percent change in a policy variable. To make the changes easier to visualize, for each policy simulation we have transferred the elasticities into four quadrant diagrams, and we have calculated the elasticity for both earned income and household income per capita (see Figures 4 and 5). The diagrams put poverty on the vertical axis and the Gini coefficient of per capita household income on the horizontal axis. Thus poverty increases in the two top quadrants, and inequality increases in the two right hand quadrants of each diagram.

Poverty effects of trade liberalization

Unilateral trade liberalization reduces poverty and raising tariffs increases it. There is only one point-source natural resource abundant country where that is not the case (Ecuador) and even in this case the increase in poverty is small as a consequence of a unilateral tariff cut. More generally, the poverty effects are not very big. Income inequality at the household level rises (slightly) in most natural resource abundant economies as predicted (Argentina, Bolivia, Costa Rica, Ecuador, and Peru), though Venezuela provides an exception to this rule. The small effects on poverty and inequality should not be surprising, as under this scenario we are cutting tariffs further from already low, post-reform levels. A key conclusion is though, that pre-reform counterfactual (raising tariffs) would enhance poverty suggesting that trade liberalization is indeed poverty-reducing. These results are broadly consistent with moving to completely free trade under the WTO or to a region-wide multilateral trade agreement under FTAA. Both of these changes also reduce poverty and inequality in most of the countries. However, poverty rises (modestly) under these scenarios in Costa Rica (only WTO), Ecuador, Paraguay, and Venezuela, mainly due to the negative effects on the agricultural sectors in these countries which is not sufficiently picked up with employment and income growth in other sectors.

Across-the-board increases in export subsidies are generally poverty reducing as well (in apparent contradiction with the WTO scenario), with a few exceptions. Under this scenario export production is stimulated in a broad sense and given the small-economy assumption is assumed not to affect world prices. In this sense it works alike a tariff cut stimulating aggregate employment as mostly more labor-intensive (e.g. agriculture) sectors benefit from subsidies that are increased in the scenario.

These results have to be interpreted with some caution though. These are general equilibrium, comparative static results that do not take into account the costs of adjusting to a changed production structure. If the exchange rate is fixed, the simulation determines the impact of lowering the tariff rates and bringing in more foreign capital to permanently finance a bigger balance of payments deficit. In the previous section we saw that this change is expansionary (though growth is led by non-traded goods rather than exports). If foreign saving is fixed, the exchange rate has to depreciate to allow exports to expand enough to pay for additional imports. But total output and employment increase in both cases and poverty declines. The simulation results also suggest that if no poverty reduction was observed in practice after trade liberalization, it is either because a lot of other poverty-increasing factors were changing at the same time (most typically dealing with macro shocks; see Taylor and Vos 2002) or because the economies are still in the process of adapting their production structures.

Poverty and external balance shifts

As we saw in the previous section devaluation is contractionary and an increase in foreign saving is expansionary. These changes have the expected effects on poverty. Devaluation increases poverty, in some cases by quite large amounts and foreign saving reduces it. It is also clear that devaluation increases income inequality. Curiously enough however it does not increase earnings inequality. That suggests that traded goods are in most countries are not skill intensive. Thus while total output and employment go down with a devaluation (or a fall in foreign saving), for those who keep their jobs skill-intensity falls.

Productivity increases

Far and away the largest amount of poverty reduction comes from increasing productivity. That is true whether the change is measured in absolute amounts or in elasticities. In most cases increasing productivity also reduces inequality. This quite clearly underlines the obvious and important role that economic growth plays in poverty reduction.

4.3 Labor market adjustment and poverty impact

As explained above, the study assumed that the labor markets are the main transmission channel of the impact of trade reforms on poverty and distribution. The effect of alteration of parameters of the labor market structure on poverty and inequality was analyzed in the country cases and is summarized in Annex Table A3.5. This table indicates, for each country, the labor market parameter which shows the largest change, in absolute terms, when explaining total changes in poverty and inequality for different simulations. The following stylized facts can be observed:

- Mean wage (and other labor-earnings) adjustments (W_1 as defined in section 2.4) tend to have the largest effect on the poverty incidence in most simulations.
- Changes in the remuneration structure (W_2) are also the most important variable explaining absolute changes in income inequality at the household level (rather than quantity shifts in the employment structure or reductions in unemployment) in most country cases. Unsurprisingly, this also applies to the simulated effects on the Gini coefficient of labor income inequality for the full distribution.
- Quantity adjustment in the form of a falling rate of unemployment are key in explaining poverty reduction under trade liberalization in a few cases, most notoriously Brazil and Peru, as well as in Cuba and Venezuela in the FTAA scenario.

5. Conclusions

The purpose of this project was to determine the impact of trade liberalization, external shocks and domestic policy responses on output, employment, poverty and the distribution of income. We found that trade liberalization increased output in almost every country in our sample. It also increased either wages or employment depending on the closure used in the country-specific models. Consistent with this, poverty declined in all but one country in the unilateral trade liberalization scenario. Rising labor inequality, particularly between skilled and unskilled workers, emerges in the larger number of cases, but does not necessarily translate into more inequality in per capita household incomes because of offsetting positive employment effects. These results are very different from the historical experience of most Latin American countries in the period after trade liberalization. This is partly due to the many other disturbances that affected the region during the period and partly because ours are comparative static equilibrium results that say nothing at all about the adjustment period during which the economy adjusts to changes in tariff protection.

Two alternative trade liberalization scenarios, WTO and FTAA have exactly the same positive effects on output, employment and poverty as a uniform and unilateral tariff reduction case in most countries.

In contrast, devaluation as an isolated policy measure is contractionary according to our results. It causes a decline in output and employment almost everywhere and an increase in poverty. The opposite is true for an increase in foreign borrowing. In both cases the simulation assumes a permanent change in the exchange rate or the inflow of foreign saving which is very different than the short run effect of devaluation on an economy out of equilibrium and in either a recession or a balance of payments crisis. The model results also do not consider likely negative effects of increased debt servicing following an increase in foreign borrowing neither do they take account of the possibility of emerging debt-solvency constraints.

Subsidizing exports is expansionary in all but Brazil and Argentina (for the fixed exchange rate closure). Employment increases and poverty declines in most cases. Skill-differentials however rise in some countries and fall in others. Thus one cannot say that choosing a more export-led growth strategy will in general favor either the skilled or the unskilled. This depends on the export structure of individual countries.

In terms of results on poverty, the analysis confirms the main results of the macro CGE simulations showed under Section 3. Policy measures with contractionary effects on the level of economic activity have negative results on poverty, leading to increased poverty incidence in most of the countries. This is the case for nominal devaluation and increase in tariffs. On the other hand, tariff reductions, productivity increases, and trade and integration agreements in line with FTAA and WTO have positive effects on the level of economic activity and contribute to reduce the poverty incidence in a majority of the countries.

If labor market parameters are crucial to explain poverty and inequality variations, and most of the evidence point in that direction, wages levels and relative wage structures seem to explain most of the variations in those welfare outcomes. Aggregate employment changes as a consequence of trade reforms are mostly not big enough to exercise a significant impact on poverty and inequality.

In sum, export-led economic strategies have not been the panacea for welfare improvements, in the form of poverty and inequality reduction, many of its supporters expected when advocating these policy choices. But they have not been the devil its detractors predicted either. To reduce poverty and inequality from the severe levels most of the countries of the region are showing at the beginning of the new century may require policy mixes far more complicated and tailored to country specificities than the Washington medicine predicted a decade ago.

Figure 4: Poverty and inequality responses to CGE simulations – Domestic Policy Scenarios
(elasticties with respect to indicated policy scenario)

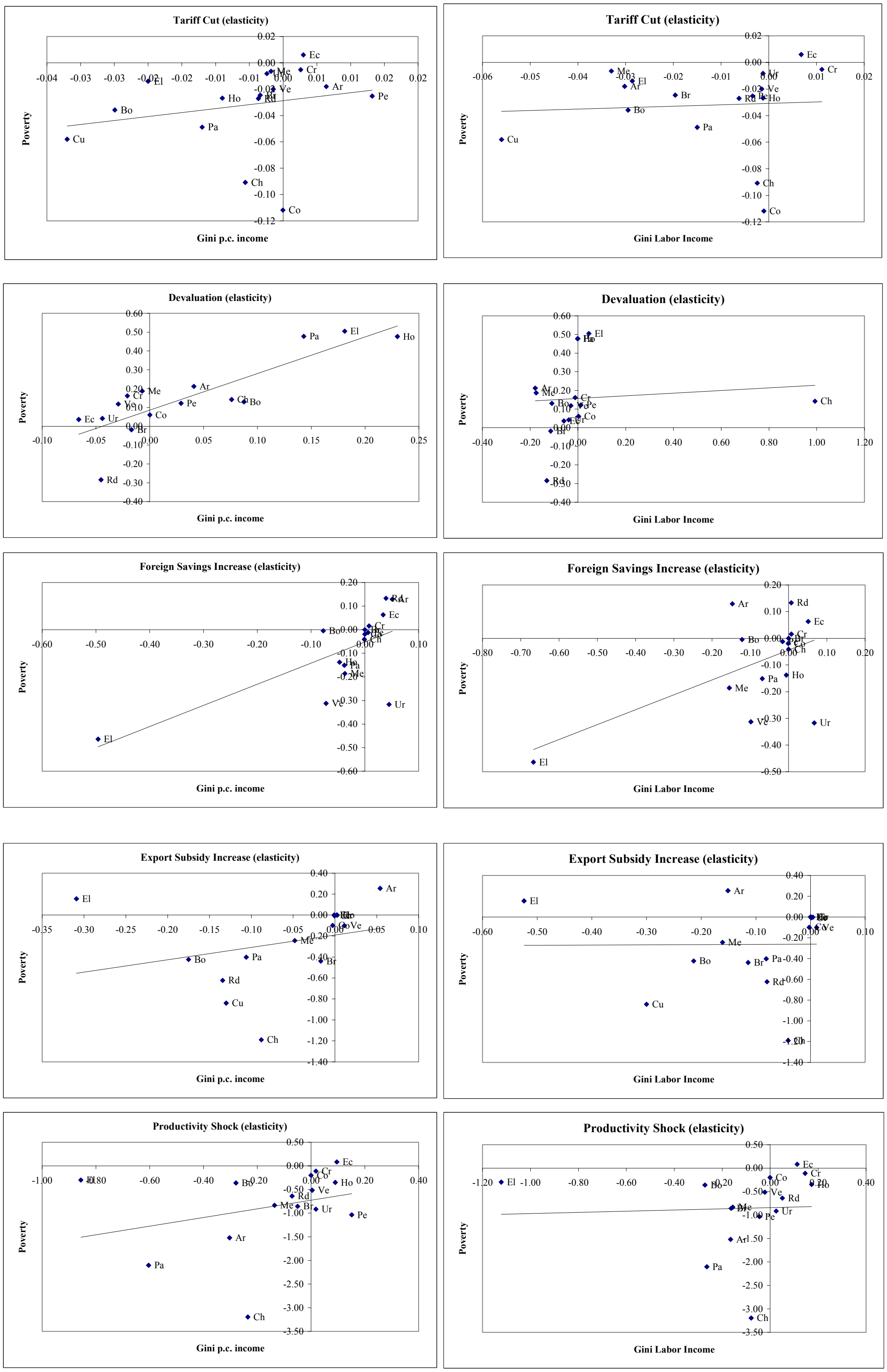
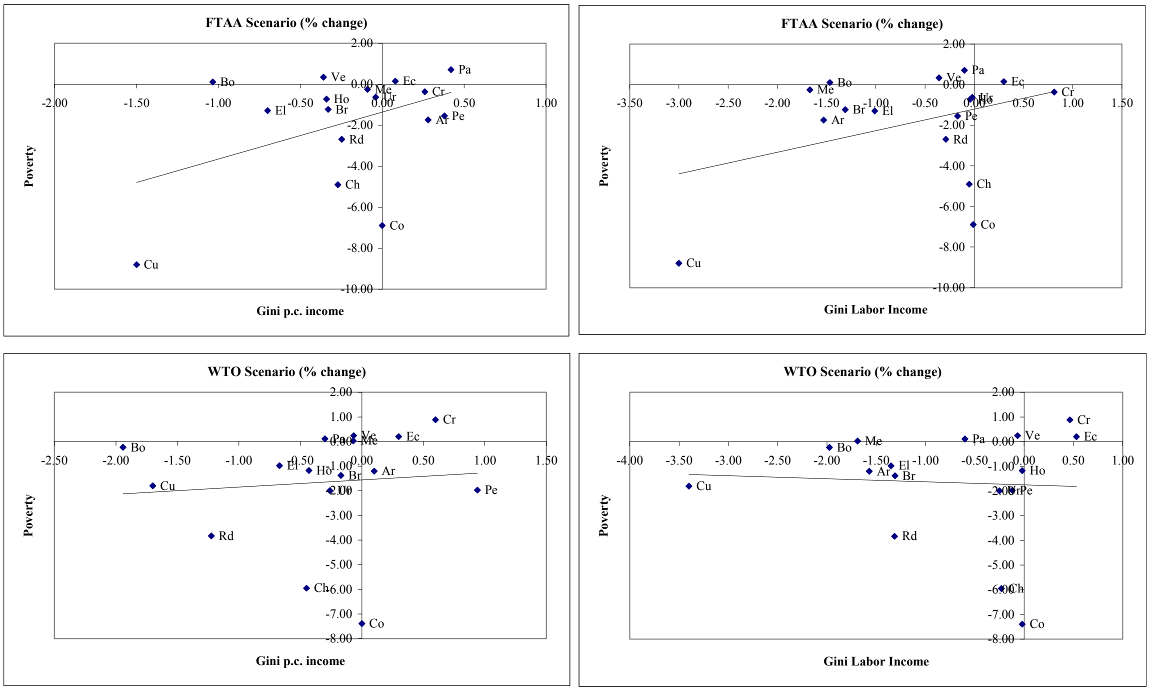


Figure 5: **Poverty and inequality responses to CGE simulations – FTAA and WTO scenarios**
(percentage changes with respect to indicated policy scenario)



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Annex to Chapter 3

Table A3.1. Mathematical Summary Statement for the Standard CGE Model

SETS

Symbol	Explanation	Symbol	Explanation
$a \in A$	activities	$c \in CMN(\subset C)$	commodities not in *CM*
$a \in ACES(\subset A)$	activities with a CES function at the top of the technology nest	$c \in CT(\subset C)$	transaction service commodities
$a \in ALEO(\subset A)$	activities with a Leontief function at the top of the technology nest	$c \in CX(\subset C)$	commodities with domestic production
$c \in C$	commodities	$f \in F$	factors
$c \in CD(\subset C)$	commodities with domestic sales of domestic output	$i \in INS$	institutions (domestic and rest of world)
$c \in CDN(\subset C)$	commodities not in *CD*	$i \in INSD(\subset INS)$	domestic institutions
$c \in CE(\subset C)$	exported commodities	$i \in INSDNG(\subset INSD)$	domestic non-government institutions
$c \in CEN(\subset C)$	commodities not in *CE*	$h \in H(\subset INSDNG)$	households
$c \in CM(\subset C)$	imported commodities		

PARAMETERS

$cwts_c$	weight of commodity c in the CPI	$\overline{qg}_c$	base-year quantity of government demand
$dwts_c$	weight of commodity c in the producer price index	$\overline{qinv}_c$	base-year quantity of private investment demand
ica_{ca}	quantity of c as intermediate input per unit of activity a	$shif_{if}$	share for domestic institution i in income of factor f
$icd_{cc'}$	quantity of commodity c as trade input per unit of c' produced and sold domestically	$shii_{ii'}$	share of net income of i' to i (i' ∈ INSDNG'; i ∈ INSDNG)
$ice_{cc'}$	quantity of commodity c as trade input per exported unit of c'	ta_a	tax rate for activity a
$icm_{cc'}$	quantity of commodity c as trade input per imported unit of c'	te_c	export tax rate
$inta_a$	quantity of aggregate intermediate input per activity unit	tf_f	direct tax rate for factor f
iva_a	quantity of aggregate intermediate input per activity unit	$\overline{tins}_i$	exogenous direct tax rate for domestic institution i
$\overline{mps}_i$	base savings rate for domestic institution i	$tins01_i$	0-1 parameter with 1 for institutions with potentially flexed direct tax rates
$mps01_i$	0-1 parameter with 1 for institutions with potentially flexed direct tax rates	tm_c	import tariff rate
pwe_c	export price (foreign currency)	tq_c	rate of sales tax
pwm_c	import price (foreign currency)	$trnsfr_{if}$	transfer from factor f to institution i
$qdst_c$	quantity of stock change	tva_a	rate of value-added tax for activity *a*

Table A3.1 (continued)

Greek Letters

α_a^a	efficiency parameter in the CES activity function	δ_c^t	CET function share parameter
α_a^{va}	efficiency parameter in the CES value-added function	δ_{fa}^{va}	CES value-added function share parameter for factor *f* in activity *a*
α_c^{ac}	shift parameter for domestic commodity aggregation function	γ_{ch}^m	subsistence consumption of marketed commodity c for household h
α_c^q	Armington function shift parameter	γ_{ach}^h	subsistence consumption of home commodity c from activity a for household h
α_c^t	CET function shift parameter	θ_{ac}	yield of output c per unit of activity a
β_{ach}^h	marginal share of consumption spending on home commodity c from activity a for household h	ρ_a^a	CES production function exponent
β_{ch}^m	marginal share of consumption spending on marketed commodity c for household h	ρ_a^{va}	CES value-added function exponent
δ_a^a	CES activity function share parameter	ρ_c^{ac}	domestic commodity aggregation function exponent
δ_{ac}^{ac}	share parameter for domestic commodity aggregation function	ρ_c^q	Armington function exponent
δ_c^q	Armington function share parameter	ρ_c^t	CET function exponent

EXOGENOUS VARIABLES

$\overline{CPI}$	consumer price index	$\overline{MPSADJ}$	savings rate scaling factor (= 0 for base)
$\overline{DTINS}$	change in domestic institution tax share (= 0 for base; exogenous variable)	$\overline{QFS}_f$	quantity supplied of factor
$\overline{FSAV}$	foreign savings (FCU)	$\overline{TINSADJ}$	direct tax scaling factor (= 0 for base; exogenous variable)
$\overline{GADJ}$	government consumption adjustment factor	$\overline{WFDIST}_{fa}$	wage distortion factor for factor f in activity a
$\overline{IADJ}$	investment adjustment factor		

Table A3.1 (continued)

ENDOGENOUS VARIABLES

$DMPS$	change in domestic institution savings rates (= 0 for base; exogenous variable)	QF_{fa}	quantity demanded of factor f from activity a
DPI	producer price index for domestically marketed output	QG_c	government consumption demand for commodity
EG	government expenditures	QH_{ch}	quantity consumed of commodity c by household h
EH_h	consumption spending for household	QHA_{ach}	quantity of household home consumption of commodity c from activity a for household h
EXR	exchange rate (LCU per unit of FCU)	$QINTA_a$	quantity of aggregate intermediate input
$GOVSHR$	government consumption share in nominal absorption	$QINT_{ca}$	quantity of commodity c as intermediate input to activity a
$GSAV$	government savings	$QINV_c$	quantity of investment demand for commodity
$INVSHR$	investment share in nominal absorption	QM_c	quantity of imports of commodity
MPS_i	marginal propensity to save for domestic non-government institution (exogenous variable)	QQ_c	quantity of goods supplied to domestic market (composite supply)
PA_a	activity price (unit gross revenue)	QT_c	quantity of commodity demanded as trade input
PDD_c	demand price for commodity produced and sold domestically	QVA_a	quantity of (aggregate) value-added
PDS_c	supply price for commodity produced and sold domestically	QX_c	aggregated quantity of domestic output of commodity
PE_c	export price (domestic currency)	$QXAC_{ac}$	quantity of output of commodity c from activity a
$PINTA_a$	aggregate intermediate input price for activity a	$TABS$	total nominal absorption
PM_c	import price (domestic currency)	$TINS_i$	direct tax rate for institution i (i $\in$ INSDNG)
PQ_c	composite commodity price	$TRII_{ii'}$	transfers from institution i' to i (both in the set INSDNG)
PVA_a	value-added price (factor income per unit of activity)		
PX_c	aggregate producer price for commodity	WF_f	average price of factor
$PXAC_{ac}$	producer price of commodity c for activity a	YF_f	income of factor f
QA_a	quantity (level) of activity	YG	government revenue
QD_c	quantity sold domestically of domestic output	YI_i	income of domestic non-government institution
QE_c	quantity of exports	YIF_{if}	income to domestic institution i from factor f

Table A3.1 (continued)

EQUATIONS

#	Equation	Domain	Description
Price Block			
1	$PM_c = pwm_c \cdot (1 + tm_c) \cdot EXR + \sum_{c' \in CT} PQ_{c'} \cdot icm_{c'c}$ $\begin{bmatrix} import \\ price \\ (LCU) \end{bmatrix} = \begin{bmatrix} import \\ price \\ (FCU) \end{bmatrix} \cdot \begin{bmatrix} tariff \\ adjust- \\ ment \end{bmatrix} \cdot \begin{bmatrix} exchange\ rate \\ (LCU\ per \\ FCU) \end{bmatrix} + \begin{bmatrix} cost\ of\ trade \\ inputs\ per \\ import\ unit \end{bmatrix}$	$c \in CM$	Import Price
2	$PE_c = pwe_c \cdot (1 - te_c) \cdot EXR - \sum_{c' \in CT} PQ_c \cdot ice_{c'c}$ $\begin{bmatrix} export \\ price \\ (LCU) \end{bmatrix} = \begin{bmatrix} export \\ price \\ (FCU) \end{bmatrix} \cdot \begin{bmatrix} tariff \\ adjust- \\ ment \end{bmatrix} \cdot \begin{bmatrix} exchange\ rate \\ (LCU\ per \\ FCU) \end{bmatrix} - \begin{bmatrix} cost\ of\ trade \\ inputs\ per \\ export\ unit \end{bmatrix}$	$c \in CE$	Export Price
3	$PDD_c = PDS_c + \sum_{c' \in CT} PQ_{c'} \cdot icd_{c'c}$ $\begin{bmatrix} domestic \\ demand \\ price \end{bmatrix} = \begin{bmatrix} domestic \\ supply \\ price \end{bmatrix} + \begin{bmatrix} cost\ of\ trade \\ inputs\ per \\ unit\ of \\ domestic\ sales \end{bmatrix}$	$c \in CD$	Demand price of domestic non-traded goods
4	$PQ_c \cdot (1 - tq_c) \cdot QQ_c = PDD_c \cdot QD_c + PM_c \cdot QM_c$ $\begin{bmatrix} absorption \\ (at\ demand \\ prices\ net\ of \\ sales\ tax) \end{bmatrix} = \begin{bmatrix} domestic\ demand\ price \\ times \\ domestic\ sales\ quantity \end{bmatrix} + \begin{bmatrix} import\ price \\ times \\ import\ quantity \end{bmatrix}$	$c \in (CD \cup CM)$	Absorption
5	$PX_c \cdot QX_c = PDS_c \cdot QD_c + PE_c \cdot QE_c$ $\begin{bmatrix} producer\ price \\ times\ marketed \\ output\ quantity \end{bmatrix} = \begin{bmatrix} domestic\ supply\ price \\ times \\ domestic\ sales\ quantity \end{bmatrix} + \begin{bmatrix} export\ price \\ times \\ export\ quantity \end{bmatrix}$	$c \in CX$	Marketed Output Value
6	$PA_a = \sum_{c \in C} PXAC_{ac} \cdot \theta_{ac}$ $\begin{bmatrix} activity \\ price \end{bmatrix} = \begin{bmatrix} producer\ prices \\ times\ yields \end{bmatrix}$	$a \in A$	Activity Price
7	$PINTA_a = \sum_{c \in C} PQ_c \cdot ica_{ca}$ $\begin{bmatrix} aggregate \\ intermediate \\ input\ price \end{bmatrix} = \begin{bmatrix} intermediate\ input\ cost \\ per\ unit\ of\ aggregate \\ intermediate\ input \end{bmatrix}$	$a \in A$	Aggregate intermediate input price

Table A3.1 (continued)

8	$PA_a \cdot (1-ta_a)\cdot QA_a \;=\; PVA_a \cdot QVA_a + PINTA_a \cdot QINTA_a$ $\begin{bmatrix} \textit{activity price} \\ (\textit{net of taxes}) \\ \textit{times activity level} \end{bmatrix} = \begin{bmatrix} \textit{value-added} \\ \textit{price times} \\ \textit{quantity} \end{bmatrix} + \begin{bmatrix} \textit{aggregate} \\ \textit{intermediate} \\ \textit{input price times} \\ \textit{quantity} \end{bmatrix}$	$a \in A$	Activity revenue and costs
9	$\overline{CPI} = \sum_{c \in C} PQ_c \cdot cwts_c$ $\begin{bmatrix} CPI \end{bmatrix} = \begin{bmatrix} \textit{prices times} \\ \textit{weights} \end{bmatrix}$		Consumer price index
10	$DPI = \sum_{c \in C} PDS_c \cdot dwts_c$ $\begin{bmatrix} \textit{Producer price index} \\ \textit{for non-traded outputs} \end{bmatrix} = \begin{bmatrix} \textit{prices times} \\ \textit{weights} \end{bmatrix}$		Producer price index for non-traded market output

Production and commodity block

11	$QA_a \;=\; \alpha_a^a \cdot \left(\delta_a^a \cdot QVA_a^{-\rho_a^a} + (1-\delta_a^a)\cdot QINTA_a^{-\rho_a^a} \right)^{-\frac{1}{\rho_a^a}}$ $\begin{bmatrix} \textit{activity} \\ \textit{level} \end{bmatrix} = CES \begin{bmatrix} \textit{quantity of aggregate value-added}, \\ \textit{quantity aggregate intermediate input} \end{bmatrix}$	$a \in ACES$	CES technology: activity production function
12	$\dfrac{QVA_a}{QINTA_a} = \left(\dfrac{PINTA_a}{PVA_a} \cdot \dfrac{\delta_a^a}{1 - \delta_a^a} \right)^{\frac{1}{1+\rho_a^a}}$ $\begin{bmatrix} \textit{value-added} - \\ \textit{intermediate-} \\ \textit{input quantity} \\ \textit{ratio} \end{bmatrix} = f \begin{bmatrix} \textit{intermediate-input} \\ - \textit{value-added} \\ \textit{price ratio} \end{bmatrix}$	$a \in ACES$	CES technology: Value—Added—Intermediate—Input ratio
13	$QVA_a = iva_a \cdot QA_a$ $\begin{bmatrix} \textit{demand for} \\ \textit{value-added} \end{bmatrix} = f \begin{bmatrix} \textit{activity} \\ \textit{level} \end{bmatrix}$	$a \in ALEO$	Leontief technology: Demand for aggregate value-added
14	$QINTA_a = inta_a \cdot QA_a$ $\begin{bmatrix} \textit{demand for aggregate} \\ \textit{intermediate input} \end{bmatrix} = f \begin{bmatrix} \textit{activity} \\ \textit{level} \end{bmatrix}$	$a \in ALEO$	Leontief technology: Demand for aggregate intermediate input
15	$QVA_a \;=\; \alpha_a^{va} \cdot \left(\sum_{f \in F} \delta_{f\,a}^{va} \cdot QF_{f\,a}^{-\rho_a^{va}} \right)^{-\frac{1}{\rho_a^{va}}}$ $\begin{bmatrix} \textit{quantity of aggregate} \\ \textit{value-added} \end{bmatrix} = CES \begin{bmatrix} \textit{factor} \\ \textit{inputs} \end{bmatrix}$	$a \in A$	Value-added and factor demands

Table A3.1 (continued)

16	$$W_f \cdot \overline{WFDIST}_{fa} = PVA_a \cdot (1 - tva_a) \cdot QVA_a \cdot \left(\sum_{f \in F'} \delta^{va}_{fa} \cdot QF_{fa}^{-\rho^{va}_a} \right)^{-1} \cdot \delta^{va}_{fa} \cdot QF_{fa}^{-\rho^{va}_a - 1}$$ $$\left[\begin{matrix} \text{marginal cost of} \\ \text{factor } f \text{ in activity } a \end{matrix} \right] = \left[\begin{matrix} \text{marginal revenue product} \\ \text{of factor } f \text{ in activity } a \end{matrix} \right]$$	$a \in A$ $f \in F$	Factor demand
17	$$QINT_{ca} = ica_{ca} \cdot QINTA_a$$ $$\left[\begin{matrix} \text{intermediate demand} \\ \text{for commodity } c \\ \text{from activity } a \end{matrix} \right] = f \left[\begin{matrix} \text{aggregate intermediate} \\ \text{input quantity} \\ \text{for activity } a \end{matrix} \right]$$	$a \in A$ $c \in C$	Disaggregated intermediate input demand
18	$$QXAC_{ac} + \sum_{h \in H} QHA_{ach} = \theta_{ac} \cdot QA_a$$ $$\left[\begin{matrix} \text{marketed quantity} \\ \text{of commodity } c \\ \text{from activity } a \end{matrix} \right] + \left[\begin{matrix} \text{household home} \\ \text{consumption} \\ \text{of commodity } c \\ \text{from activity } a \end{matrix} \right] = \left[\begin{matrix} \text{production} \\ \text{of commodity } c \\ \text{from activity } a \end{matrix} \right]$$	$a \in A$ $c \in CX$	Commodity production and allocation
19	$$QX_c = \alpha^{ac}_c \cdot \left(\sum_{a \in A} \delta^{ac}_{ac} \cdot QXAC_{ac}^{-\rho^{ac}_c} \right)^{-\frac{1}{\rho^{ac}_c - 1}}$$ $$\left[\begin{matrix} \text{aggregate} \\ \text{marketed} \\ \text{production of} \\ \text{commodity } c \end{matrix} \right] = CES \left[\begin{matrix} \text{activity-specific} \\ \text{marketed} \\ \text{production of} \\ \text{commodity } c \end{matrix} \right]$$	$c \in CX$	Output Aggregation Function
20	$$PXAC_{ac} = PX_c \cdot QX_c \left(\sum_{a \in A'} \delta^{ac}_{ac} \cdot QXAC_{ac}^{-\rho^{ac}_c} \right)^{-1} \cdot \delta^{ac}_{ac} \cdot QXAC_{ac}^{-\rho^{ac}_c - 1}$$ $$\left[\begin{matrix} \text{marginal cost of com-} \\ \text{modity } c \text{ from activity } a \end{matrix} \right] = \left[\begin{matrix} \text{marginal revenue product of} \\ \text{commodity } c \text{ from activity } a \end{matrix} \right]$$	$a \in A$ $c \in CX$	First-Order Condition for Output Aggregation Function
21	$$QX_c = \alpha^t_c \cdot \left(\delta^t_c \cdot QE_c^{\rho^t_c} + (1 - \delta^t_c) \cdot QD_c^{\rho^t_c} \right)^{\frac{1}{\rho^t_c}}$$ $$\left[\begin{matrix} \text{aggregate marketed} \\ \text{domestic output} \end{matrix} \right] = CET \left[\begin{matrix} \text{export quantity, domestic} \\ \text{sales of domestic output} \end{matrix} \right]$$	$c \in (CE \cap CD)$	Output Transformation (CET) Function
22	$$\frac{QE_c}{QD_c} = \left(\frac{PE_c}{PDS_c} \cdot \frac{1 - \delta^t_c}{\delta^t_c} \right)^{\frac{1}{\rho^t_c - 1}}$$ $$\left[\begin{matrix} \text{export-domestic} \\ \text{supply ratio} \end{matrix} \right] = f \left[\begin{matrix} \text{export-domestic} \\ \text{price ratio} \end{matrix} \right]$$	$c \in (CE \cap CD)$	Export-Domestic Supply Ratio
23	$$QX_c = QD_c + QE_c$$ $$\left[\begin{matrix} \text{aggregate} \\ \text{marketed} \\ \text{domestic output} \end{matrix} \right] = \left[\begin{matrix} \text{domestic market} \\ \text{sales of domestic} \\ \text{output [for} \\ c \in (CD \cap CEN)] \end{matrix} \right] + \left[\begin{matrix} \text{exports [for} \\ c \in (CE \cap CDN)] \end{matrix} \right]$$	$c \in$ $(CD \cap CEN)$ $\cup$ $(CE \cup CDN)$	Output Transformation for Non-Exported Commodities

Table A3.1 (continued)

24	$QQ_c = \alpha_c^q \cdot \left(\delta_c^q \cdot QM_c^{-\rho_c^q} + (1-\delta_c^q) \cdot QD_c^{-\rho_c^q} \right)^{-\frac{1}{\rho_c^q}}$ $\begin{bmatrix} composite \\ supply \end{bmatrix} = f \begin{bmatrix} import\ quantity,\ domestic \\ use\ of\ domestic\ output \end{bmatrix}$	$c \in (CM \cap CD)$	Composite Supply (Armington) Function
25	$\frac{QM_c}{QD_c} = \left(\frac{PDD_c}{PM_c} \cdot \frac{\delta_c^q}{1-\delta_c^q} \right)^{\frac{1}{1+\rho_c^q}}$ $\begin{bmatrix} import\text{-}domestic \\ demand\ ratio \end{bmatrix} = f \begin{bmatrix} domestic\text{-}import \\ price\ ratio \end{bmatrix}$	$c \in (CM \cap CD)$	Import-Domestic Demand Ratio
26	$QQ_c = QD_c + QM_c$ $\begin{bmatrix} composite \\ supply \end{bmatrix} = \begin{bmatrix} domestic\ use\ of \\ marketed\ domestic \\ output\ [for \\ c \in (CD \cap CMN)] \end{bmatrix} + \begin{bmatrix} imports\ [for \\ c \in (CM \cap CDN)] \end{bmatrix}$	$c \in (CD \cap CMN) \cup (CM \cap CDN)$	Composite Supply for Non-Imported Outputs and Non-Produced Imports
27	$QT_c = \sum_{c' \in C'} \left(icm_{c\,c'} \cdot QM_{c'} + ice_{c\,c'} \cdot QE_{c'} + icd_{c\,c'} \cdot QD_{c'} \right)$ $\begin{bmatrix} demand\ for \\ transactions \\ services \end{bmatrix} = \begin{bmatrix} sum\ of\ demands \\ for\ imports,\ exports, \\ and\ domestic\ sales \end{bmatrix}$	$c \in CT$	Demand for Transactions Services

Institution block

28	$YF_f = \sum_{a \in A} WF_f \cdot \overline{WFDIST}_{f\,a} \cdot QF_{f\,a}$ $\begin{bmatrix} income\ of \\ factor\ f \end{bmatrix} = \begin{bmatrix} sum\ of\ activity\ payments \\ (activity\text{-}specific\ wages \\ times\ employment\ levels) \end{bmatrix}$	$f \in F$	Factor Income
29	$YIF_{i\,f} = shif_{i\,f} \cdot \left[\left(1 - tf_f\right) \cdot YF_f - trnsfr_{row\,f} \cdot EXR \right]$ $\begin{bmatrix} income\ of \\ institution\ i \\ from\ factor\ f \end{bmatrix} = \begin{bmatrix} share\ of\ income \\ of\ factor\ f\ to \\ institution\ i \end{bmatrix} \cdot \begin{bmatrix} income\ of\ factor\ f \\ (net\ of\ tax\ and \\ transfer\ to\ RoW) \end{bmatrix}$	$i \in INSD$ $f \in F$	Institutional factor incomes
30	$YI_i = \sum_{f \in F} YIF_{i\,f} + \sum_{i' \in INSDNG'} TRII_{i\,i'} + trnsfr_{i\,gov} \cdot \overline{CPI} + trnsfr_{i\,row} \cdot EXR$ $\begin{bmatrix} income\ of \\ institution\ i \end{bmatrix} = \begin{bmatrix} factor \\ income \end{bmatrix} + \begin{bmatrix} transfers \\ from\ other\ domestic \\ non\text{-}government \\ institutions \end{bmatrix} + \begin{bmatrix} transfers \\ from \\ government \end{bmatrix} + \begin{bmatrix} transfers \\ from \\ RoW \end{bmatrix}$	$i \in INSDNG$	Income of domestic, non-government institutions
31	$TRII_{i\,i'} = shii_{i\,i'} \cdot (1 - MPS_{i'}) \cdot (1 - TINS_{i'}) \cdot YI_{i'}$ $\begin{bmatrix} transfer\ from \\ institution\ i'\ to\ i \end{bmatrix} = \begin{bmatrix} share\ of\ net\ income \\ of\ institution\ i' \\ transfered\ to\ i \end{bmatrix} \cdot \begin{bmatrix} income\ of\ institution \\ i',\ net\ of\ savings\ and \\ direct\ taxes \end{bmatrix}$	$i \in INSDNG$ $i' \in INSDNG'$	Intra-Institutional Transfers

Table A3.1 (continued)

32	$EH_h = \left(1 - \sum_{i \in INSDNG} shii_{ih}\right) \cdot \left(1 - MPS_h\right) \cdot (1 - TINS_h) \cdot YI_h$ [household income disposable for consumption] = [household income, net of direct taxes, savings, and transfers to other non-government institutions]	$h \in H$	Household Consumption Expenditure
33	$QH_{ch} = \gamma_{ch} + \dfrac{\beta^m_{ch} \cdot \left(EH_h - \sum_{c' \in C} PQ_{c'} \cdot \gamma^m_{c'h} - \sum_{a \in A} \sum_{c' \in C} PXAC_{ac'} \cdot \gamma^h_{ac'h}\right)}{PQ_c}$ [quantity of household demand for commodity c] = f [household consumption spending, market price]	$c \in C$ $h \in H$	Household Consumption Demand for Marketed commodities
34	$QHA_{ach} = \gamma^h_{ach} + \dfrac{\beta^h_{ach} \cdot \left(EH_h - \sum_{c' \in C} PQ_{c'} \cdot \gamma^m_{c'h} - \sum_{a \in A} \sum_{c' \in C} PXAC_{ac'} \cdot \gamma^h_{ac'h}\right)}{PXAC_{ac}}$ [quantity of household demand for home commodity c from activity a] = f [household disposable income, producer price]	$a \in A$ $c \in C$ $h \in H$	Household Consumption Demand for Home Commodities
35	$QINV_c = \overline{IADJ} \cdot \overline{qinv}_c$ [fixed investment demand for commodity c] = [adjustment factor times base-year fixed investment]	$c \in CINV$	Investment Demand
36	$QG_c = \overline{GADJ} \cdot \overline{qg}_c$ [government consumption demand for commodity c] = [adjustment factor times base-year government consumption]	$c \in C$	***Government Consumption Demand***
37	$YG = \sum_{i \in INSDNG} TINS_i \cdot YI_i + \sum_{f \in F} tf_f \cdot YF_f + \sum_{a \in A} tva_a \cdot PVA_a \cdot QVA_a$ $+ \sum_{a \in A} ta_a \cdot PA_a \cdot QA_a + \sum_{c \in CM} tm_c \cdot pwm_c \cdot QM_c \cdot EXR + \sum_{c \in CE} te_c \cdot pwe_c \cdot QE_c \cdot EXR$ $+ \sum_{c \in C} tq_c \cdot PQ_c \cdot QQ_c + \sum_{f \in F} YF_{gov\,f} + trnsfr_{gov\,row} \cdot EXR$ [government revenue] = [direct taxes from institutions] + [direct taxes from factors] + [value-added tax] + [activity tax] + [import tariffs] + [export taxes] + [sales tax] + [factor income] + [transfers from RoW]		Government Revenue

Table A3.1 (continued)

38	$EG = \sum_{c \in C} PQ_c \cdot QG_c + \sum_{i \in INSDNG} trnsfr_{i\,gov} \cdot \overline{CPI}$ $\begin{bmatrix} government \\ spending \end{bmatrix} = \begin{bmatrix} government \\ consumption \end{bmatrix} + \begin{bmatrix} transfers\ to\ domestic \\ non\text{-}government \\ institutions \end{bmatrix}$		Government Expenditures

System Constraint Block

39	$\sum_{a \in A} QF_{f\,a} = \overline{QFS}_f$ $\begin{bmatrix} demand\ \ for \\ factor\ \ f \end{bmatrix} = \begin{bmatrix} supply\ \ of \\ factor\ \ f \end{bmatrix}$	$f \in F$	Factor market
40	$QQ_c = \sum_{a \in A} QINT_{c\,a} + \sum_{h \in H} QH_{c\,h} + QG_c$ $+QINV_c + qdst_c + QT_c$ $\begin{bmatrix} composite \\ supply \end{bmatrix} = \begin{bmatrix} intermediate \\ use \end{bmatrix} + \begin{bmatrix} household \\ consumption \end{bmatrix} + \begin{bmatrix} government \\ consumption \end{bmatrix}$ $+ \begin{bmatrix} fixed \\ investment \end{bmatrix} + \begin{bmatrix} stock \\ change \end{bmatrix} + \begin{bmatrix} trade \\ input\ use \end{bmatrix}$	$c \in C$	Composite Commodity Markets
41	$\sum_{c \in CM} pwm_c \cdot QM_c + \sum_{f \in F} trnsfr_{row\,f} = \sum_{c \in CE} pwe_c \cdot QE_c + \sum_{i \in INSD} trnsfr_{i\,row} + \overline{FSAV}$ $\begin{bmatrix} import \\ spending \end{bmatrix} + \begin{bmatrix} factor \\ transfers \\ to\ RoW \end{bmatrix} = \begin{bmatrix} export \\ revenue \end{bmatrix} + \begin{bmatrix} institutional \\ transfers \\ from\ RoW \end{bmatrix} + \begin{bmatrix} foreign \\ savings \end{bmatrix}$		Current Account Balance for RoW (in Foreign Currency)
42	$YG = EG + GSAV$ $\begin{bmatrix} government \\ revenue \end{bmatrix} = \begin{bmatrix} government \\ expenditures \end{bmatrix} + \begin{bmatrix} government \\ savings \end{bmatrix}$		Government Balance
43	$TINS_i = \overline{tins}_i \cdot \left(1 + \overline{TINSADJ} \cdot tins01_i\right) + \overline{DTINS} \cdot tins01_i$ $\begin{bmatrix} direct\ \ tax \\ rate\ for \\ institution\ i \end{bmatrix} = \begin{bmatrix} base\ rate\ adjusted \\ for\ scaling\ for \\ selected\ institutions \end{bmatrix} + \begin{bmatrix} point\ change \\ for\ selected \\ institutions \end{bmatrix}$	$i \in INSDNG$	Direct institutional tax rates
44	$MPS_i = \overline{mps}_i \cdot \left(1 + \overline{MPSADJ} \cdot mps01_i\right) + DMPS \cdot mps01_i$ $\begin{bmatrix} savings \\ rate\ for \\ institution\ i \end{bmatrix} = \begin{bmatrix} base\ rate\ adjusted \\ for\ scaling\ for \\ selected\ institutions \end{bmatrix} + \begin{bmatrix} point\ change \\ for\ selected \\ institutions \end{bmatrix}$	$i \in INSDNG$	Institutional savings rates

Table A3.1 (continued)

45	$\sum_{i \in INSDNG} MPS_i \cdot (1 - TINS_i) \cdot YI_i + GSAV + EXR \cdot \overline{FSAV} =$ $\sum_{c \in C} PQ_c \cdot QINV_c + \sum_{c \in C} PQ_c \cdot qdst_c$ $\begin{bmatrix} \textit{non-govern-} \\ \textit{ment savings} \end{bmatrix} + \begin{bmatrix} \textit{government} \\ \textit{savings} \end{bmatrix} + \begin{bmatrix} \textit{foreign} \\ \textit{savings} \end{bmatrix} =$ $\begin{bmatrix} \textit{fixed} \\ \textit{investment} \end{bmatrix} + \begin{bmatrix} \textit{stock} \\ \textit{change} \end{bmatrix}$		Savings-Investment Balance
46	$TABS = \sum_{h \in H} \sum_{c \in C} PQ_c \cdot QH_{ch} + \sum_{a \in A} \sum_{c \in C} \sum_{h \in H} PXAC_{ac} \cdot QHA_{ach}$ $+ \sum_{c \in C} PQ_c \cdot QG_c + \sum_{c \in C} PQ_c \cdot QINV_c + \sum_{c \in C} PQ_c \cdot qdst_c$ $\begin{bmatrix} \textit{total} \\ \textit{absorption} \end{bmatrix} = \begin{bmatrix} \textit{household} \\ \textit{market} \\ \textit{consumption} \end{bmatrix} + \begin{bmatrix} \textit{household} \\ \textit{home} \\ \textit{consumption} \end{bmatrix}$ $+ \begin{bmatrix} \textit{government} \\ \textit{consumption} \end{bmatrix} + \begin{bmatrix} \textit{fixed} \\ \textit{investment} \end{bmatrix} + \begin{bmatrix} \textit{stock} \\ \textit{change} \end{bmatrix}$		Total Absorption
47	$INVSHR \cdot TABS = \sum_{c \in C} PQ_c \cdot QINV_c + \sum_{c \in C} PQ_c \cdot qdst_c$ $\begin{bmatrix} \textit{investment-} \\ \textit{absorption} \\ \textit{ratio} \end{bmatrix} \cdot \begin{bmatrix} \textit{total} \\ \textit{absorption} \end{bmatrix} = \begin{bmatrix} \textit{fixed} \\ \textit{investment} \end{bmatrix} + \begin{bmatrix} \textit{stock} \\ \textit{change} \end{bmatrix}$		Ratio of Investment to Absorption
48	$GOVSHR \cdot TABS = \sum_{c \in C} PQ_c \cdot QG_c$ $\begin{bmatrix} \textit{government} \\ \textit{consumption-} \\ \textit{absorption} \\ \textit{ratio} \end{bmatrix} \cdot \begin{bmatrix} \textit{total} \\ \textit{absorption} \end{bmatrix} = \begin{bmatrix} \textit{government} \\ \textit{consumption} \end{bmatrix}$		Ratio of Government Consumption to Absorption

Table A3.2 Closure Rules for Standardized and Country-specific CGE Simulations

	Argentina	Bolivia	Brazil	Cuba	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Para-guay	Peru	Dom. Rep	Uruguay	Venezuela
Standardized closure rules																
External Balance	1 and 2	1 and 2	1 and 2	2	1 and 2	1 and 2	1 and 2	1 and 2	1 and 2	1 and 2	1 and 2	1 and 2	1 and 2	1 and 2	1 and 2	1 and 2
Government Balance	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Savings-Investment	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Factor Markets																
Labor market	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Capital	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Country-specific closure rules																
External Balance	3	1	2	2*	1	2	2	2	2	2	1	2	1	1	2	1
Government Balance	4	1	3	1	1	1	1	1	1	1	1	1	1	1	1	2
Savings-Investment	2	4	3	1	1	1	1	1	4	1	5	4	3	1	1	1
Factor Markets																
Labor market																
formal - skilled	3	3	3	3	3	1	3	1	3	3	5	3	3	1	1	5
informal - skilled	3	1	5	3	3	1	3	1	3	3	5	3	3	1	1	5
formal - unskilled	3	3	5	3	3	1	3	3	3	3	5	3	3	3	1	5
informal - unskilled	3	1	5	3	3	1	3	3	3	3	1	3	3	3	1	5
Capital	2	2	2	2	2	2	2	2	1	2	1	1	1	2	2	1

Note: * Cuba has dual foreign exchange market with fixed official ER and flexible informal market rate.

Definition of closures

Value for savings-investment closure

1 investment-driven savings (uniform mps rate point change for selected institutions)

2 investment-driven savings (scaled mps for for selected institutions)

3 investment is savings-driven

4 balanced closure (1): investment and government are fixed (absolute shares)

5 balanced closure (2): investment is fixed (abs share); scaled mps (cf. 2)

(mps = marginal propensity to save)

Value for Rest of World closure

1 Flexible ER, fixed foreign savings

2 Fixed ER, endogenous foreign savings

3 Fixed ER and fixed FORSAV (Argentina: has flexible money supply and CPI)

Value for Government closure

1 Gov savings are flexible, dir tax rate is fixed

2 Gov savings are fixed, uniform dir tax rate point change for selected instit.

3 Gov savings are fixed, scaled dir tax rate for selected institutions

Factor market closures

1 Factors are fully employed & mobile in sim

2 Factors are fully employed & activity-specific in sim

3 Factors are unemployed & mobile in sim

5 OTHER closure:

ARG: Labor is unemployed and mobile. For each activity, the real wage is fixed.
QFS and nominal wage are market-clearing variables for unified labor market. WFDIST clears each sector.

BRA: Wage curve for most urban workers (imperfect wage adjustment)

MEX Skilled labor: fixed wage, flex WFDIST, mobile in sim, fixed labor supply.
Unskilled labor: faces upwards sloping labor supply function; market-clearing wage, total stock endogenous, mobile among sectors.
Agricultural labor: fully employed and mobile within agric sectors

VEN Fixed nominal wage for all workers, real wages and unemployment adjust to balance labour supply and demand.

Table A3.3: GTAP Model: Simulated World Market Prices for FTAA and WTO Scenarios.
(indices; changes from baseline)

	FTAA	WTO
Rice	1.013	1.149
Wheat	1.001	1.231
Other cereals	1.002	1.204
Fruits and vegetables	1.005	1.052
Oil seeds	1.000	1.113
Sugar	1.009	1.106
Natural fibres	0.998	1.011
Other crops	1.002	1.015
Wool	0.995	1.066
Forestry	0.996	1.001
Fishing	0.996	1.016
Meat and meat products (bovine)	1.009	1.213
Other meat products	1.002	1.190
Vegetable oils	1.000	1.044
Dairy products	1.007	1.262
Other food products	1.002	1.068
Beverages and tobacco	1.000	1.087
Energy products	0.997	0.980
Mining products	0.995	0.998
Textiles	0.998	1.014
Clothing	0.997	0.993
Leather products	0.997	0.992
Paper and printing	0.998	1.010
Oil products	0.997	0.996
Chemicals, rubber and plastics	0.998	1.013
Mineral products	0.997	1.012
Automobiles and parts	0.999	1.013
Other transport equipment	0.997	1.002
Electronic equipment	0.997	1.000
Machinery	0.997	1.007

Source: Simulation results of the GTAP model, prepared by E. Diaz Bonilla and X. Diao.

Table A3.4: Poverty and inequality indicators for Latin America during the 1990s

			Poverty incidence	Extreme poverty incidence	Gini coefficient
ARGENTINA					
	1990	b/	21.2	5.2	0.501
	1997	b/	17.8	4.8	0.530
	1999	b/	19.7	4.8	0.542
	2001	*	31.3	10.9	-
BOLIVIA					
	1989	c/	53.1	23.2	0.538
	1997		62.1	37.2	0.595
	1999		60.6	36.5	0.586
	2001	*	61.2	37.3	-
BRAZIL					
	1990	_	48.0	23.4	0.627
	1996	_	35.8	13.9	0.638
	1999	_	37.5	12.9	0.640
	2001	*	36.9	13.0	-
CHILE					
	1990		38.6	12.9	0.554
	1996		23.2	5.7	0.553
	2000		20.6	5.7	0.559
	2001	*	20.0	5.4	-
COLOMBIA					
	1991		56.1	26.1	0.531
	1997		50.9	23.5	0.569
	1999		54.9	26.8	0.572
	2001	*	54.9	27.6	-
COSTA RICA					
	1990		26.2	9.8	0.438
	1997		22.5	7.8	0.450
	1999		20.3	7.8	0.473
	2001	*	21.7	8.3	-
ECUADOR					
	1990	d/	62.1	26.2	0.461
	1997	d/	56.2	22.2	0.469
	1999	d/	63.6	31.3	0.521
	2001	*	63.5	28.9	-
EL SALVADOR					
	1995		54.2	21.7	0.507
	1997		55.5	23.3	0.510
	1999		49.8	21.9	0.518
	2001	*	49.9	22.5	-
GUATEMALA					
	1989		69.1	41.8	0.582
	1998		60.5	34.1	0.582
	2001	*	60.4	34.4	-
HONDURAS					
	1990		80.5	60.6	0.615
	1997		79.1	54.4	0.558
	1999		79.7	56.8	0.564
	2001	*	79.1	56.0	-
MEXICO					
	1989		47.8	18.8	0.536
	1996		52.1	21.3	0.526
	2000		41.1	15.2	0.542
	2001	*	42.3	16.4	-
NICARAGUA					
	1993		73.6	48.4	0.582
	1998		69.9	44.6	0.584
	2001	*	67.4	41.5	-

		Poverty incidence	Extreme poverty incidence	Gini coefficient
PANAMA				
1991		42.8	19.2	0.560
1997		33.2	13.0	0.570
1999		30.2	10.7	0.557
2001	*	30.8	11.6	-
PARAGUAY				
1990	e/	42.2	12.7	0.447
1996	d/	46.3	16.3	0.493
1999		60.6	33.9	0.565
2001	*	61.8	36.1	-
PERU				
1997	_	47.6	25.1	0.532
1999	_	48.6	22.4	0.545
2001	*	49.0	23.2	-
DOMINICAN REP.				
1997		37.2	14.4	0.517
2001	*	29.2	10.9	-
URUGUAY				
1990	d/	17.8	3.4	0.492
1997	d/	9.5	1.7	0.430
1999	d/	9.4	1.8	0.440
2001	*	12.5	2.8	-
VENEZUELA				
1990		40.0	14.6	0.471
1997		48.1	20.5	0.507
1999		49.4	21.7	0.498
2001	*	48.5	21.2	-

Source: ECLAC (2002)

* Estimates based on microsimulations keeping the Gini coefficient constant.

a/ Estimate for per capita household incomes.

b/ Gran Buenos Aires.

c/ Eight largest cities and El Alto.

d/ Total urban

e/ Metropolitan area of Asunción.

Table A3.5 Microsimulations: Main labor market adjustment impact on poverty and inequality

	Nominal devaluation			Foreign Savings Increase			Export Subsidy Increase			Productivity Shock		
	Poverty Incidence	Gini p.c. income	Gini Labor Income	Poverty Incidence	Gini p.c. income	Gini Labor Income	Poverty Incidence	Gini p.c. income	Gini Labor Income	Poverty Incidence	Gini p.c. income	Gini Labor Income
Argentina	6	5	5	6	5	5	6	5	5	5	5	5
Bolivia	2	4	4	2	4	4	2	4	4	2	4	4
Brazil *	2	2	6	n.c.	n.c.	n.c.	6	2	6	6	2	6
Colombia *	6	6	2	6	6	2	6	6	2	6	6	2
Costa Rica	3	3	3	3	6a	6a	3	3	3	3	3	6a
Cuba												
Chile	4	7	4	3	3	3	3	3	3	6	3	3
Ecuador	5	5	5	5	5	5	5	5	5	5	5	4
El Salvador	3	3	3	4	7	4	3	3	4	4	3	3
Honduras	5	4	4	6	4	7	6	4	7	5	6	4
Mexico	6	5	5	6	3	5	6	5	5	6	6	5
Paraguay	3	3	6	4	4	6	4	4	4	2	2	4
Peru	2	2	4	5	2	3				2	2	4
Dominican Republic	6	3	3	2	2	2	6	5	2	2	2	5
Uruguay	6	5	5	6	5	5	5	5	7	6	5	5
Venezuela *	2	2	2	2	2	2	6	6	6	6	2	2

Table A3.5 (continued)

	Tariff Cut			FTAA Scenario			WTO scenario		
	Poverty Incidence	Gini p.c. income	Gini Labor Income	Poverty Incidence	Gini p.c. income	Gini Labor Income	Poverty Incidence	Gini p.c. income	Gini Labor Income
Argentina	5	5	5	6	5	5	6	5	5
Bolivia	2	4	4	2	4	4	2	4	4
Brazil *	2	2	2	6	2	6	6	2	6
Colombia *	6	6	2	6	6	2	6	6	2
Costa Rica	3	3	6a	3	3	6a	3	3	6a
Cuba	5	5	5	2	2	2	5	5	5
Chile	6	3	3	6	7	3	6	3	3
Ecuador	5	5	5	5	5	5	5	5	5
El Salvador	3	3	3	7	3	3	3	3	4
Honduras	6	4	7	6	4	7	6	4	7
Mexico	5	5	5	5	5	5	5	5	5
Paraguay	4	4	4	4	3	6	3	4	3
Peru	2	2	2	2	2	3	2	2	3
Dominican Republic	6	5	5	6	5	5	2	2	3
Uruguay	6	n.c.	n.c.	6	5	5	6	5	5
Venezuela *	6	2	2	2	6	6	2	2	2

Source: Authors' calculations

Notes:

Phase	Symbol	Definition
1	P	Participation rate
2	U	Unemployment rate
3	S1	Employment structure by sectors
4	O	Employment by occupational category
5	W1	Remuneration structure
6	W2	Change in mean remuneration level
6a	W1+W2	Combined effect of W1 and W2
7	M	Employment structure by education level
	*	Only two phases simulated (U + W2)
	n.c.	No change from baseline