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A Dynamic Evaluation of the Effects of A Free Trade Area of the Americas – An Intertemporal, Global General Equilibrium Model

Xinshen Diao*
International Food Policy Research Institute

Agapi Somwaru
U.S. Department of Agriculture, Economic Research Services

Abstract

This study examines the dynamic effects of a Free Trade Area of the Americas (FTAA) on the countries within the Western Hemisphere. The analysis uses an intertemporal, global, multi-sector general equilibrium model which takes into account changes in saving-investment, capital accumulation, and the linkages between openness in trade and economic growth. The study finds that the developing countries in the hemisphere may not enjoy welfare gain from an FTAA if they trade more with non-hemisphere countries and if trade-diverting effects dominate trade-creating effects. Taking into account the total factor productivity (TFP)-trade linkages, however, all developing countries in the region would benefit from an FTAA. The direct effects of an FTAA on the U.S. and Canada are modest, while the indirect effects of an FTAA, i.e., the effects on U.S. and Canadian firms to invest in their neighboring countries, are strong.

- **JEL Classifications:** C61, C68, D62, D90, E22, F11, F15, O41, O51, O54
- **Key Words:** FTAA, Global Dynamic Applied General Equilibrium, Trade, Trade Bloc

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*Corresponding Address: Dr. Xinshen Diao, International Food Policy Research Institute, 2033 K Street. N.W., Washington DC 20006, USA. Tel: +1-202-862-8113, Fax: +1-202-467-4439, Email: x.diao@cgiar.org

I. Introduction

Regionalism is an integral part of the broader economic policy reforms that have occurred in the Western Hemisphere over the last decade. Beginning in mid-1980, many Latin American countries undertook comprehensive economic reform programs, including a fundamental shift from the import-substitution development policies of previous decades to more open, market-based policies.

In the 1960s and 1970s, governments in most Latin American countries adopted an import-substitution strategy in forming their economic policies, especially trade policies. In implementing this strategy, many Latin American countries levied heavy taxes on agricultural exports to subsidize industrial development and imposed high import barriers on agricultural inputs. Such tax burdens were further exacerbated by inflationary fiscal policies that implicitly taxed the primary sectors of production, especially agriculture. When the two oil shocks of the 1970s sharply raised import prices as well as interest rates for the Latin American countries and slowed their economic growth, these countries became trapped in serious macro economic crises with heavy burdens of foreign debt. Thus, the structural adjustment and economic policy reforms became inevitable in trade policy as well as macroeconomic policy reforms (Little *et al.*, 1993 and Alam *et al.*, 1993).

Trade reforms involved a shift from import-substitution regimes toward outward-oriented trade regimes. After the reforms, average tariff rates were reduced dramatically. Many Latin American countries also simplified the tariff categories. Thus, the degree of openness, measured by the ratio of the sum of exports and imports to Gross Domestic Product (GDP), increased from a pre-reform level of 49 percent to a post-reform (1991) of 58 percent for these countries on average (Alam and Rajapatiran, 1993). The reduction of protection barriers on imports and expansion of exports led these countries to adopt General Agreement on Tariffs and Trade (GATT) consistent rules and, consequently, to become members of GATT.

Regional integration was another step of the successful trade and macroeconomic reforms and became an integral part of them. MERCOSUR (The *Mercado Común del Sur*), the second largest regional trade arrangement in the Western Hemisphere, was established in 1991 among the countries of Argentina, Brazil, Paraguay, and Uruguay. MERCOSUR eliminated most trade barriers among its members and established a common external tariff for most agricultural products by 1995, with longer transition periods for a few sensitive agricultural products.

The United States, Canada and Mexico also started to reduce their direct government intervention in agricultural markets and liberalized agricultural trade in the 1980's. In 1994, North America Free Trade Agreement (NAFTA), the largest regional trade arrangement in the Western Hemisphere was established among the three north American countries.

Besides NAFTA and MERCOSUR, a multitude of other trade agreements have been initiated or re-activated during the past decade. About 40 trade agreements now operate in the hemisphere, and at least another dozen are under negotiation (USDA, 1998). This proliferation of trade agreements with the broader economic policy reforms in the hemisphere has given rise to calls for a comprehensive, hemisphere-wide agreement. At the Miami Summit of the Americas held in December 1994, the leaders of 34 Western Hemisphere countries pledged to negotiate a Free Trade Area of the Americas (FTAA) by the year 2005. Formal negotiations were initiated in April 1998 at the second Summit of the Americas in Santiago, Chile.

An FTAA could simplify the complex system of regional and bilateral trade preferences emerging in the hemisphere and ensure more open trade and investment among the hemisphere countries, especially in the rapidly growing markets of Latin America. Further, an FTAA could help countries in the hemisphere lock in the economic reforms they have already adopted and improve the long-term outlook for growth and stability in the hemisphere.

Many of the Latin American countries have a comparative advantage in agricultural production, similar as U.S. and Canada. As the old policies that discouraged agricultural production and constrained economic growth are replaced with more market-oriented economic policies, agricultural productivity and economic growth in these countries are expected to accelerate. Hence, besides mutual benefits from a more integrated hemisphere, competition between U.S., Canada and other West Hemisphere countries in world agricultural markets may rise. Thus, as a highly dynamic region, the Western Hemisphere is setting up a stage for dynamic changes in the region by adopting economic policies and trade reforms. Therefore, how the regional integration of the Americas evolves, specifically whether the United States is actively involved, will have important implications for countries in this region.

This study focuses on the examination of the dynamic effects of regional integration arrangements in the Western Hemisphere. By taking into account investment response and capital accumulation, and through close linkage between open trade and economic growth, especially through technological spillovers embodied in trade of capital goods, we find that countries within the hemisphere, especially the less developed countries, will enjoy economic gains from the regional integration arrangements. For the wealthy countries in the hemisphere, such as the U.S. and Canada, they have a comparative advantage in financial capital markets. This allows U.S. and Canadian households to enjoy the integration benefit by investing in the other hemispheric countries.

The organization of the paper is as follows: in the following section, the structure of the model and the data are described. In Section III, the policy scenarios and simulation results will be discussed. Section IV concludes the paper.

II. The Model

A. Overview

The model is based on the intertemporal general equilibrium theory with multi-region and multi-sector specification, and draws in many ways upon the recent contributions of dynamic applied GE modeling by McKibbin (1993), Mercenier and Sampaïo de Souza (1994) Mercenier and Yeldan (1997), and Diao and Somwaru (2000). The model is dynamic in the sense that firms and households have a forward-looking behavior, such that a regional trade agreement (RTA) or other trade policies will affect savings, investment, capital accumulation, and international borrowing and lending activities of each country and region in the model. The trade liberalization also affects a country's productivity growth in the model. Such effects are modeled by increases in *technological spillovers* embodied in the trade of capital goods. Specifically, if a developing country adapts a more open trade policy, it then tends to learn more or adopt advanced technologies embodied in its imports from the developed countries, and hence its productivity can be improved (Grossman and Helpman, 1991; Romer, 1994).

The model is global, that is, all countries/regions in the model are characterized by their intertemporal economic behavior. As the focus of the study is in the Western Hemisphere, the major Western Hemisphere countries are specified into five countries/regions, United States, Canada, Mexico, Mercosur, and all other Western Hemisphere countries as a region (OWH). The rest of world is aggregated into two regions-developed and developing regions. There are six production sectors, each of which produces a single commodity. The aggregate production sectors are: (1) agriculture, (2) textile, (3) technology-intensive manufacturing, (4) other manufacturing, (5) technology-intensive services, and (6) other services. In a multi-region and multi-sector global model, with a specification of the Armington (1969) system, commodity trade flows are kept track by their geographical and sectoral origin and destination. Thus, technological spillovers in the developing regions are caused by imports of the technology-intensive goods and services from the developed countries/regions.

The detailed discussions of the economic behavior of the model are as follows, while the technical description can be found in Appendix.

B. Firms and Investment

We assume that producers within each sector of a region are aggregated into a representative firm. Firms make production and investment decisions to maximize their intertemporal profit functions or the value of the firms. In making production decisions, the firms choose the levels of labor and intermediate inputs to produce a single sectoral output for each time period, taking into account the price of sectoral outputs, the wage rate, the prices of intermediate inputs, and the stock of capital at each time period. Sectoral outputs are either sold in the domestic market or exported to foreign markets.

In making investment decisions, firms have to compare the costs of investment with the expected future returns to capital, taking into account the price of investment goods and the interest rate in each time period. Firms are owned by households/consumers and investment is financed by undistributed profits. In each time period, the firm's profit, $div_{i,t}$, equivalent to the gross revenue minus labor costs, intermediate input costs, and investment costs, distributed to households. Investment raises the stock of capital with waste caused by capital adjustment costs. Investment goods are purchased from other sectors, as well as from the firm's own forgone outputs. Investment goods can also be imported from abroad. Formally, the firm's problem can be described as follows:

$$Max\ V_t = \Sigma_{t=1}^{\infty} R_t div_{i,t} \equiv \Sigma_{t=1}^{\infty} R_t \left[P_{i,t} f_i(L_{i,t}, K_{i,t}) - w_t L_{i,t} - \varphi_i \frac{P_{i,t} I_{i,t}^2}{K_{i,t}} - PI_{i,t} I_{i,t} \right]$$

subject to:

$$K_{i,t+1} = (1 - \delta_i) K_{i,t} + I_{i,t}$$

where V_i represents the market value of firm i at the first period, $R_t = \Pi_{s=1}^{t} 1/(1+r_s)$, is the discount factor for the future returns; $I_{i,t}$ is quantity of new capital equipment built through investment at time t; and δ_i is a positive capital depreciation rate. The term, $\phi_i P_i I_i^2/K_i$, represents the capital adjustment cost function.

C. The Households and Consumption/Savings

In each region the representative household owns labor and all financial assets, including the equity of domestic firms and foreign assets. Foreign assets are riskless, e.g., a foreign country's government bond. The households/consumers make consumption and saving decisions to maximize their intertemporal utility function over time. The total consumption expenditure (total current income minus current savings) and consumer demand for each individual commodity are determined simultaneously. However, the current consumption is not determined or constrained by consumer's current income because of savings. The intertemporal budget constraint prevents unlimited borrowing. Both borrowing and lending occur in the international capital market. The formal presentation of the consumer's problem is as follows:

$$Max\ \Sigma_{t=0}^{\infty}\left(\frac{1}{1+\rho}\right)^t u(TC_t)$$

subject to:

$$SAV_t = w_t L_t + TI_t + div_t + r_t B_{t-1} - Ptc_t TC_t$$

where ρ is the positive rate of time preference, TC_t is the aggregate consumption, SAV_t is household savings, B_{t-1} is the stock of foreign assets and $r_r B_{t-1}$ is interest earnings from ownership of foreign bond, Ptc_t is the consumer price index, and TI_{nt} is the lump sum transfer of government revenues from excise taxes and tariffs. We assume no independent government saving-investment behavior. "Government" spends all its tax revenues on consumption or transfer to households and, hence, public sector borrowing requirement is not explicitly modeled. TC_t, the instantaneous aggregate consumption, is generated from the consumption of final goods by maximizing:

$$TC_t = \Pi_i C_{i,t}^{b_i}$$

subject to

$$\Sigma_{i=1}^{5} PC_{i,t} C_{i,t} = Ptc_i TC_t .$$

where $C_{i,t}$ is the final consumption for good i, $0<b_i<1$, and $\Sigma_i b_i=1$.

The flow of savings, SAV_t, is the demand for new foreign bonds issued by other regions, which, under equilibrium, reflects current account balance of the region:

$$SAV_t \equiv B_t - B_{t-1} = r_t B_{t-1} + FBOR_t$$

where a positive $FBOR_t$ implies a surplus in the regions foreign trade.

D. Equilibrium

Intra-temporal equilibrium requires that at each time period, (i) in each region, demand for production factors equal their supply; (ii) in the world, total demand for each sectoral good equal to its total supply; (iii) in the world, the aggregate household savings equal zero. The inter-temporal equilibria are further constrained by the following steady state conditions:

$$r_{ss} = \frac{div_{i,ss}}{V_{i,ss}}$$

$$I_{i,ss} = \delta K_{i,ss}$$

$$FBOR_{ss} + r_{ss} B_{ss} = 0 .$$

The first equation above implies that at the steady state, the value of the firm, $V_{i,ss}$, becomes constant and hence the dividend, $div_{i,ss}$, is simply equal to the interest earnings from a same amount of riskless assets. The second equation implies that in each sector, investment just covers the depreciation of sectoral capital; hence, the stock of capital remains constant. Finally, the last one states that under the steady state, foreign bond accumulation must be constant, i.e., the future trade deficits must be covered by interest earnings on foreign bonds held.

III. Analysis of Alternative Simulations

We now utilize our analytical model to study the potential dynamic effects of an FTAA on the major countries in the region. Our starting point is the macro general equilibrium of the global commodity and financial markets as of 1995. Our data come from a direct aggregation of the database of the *Global Trade Analysis Project* (GTAP), version 4 (McDougall *et al.*, 1998). We give a broad outline of the sectoral and country aggregation from this data set in Appendix Table A1.

The estimated effects of an RTA depend critically on the initial level of protection and the degree of liberalization applied in the model. The trade restrictions are measured as *ad valorem* tariff equivalents. Source of the initial levels of tariff rates for the countries and regions in the model is the same database (GTAP database, version 4). The tariff rates are weighted applied rates for each individual country and region in the database, and the weights are sectoral import shares for countries/regions in the model. Within the Western Hemisphere in 1995 (base year), the realized protection rate on agricultural trade is between 4-8 percent, much lower than that in the rest of world (23 and 33 percent for the other developing and developed regions, respectively). Textile trade is observed to have the highest protection rate among the countries in the region, 11-20 percent. Such protection rate is higher than that (7.5 percent) for the other developed region but lower than that (35 percent) for the other developing region. The protection rate for manufacturing trade is quite low among most hemisphere countries/regions, except for the Mercosur (about 18 percent and see Appendix Table A2).

Focus of the study is not to predict real economic performance after the base year (1995). Instead, the model is used to generate different outcomes from alternative policy scenarios. The policy simulations are implemented via parametric changes. By doing so, we can trace out the out-of-steady state transitional dynamic adjustments towards a new steady state equilibrium. We study two sets of issues: first, we look into the country experiences in response to an FTAA. The FTAA is modeled by eliminating all tariffs among the five hemisphere countries/regions in the model. This scenario is used to evaluate "pure" effects of a preferential trade arrangement and is based on the neoclassical trade theory with an intertemporal setup.

In the second scenario, we further allow the total factor productivity (TFP) in the developing hemisphere countries/regions to grow with increased imports of technology-intensive manufacturing goods and services from the developed countries in the region. As our focus is mostly on the short- to medium-run effects of an FTAA, we choose to limit such TFP-trade linkage only for the first 7 time periods. This scenario is used to evaluate the technological spillover effects due to enhanced trade between developed and developing countries/regions in the hemisphere. The theoretical justification of this scenario relates to the new growth and trade theories. According to the theory, international trade enables a country to employ a larger variety of intermediate products and capital equipment, which enhances the productivity of its own resources (Coe *et al.*, 1997). Given significant different levels of economic development among the hemisphere countries, when an FTAA further enhances trade relationship between developing and developed countries, technological spillovers embodied in the trade would be expected and such spillovers would further stimulate TFP growth in the region's developing countries.

The evaluation of the potential dynamic effects of the FTAA is captured by the use of several economic indicators. For the welfare effects, we use the equivalent variation to measure both inter-temporal and intra-temporal welfare gains/losses. Other indicators such as the growth paths of investment and trade (exports and imports), as well as changes in foreign capital inflows or outflows are used to measure the comprehensive effects on each of the economy in the hemisphere.

A. Without TFP-Trade Linkages, Welfare effects Are Mixed

It can be argued that RTAs can be regarded as a first step towards achieving more openness in the world commodity and capital markets. It is not clear, however, what the intrinsic outcomes would be given the changed patterns of trade due to pressures of trade diversion. To a great extent, the conventional CGE modeling framework has been widely used to assess the possible welfare impact of free trade blocs. However, due to its static feature, such modeling analysis would mainly capture the resource reallocation and terms of trade effects of an RTA. Our intertemporal CGE model is based on the neoclassical growth theory and hence with endogenously derived saving-investment decisions, capital accumulation becomes the other source to welfare improvement. Moreover, numerous studies have found empirically strong and positive linkages between growth in a country’s TFP and the share of its economy involved in trade with a more advanced nation (for example, Coe and Helpman, 1995; Wang and Xu, 1997; and Coe, *et al.*, 1997). It is important for the analysis to capture such linkages, especially since there exists large development gap among the hemisphere countries. Thus, we further extend the intertemporal model along the lines of the new growth theory.

The welfare effects of an FTAA on the five hemisphere countries/regions are presented in Table 1. We consider both intra- and inter-temporal effects of an FTAA on the equivalent variation. The intra-temporal criterion is equivalent to that in a static model, while the inter-temporal criterion can be found in Appendix.

In the first scenario, that is, without taking into account for the TFP-trade linkages, the welfare effect of an FTAA on the hemisphere countries is quite small and mixed: the three NAFTA countries (U.S., Canada and Mexico) are observed slightly welfare gains while the other two regions [Mercosur and the other

Table 1. Welfare (Equivalent Variation) Effect of the FTAA

(% change from the base year)

	FTAA without TFP-trade linkages				FTAA with TFP-trade linkages			
	Intra-temporal			Intertemporal	Intra-temporal			Intertemporal
	Year 1	Year 10	SS*		Year 1	Year 10	SS	
USA	0.00	0.04	0.06	0.04	–0.02	0.07	0.21	0.08
Canada	0.01	0.03	0.06	0.03	–0.06	0.03	0.17	0.40
Mexico	0.01	0.06	0.16	0.07	0.48	2.14	3.17	1.96
Mercosur	–0.26	–0.05	0.23	–0.02	0.78	7.04	12.35	6.75
OWH	–0.66	–0.30	0.33	–0.22	0.27	5.22	8.95	4.89

Note: *the steady state

Western Hemisphere countries (OWH)] are observed welfare loss in the short- and medium runs. Even though the long-term effect of an FTAA on these two regions' welfare is positive, change in the intertemporal welfare index, by giving the short- and medium-terms effects more weights, is still negative.

B. Trade-Creating vs Trade-Diverting Effects

Two main reasons cause a negative welfare effect of an FTAA on Mercosur and the OWH: first, import tariffs accounted for 10 and 26 percent of government revenues in Mercosur and the OWH, respectively, and these ratios are higher than that in the three NAFTA countries (4-6 percent). In our model setup, government revenues are fully transferred to a region’s consumers in lump-sum. Removing tariffs reduces the government revenues by 5 percent in Mercosur and 15 percent in the OWH, which causes the regional income to fall by 1.4 and 1.8 percent, respectively, in Mercosur and the OWH. However, regional income rises in the three NAFTA countries.

Second and most important reason of the negative welfare effect on Mercosur and the OWH is due to the negative terms of trade effect of an FTAA for these two regions (while the terms of trade effect is positive for the three NAFTA countries). The terms of trade are defined as a ratio of the export price index over the import price index. Given the initial tariff rates and that the trade patterns are different across regions, the export/import price index world price for each commodity weighted by regional export/import share of the commodity would change in different directions. In the first scenario the terms of trade improve slightly (by 0.005-0.3 percent) in the three NAFTA countries, while it is worse (by 0.5-0.7 percent) in the Mercosur and the OWH region.

A negative change in the terms of trade mainly reflects a fact that Mercosur and the OWH have relative high tariff rates and trade more with non-hemisphere countries. The average tariff rate is 4 and 6 percent for the two developed hemisphere countries, the U.S. and Canada, 9.7 percent for Mexico, 14.4 percent for Mercosur and 9.1 percent for the OWH region. Moreover, in Mercosur's total trade, trade with non-hemisphere countries accounted for 66 and 64 percent of Mercosur's exports and imports, while trade with non-hemisphere countries accounted for 52 and 51 percent of the OWH's exports and imports. These shares are much higher than those for Canada (23 and 28 percent, respectively) and Mexico (14 and 24 percent, respectively), but still lower than those for the U.S. (69 percent for both exports and imports). However, U.S. is a much larger economy than Mercosur and the OWH, as U.S. GDP is 8 and 20 times higher than that for these two regions.

It is well known from Viner (1950) that trade creation and diversion would both occur due to preferential tariff treatment of an RTA. While trade creation usually has a positive welfare effect on a country that reduces tariff barriers against

Table 2. Trade-Creating and Tarde-Diverting Effect of the FTAA

(% change from the base year)

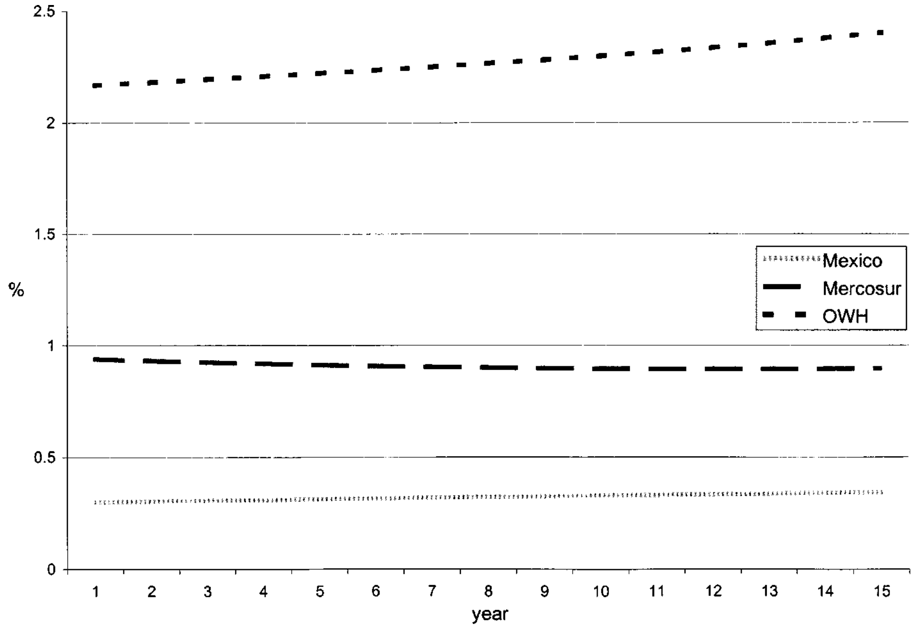
	FTAA without TFP-trade linkages											
	Total imports						Total exports					
	from member countries			from nonmember countries			to member countries			to nonmember countries		
	1	10	SS	1	10	SS	1	10	SS	1	10	SS
USA	1.85	1.89	1.98	0.46	0.41	0.37	3.94	3.91	3.82	–0.27	–0.24	–0.24
Canada	0.62	0.62	0.62	0.52	0.49	0.46	0.75	0.71	0.68	–0.18	–0.18	–0.18
Mexico	1.42	1.43	1.39	0.80	0.77	0.69	1.24	1.24	1.28	–0.39	–0.35	–0.27
Mercosur	15.35	15.29	15.17	–3.05	–3.21	–3.44	10.30	10.30	10.45	0.53	0.67	0.86
OWH	12.91	12.85	12.58	–3.59	–3.71	–4.00	8.98	9.34	9.94	0.23	0.56	1.09
	FTAA with TFP-trade linkages											
	Total imports						Total exports					
	from member countries			from nonmember countries			to member countries			to nonmember countries		
	1	10	SS	1	10	SS	1	10	SS	1	10	SS
USA	1.53	2.78	3.54	0.59	0.31	0.07	5.08	5.06	4.12	–0.29	–0.38	–0.45
Canada	0.60	0.63	0.61	0.59	0.42	0.26	0.98	0.74	4.58	–0.15	–0.27	–0.37
Mexico	2.35	3.00	2.54	1.81	2.39	1.71	0.84	2.59	3.25	–0.92	0.75	1.61
Mercosur	20.19	20.45	16.61	1.35	0.37	–3.58	9.53	15.78	19.11	–1.16	3.94	7.57
OWH	5.39	16.84	15.68	–0.86	–0.79	–2.33	8.56	13.40	16.42	–0.72	3.75	6.70

member countries within an RTA, trade diversion may generate negative welfare effects when a shift in imports from an efficient nonmember exporter to a more expensive producer from the country's RTA partners occurs. Whether trade-creating effects dominate trade-diverting effects for an RTA is an empirical issue. It is obvious that, in this study without taking into account TFP-trade linkages, trade-diverting effects of the FTAA on Mercosur and the OWH region dominate trade-creating effects and thus these two regions would be worse-off due to the FTAA. Table 2 presents changes in trade flows among the hemisphere countries as well as between Western Hemisphere and non-hemisphere countries. In the first FTAA scenario without TFP-trade linkages, the three NAFTA countries increase both intra- and extra-regional imports, while Mercosur and the OWH region only increase imports from their trading partners in the region, while their imports from countries outside the region fall.

C. TFP-Trade Linkages Enhance Welfare Gains

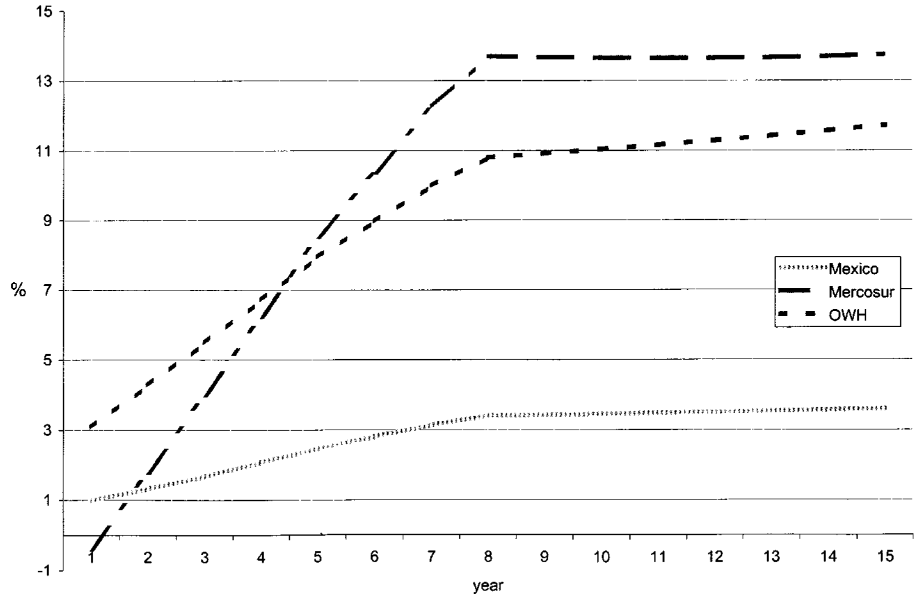
In our second FTAA scenario, the linkages between improvement of developing countries' TFP and the increase in trade with developed countries are taken into account. Thus, the welfare effect of an FTAA is much enhanced, especially for the

Figure 1. Change in Total Investment due to FTAA.



Note: without TFP-trade linkages and % change from the base-year

Figure 2. Change in Total Investment due to FTAA

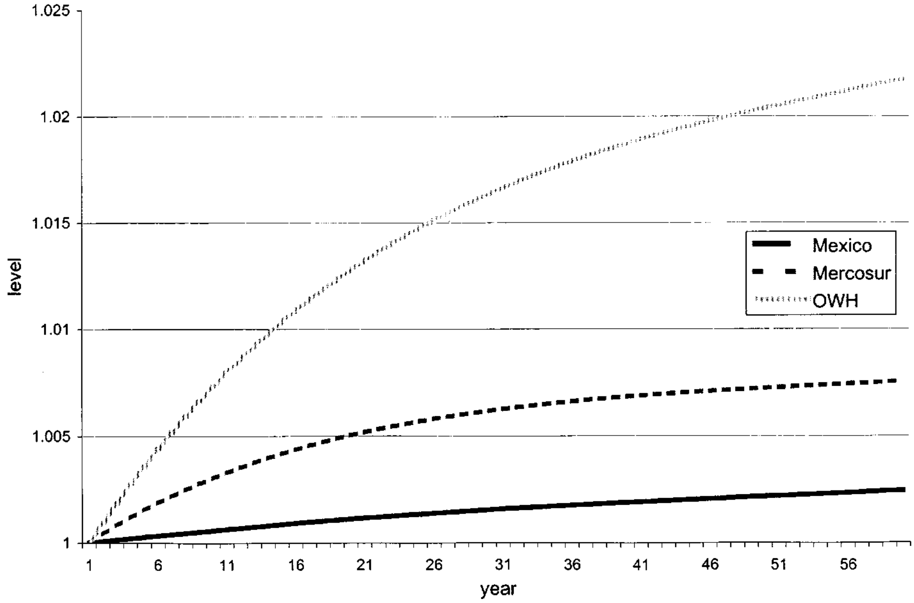


Note: with TFP-trade linkages and % change from the base-year

developing countries in the hemisphere (Table 1, second part). A much large welfare gain is observed for Mercosur and the OWH region in which the welfare loss occurs in the first scenario. Growth in TFP is modeled as a function of the increased imports of technology-intensive goods and services from U.S. and Canada. As Mercosur and the OWH region significantly rise imports from U.S. and Canada, they benefit more from the FTAA than Mexico in the second scenario. On the other hand for Mexico, as a member of NAFTA, its trade with U.S. and Canada does not increase as much as that in Mercosur and the OWH region. Thus, the welfare gain of the FTAA for Mexico in this scenario is smaller than that for Mercosur and the OWH region, though it is still much larger than that in the first scenario.

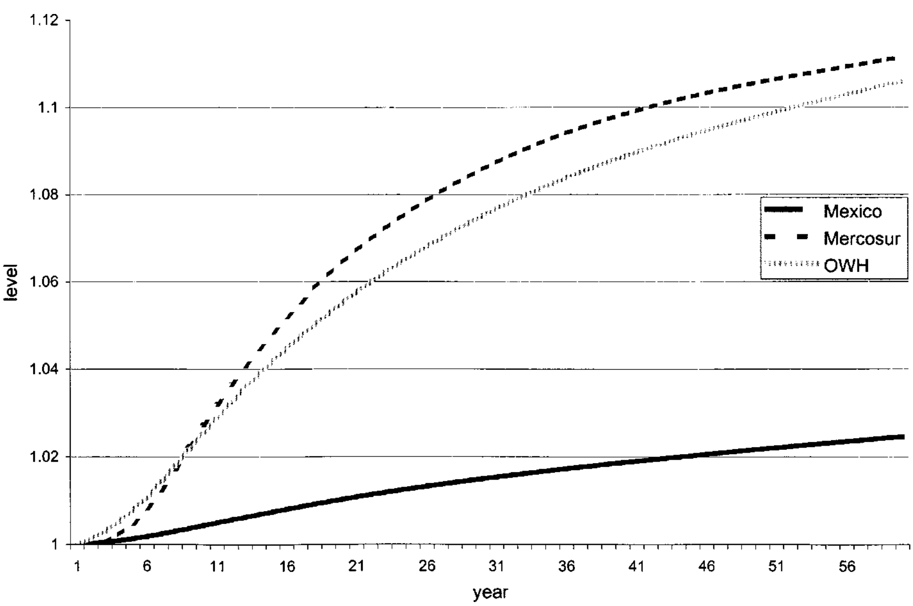
Two interesting results need to give special attention. First, the welfare effect of an FTAA with the TFP-trade linakges is mainly a long-term effect. Even though in the model, we only allow the developing countries/regions' TFP to grow in the first seven years, the long-run welfare gains are much larger than that in the short-run. The reason is that improved TFP not only increases current output at the given level of resources, it also stimulates investment as expected returns from capital investment rise with a high level of TFP (Figures 1-2). With more rapid capital accumulation (Figures 3-4), the production capacity of the developing

Figure 3. Capital Accumulation due to FTAA



Note: without TFP-trade linkages and % change from the base-year

Figure 4. Capital Accumulation due to FTAA.



Note: with TFP-trade linkages and the base- year is 1

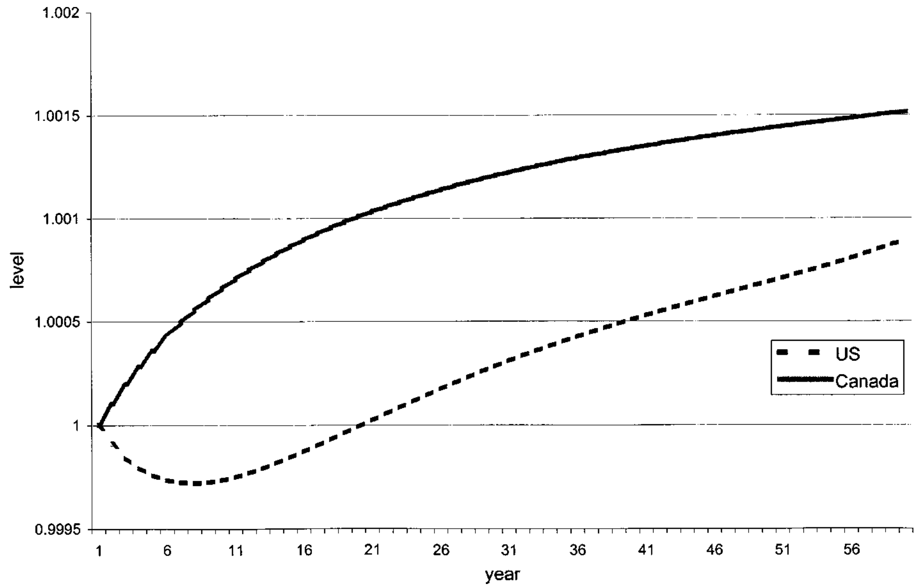
countries in the region expands in the future and thus, a large welfare gain is observed in the long-run.

The second interesting result is that, even though our model only considers the technological spillovers from developed to developing countries in the region, the welfare gains are also enhanced in the U.S. and Canada in the medium- and long-run. This result calls for further investigating the economy linkages beyond trade relationship between developed and developing countries.

D. Effects on Capital Flows

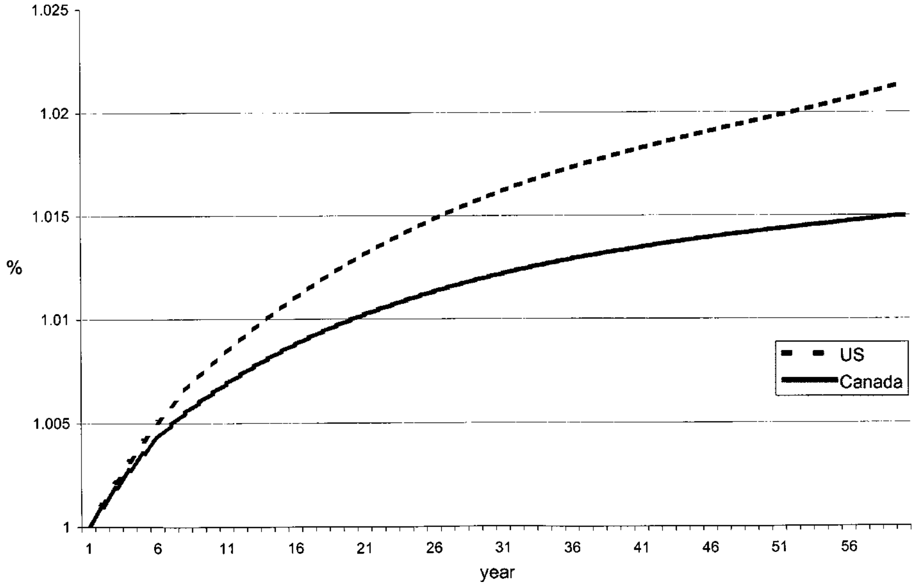
As U.S. and Canada are highly developed countries with relatively low levels of economic distortions in trade, gains for these two countries, measured by welfare gains, cannot be expected to be large. However, as wealthy economies, the investment opportunities of the U.S. and Canada are not limited to within their country borders and, hence, a rise in equivalent variation alone cannot capture all the effects of an FTAA on the U.S. and Canadian economy. As increased investment in developing countries cannot be fully financed by their domestic savings, international financial capital markets would be an important source to finance their rapid growth in investment. This would create opportunities for the U.S. and Canada to invest abroad, either through international lending activity or foreign direct investment in those hemisphere countries. These *indirect* effects generated from the growing demand for foreign capital inflows by the developing

Figure 5. Accumulation Capital Outflows due to FTAA



Note: without TFP-trade linkages and the base level is 1

Figure 6. Accumulation Capital Outflows due to FTAA



Note: without TFP-trade linkages and the base level is 1

countries may be relatively strong, given that the economic adjustments in the region's developing countries are expected to be more drastic. Our model captures such indirect effects of an FTAA. Under both scenarios, we observe that for the developing countries in the hemisphere, foreign capital inflows increase. Moreover, with TFP-trade linkages in the second scenario, such inflows rise dramatically following an FTAA. These create opportunities for U.S. and Canadian firms to invest abroad. In total, the U.S. and Canadian financial capital outflows rise by about 2 percent in the second scenarios (Figures 5-6). These outflows mainly go to the developing countries in the hemisphere. As shown in

Table 3. Balance of Trade Effect of the FTAA with TFP-Trade Linakges

	With Developed Hemisphere Countries				With Developing Hemisphere Countries			
	Base year	Year 1	Year 10	SS	Base year	Year 1	Year 10	SS
USA	31002	31269	31061	30890	9314	1464	5114	9534
Canada	–31002	–31269	–31061	–30890	434	–97	131	385
Mexico	–17647	–16346	–17335	–18258	–3517	–4183	–4157	–3979
Mercosur	8811	12630	11677	10082	–3538	–3720	–4199	–4533
OWH	-913	2348	413	–1742	7055	7903	8356	8513

Note: in million U.S. Dollar and positive number is trade deficit

Table 3, with TFP-trade linkages in the second scenario, trade flows between U.S. and Canada only rise by 0.86 percent in the short-run and 0.19 percent in the medium-run. However, U.S. trade deficit with developing hemisphere countries falls from 9,300 million in the base year to 1,500 and 5,100 million in the short- and medium run. Canadian trade deficit with developing hemisphere countries was 400 million in the base year and it turns to become trade surplus of 97 million in the short-run and falls to 130 million in the medium-run (Table 3). These results imply that the measure of importance of the FTAA for the developed economy in the region should be based on the indirect effects generated from the growing foreign demand for their financial capital, rather than on the direct effects on the commodity trade only. As wealthy countries, the U.S. and Canada have a comparative advantage in the financial capital market, besides their comparative advantage in trade of agricultural goods and services. With rapid economic growth in the developing economies, increased demand for their financial capital are expected to be large, which would allow these two countries' households to accumulate assets of other nations in the region.

IV. Summary and Conclusions

Some caveats are in order on the limitations of the study before we go on with the summary of our findings. First, it has to be clear that, with this type of a methodology, no distinctive conclusions can be inferred about the characterization of the future path of the economy based on “calendar” dates. The policy experiments performed are basically of comparative nature and are meaningful only in relation to each other, rather than revealing forecasts of the future.

Second, both the consumption and production activities of the economy are modeled in very aggregate terms. The idea of a *representative* national consumer, though a common device in modern macroeconomic thinking, preclude any analysis addressing income distribution effect of an FTAA. Moreover, following traditional neoclassical trade theory, factor mobility (especially labor movement across national borders) is ignored in the model. Recognizing the large wage gap that exists between developed and developing countries in the region, labor migration, especially from Mexico to U.S., is one important factor to affect both region’s developed and developing economies after an FTAA (see O’Rourke 1999 for an intensive literature review on the issue of trade and factor flows substitution). Incorporate labor migration effect, however, would significantly change the model structure and hence it lays beyond the scope of this study.

Third, one has to note that the adjustment path as characterized by the simulation exercises reflect *equilibrium* relationship on a *smooth* time horizon, mainly in the absence of rigidities and/or structural bottlenecks. Thus, the speed of transitional adjustment of many variables to their respective equilibrium paths should not be taken as a measure of the global stability properties of the modeled economies, but rather as a direct outcome of the laboratory characteristics of a macroeconomic model with continuous, well-behaved functional forms. For these reasons, our results should be regarded as crude approximations of the short- and medium-run equilibrium effects of an FTAA.

An FTAA in the Western Hemisphere can be viewed as another step in a sequence of trade liberalization policies that most countries in the region have being pursuing in the last decade. However, the model results reveal that the developing countries in the region may not enjoy welfare gain from such an RTA if they trade more with non-hemisphere countries and if trade-diverting effects dominate trade-creating effects.

Taking into account the positive linkages between open trade and economic growth, through technological spillovers, developing countries in the region would benefit from a hemisphere-wide integration-FTAA, which would allow them to have more trade with the developed countries in the hemisphere, such as the U.S. and Canada.

The direct effects of an FTAA on the U.S. and Canada, measured by equivalent variation alone, are modest, given that they are advanced and open economies. On the other hand, the indirect effects of an FTAA, that is, the effects on U.S. and Canadian investment abroad or U.S. and Canadian financial capital outflows to neighboring countries, are strong. With their comparative advantage in world financial capital markets, the long run effects of an FTAA on the U.S. and Canadian economy will go beyond the increase in trade opportunities.

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Appendix I: Data aggregation and initial protection rates

Table A.1 Aggregation Structure

Regions of the Model	**Countries/regions in GTAP database**
USA	The United States
Canada	Canada
Mexico	Mexico
Mercosur	Argentina, Brazil, Uruguay
Other West Hemisphere countries	Venezuela, Colombia, Rest of Andean Pact, Central America and the Caribbean, Rest of South America
Other developed countries	Australia, New Zealand, Japan, Korea, Singapore, Taiwan, Hong Kong, United Kingdom, Germany, Denmark, Sweden, Finland, Rest of European Union, European Free Trade Area
Other developing countries	China, Indonesia, Malysia, Philippines, Thailand, Viet Nam, Sri Lanka, Rest of South Asia, Central European Associates, Former Soviet Union, Turkey, Rest of Middle East, Morocco, Rest of North Africa, South African Customs Union, Rest of Southern Africa, Rest of Sub Saharan Africa, Rest of World
Sectors of the Model	**Sectors in GTAP database**
Agriculture	grains, vegetables, fruits and nuts, oil seeds and oil, sugar and sugar products, fibers, livestock and livestock products, diary products, beverages and tobacco products, other processed food products
Textile	Textiles, wearing apparel, leather products
Tech-intensive manufacturing	Motor vehicles and parts, transport equipment, electronic quipment, machinery and equipment
Other manufacturing	All other manufacturing sectors
Tech-intensive services	Trade, transport, financial, business, recreational serices
Other services	All other services

Table A.2. Initial tariff rates in Western Hemisphere countries/regions (1995)

	USA	Canada	Mexico	Mercosur	OWH
Agriculture	7.9	4.20	4.30	0.60	7.30
Textile	11.5	18.60	17.70	16.60	20.40
Tech-intensive manufacturing	2.5	4.10	11.40	18.20	10.70
Other manufacturing	2.7	5.60	10.90	11.40	10.50

Note: Tariffs on service sectors are minimal.

Appendix II: Equations and Variables in the Dynamic CGE Model

A.1. The Producers decisions

$$Max\ V_{n,i,1} = \Sigma_{t=1}^{T}\frac{1}{\Pi_{s=t}(1+r_s)^t}div_{n,i,t} + div_{n,i,T}\frac{(1+r_T)^{1-T}}{r_T} \quad \text{(A1)}$$

$$div_{n,i,t} = PVA_{n,i,t}X_{n,i,t} - wl_{n,t}LB_{n,i,t} - wd_{n,t}LD_{n,i,t}$$

$$-PC_{n,i,t}\varphi_{n,i}\frac{I_{n,i,t}^2}{K_{n,i,t}} - PI_{n,i,t}I_{n,i,t} \quad \text{(A2)}$$

$$s.t.X_{n,i,t} = A_{n,i}LB_{n,i,t}^{\alpha_{n,i,ib}}LD_{n,i,t}^{\alpha_{n,i,ld}}K_{n,i,t}^{\alpha_{n,i,k}} \quad \text{(A3)}$$

$$K_{n,i,t+1} = (1-\delta_{n,i})K_{n,i,t} + I_{n,i,t}$$

$$I_{n,i,t} = A_{n,i,k}\Pi_j^J IVD_{n_{j,i,t}}^{d_{n,j,i}} \cdot t = 1, 2, \ldots \quad \text{(A4)}$$

$$\alpha_{n,i,l}PVA_{n,i,t}X_{n,i,t} = wl_nLB_{n,i,t} \quad \text{(A5)}$$

$$\alpha_{n,i,d}PVA_{n,i,t}X_{n,i,t} = wd_nLD_{n,i,t} \quad \text{(A6)}$$

$$q_{n,i,t} = PI_{n,i,t} + 2PC_{n,i,t}\varphi_{n,i}\frac{I_{n,i,t}}{K_{n,i,t}} \quad \text{(A7)}$$

$$(1+r_t)q_{n,i,t-1} = a_{n,i,k}PC_{n,i,t}\frac{X_{n,i,t}}{K_{n,i,t}} + PC_{n,i,t}\varphi_{n,i}\left(\frac{I_{n,i,t}}{K_{n,i,t}}\right)^2 + (1-\delta_{n,i})q_{n,i,t} \quad \text{(A8)}$$

$$IVD_{n,i,j} = \frac{d_{n,i,j}PI_{n,j}I_{n,j}}{PC_{n,i}} \quad \text{(A9)}$$

$$IVD_{n,i,j} = IO_{n,j,i}X_{n,i,t} \quad \text{(A10)}$$

$$PX_{n,i,t} = PVA_{n,i,t} + \Sigma_jPC_{n,j,t}IO_{n,i,j,t} \quad \text{(A11)}$$

$$PX_{n,i,t} = PVA_{n,i,t} + \Sigma_jPC_{n,j,t}IO_{n,i,j,t} \quad \text{(A12)}$$

where

$PVA_{n,i,t}$	unit value added,
$PX_{n,i,t}$	producers price,
$PC_{n,i,t}$	Armington price,
$X_{n,i,t}$	output,
$wl_{n,t}$	wage rate,
$LB_{n,i,t}$	labor employed by sector,
$wd_{n,t}$	rental rate for land,
$LD_{n,i,t}$	land employed by sector
$K_{n,i,t}$	capital in sector

$I_{n,i,t}$ investment in quantity,
$PI_{n,i,t}$ unit value of capital investment,
$IVD_{n,j,i,t}$ investment demand for good,
$ITD_{n,j,i,t}$ intermediate inputs,
$q_{n,i,t}$ marginal value (Tobins q) of capital,
$A_{n,i}$ parameter of technological level in value added function,
$A_{n,i,k}$ parameter of technological level in investment function,
$\alpha_{n,i,f}$ share parameter in value added production function for factor,
$d_{n,j,i}$ share parameter in investment production function for good,
$\phi_{n,i}$ parameter in capital adjustment function,
$\delta_{n,i}$ constant capital depreciation rate.
$IO_{n,i,j}$ input-output coefficient.

A.2. The Households Decisions

where

$$Max\ U_{n,1} = \Sigma_{t=1}^{T}\left(\frac{1}{1+\rho}\right)^{t}\ln(TC_{n,t}) + \ln(TC_{n,T})\frac{(1+\rho)^{1-T}}{\rho} \quad \text{(A13)}$$

$$TC_{n,t} = \Pi_i CD_{n,i,t}^{b_{n,i}} \quad \text{(A14)}$$

$$s.t.\ \Sigma_i PC_{n,i,t}CD_{n,i,t} = Y_{n,t} - SAV_{n,t} \quad \text{(A15)}$$

$$Y_{n,t} = wl_{n,t}LB_n + wd_{n,t}LD_n + \Sigma_i div_{n,i,t} + GT_{n,t} - r_tB_{n,t} \quad \text{(A16)}$$

$$\frac{Y_{n,t+1} - SAV_{n,t+1}}{Y_{n,t} - SAV_{n,t}} = \frac{1+r_{t+1}}{1+\rho} \quad \text{(A17)}$$

$$CD_{n,i,t} = \frac{b_{n,i}(Y_{n,i} - SAV_{n,t})}{PC_{n,i,t}} \quad \text{(A18)}$$

where
$TC_{n,t}$ household aggregate consumption,
$CD_{n,i,t}$ household demand for good,
$Y_{n,t}$ household income,
$SAV_{n,t}$ household savings,
$B_{n,t}$ foreign debt,
$GT_{n,t}$ government transfe;r
$LB_{n,t}$ labor supply,
$LD_{n,t}$ land supply,

ρ rate of consumer time preference,
$b_{n,i}$ share parameter in household demand function.

A.3. Government Consumption Demand

$$PC_{n,i,t}GD_{n,i,t} =$$
$$c_{n,i,t}(\Sigma_i\Sigma_s te_{n,s,i,t}PWM_{n,s,i,t}M_{n,s,i,t} + \Sigma_i\Sigma_s tm_{s,n,t}PWM_{s,n,i,t} - GT_{n,t}) \quad \text{(A19)}$$

where

$GD_{n,i,t}$ government demand,
$M_{n,s,i,t}$ trade flow;
$tm_{s,n,i,t}$ tariff rate,
$te_{n,s,i,t}$ export tax rate,
$c_{n,i}$ share parameter in government demand function,

A.4. Exports and Imports

$$MM_{n,i,t} = Y_{n,i}[\Sigma_s \theta_{s,n,i} M_{s,i,t}^{(\sigma m_{n,i}-1)/\sigma m_{n,i}}]^{\sigma m_{n,i}/(\sigma m_{n,i}-1)} \quad \text{(A20)}$$

$$C_{n,i,t} =$$
$$\Lambda_{n,i}[\beta_{n,i} MM_{n,i,t}^{(\sigma mm_{n,i}-1)/\sigma mm_{n,i}} + (1-\beta_{n,i})D_{n,i,t}^{(\sigma mm_{n,i}-1)/\sigma mm_{n,i}}]^{(\sigma mm_{n,i}-1)/(\sigma mm_{n,i}-1)}$$
$$\text{(A21)}$$

$$MM_{s,n,i,t} = Y_{n,t}^{\sigma m_{n,i}-1}\left[\frac{\theta_{s,n,i}PMM_{n,i,t}}{((1+tm_{s,n,i,t})/(1-te_{s,n,i,t}))PX_{s,i,t}}\right]^{\sigma m_{n,i}} MM_{n,i,t} \quad \text{(A22)}$$

$$MM_{n,i,t} = \Lambda_{n,t}^{\sigma mm_{n,i}-1}\left[\beta_{n,i}\frac{PC_{n,i,t}}{PMM_{n,i,t}}\right]^{\sigma mm_{n,i}} C_{n,i,t} \quad \text{(A23)}$$

$$D_{n,i,t} = \Lambda_{n,t}^{\sigma mm_{n,i}-1}\left[(1-\beta_{n,i})\frac{PC_{n,i,t}}{PX_{n,i,t}}\right]^{\sigma mm_{n,i}} C_{n,i,t} \quad \text{(A24)}$$

where

$MM_{n,i,t}$ composite import good,
$PMM_{n,i,t}$ composite import price,
$C_{n,i,t}$ total absorption of composite good,
$D_{n,i,t}$ good i produced and consumed domestically;
$Y_{n,i}$ shift parameter in Armington import function,
$\Lambda_{n,i}$ shift parameter in Armington composite function,
$\theta_{s,n,i}$ share parameter in Armington import function,

$\beta_{n,i}$ share parameter in Armington function for composite good,
$\sigma m_{n,i}$ elasticity of substitution in Armington import function,
$\sigma mm_{n,i}$ elasticity of substitution in Armington composite function.

A.5. Foreign Borrowing and Foreign Debt

$$FB_{n,t} = \Sigma_t \Sigma_s \left(\frac{PX_{n,i,t}}{1 - te_{s,n,i,t}} M_{s,n,i,t} - \frac{PX_{s,i,t}}{1 - te_{n,s,i,t}} M_{n,s,i,t} \right) \tag{A25}$$

$$B_{n,t+1} = (1 + r_t) B_{n,t} + FB_{n,t} \tag{A26}$$

where $FB_{n,t}$ foreign trade deficit.

$$\xi_{n,t} = \xi_{n,t} \Sigma_s w_s \Sigma_j \Delta M_{s,n,j,t} \tag{A27}$$

$$A_{n,i,t} = (1 + \xi_{n,t}) A_{n,t,0} \tag{A28}$$

where $\zeta_{n,t}$ is technological spillover coefficient in the commodity production function; $\xi_{n,t}$ is the coefficient in the spillover function, ω_s is the weight for imports from country s, ΔM is change in imports from s to n for good j at time t, and s is only for developed countries and n for developing countries.

A.6. Factor Market Equilibrium Conditions within Regions

$$\Sigma_i LB_{n,i,t} = L\bar{B}_n \tag{A29}$$

$$\Sigma_i LD_{n,i,t} = L\bar{D}_n \tag{A30}$$

A.7. Commodity Market Equilibrium Conditions

$$C_{n,i,t} = CD_{n,i,t} + GD_{n,i,t} + \Sigma_j IVD_{n,i,j,t} + \Sigma_j ITD_{n,i,j,t} \tag{A31}$$

A.8. Terminal Conditions (the Steady State Constraints)

$$\delta_{n,i} K_{n,i,T} = I_{n,i,T} \tag{A32}$$

$$r_T V_{n,i,T} = div_{n,i,T} \tag{A33}$$

$$r_T B_{n,T} + FB_{n,T} = 0 \tag{A34}$$

$$r_T = \rho \tag{A35}$$

Appendix III. Calibration Strategy

Calibration of the model involves specifying values for certain parameters based on outside estimates, and deriving the remaining ones from restrictions posed by the equilibrium conditions. As in a static CGE model where calibration begins with the assumption that data obtained for the domestic economy reflect a within time period equilibrium, we assume that the world is evolving along a balanced (equilibrium) growth path[1]. Hence, some of the assumptions on the model calibration concerning the economy's exogenous environment are arbitrary. However, as we are interested in deviations with respect to a reference path in our counter factual experiments, this specification can be regarded as robust.

The method used to calibrate parameters or initial values of variables associated with intra-temporal economic activities are quite standard as that used in most static CGE models. We only sketch the more subtle dynamic calibration. Starting from the steady state assumption, the household time discount rate, ρ, equals the world interest rate, r, which can be chosen from outside data, while a countrys foreign assets or debt are determined by Eq. (A34) once the trade deficits or surplus are obtained from the database. The GTAP database further provides both the values of each regions stock of capital and the flows of capital. Thus, with the data of the value of total investment, including capital adjustment costs, it is easy to calculate the initial level of total dividend payments (*div=value of capital flows - value of total investment*). The aggregate steady state value of the firms, V, and hence the marginal value of capital, Tobins q, are then obtained, i.e., $V=div/r$; $q=V/K$. The values of capital depreciation rate, δ, and the coefficient in the capital adjustment costs, ϕ, have to be chosen consistently with the steady state condition. We can first either choose δ or ϕ and then calculate the other one from the steady state equations presented in section II. If ϕ is chosen first, then δ is calculated from the following equation derived from the steady state conditions:

$$\delta = \frac{q}{2P\varphi} - \left[\frac{rq - wk}{P\varphi} + \left(\frac{q}{2P\varphi}\right)^2\right]^{1/2}$$

[1]The steady-state assumption, though questionable for most developing economies, is systematically adopted in applied intertemporal general equilibrium models due to its extreme convenience for calibration. For example, Goulder and Summers (1989), Go (1994), and Mercenier and Yeldan (1997). As balanced growth rate (the constant steady state growth rate) is the same for all sectors and across countries, and is not affected by any policy change, it can be normalized to be zero, i.e., the aggregate supply of labor is fixed with no TFP growth envisaged. Such specification has no real effect on the model results, since, alternatively, we could simply multiply all variables by this constant growth rate.

The quantity of total investment, I, can be determined via $I = \delta K$. The capital adjustment costs, and the price for investment, PI, then can be easily obtained.

In a dynamic general equilibrium model the analyst is typically interested in the adjustments generated in the finite time periods in response to parametric changes of selected exogenous variables. In addition, the model is run by using the GAMS. Hence, imposition of a terminal condition becomes pertinent for a discrete time dynamic model when there are out-of-steady state transitional paths for the endogenous variables. Since the so-called terminal conditions are, in fact, conditions for the steady state, an ideal terminal period should be chosen when a steady state is asymptotically approached. In administering the dynamic experiments, two criteria can be adhered to select the "convergence" of a steady state: the first is the time horizon when 99.99% of the transitional life of the main variables is realized; and the second is the time period when all endogenous variables cease to change by less than 0.000001%. However, for a large size global model, the computational ability of the software or computer used may restrict the application of these two criteria. Implementing the time-aggregation techniques á là Mercenier and Michel (1994) reduces required aggregate number of time periods and, hence, reduce the size of the numerical model. This technique is applied in our simulation experiments.

Appendix IV. Sensitivity Tests

Similar as in a static CGE model, the foreign and domestic goods are assumed to be imperfectly substitutable both in consumption and production in our model. Thus, it is well known that the elasticity of substitution between foreign and domestic goods would affect model simulation results, especially for the simulations conducted by altering trade policy parameters. Besides elasticities, the choice of initial interest rate in the dynamic CGE model would also affect the simulation results, as capital accumulates and balance of the current account change along their out-of-steady state transitional paths. For this reason, it is necessary to conduct a series of sensitivity tests to check the robustness of the model results.

We conduct a series of sensitivity tests by modifying the elasticities of substitution as well as the initial interest rate employed in the model, and then carry out the two experiment exercises that we discussed in the paper. Tables A3-A4 and figures A1-A2 present the results of the sensitivity tests. To reduce the length of the paper, we select a region to display the results and choose the relevant variables that we have discussed in our early analysis. The sensitivity tests show that, the choices of both elasticities and interest rate do not affect the direction of model results, indicating the robustness of the model results. Different elasticities of substitution affect model results more than the difference in interest rate, especially in the long-run. The TFP-trade linkages would enhance the sensitivity of the model to the choice of the elasticities, as imports and exports are quite sensitive variables to the choice of elasticities and growth in TFP depends on the increase in imports. Hence, in an FTAA scenario with TFP-trade linkages, change in the equivalent variation index becomes greater when a high elasticity is employed in the model.

Table A3. Sensitivity Test-Welfare Effect of the FTAA on Mercosur with Different Elasticities and Interest Rates

(% change from the base year)

	FTAA without TFP-trade linkages				FTAA with TFP-trade linkages			
	Intra-temporal			Intertemporal	Intra-temporal			Intertemporal
	1	10	SS		1	10	SS	
High elasticity	–0.26	–0.04	0.27	–0.05	3.03	14.27	23.72	13.59
Medium elasticity	–0.26	–0.05	0.23	–0.02	0.78	7.04	12.35	6.75
Low elasticity	–0.24	–0.06	0.20	–0.03	0.20	4.16	7.45	3.98
High interest rate	–0.25	–0.01	0.24	–0.02	0.72	7.52	12.46	6.52
Low interest rate	–0.28	–0.14	0.23	–0.04	0.57	6.06	12.43	6.46

Note: "Medium elasticity" case is the one used for our study in which the substitution elasticities between foreign and domestic goods are chosen between 1.5 (for services) to 3 (for manufacturing). In the "high elasticity" case, the elasticities are doubled, i.e., between 3 to 6, while in the "low elasticity" case, the elasticities are reduced to between 1.1 to 1.5. With these three different choices for elasticities, the initial interest rate is chosen at 6.4%. In the "high interest' case, the interest rate increases by 30 percent (i.e., at 8.32%), while in the "low interest" case, the interest rate is 4%. In the both cases, the elasticities are the same as in the "medium elasticity" case.

Table A4. Sensitivity Test-Balance of Trade Effect of the FTAA on the U.S. with Different Elasticities and Interest Rates

(in million U.S. Dollar and positive number is trade deficit)

	With Developed Hemisphere Countries				With Developing Hemisphere Countries			
	Base year	Year 1	Year 10	SS	Base year	Year 1	Year 10	SS
High *e*	31002	31462	31103	30725	9314	–15341	1409	17490
Medium *e*	31002	31269	31061	30890	9314	1464	5114	9534
Low *e*	31002	31181	31037	30928	9314	6542	6468	7766
High *r*	31002	31258	31028	30870	9314	1717	5755	9857
Low *r*	31002	31296	31122	30911	9314	796	3825	9430