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THE EFFECT OF WTO AND FTAA ON AGRICULTURE AND THE RURAL SECTOR IN LATIN AMERICA

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EXECUTIVE SUMMARY

In this paper we analyze the effect on output, employment and poverty of two (2) alternative versions of further trade liberalization- one representing free trade world wide (WTO) and the other a Western hemisphere free trade bloc (FTAA). The paper introduces international commodity price changes derived from a world model into national Computable General Equilibrium (CGE) and microsimulation models for fifteen (15) Latin American countries to estimate how FTAA and WTO would affect sectoral output, employment, wages and poverty levels at the national level for each of the countries. We found that either of these two alternatives is expansionary for both output and employment in general and for agriculture in particular in most Latin American countries. WTO particularly favors the rural sector because the elimination of producer subsidies in developed countries causes a big increase in prices of all food commodities, especially on grains, dairy products and milk. As a result we found that in general, trade liberalization reduced skill differentials, both within the urban sector, and where we had the information, between the rural and urban unskilled. Finally, the poverty microsimulation exercise showed that the poor are helped by either WTO or FTAA. Either version reduces poverty and inequality, and the changes are especially significant under the WTO. Clearly the rural poor pay a fairly heavy price for the producer subsidies in developed countries.

THE EFFECT OF WTO AND FTAA ON AGRICULTURE AND THE RURAL SECTOR IN LATIN AMERICA

Samuel Morley[1] and Valeria Piñeiro[2]

1. INTRODUCTION

During the last 15 years Latin America has embraced the strategy of tariff reductions and capital account liberalization as key elements in its shift to a more outward-looking development strategy and as a part of the globalization process. Things seemed to be going well in the initial post-liberalization phase, prior to the Tequila Crisis in 1995. Growth rates were much higher than they had been in the 1980s, and for some countries were even higher than they had been in the long period between World War II and the debt crisis. Things were expected to get even better in the following years since in many countries the reforms had only recently been adopted and since it takes time to reap their full benefits.

But it is not working out that way for most of the countries in the region. Instead of accelerating, growth has decelerated, especially in the countries of South America. Overall average per capita income growth in the region between 1990 and 1995 was 2.0% per year. That rate fell to 1.3% per year between 1995 and 2000. Only a few countries (Dominican Republic, Mexico and Nicaragua) did better in the last five years than they did in the first five of the decade. Indeed there are only five (Argentina, Chile, Uruguay, Dominican Republic and Peru) of the nineteen countries for which we have data whose growth in the 1990s is greater than it was in the twenty years before the first debt crisis in 1980. [3] (Morley and Vos, 2003)

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[3] And all but Chile have had severe recessions in the last several years.

While it is unclear what explains the deterioration in the economic performance of the region, policymakers have to decide whether they are going to attempt to reverse the process of trade liberalization, and if not what stance they should take with respect to further liberalization. One approach would be to push for the full implementation of free trade in all countries including the abolition of producer subsidies in developing countries. For while significant progress has been made around the world in reducing barriers to trade, many still remain, and more important, subsidies to producers in many developed countries significantly affect the price and world supply of important commodities, particularly in agriculture. An alternative strategy, recognizing the difficulty of getting developed countries to abandon producer subsidies would be to push forward with a regional free trade agreement. Trade barriers would be eliminated but only for trade within the block, thus gaining some of the increased efficiency coming from access to a larger market, but also retaining some bargaining power relative to countries outside the block.

The purpose of this paper is to analyze what the impact would be of these two alternatives-the elimination of all barriers to trade including producer subsidies which we will call the WTO option, or a regional free trade agreement among all the countries in the Western Hemisphere which we will call the FTAA (Free Trade Area of the Americas) option. To do this exercise we will borrow heavily from two previous research efforts done at IFPRI, one a simulation using a world model (with GTAP data) and the other a UNDP project that developed national CGE models for 16 countries in the region. In their study Diao et al. (2002) used a world model to calculate what the change in world commodity prices would be if all trade barriers and producer subsides were eliminated. These prices were then fed into the national CGE models for each of the Latin American countries to see what the impact would be of the full implementation of the WTO and FTAA on the growth and sectoral composition of output, on wages and employment, and on poverty and distribution. These country CGE models were used in a larger UNDP project to analyze a wide variety of trade related issues including tariff reductions,

inflows of foreign capital, changes in the terms of trade as well as the WTO and FTAA experiments reported here.[4] Our aim here is to extract from the larger project the results pertaining to the WTO and FTAA paying particular attention to the impact of these two alternatives on agriculture, rural employment, agricultural wages and poverty.

The paper is organized as follows. In the next section we briefly describe the methodology used in both the world model simulations and in the national CGE simulations. In section three we report the results of the two simulations on output by sector and employment by rural and urban where the data permit for each of the 16 countries in the IFPRI-UNDP project. In section four we report the impact on poverty and distribution of the changes in world prices from the GTAP model. Section five concludes.

2. MODEL METHODOLOGY

In this study we use two different Computable General Equilibrium models (CGE). The first one is a world model (Diao et al., 2002) while the second set of models is single country models (Ganuza et al., forthcoming). CGE models consist of a set of market clearing equations for output, employment, exports, imports and household consumption, all disaggregated into different goods and factor markets. Both of the models are solved for equilibrium prices, outputs and wages, given total factor supplies. The solutions are of a comparative static nature, which means that they cannot tell us anything about the growth impact of policy choices. However, they are a useful simulation laboratory for doing controlled experiments, changing policies and other exogenous conditions, and measuring the impact of these changes on sector structure, household welfare, and income distribution.

[4] The papers from the project will be published in Ganuza et al (forthcoming) and can also be found at the UNDP website at http://www.undp.org/rblac/finaldrafts/

Table 1: — Percentage changes in international prices resulting from the FTAA and WTO simulations with the GTAP model.

	FTAA	WTO
rice	1.3	14.9
wheat	0.1	23.1
other grains	0.2	20.4
fruits and vegetables	0.5	5.2
oil seeds	0	11.3
sugar	0.9	10.6
vegetables	-0.2	1.1
other crops	0.2	1.5
wool	-0.5	6.6
forestry products	-0.4	0.1
fish	-0.4	1.6
beef	0.9	21.3
other meat products	0.2	19.0
vegetable oils	0	4.4
dairy products	0.7	26.2
other food products	0.2	6.8
drinks and tobacco products	0	8.7
energy	-0.3	-2.0
mining	-0.5	-0.2
textiles	-0.2	1.4
clothing	-0.3	-0.7
leather products	-0.3	-0.8
paper and printing	-0.2	1.0
oil-based products	-0.3	-0.4
chemical products	-0.2	1.3
mineral products	-0.3	1.2
cars and car parts	-0.1	1.3
transport equipment	-0.3	0.2
electronic products	-0.3	0
machinery and equipment	-0.3	0.7
electricity and water	0	0
construction	0	0
services	0	0
government sector	0	0

Source: Simulation data provided by E. Diaz Bonilla and X. Diao.

The results of this analysis were obtained in two steps. First the world model was used in solving for the international price and tariffs vectors that result from the simulation of the FTAA and WTO scenarios. For the FTAA scenario all tariffs between countries in the Western Hemisphere were eliminated, but producer subsidies were left at the current levels. Note that non-tariff barriers and phyto-sanitary restrictions were not included in the analysis, which means that they were assumed constant. For the WTO simulation all trade barriers and producer subsidies were eliminated, worldwide.

The data used in the world model comes from version 5 of the GTAP and includes the 39 sectors shown in Table 1 and 28 regions or countries[5]. This data corresponds to the state of the global economy in 1997.[6] The trade restrictions are measured as tariff equivalents. They are calculated as a proportion of the product price (ad valorem). In both simulations it is assumed that there is a free market access for the participant countries. Non-tariff barriers and sanitary barriers are not included in this measure of protection.

The closures for the world model are as follow. The labor markets were differentiated between developed and developing countries. For developed countries there is full employment and wages are flexible. For developing countries, there is unemployment and the wages are fixed. For the capital market full employment was assumed, in which case the total quantity of capital stayed fixed in each country in the simulations, however it can move between sectors. And the price of capital is flexible.

In the case of the external balance, the exchange rates of all the countries are flexible and float relative to the US dollar. The exchange rate of the US is the *numeraire* and is fixed while all the other exchange rates can change. Foreign savings are fixed, which means

[5] The countries and regions included are: US, Canada, Mexico, Central America and the Caribbean, Colombia, Peru, Venezuela, Rest of the Andean Pact, Argentina, Brazil, Chile, Uruguay, Rest of South America, Australia and New Zealand, Japan and Korea, EU, China, Indonesia, Philippines, India, Asia export (countries with agricultural exports), Other Asia, East Europe, Turkey, Northern Africa and Rest Middle East, South Africa, Africa with trade with EU and Rest of Africa.

[6] For more information on this database go to http://www.gtap.agecon.purdue.edu/

that the total trade balance of each country does not change. However the bilateral trade between countries and the composition of commodities can change. Last, the government consumption and government investment demand are assumed fixed.

In both integration scenarios the international prices for the agricultural sector increase (see Table 1). In the case of the FTAA the aggregate increase is around 0.5%. Rice, sugar and fruits and vegetables rise the most in the primary sector and meat products and dairy in the food processing industry. Wool, forestry and fishery are the only agricultural products where the prices decrease. For the rest of the industry and oil products all the prices decrease under the FTAA.

The impact on relative and absolute prices is much higher in the case of the WTO. For agriculture as a whole the increase in the price is around 11%. Prices go up the most where producer subsidies in the OECD countries are the most significant, and that is in grains, dairy products and meat. In those sectors a full free trade agreement would raise prices by over 20%.

As mentioned before, the second stage of this study was to determine the impact of the changes in world prices displayed in Table 1 on employment, output and poverty in individual countries. That was done as part of a UNDP-IFPRI project whose objective was to determine the impact of trade liberalization and external shocks of various kinds on poverty and income distribution. In the UNDP-IFPRI project a Social Accounting Matrix (SAM) and a CGE model were developed for 16 countries in LAC[7] (even though Cuba is included in the project the results were not reported in this study because they are not relevant for the FTAA or WTO scenarios).

[7] The countries included in the project were: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Honduras, Mexico, Paraguay, Peru, Dominican Republic, Uruguay, and Venezuela.

For the single country cases the standard model built by IFPRI (Lofgren et al., 2001) was used in all the cases with the exception of Brazil and Venezuela. The advantage of this model is its flexibility in choosing the appropriate behavior and closures for each country depending on the specific characteristics of each country. The model's disaggregation of institutions, factors and activities follow the structure of the SAM, which is determined by data availability. Also, the year of the SAMs varies according to the specific country (all of them are from the 1990s[8]).

The standard model[9] is written as a set of equations that define the behavior of the different actors of the economy and a set of constraints that have to be satisfied. These constraints cover the commodity and factor markets, and the macroeconomic balances, i.e., balances for savings-investment, the government, and the current account with the rest of the world.

The closure chosen for each individual market and macroeconomic balance will affect the way in which the model will adjust to changes in domestic policy or external shocks. In this exercise, for the FTAA and WTO simulations each country author had the option to choose between having a nominal wage (rent) fixed, which means that the variable that will adjust is the quantity demanded of labor (capital); or leaving the wage flexible and the supply of the factor fixed. In the first option, it is assumed that the economy has unemployment and the firms will employ the quantity of labor they need at the given wage.

Some country authors also assumed that certain factor markets are segmented while other factors are activity-specific. This closure was used in cases where the factor cannot be

[8] The year of the SAMs are: Argentina (1997), Bolivia (1996), Brazil (1996), Chile (1996), Colombia (1997), Costa Rica (1997), Cuba (1999), Ecuador (1993), El Salvador (1999), Honduras (1997), Mexico (1996), Paraguay (1998), Peru (1994), Dominican Republic (1991), Uruguay (1995), and Venezuela (1996).

[9] The explanation about closures is taken from Lofgren et al. (2001).

moved to a different activity over time. For example, some country authors assumed that land cannot be moved from one agricultural sub-sector to another. For this case, quantities of activity-specific factors and the economy-wide wage are fixed while the activity-specific wage terms and the supply variables are flexible.

Several choices have to be made about macroeconomic closures (i.e., the government balance, the external balance, and the saving-investment balance). For the external balance there are two options:[10] flexible exchange rate and fixed foreign savings, or fixed exchange rates with flexible foreign saving. Given that all other items are fixed in the balance of payments accounts (transfers between the rest of the world and domestic institutions), fixing foreign saving means that the trade balance is also fixed. The other option is fixed exchange rate and flexible foreign savings. Which of these two closures is chosen has significant implications for the sectoral composition of output in general and for agriculture in particular, because the agricultural sector mostly produces traded goods.

For the savings-investment balance, closures are either investment driven (in which case the values of savings adjusts) or savings driven (then the value of investment adjusts). For the saving-investment closure, there is also the option of a "balanced" closure, which imposes an adjustment rule for government consumption. Under this case, adjustments in absorption are spread across all its components (household consumption, government consumption and investment).

It is important to notice that the choice of closure determines the way in which the model adjusts and hence influences the results that are obtained. In the case of the external balance the authors for some countries like Brazil, Colombia, Costa Rica, Ecuador, El Salvador, Honduras and Paraguay assumed a fixed exchange rate, leaving the current balance to move freely. The rest of the country authors used the second option in which

[10] With the exemption of the Argentine model in which a cash in advance constraint was included. Adding one more variable (money), allowing for the exchange rate and foreign savings to change. See Diaz Bonilla and Piñeiro (1998).

case the current balance is fixed. The latter option implies that even though exports and imports can change, the difference between them has to stay constant.

Finally it makes a difference whether country authors assume that factor supplies are fixed or flexible (i.e. whether there is unemployed labor). Output responses are much higher when factor supplies are assumed to be endogenous. With the exception of Mexico and Brazil (these models have an upward sloping labor supply curve), the countries assumed the existence of unemployment for the case of labor and full employment for capital. Also, some country authors assumed fixed amount of capital for a specific sector, for example the case of copper in Chile.

3. THE ECONOMIC AND SOCIAL IMPACT OF WTO AND FTAA

The impact of WTO and FTAA on output and employment

We turn now to our main question-what would be the impact of full trade liberalization or a regional trade agreement on output, employment and poverty in the region? As we saw from the vector of price changes in the previous section, full trade liberalization causes a very large increase in world prices of agricultural products mainly because of the elimination of all producer subsidies in developed countries. Implementing the Free Trade Area of the Americas does not have much effect on world prices reflecting the agreement among the countries that negotiations on producer subsidies would be part of the process of trade liberalization worldwide and under the WTO.

To calculate the impact of the two alternative trade liberalization strategies, researchers involved in the country studies in the IFPRI-UNDP project ran their full CGE model with the changes in world prices shown in Table 1. We aggregated their results into a small

number of sectors and report them in Tables 2 and 3.[11] These two tables report the changes in the base period output levels for each of our sectors or macroeconomic aggregates to give us a picture of the differential impact of WTO and FTAA across the different sectors of the economy.

The WTO simulation imposes three changes simultaneously, one of which should be favorable to all domestic producers and two of which should favor some producers and hurt others. Tariff reductions in the United States and Canada should be favorable to all producers, ignoring for the moment competition for factors of production. The rise in the world prices of agricultural commodities, particularly grain, meat and dairy products should help that part of domestic agriculture producing those commodities, but hurt producers whose workers raise their wage demands to cover the rise in the cost of food. Finally, the elimination of tariffs hurts producers of import substitutes but helps those who use imported inputs on which tariffs were paid in the base year.

Table 2 tells us that for most countries full trade liberalization under the WTO is expansionary. In 10 of the 15 in our sample, GDP rises. With the exception of Costa Rica, El Salvador, Mexico and Venezuela, agriculture and food processing industries are the main beneficiaries of the change. They have the fastest growth rates and generally are the reason that total output increases. For Costa Rica, agriculture shrinks under full WTO because of a sharp decline in the production of coffee, bananas and sugar, which offsets positive impacts of the change in the rest of agriculture. The story is similar in El Salvador where trade liberalization hurts coffee and cotton production. Mexico is a special case partly because it has special access to the U.S. market under NAFTA, and partly because we assumed in the simulation that the total supply of labor and capital to agriculture was fixed. That means that producing more grain or dairy products in response to the rise in world prices forces production to fall in some other agricultural

[11] Results with a greater disaggregation by sector and type of employment can be found in the papers on the UNDP website http://www.undp.org/rblac/finaldrafts/

Table 2: — Percentage changes in Macro Variables under the WTO scenario
[Source: Individual country papers of the IFPRI-UNDP project]

	Argentina	Bolivia	Brazil	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Republic	Uruguay	Venezuela
Absorption	2.10	1.16	-0.03	0.01	0.68	2.00	1.50	1.10	0.90	-0.30	-0.48	0.34	1.30	0.25	-1.41
Consumption	2.80	0.99	0.39	0.01	0.40	2.80	2.20	1.00	1.30	-0.50	-0.29	1.77	1.60	0.35	-1.10
Investment	0.00	2.75	-2.27	0.00	0.35	0.00	0.00	1.80	0.00	0.50	-1.78	-3.99	0.00	0.00	-3.69
Government	0.00	0.22	-2.27	0.00	2.16	0.00	0.00	0.50	0.00	-0.20	1.47	0.00	0.00	0.00	0.00
Exports	10.00	2.00	2.00	3.93	7.78	-1.20	2.90	0.90	9.80	-1.90	4.02	6.54	8.10	4.99	1.57
Imports	13.60	4.48	2.65	0.86	0.06	3.20	4.30	2.70	5.40	-2.00	-0.57	4.84	7.60	6.11	-1.67
Real Exchange	-4.10	0.90	1.13	5.40	0.32	2.40	1.30	0.70	1.90	-0.30	5.40	2.55	3.10	0.60	7.01
Agriculture	14.01	3.22	0.45	2.65	4.55	-1.09	2.68	-0.07	3.19	-2.67	1.15	3.36	7.81	4.41	-1.17
Mining	-1.19	-2.27	-4.25	0.88	-2.74	n.a.	0.02	-1.36	0.00	n.a.	n.a.	0.52	1.11	n.a.	0.28
Food Mfg	2.49	2.77	0.75	2.20	n.a.	0.30	2.73	2.23	8.91	2.04	n.a.	2.20	6.18	3.49	-0.81
Other Industry	-0.79	-0.53	-0.26	2.20	-1.16	-0.27	0.02	-0.13	1.01	-0.56	0.69	-1.37	-4.61	-4.44	0.64
Services	1.22	-0.19	-0.53	0.38	-1.08	0.30	0.55	0.52	0.59	-0.11	-0.02	0.29	0.23	-0.34	-0.75
Total Value Added	1.74	0.50	-2.72	1.06	-0.45	0.06	1.02	0.46	2.13	-0.24	0.35	0.52	1.20	-0.23	-0.29

sectors. If we permit labor supply to be endogenous, total agricultural output still declines but only by 0.04% instead of 2.7%.

The implementation of the full WTO is particularly helpful to countries that either produces a lot of grain, meat and dairy products like Argentina and Honduras or which have big export sectors with significant sales to the United States such as Chile and the Dominican Republic. In Uruguay and Brazil the net impact of WTO on national GDP is negative even though agriculture expands. That is partly because the agriculture sector is a small part of the economy, and partly because the reduction in tariffs hurts import-substituting industries in these countries.

In most countries there is a significant increase in exports in the WTO experiment. Indeed export growth exceeds that of GDP in all but Costa Rica and Mexico. For Mexico, as noted above, WTO is far less advantageous than it is for other countries, because of NAFTA. But the movement in the real exchange rates tell us that the increase in exports is caused more by the need to pay for higher priced imports than from the positive impact of higher agricultural prices on exports themselves.

Consider now the impact of the adoption of the FTAA (see Table 3). This simulation shows the effect of the elimination of all barriers to trade among the countries of the Western Hemisphere but without the change in producer subsidies, which was such an important component of the WTO simulation. For almost every country, the effects of the FTAA are smaller in size than the WTO, which is to be expected given the much smaller changes in world prices predicted by the GTAP model. As a result all the countries whose aggregate production fell under WTO are better off with the FTAA. In fact Mexico and Colombia, where output fell under the full WTO, all grow slightly with the FTAA. Indeed FTAA is expansionary in all but Brazil, Uruguay and Venezuela. But there are a number of countries, most of them small (Costa Rica, El Salvador and Paraguay, along with Venezuela) for which FTAA fails to increase exports In these

Table 3: — Percentage changes in Macro Variables under FTAA scenario
[Source: Individual country papers of the IFPRI-UNDP project]

	Argentina	Bolivia	Brazil	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Republic	Uruguay	Venezuela
Absorption	0.40	0.40	-0.01	0.67	0.31	2.50	0.50	1.70	1.90	0.00	0.69	0.54	1.30	-0.09	-0.13
Consumption	0.50	0.32	0.18	1.13	0.21	3.60	0.70	1.80	2.80	0.00	0.67	1.44	1.70	-0.13	-0.13
Investment	0.00	1.26	-0.97	0.00	0.12	0.00	0.00	2.20	0.00	0.10	0.74	-2.04	0.00	0.00	-0.20
Government	0.00	-0.18	0.96	0.00	0.92	0.00	0.00	0.90	0.00	0.00	0.83	0.00	0.00	0.00	0.00
Exports	4.30	2.11	1.00	1.83	5.87	-0.50	1.50	-0.20	0.70	0.60	0.00	4.78	9.70	2.19	-0.36
Imports	3.60	1.82	2.00	1.59	0.16	4.70	1.60	4.00	2.40	0.60	1.02	4.28	0.00	1.30	-0.72
Real Exchange	0.80	2.00	1.26	1.70	2.81	-2.00	1.80	-0.70	-0.10	0.00	-0.20	1.60	2.20	1.20	-1.84
Agriculture	2.62	0.05	0.41	1.18	0.67	-0.02	0.85	0.05	2.44	0.37	-0.39	0.11	0.46	0.51	0.28
Mining	-0.27	1.60	-3.86	0.62	1.38	n.a.	0.02	-1.27	0.00	n.a.	n.a.	1.71	1.11	n.a.	-0.07
Food Mfg	1.53	0.05	0.68	0.77	n.a.	0.05	0.69	0.81	1.50	0.03	n.a.	0.97	0.00	-0.26	-0.09
Other Industry	0.00	0.75	-0.24	0.77	0.43	0.25	-0.05	-0.31	-0.63	0.05	0.33	0.22	1.34	-0.91	-0.27
Services	0.20	0.10	-0.48	0.63	-0.28	0.29	0.38	0.80	0.28	0.00	0.44	0.46	1.11	0.05	-0.03
Total Value Added	0.36	0.28	-0.32	0.71	0.00	0.23	0.42	0.40	1.21	0.04	0.29	0.50	0.95	-0.05	-0.08

countries, removing regional trade barriers leads to inflow of foreign capital, and appreciation of the real exchange rate, a contraction of exports and a rise in imports.

Differences in the closures for the external sector also explain some of the differential impact of WTO and FTAA across sectors. In some countries the authors assumed a fixed nominal exchange rate. That implies that foreign saving or the trade balance is free to move in response to the change in world prices. In other countries the authors assumed that foreign saving was fixed. Under that assumption a rise in world prices forces either an appreciation or a depreciation of the exchange rate depending on whether the country is a net importer or a net exporter of agricultural commodities. Even with a fixed nominal exchange rate, changes in the domestic price level have an effect on the real exchange rate. Table 2 shows that in all but two countries the real exchange rate depreciates in the WTO simulation which means that other things equal, the rise in the world prices raises the cost of Latin American imports more than it benefits agricultural exports. Argentina is the obvious exception to this observation and that is why Argentina is one of the two countries (together with Mexico) where the exchange rate appreciates, helping the services sector but hurting non-food processing industries.

The impact of WTO and FTAA on wages and employment

Both full and regional trade liberalization are expansionary in most countries. But what effects should these have in the labor market? Do these changes increase skill-intensity? Do they help or hurt rural households? Our simulations provide tentative answers to both of these questions. However, before looking at the quantitative evidence, it is important to understand the assumptions that were used in each country in their modeling of the labor market. In each country the labor market was divided into a number of different segments based on skill level and in some cases location (i.e., rural-urban). Each of these segments was considered to be a separate labor market with a common wage payable by all firms using that type of labor.

No movement between labor market segments was permitted. In some countries there was assumed to be an excess supply of some or all of the different types of labor, which is tantamount to fixing the real wage. In those cases the increase or decrease in the demand for labor was reflected in changes in employment levels. In other countries the total supply of the different types of labor was assumed fixed in which case the changes in the demand for labor in the simulations caused a change in real wages. Finally, there are a number of countries for which we assumed an upward sloping supply curve of labor. In these cases any change in labor demand will change both the level of employment and wages.

In Tables 4 and 5 we have aggregated the different labor markets into urban and rural skilled and unskilled, and weighted the changes in the different submarkets by their respective shares of total employment. In addition the table displays changes in the level of welfare, measured as consumption per capita for the rural and urban households where that information was reported by the country authors.

In all but three countries (Bolivia, Mexico and Venezuela) WTO and FTAA both increase the demand for labor. That leads to either an increase in employment, wages or both simultaneously, depending on the factor market closure used. For a number of countries there is no disaggregation of the labor force into rural and urban categories. So we cannot say what happened to rural-urban wage differentials. However in most of those cases we do have an estimate of changes in rural household consumption which gives us a good proxy for changes in the demand for rural labor. Take Bolivia as an example. For Bolivia we only have information on the urban labor force. It is clearly hurt by either trade liberalization regime. As we saw in section 3.1, the production of both services and non-food industry contract. But agriculture and food processing expand, particularly under WTO. We do not know what happens to agricultural employment, but we do know that the total consumption of rural households increases at a far more rapid rate than

Table 4: — Changes in Employment and Welfare under WTO
[Source: Individual country papers of the IFPRI-UNDP project]

	Argentina	Bolivia	Brazil	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Republic	Uruguay	Venezuela
Employment by Factor															
Rural skilled					n.a.	-2.83						2.13	19.53	n.a.	
Rural unskilled	3.44		0.46			-4.13				0.00*		2.39	24.42		
Rural Total	3.44		0.46			-3.99						2.35	24.16		
Urban skilled	4.06	-1.95	0.54			2.59				0.00*		1.83	-0.59		
Urban unskilled	2.59	-3.97	0.46			1.94				-0.20		2.55	3.20		
Urban Total	2.96	-2.48	0.54			2.26				-0.18		2.12	2.20		
Total skilled	4.06		0.54	0.01		2.38	0.00	1.20	1.82	0.00*	0.83	1.88	0.59		-0.98
Total unskilled	2.77		0.46	0.02		0.45	2.76	1.53	2.41	-0.20	0.86	2.46	9.20		-1.60
Total Labor Force	2.96		0.51	0.02		1.28	1.79	1.43	2.20	-0.18	0.84	2.22	7.36		-1.36
Wages by Factor															
Rural skilled		n.a.				n.a.		n.a.	n.a.		n.a.	0.11	-3.19		
Rural unskilled	6.63		0.32							-0.59		-0.33	-7.91		
Rural Total	6.63		0.32							-0.59		-0.25	-7.68		
Urban skilled	6.99		0.37							-0.42		0.33	5.59	0.56	
Urban unskilled	6.64		0.31							-0.58		0.15	0.26	2.34	
Urban Total	6.94		0.35							-0.56		0.26	1.64	1.61	
Total skilled	6.99		0.37	0.30	4.11		3.41			-0.42		0.29	5.06		0.82
Total unskilled	6.64		0.31	0.41	2.04		0.01			-0.45		0.08	-2.05		0.82
Total Labor Force	6.94		0.34	0.35	3.07		1.37			-0.57		0.17	-0.58		0.82
Households Welfare Real Consumption, per capita															
Rural households		2.40	0.86		0.03	3.10	2.21	0.98	0.65		-0.24	2.02	2.43		
Urban households		0.70	0.77		0.02	2.50	2.22	0.80	1.48		-0.72	1.86	1.03		
Total Households	n.a	1.00	0.82	0.00	0.02	2.80	2.22	0.96	1.39	n.a.	-0.57	1.89	1.60	0.35	-1.10
*in the case of Mexico, the quantity of labor did not change for skilled and agricultural workers															

Table 5: — Changes in Employment and Welfare under FTAA
[Source: Individual country papers of the IFPRI-UNDP project]

	Argentina	Bolivia	Brazil	Chile	Colombia	Costa Rica	Ecuador	El Salvador	Honduras	Mexico	Paraguay	Peru	Dom. Republic	Uruguay	Venezuela
Employment by Factor															
Rural skilled					n.a.	0.69						1.68	1.29		
Rural unskilled	1.12		0.22			0.74				0.00*		1.13	4.37		
Rural Total	1.12		0.22			0.73						1.22	4.21		
Urban skilled	0.78	-2.46	0.26			2.96				0.00*		1.62	-0.09		
Urban unskilled	0.76	-6.49	0.22			2.61				0.10		2.04	2.67		
Urban Total	0.76	-3.52	0.26			2.78				0.09		1.79	1.95		
Total skilled	0.78		0.26	0.01		2.88	0.00	1.47	0.18	0.00*	0.71	1.63	-0.01		-0.11
Total unskilled	0.83		0.22	0.01		2.15	1.08	1.19	1.03	0.10	0.72	1.51	3.16		-0.11
Total Labor Force	0.76		0.24	0.01		2.46	0.70	1.28	0.72	0.09	0.72	1.56	2.48		-0.11
Wages by Factor															
Rural skilled		n.a.				n.a.		n.a.	n.a.		n.a.	-1.21	2.10		
Rural unskilled	-0.94		0.15							1.44		-1.25	-1.66		
Rural Total	-0.94		0.15							1.44		-1.25	-1.47		
Urban skilled	-0.91		0.18							0.10		0.10	4.64	0.40	
Urban unskilled	-0.94		0.15							-0.38		-0.15	0.80	0.62	
Urban Total	-0.93		0.17							-0.32		0.00	1.79	0.53	
Total skilled	-0.91		0.18	0.32	1.39		1.67			0.10		-0.11	4.49		-0.97
Total unskilled	-0.94		0.15	0.29	1.22		0.01			-0.29		-0.65	0.11		-0.97
Total Labor Force	-0.93		0.17	0.31	1.31		0.76			0.04		-0.43	1.05		-0.97
Households Welfare Real Consumption, per capita															
Rural households		0.50	0.41		0.01	4.10	0.72	1.80	5.31		0.66	1.30	2.02		
Urban households		0.30	0.36		0.01	3.10	0.78	1.46	1.63		0.66	1.56	1.40		
Total Households	n.a	0.30	0.39	1.10	0.01	3.60	0.77	1.76	2.03	n.a.	0.66	1.52	1.65	-0.13	-0.13
*in the case of Mexico, the quantity of labor did not change for skilled and agricultural workers															

consumption in urban households (2.4% compared to 0.7%). Therefore we can conclude that trade liberalization must have increased the demand for rural labor in Bolivia. We can make the same sort of calculation for most of the other countries with the same data patterns.

In most countries WTO particularly favors the rural sector since it is the producer of goods, which rise sharply in price under this simulation. This is true for Argentina, Bolivia, Peru, the Dominican Republic, El Salvador and Brazil. We do not have a separate breakdown by rural and urban labor for Honduras, but from the welfare calculations at the bottom of the table we see that rural households also benefit in both simulations, but more under FTAA.

An alternative estimate with a uniform closure and fixed wages

The results on employment discussed above suggest that WTO and FTAA both help unskilled and rural labor. But they are somewhat ambiguous because of differences in assumptions and closures between countries. Two in particular affect the results that are of interest to us here, namely whether or not foreign saving is fixed and whether or not the supply of labor or the wage is fixed. It is important to know whether or not the results that we obtained are affected by the closures used and whether our conjectures about the impact of WTO and FTAA on labor are strengthened or weakened when we use exactly the same closures and assumptions for each country?

In order to answer those questions we reran each country's model assuming fixed foreign saving and fixed wages (or an excess supply of labor of all types). This means that whatever the trade deficit or surplus is in the base run, the exchange adjusts to keep that trade balance constant. All increases in the demand for labor translate into increases in employment and production. Obviously this not a realistic assumption or a realistic prediction of what is likely to happen under the two policy changes we are analyzing. But it will tell us what happens to the relative demand for labor-that is whether the

demand for skilled labor rises by more or less than that of unskilled, and whether the demand for agriculture labor rises by more or less than that of other labor for those countries with a separate classification for rural labor. The results of these common simulation runs for each type of labor in each country are displayed in Annex 1.

The result strongly confirms our original conjecture. Both WTO and to a lesser extent FTAA favor rural workers and the unskilled. We have information on rural or agricultural labor in Argentina, Costa Rica, Mexico, Peru and the Dominican Republic.[12] For the WTO simulation the increase in the demand for rural labor exceeds the increase in the demand for urban labor in all five of these cases except for Argentina where they are about equal. The FTAA simulation is a bit less clear-cut as one would expect from the difference in the change in world prices. But still FTAA is strongly favorable to the rural sector in Costa Rica and Peru, and roughly equally favorable to rural and urban labor in the other four countries.[13]

There is far more information on employment by skill-level in the urban sector. The change favors urban unskilled labor in 9 out of the 14 countries in Table 5 for FTAA, and 11 out of the 14 countries in Table 4 for WTO.[14] If economies follow this route to further trade liberalization, with flexible exchange rates and excess labor in all categories, there has to be a devaluation to induce the rise in exports required to pay for increased imports. There is a change in production structure favoring tradables, particularly in exports and in agriculture. Services and non-tradables lag. All of those changes favor unskilled labor. In the simulation the changes lead directly to increases in output. But that is mainly because we assumed an excess supply of labor. Under more realistic assumptions, the

[12] Brazil is not included here because the labor force classification made available to us for the comparative runs did not separate rural from urban unskilled labor.

[13] For Costa Rica the results for rural employment growth in the annex are very different from those shown in tables 5-6, but they are consistent with the relatively rapid growth in rural consumption shown in those tables.

[14] By this we mean that the growth in the demand for unskilled labor is greater than for skilled labor where both increases are positive or that the reduction in demand for unskilled labor is smaller than that for skilled labor where both are declining as in Mexico for the WTO simulation.

change would more likely have caused some increase in both supply and wages. In that case we would have had a narrowing in the wage differential, both between the rural and urban sectors and between the unskilled and the skilled within the urban sector.

4. CHANGES IN POVERTY AND DISTRIBUTION IN THE WTO AND FTAA SIMULATIONS

In the previous sections we saw what happened to output and employment in the two trade simulations. What we would also like to know is what these changes might mean for poverty and the distribution of income. One of the main purposes of the IFPRI-UNDP project, which produced the results that we are reporting here, was to determine the impact on poverty of various traded-related shocks. To achieve this the CGE model was first solved for a set of equilibrium wages, employment levels and prices, leading to the results that we reported in the previous sections of this paper. This information, although suggestive perhaps, is not sufficient to inform us about the implications of trade liberalization for poverty and distribution because those two statistics are derived from the distribution of income among households not by factors of production. Using a household survey and a suitable aggregation and matching, we can see what the allocation is of workers of different categories across households in a base period. The problem comes when we make a simulation and change the number of workers in a particular category or a sector. For example, in our WTO simulations there is a significant increase in employment in those countries that assumed an excess supply of labor. Which of those potential employees should be given the new jobs that have been created?[15]

Several methodologies have been proposed in the literature to solve this problem. Most of the country authors in the IFPRI-UNDP project used a random selection procedure

[15] The problem is a good deal simpler if one assumes that there is no unemployed labor since then one has only to allocate changes in wages across the employed factors in their respective households.

developed by Almeida dos Reis and Paes de Barros (1991). In each labor category unemployed or inactive workers are given a random-number-generated probability of moving to employment if a simulation calls for an increase in employment. In similar fashion all those employed in the base period are given a random–number-generated probability of losing their jobs if the simulation calls for a contraction in this type of labor. If the simulation solution calls for an increase in certain types of labor, those with the highest probability are moved into the new jobs and incomes of each household are recalculated to determine the changes in poverty and the distribution of household income. The opposite procedure is used if employment declines.[16] Since this procedure is completely arbitrary, the process is repeated a large number of times to get a distribution of the outcomes for poverty and distribution, and only the mean or the expected value of these two statistics is reported here.

Table 6 reports the results of this simulation exercise for each of the countries in our sample. The first column is the estimate for each country of the percentage of the population in the base year with incomes below the poverty line. Note that income is measured as total household income per household member. The poverty lines themselves are defined with reference to the cost of acquiring a minimum market basket of food and other basic necessities. These poverty lines vary across countries according to the cost and the definition of the basic necessities, which means that the levels of poverty in the base year cannot be compared across countries. In the right hand columns of Table 6 we show a measure of the distribution of household income per capita and what happens to it in our two simulations.

It is clear from the table that a world with no trade restrictions and no producer subsidies is good for the poor. Poverty falls in 11 out of the 15 countries in the WTO simulation,

[16] In the case of Mexico and Argentina instead of using a random selection of candidates for employment or dismissal, we calculated the probability of moving through the use of probit regressions on each person's personal characteristics. Then if there is a change in conditions, those most likely to move are the ones that are chosen. See Diaz-Bonilla and Morley (2003) for a more detailed description of the methodology.

such as Brazil, Colombia, Mexico and Uruguay, despite a decline in output. In all these cases the benefits of higher world agricultural prices to rural workers and households outweigh the costs of higher food prices to urban households. Since the poverty rates are much higher in rural than in urban households, the net effect is positive for poverty.

Table 6: — Changes in Poverty and Distribution under WTO and FFTA
[Source: Individual country papers]

	Poverty			Income Distribution		
	base	% change		base	% change	
	P_0	FTAA	WTO	Gini	FTAA	WTO
Argentina	0.3011	-0.0174	-0.0120	0.4533	0.0028	0.0010
Bolivia	0.6247	0.1081	-0.2317	0.5939	-1.0346	-1.9402
Brazil	0.3341	-1.2272	-1.3768	0.6000	-0.3333	-0.1667
Chile	0.2054	-4.8968	-5.9497	0.5639	-0.2688	-0.4505
Colombia	0.3669	-6.8921	-7.3921	0.4885	-0.0002	-0.0005
Costa Rica	0.1918	-0.3650	0.8863	0.3839	0.2605	0.5991
Dominican Rep	0.2975	-2.6900	-3.8300	0.4433	-0.2500	-1.2300
Ecuador	0.3190	0.0043	0.0034	0.5290	0.0025	0.0032
El Salvador	0.4130	-1.2833	-0.9803	0.5427	-0.6737	-0.6737
Honduras	0.7259	-0.7160	-1.1763	0.5315	-0.3387	-0.4327
Mexico	0.6145	-0.0025	-0.0009	0.5756	-0.0009	-0.0007
Paraguay	0.4009	0.0071	0.0011	0.5765	0.0042	-0.0030
Peru	0.4820	-1.5472	-1.9665	0.4797	0.3750	0.9414
Uruguay	0.2275	-0.6302	-1.9926	0.4165	-0.0409	-0.2622
Venezuela	0.6227	0.3420	0.2415	0.4750	-0.3584	-0.0669

In most of the countries where there are substantial reductions in poverty, there are significant increases in agricultural production. (e.g. Chile, Colombia, Honduras, the Dominican Republic, Peru and Uruguay). Where WTO is not beneficial to the poor (Costa Rica, Ecuador, Paraguay and Venezuela) it is either because agricultural output declines or because the sector has a small share of total output.

FTAA is also beneficial to the poor in most countries, although the size of its impact is smaller than WTO in most cases. Wider access to markets does not help the poor in Paraguay, Ecuador and Venezuela in either the WTO or FTAA, but FTAA is better for

the poor in Costa Rica and worse in Bolivia, in both cases, it seems, because of changes in output in the agriculture.

Changes in the distribution of income in response to either trade regime are progressive but small in almost every case. This finding is similar to results in many other studies which have found the Gini coefficient to be quite insensitive to changes in growth rates and growth strategies so long as the economy being analyzed is on its long run, equilibrium growth path. Distributions react to short term shocks such as recession, balance of payments crisis and hyperinflation. But they do not react very much to changes in production structure in full equilibrium.[17]

5. CONCLUSIONS

In this paper we used a set of country-level CGE models to simulate the effect of going forward with either of two alternative versions of trade liberalization - one representing completely free trade world-wide and the other a Western hemisphere free trade bloc. Either of these two alternatives is expansionary for both output and employment in general and for agriculture in particular in most Latin American countries. WTO particularly favors the rural sector because the elimination of producer subsidies in developed countries causes a big increase in prices of all food commodities, but especially grains, dairy products and milk. As a result we found that in general, trade liberalization reduced skill differentials, both within the urban sector, and where we had the information, between the rural and urban unskilled. The simulations also showed that the increase in the welfare of rural households grew faster than urban in most cases for which we have information. Finally, we used a microsimulation exercise to determine the impact on poverty of trade liberalization. It showed that the poor are helped by either WTO or FTAA. Either version reduces poverty and inequality, and the changes are

[17] See Ganuza et al. (forthcoming) for more evidence on this point.

especially significant under the WTO. Clearly the rural poor pay a fairly heavy price for the producer subsidies in developed countries.

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ANNEX 1: — Employment

[Source: E. Ganuza, S. Morley, R. Vos, forthcoming]

ARGENTINA	FTAA	WTO
Rural male	0.61	2.13
Skilled male	0.65	2.15
Semi-skilled male	0.60	1.98
Unskilled male	0.63	2.44
Rural female	0.69	2.45
Skilled female	0.45	1.32
Semi-skilled female	0.47	1.61
Unskilled female	0.43	1.57
TOTAL	0.54	1.86
BRAZIL		
Informal unskilled	0.01	0.03
Informal skilled	0.01	0.02
Formal unskilled	0.01	0.03
Formal semi-skilled	0.01	0.01
Formal skilled	0.00	0.00
Public unskilled	0.00	0.00
Public skilled	0.00	0.00
Small self-employed	0.00	0.00
Big self-employed	0.00	0.00
TOTAL	0.01	0.00
BOLIVIA		
Wage earners skilled	2.04	4.60
Wage earners unskilled	2.21	5.32
Non-wage earners skilled	2.26	6.19
Non-wage earners unskilled	2.34	8.30
TOTAL	2.19	5.89
Chile	FTAA	WTO
Non-wage earners unskilled male	2.59	3.42
Non-wage earners unskilled female	2.30	2.61
Non-wage earners skilled male	2.03	2.44
Non-wage earners skilled female	1.79	1.78
Wage earners unskilled male	2.46	3.25
Wage earners unskilled female	1.97	2.29
Wage earners skilled male	2.12	2.44
Wage earners skilled female	1.77	1.75
TOTAL	2.22	2.70

COLOMBIA	FTAA	WTO
Formal unskilled	10.41	17.10
Formal skilled	11.10	16.35
Informal unskilled	10.09	18.23
Informal skilled	10.46	16.38
TOTAL	10.39	17.35
COSTA RICA		
Wage earners skilled, agricultural sector	4.02	9.63
Non-wage earners skilled, agricultural sector	3.48	11.06
Wage earners unskilled, agricultural sector	3.99	9.66
Non-wage earners unskilled, agricultural sector	3.79	10.22
Wage earners skilled, formal sector	2.16	2.13
Non-wage earners skilled, formal sector	1.83	2.51
Wage earners unskilled, formal sector	2.30	2.18
Non-wage earners unskilled, formal sector	2.03	2.61
Wage earners skilled, informal sector	1.91	2.73
Non-wage earners skilled, informal sector	1.98	3.11
Wage earners unskilled, informal sector	1.96	2.70
Non-wage earners unskilled, informal sector	1.99	2.76
TOTAL	2.38	3.59
ECUADOR		
Wage earners skilled	2.89	7.22
Wage earners unskilled	3.27	8.98
Non-wage earners skilled	3.39	8.38
Non-wage earners unskilled	3.32	9.33
TOTAL	3.21	8.60

EL SALVADOR	FTAA	WTO
Large-scale unskilled labor	1.41	1.35
Unskilled labor formal	0.96	2.21
Unskilled labor informal	1.10	0.98
Skilled labor	1.19	1.14
TOTAL	1.25	1.39
HONDURAS		
Wage earners unskilled male	3.35	13.91
Non-wage earners unskilled male	2.43	12.24
Wage earners semi-skilled male	3.47	7.99
Non-wage earners semi-skilled male	2.56	11.93
Wage earners skilled male	3.76	8.60
Non-wage earners skilled male	4.27	10.24
Wage earners unskilled female	2.08	4.82
Non-wage earners unskilled female	3.39	14.73
Wage earners semi-skilled female	2.94	5.60
Non-wage earners semi-skilled female	2.97	8.09
Wage earners skilled female	2.26	4.54
Non-wage earners skilled female	2.70	7.92
TOTAL	2.89	10.86
MEXICO		
Agricultural labor male	0.39	3.01
Agricultural labor female	0.38	1.45
High school or less male	0.38	-0.70
High school or less female	0.37	-0.82
University or higher male	0.42	-0.86
University or higher female	0.35	-0.89
TOTAL	0.38	-0.07
Paraguay	FTAA	WTO
Formal skilled male	1.87	0.40
Formal unskilled male	1.85	0.39
Formal skilled female	1.61	0.23
Formal unskilled female	1.37	0.03
Informal skilled male	1.46	0.15
Informal unskilled male	1.64	0.25
Informal skilled female	1.63	0.44
Informal unskilled female	1.93	0.55
TOTAL	1.75	0.34
PERU		
Wage earners unskilled urban male	3.00	8.00
Non-wage earners unskilled urban male	3.02	8.49
Wage earners skilled urban male	1.97	-0.34
Non-wage earners skilled urban male	2.15	2.60
Unskilled rural male	2.18	4.68
Skilled rural male	2.29	5.31
Wage earners unskilled urban female	2.20	1.60
Non-wage earners unskilled urban female	2.57	5.04
Wage earners skilled urban female	1.68	2.51
Non-wage earners skilled urban female	1.96	3.65
Unskilled rural female	2.51	5.44
Skilled rural female	1.81	3.38
TOTAL	2.30	4.22
Dominican Republic	FTAA	WTO
Professional labor	4.00	3.91
Office labor	3.41	3.05
Commerce labor	2.67	2.31
Rural labor	3.94	8.80
Manual labor	4.86	4.35
Informal labor	2.30	1.86
TOTAL	3.67	4.70
URUGUAY		
Skilled	1.12	2.72
Unskilled	1.37	3.62
TOTAL	1.23	3.09
VENEZUELA		
Skilled	-0.11	-0.98
Unskilled	-0.11	-1.60
TOTAL	-0.11	-1.36