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THE IMPACT OF CAFTA ON GROWTH AND POVERTY IN FOUR COUNTRIES IN CENTRAL AMERICA: EVIDENCE FROM A CGE ANALYSIS

This document was prepared by Samuel Morley and Valeria Piñeiro, within the framework *Desarrollo Rural en Centroamérica en el Marco del CAFTA. Análisis de Impactos y Opciones de Política para Inversiones en Infraestructura* (BID/05/003). The opinions expressed herein are those of the authors and do not necessarily reflect the views of the Organization.

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INTRODUCTION

The Central America Free Trade Agreement (DR-CAFTA) is an ambitious attempt to meld the markets and interests of the United States with those of the five Central American countries and the Dominican Republic. The treaty is an expression of the belief that removing barriers to trade and investment is the surest way to raise income and enhance growth prospects in developing countries. The treaty determines the time path of trade liberalization between the United States and each of the Central American trading partners as well as rules regarding the treatment of foreign direct investment, intellectual property and labor rights, the environment and conflict resolution.

The proposed treaty has ignited a contentious debate both in the United States and Central America about the impact it will have on farmers, poverty, and the environment and on the development prospects in Central American countries. The treaty will bring significant trade liberalization for both industrial and agricultural commodities in Central America. But there are widespread fears that this could cause significant hardships particularly for smallholders by exposing them to low-cost and subsidized agricultural products from the United States. Many in the region also feel that their countries have been too generous in the proposed treatment of foreign investment and the environment.

There have been a number of previous attempts to determine the impact CAFTA is likely to have on economies and households in Central America. Jaramillo and Lederman of the World Bank managed a large study of the question which resulted in a book published in 2006. They used a number of different methods to make a rough estimate of what the impact of CAFTA would be. Using a combination of econometric estimates of the impact of previous free trade areas on growth in other countries they forecast that CAFTA would raise the growth rate in Central America although they insist that the full potential impact of the Agreement would require a number of complementary policy reforms and investment, particularly in port facilities, customs administration, education and agricultural productivity. To address the question of winners and losers or the net poverty impact of the Agreement, they used household survey information to differentiate households which were net consumers and net producers of the sensitive food commodities whose prices will fall under CAFTA. In all four countries they found that the net positive impact of lower prices on households as consumers far outweighed the negative impact on producer households. And they pointed out the importance of taking advantage of the transition period stipulated in the agreement to help the net producers of sensitive commodities to adjust to the new environment.

For the most part, the Jaramillo and Lederman study is not based on models of the economy or of the agricultural sector. An ambitious effort that was based on models was led by Professor Edward Taylor. He and his coauthors built village level CGE models for rural households in four Central American countries. [1] They then asked what would be the impact of the price changes for agricultural commodities on households of different types within the rural sector. While these results are interesting they are clearly partial in the sense that they do not incorporate indirect macro effects such as the depreciation in the real exchange rate that is likely to be caused by an increase in the import of foodstuffs whose tariffs have been eliminated. In addition, the treatment does not cover the impact on the urban poor of lower food prices which was an important point made in the World Bank study. Nor do they pick up the possible positive impact of expanding exports to the United States for commodities whose US tariffs were lowered or whose duty-free quotas were increased. There are also several early papers that survey the literature on the effect of NAFTA, and make forecasts of the agricultural commodities in each CAFTA country that are likely to be most affected by CAFTA. Such studies include Todd, Winters and Arias (2004), and Hathaway (2004). Finally, there are a large number of studies that make predictions about the impact of CAFTA on various sectors in particular countries, on regional integration and on other areas of particular interest.

All of the preceding papers are either descriptive or partial analyses of the expected impact of CAFTA or policy recommendations. To complement these efforts, several projects were initiated to build dynamic computable general equilibrium models for each of the Central American countries, and then to use these models to quantify the impact of CAFTA. [2] The advantage of the general equilibrium approach is that it specifically includes indirect effects on the exchange rate, household income and employment of the sector-specific changes brought about by CAFTA. Due to a lack of information, the effect of CAFTA on Guatemala could not be analyzed. But for each of the other countries in the region, studies were published based on CGE models that had been built and used to simulate the impact of the CAFTA tariff reductions, changes in quotas and the new regulations for the important maquila industry (Vos and Sánchez 2006; Sánchez 2007; Morley and others 2007, 2007a). While the methodologies and assumptions in the Sánchez-Vos studies for Nicaragua and Costa Rica differ in certain particulars from those in the Morley-Piñeiro studies of Honduras and El Salvador, there are sufficient similarities in the models built for each of the four countries to make a summary of results and their policy

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[1] El Salvador, Guatemala, Honduras and Nicaragua. There are five studies in all beginning with a summary paper by Taylor and others (2005). There are four country papers: Honduras (Taylor and others April 2006); Nicaragua (Taylor and others February 2006); Guatemala (Taylor and others January 2006); and El Salvador (Taylor and others, August 2006).

[2] The country studies of Honduras (Morley and others 2007) and El Salvador (Morley and others 2007a) as well as this overview paper were the result of two projects, one funded by the World Bank and carried out by IFPRI and one carried out by ECLAC, IDB and IFPRI. The overview paper also drew on the country studies of Nicaragua (Vos and Sánchez 2006) and Costa Rica (Sánchez 2007). The Nicaragua study was conducted at the request of the Ministry of Industrial Development and Commerce of Nicaragua (MIFIC), who also co-sponsored the study with US-AID, UNDP, ECLAC, UN-DESA and the ISS. The Costa Rica study was co-sponsored by ECLAC and UN-DESA.

implications worthwhile. [3] That is what we will do in this paper, attempting to make clear what the differences in treatment are and what difference that may make in country comparisons or in our general conclusions.

The paper is organized as follows. In section one of the paper we summarize the main components of the CAFTA agreement. We use disaggregated tariff data and the classification of products in the agreement to make an estimate of both the level and the rate of change of protection for agricultural and processed agricultural commodities. We pay particularly close attention to the changes in the level of protection for certain commodities such as beans, corn and rice which are important for the poor either because they are big components in their food baskets or because they provide significant employment for small farmers. We also summarize changes in tariffs and quotas in the United States and their likely effect on producers in Central America. In section three we present the dynamic recursive model that we used in the Honduras and El Salvador country papers, and also indicate the ways in which that model differs from the models used by Sánchez and Vos for Nicaragua and Costa Rica. Section four summarizes the model results of our CGE simulations for production, employment and poverty in Honduras and El Salvador and the results taken from the Sánchez-Vos studies of Nicaragua and Costa Rica where they are sufficiently comparable. Section five summarizes our conclusions.

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[3] A preliminary Input-Output (I-O) Matrix for El Salvador at current prices for 2005 is available, but at the time of the study had not been developed into the Social Account Matrix (SAM) necessary for use in this analysis. This new I-O matrix is a very valuable updating of the basic accounts in El Salvador, and a new SAM and CGE model based on it as well as the new National Accounts System would make an important contribution to available analysis. They would make it possible to overcome a number of limitations in the I-O Matrix and its related SAM of 2000, including the supposition that each activity corresponds to one product; the use of the 1992 structure to disaggregate value added into factors; inconsistencies between production and export/import data; between tax data from the Finance Ministry and national accounts and; between data from the Multiple Purpose Household Survey and the national accounts' household ones.

I. THE CAFTA AGREEMENT: WHAT DOES IT CHANGE AND HOW IMPORTANT IS THIS LIKELY TO BE?

In order to put the CAFTA agreement into context, we first summarize the relevant conditions of previous trade agreements between the US and the five Central American countries, which lay the basis from which CAFTA departs. The five Central American countries are part of the so-called Caribbean Basin Initiative (CBI) proposed by President Ronald Reagan in February 1982 as part of a more comprehensive foreign policy program "to promote economic revitalization and facilitate expansion of economic opportunity in the Caribbean Basin region." CBI trade preferences and other benefits were granted to the countries of the region by the Caribbean Basin Economic Recovery Act (CBERA) of 1983 and put into effect beginning January 1, 1984.

CBERA granted unilateral preferential treatment (duty-free or lower-than-applicable preferential tariffs) to many products imported into the United States from 24 beneficiary countries in the Caribbean Basin. Some significant tariff and phytosanitary barriers to Central American exports of agricultural commodities were left in place as we shall see in our discussion of the changes in protection in the US under CAFTA. Eligible for duty-free treatment under CBERA are all otherwise dutiable products except: textiles and apparel subject to textile agreements, as well as footwear ineligible for the Generalized System of Preferences (GSP) as of January 1, 1984, canned tuna, petroleum and its products, and watches and watch parts containing any material originating in countries denied most-favored-nation (MFN) status.

It is important to note that duty free entry into the US market was not granted permanently under CBERA, and is scheduled to expire in 2008 should the CAFTA agreement not be implemented successfully. CAFTA makes duty-free access to the US market permanent. This should be kept in mind when constructing CAFTA counterfactuals. Comparing tariff rates in the United States pre and post CAFTA is incorrect. For the United States one should compare the CAFTA tariffs to what the tariffs would be in the absence of CBERA, a particularly relevant distinction for maquila simulations as we shall see.

Textiles were not given special tariff-free access to the US market under CBERA. However they were exempted from the world-wide quota system then in place provided that they were produced from inputs made in the United States. Under CBERA the US granted identical trade and tariff treatment to textiles from both Mexico and the Caribbean Basin countries. Both were accorded MFN treatment (non-discriminatory treatment), both were eligible for tariff benefits under the "production sharing" program (a program highly used by US companies), and both were GSP beneficiaries. That changed in 1990 with the passage of the Caribbean Economic Recovery Expansion Act (CBEREA). It reduced tariffs for the Caribbean and Central American countries by 20% over a five year period with a 2.5% floor. Thus between 1990 and the implementation of NAFTA, the Central American countries enjoyed significant advantages over Mexico because of lower US tariffs.

NAFTA, which took effect on January 1, 1994, changed the position of maquila in Central America. An unintended side effect of the agreement was that the initial advantages of CBEREA beneficiary countries over Mexico were virtually eliminated because Mexican products now entered the US duty free. To make matters worse for Central American maquila producers, Mexican producers were not subject to the restrictive rules of origin on intermediate inputs. To offset this unintended and unfavorable effect of NAFTA on Central America, in 2000 the United States-Caribbean Basin Trade Partnership Act (CBTPA) was passed. CBTPA beneficiary products include all textile and apparel products, footwear, tuna, petroleum and petroleum products, watches and watch parts. Textile and apparel products are the centerpieces of the new legislation. They were granted the same duty free access to the US market and liberalized rules of origin granted to Mexico under NAFTA. Specifically, duty-free entry into the US was granted for clothing produced with inputs from any of the participating CAFTA countries. This has provided a major impetus to the growth of the maquila industry in all of the Central American countries as we will see. There is a catch however in that the CBTPA like the CBI is scheduled to expire in 2008 unless renewed or supplanted by either CAFTA or a full Latin American Free Trade area. It is a unilateral, discretional and temporary agreement that the United States could terminate or change at any time or which it could simply allow to expire. These facts and this deadline were very much on the minds of the Central American negotiators of the CAFTA agreement. [4]

1. Trade liberalization under CAFTA

In order to appreciate how substantial the impact of CAFTA is likely to be, it is useful to look first at how much protection there was prior to CAFTA. We show a recent estimate of the average level of tariffs and tariff dispersion for several years in the 1990s in Table One. As the reader can see, tariffs have been significantly reduced everywhere, but particularly in Costa Rica and Honduras. Trade liberalization, a key component of the reform agenda, significantly lowered trade barriers during the 1990s in each of the Central American countries, with the possible exception of Nicaragua, where the data for 1990 are somewhat suspect. [5] While this implies that trade liberalization under CAFTA cannot be too significant on average, it may be of great importance to particular sectors or commodities where tariffs remained high prior to CAFTA. To get a sense of how important that could be one has to look at the disaggregated tariff data in detail. That is what we will do in the next several sections of this paper.

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[4] The section on previous trade agreements in the region draws heavily on Dypski (2002) and on a release from the embassy of El Salvador called "background to the new CBI legislation".

[5] In Nicaragua the average tariff level was 21% in 1987, 8% in 1990 and 17.4% in 1994. Those variations have more to do with the changes in the composition of imports over those years than increases and decreases in tariff rates.

Table 1

CENTRAL AMERICA: AVERAGE TARIFF LEVELS AND DISPERSION
BY COUNTRY AND YEAR, 1990-1999

	1990	1995	1997	1999
Tariff levels				
Costa Rica	16.4	11.2	9.9	3.3
El Salvador	16	10.2	10.2	5.7
Guatemala	16	12	11.4	7.6
Honduras	41.9	9.7	9.7	8.1
Nicaragua	8	10.7	6.9	10.9
Tariff dispersion				
Costa Rica	8.8	8.5	5.5	7.8
El Salvador	8.6	7.6	5.7	3.4
Guatemala	8.6	7.5	6.3	4.4
Honduras	21.8	7.5	5.4	7.8
Nicaragua	4.6	7.4	4.8	7.3

Source: Lederman and others, World Bank.

The CAFTA agreement is a treaty which spells out in great detail how the United States and the five countries of the region, and now the Dominican Republic as well will move toward a trading system that, with some significant exceptions such as sugar, is free of tariffs and other trade barriers. As written, the treaty has been formally approved by El Salvador, the Dominican Republic, Guatemala, Nicaragua, Honduras and the United States, and is being debated by Costa Rica as of June 2007. Our analysis will be of the treaty as written for the Central American countries and the United States. This treaty does not change the existing trade arrangements between the Central American countries but it may help them to reach an effective common external tariff.

The CAFTA treaty specifies precisely how tariffs on all commodities are going to be eliminated or reduced over time. For each country the agreement contains a long and very detailed list of commodities with both the current most-favored-nation (MFN) tariff and a tariff category to which the commodity has been assigned. These categories determine how fast tariffs will be reduced over time. The categories common to all five countries are shown in Table 2. In addition there are separate categories for various products for which the liberalization process is handled differently in each country.

Table 2

TARIFF CATEGORIES UNDER CAFTA

Category		Applies to
A	Immediate tariff reduction to zero	All countries
B	Linear reduction of tariffs to zero over five years	All countries
C	Linear reduction of tariffs over ten years	All countries
D	Linear reduction of tariffs over 15 years	All countries
E	Six-year grace period followed by 33% reduction over next four years, then full liberalization from 12th to 15th year	All countries
F	Ten year grace period, then linear reduction to zero over the next ten years	All countries
G	Goods in this category already have a zero tariff rate.	All countries
H	Goods in this category are excluded from tariff reductions under CAFTA with tariffs remaining at the rates agreed to in WTO	All countries
M	Non-linear reduction in tariffs to zero. 2% in 1st year, 8% per year from 3rd to 6th year and 16% per year from 7th to 10th year	All countries
N	Elimination of tariffs in 12 equal, annual steps	All countries
O	Six-year grace period followed by elimination in nine non-linear steps, 40% from 7th to 11th year and 60% from 12th to 15th year	ES, HN, NI
P	Ten-year grace period, then elimination over seven years: 33% from 11th to the 14th year and 67% from the 15th to the 18th year	ES, HN, NI
Q	Elimination over 15 years: 15% in 1st year, 33% from the 4th to the 8th year and 67% from 9th to the 15th year	ES, NI

Source: CAFTA-DR Treaty.

For a subset of sensitive agricultural products CAFTA also expands a system of tariff rate quotas (TRQs) which define amounts of certain commodities that can be imported free of tariffs. [6] For many products safeguard provisions permit a country to apply the MFN tariff level if imports from the United States, or in the case of the US imports from Central America exceed the safeguard level. Safeguards are provisions permitted under WTO (and GATT) regulations by which imports beyond the safeguard level can be temporarily restricted. For some cases the safeguard is automatic and implemented when certain conditions are met (mostly for agricultural products), with no investigation required. In other cases the implementation of the safeguard is not automatic and the affected industry has to demonstrate that it will suffer serious injury from the level of imports beyond the safeguard level. In most cases the safeguard-level tariffs fall over time.

[6] These products are politically sensitive, and are produced and/or consumed by the poor.

2. Changes in the protection of agriculture based products under CAFTA

In Table 1 we show average tariffs for all the separate commodity classes. Unfortunately, this does not provide the information we want on changes in the level of protection for agricultural commodities or processed agricultural commodities under CAFTA. We now turn our attention to these changes. As we pointed out above, under CAFTA commodities are divided into various categories according to the time profile of programmed tariff reductions under the agreement. Table 3 shows the amount of trade in each of the tariff categories for all agricultural and processed agricultural products and the level and changes in the average tariff in each of the categories. For example, in category A, tariffs are eliminated immediately while in B they are reduced to zero in five equal installments over the first five years and in C over the first ten years. Note that these averages are all weighted averages of individual tariff rates where the weights are determined by the share of the commodity in total imports. As is well known this method of averaging can seriously underestimate the average level of protection when there are tariffs so high that they choke off imports. The last category in each table is comprised of all the commodities that have quotas other than those such as yellow corn, which is shown separately for some countries. In most countries the dominant commodity in the final quota line is rice.

Table 3 gives a clear picture of where tariffs are significant, where they will be cut and over what time period. The reader will note that except for Nicaragua all the average tariff levels are higher than those shown in Table 1. This reflects the fact that the level of protection in agriculture is higher than in industry. It also stems from the high level of imports and the high-published tariff rates in the last or quota category in each of our four countries. The averages in the table are calculated using the legally mandated tariff rates for each commodity, not actual tariff collections. The quota category is almost entirely comprised of rice imports for which the tariff rates vary between 29% to over 60% in the four countries. We used the tariff rates in the table applied to the actual level of imports in order to calculate the hypothetical tariff collections by category, but it not clear whether these rates were actually imposed, particularly for yellow corn. [7] Since imports and calculated tariffs in the quota category comprise such a high proportion of total imports and tariff collections and since there is a good deal of uncertainty on the tariff rate actually charged for these products, we recalculated the average tariff on all agricultural commodities other than rice and yellow corn. Those tariffs are shown below the tariff rate for each country, and are in all cases substantially lower than the overall average tariff rates shown in the table itself, particularly in Honduras. What this says is that apart from rice and corn, the average level of pre-CAFTA protection in agriculture was quite low, well below 10% in all four countries. Between 40% and 54% of agricultural imports were in category G, for which tariffs were already zero before CAFTA. In Costa Rica, which did not have a category G, 70% of imports were in its category A whereas the average tariff was only 2.3% before CAFTA. For all of these commodities, CAFTA does not represent any change in conditions. This is important to keep in mind when thinking about the likely effect of CAFTA on agriculture.

[7] There are a number of trade reports that discuss actual tariff rates for yellow corn. In Honduras the rate was said to be 20% rather than the published rate of 45%, and in Nicaragua a zero tariff on imports at the WTO TRQ which was higher than actual imports.

Table 3

AGRICULTURE AND PROCESSED FOOD TARIFFS BY TARIFF CLASS

Tariff category	Trade		Nº of products	Average tariff				
	Imports	Exports		Pre CAFTA	First year	5th year	10th year	15th year
El Salvador	268 433			0.085	0.074	0.064	0.046	0.019
A	18 836	1 055	398	0.134	0.000	0.000	0.000	0.000
B	9 376	898	141	0.129	0.103	0.000	0.000	0.000
C	17 553	7 614	153	0.153	0.138	0.077	0.000	0.000
D	6 249	34 825	89	0.182	0.170	0.122	0.061	0.000
G	146 154	576	245	0.000	0.000	0.000	0.000	0.000
N	2 135	335	17	0.212	0.195	0.124	0.035	0.000
Yellow corn	48 854	0	1	0.150	0.150	0.150	0.090	0.000
White corn	644	0	1	0.200	0.200	0.200	0.200	0.200
Quota	19 276	42	42	0.386	0.385	0.385	0.385	0.257
Costa Rica	288 589			0.079	0.059	0.054	0.037	0.019
A	202 155	563 697	519	0.023	0.000	0.000	0.000	0.000
B	9 613	124 921	104	0.108	0.086	0.000	0.000	0.000
C	10 910	7 121	151	0.151	0.136	0.076	0.000	0.000
D	22 653	131 168	216	0.152	0.141	0.101	0.051	0.000
F	16	188	3	0.660	0.660	0.660	0.660	0.330
N	16 655	6 226	34	0.146	0.134	0.085	0.024	0.000
S	1 826	1	9	0.128	0.128	0.128	0.077	0.000
T	956	13 463	4	0.150	0.150	0.135	0.075	0.000
Quota	23 805	594	34	0.378	0.378	0.379	0.379	0.227
Total without rice				0.050				
Guatemala	465 017			0.139	0.106	0.042	0.013	0.000
A	98 554	247 504	451	0.090	0.000	0.000	0.000	0.000
B	25 057	17 175	105	0.150	0.120	0.000	0.000	0.000
C	38 423	12 777	144	0.139	0.125	0.069	0.000	0.000
D	11 772	197 898	93	0.121	0.113	0.081	0.040	0.000
F	47	0	4	0.150	0.150	0.150	0.150	0.075
G	187 038	23 875	248	0.000	0.000	0.000	0.000	0.000
N	123	706	4	0.175	0.161	0.102	0.029	0.000
O	2 110	2	1	0.200	0.200	0.200	0.120	0.000
Quota	101 893	177	40	0.441	0.392	0.151	0.053	0.000
Total without rice and yellow corn				0.066				

/Continued

Table 3 (Concluded)

Tariff category	Trade		Nº of products	Average tariff				
	Imports	Exports		Pre CAFTA	First year	5th year	10th year	15th year
Honduras	227 747			0.136	0.119	0.107	0.097	0.061
A	26 000	192 298	365	0.127	0.000	0.000	0.000	0.000
B	5 908	30 360	124	0.140	0.112	0.000	0.000	0.000
C	15 670	9 227	175	0.166	0.149	0.083	0.000	0.000
D	16 685	50 656	137	0.147	0.137	0.098	0.049	0.000
F	78	10	7	0.150	0.150	0.150	0.150	0.075
G	107 545	830	235	0.000	0.000	0.000	0.000	0.000
N	4 510	0	10	0.139	0.127	0.081	0.023	0.000
O	869	379	4	0.150	0.150	0.150	0.090	0.000
Quota	50 482	1 514	33	0.416	0.416	0.416	0.416	0.277
Total without rice and yellow corn				0.072				
Nicaragua	124 150			0.095	0.066	0.049	0.036	0.016
A	21 928	106 318	311	0.138	0.000	0.000	0.000	0.000
B	5 467	7 189	190	0.144	0.115	0.000	0.000	0.000
C	7 422	375	205	0.142	0.128	0.071	0.000	0.000
D	14 505	68 625	139	0.158	0.147	0.105	0.053	0.000
F	22	370	11	0.332	0.332	0.332	0.332	0.166
G	58 359	150	196	0.000	0.000	0.000	0.000	0.000
N	5 608	655	27	0.116	0.106	0.067	0.019	0.000
Q	88	46 426	10	0.300	0.045	0.039	0.010	0.000
Quota	10 751	2 096	39	0.366	0.366	0.340	0.329	0.185
Total without yellow corn and rice				0.087				

Source: Worksheets made available by ECLAC, Mexico.
Note: The import and export levels are for 2002. The quota category includes all commodities with TRQs.

Tariffs in Categories A and B are either eliminated immediately or over the first five years of the agreement. Products in these categories are broadly comprised of prime cuts of beef, fish, flowers, various fresh fruits and vegetables, potatoes, and inputs to processed food such as soups and dog food. For the most part, these are not products in which US imports compete with local producers. For fish, fruits and vegetables it is unlikely that US prices would be competitive with local product even at a zero tariff. The picture in beef is more complicated. Central American cattle growers do not now produce prime cuts of beef, so the increase in tariff-free imports should have little effect on local producers. In fact, because CAFTA grants beef import quotas in the US, the treaty is on balance likely to be favorable to them.

Category C commodities are those with a ten-year linear tariff reduction schedule. This group is comprised primarily of processed foods. D and F category commodities have a very gradual reduction of tariff protection over either 15 or 20 years (see Table 2). Thus whatever

impact CAFTA will have on producers in these two categories will necessarily be quite drawn out. The bulk of D category products are what could be called processed agricultural commodities such as animal or vegetable fats, candies and products made from sugar, products made from chocolate, leather, flour, beverages and products made from vegetables or fruits. In Honduras the category also includes potatoes and some beans. The F category, which has a ten-year grace period followed by ten-year tariff elimination, is used in four of the countries and is comprised exclusively of dairy products.

3. Tariff reductions for sensitive commodities

Certain commodities like beans, corn and rice are of particular importance to either the income or the consumption of the poor. We have used the information on tariff categories and initial tariffs in Table 2 to calculate the time path of tariff reductions for a number of these "sensitive" commodities, and show the results in Table 4. Note that the table lists only the tariff level, not the impact of quotas, which we will discuss in a moment.

Tariff protection for all of these sensitive products will disappear over twenty years except on white corn in several countries. But for most products, the liberalization will be very gradual with much of it occurring at least ten years after the treaty goes into effect. This is important. In Central America many have protested that CAFTA will hurt small farmers by reducing protection of commodities of particular importance to smallholders and the poor. The evidence in the table makes it quite clear that this will not be the case, at least not for the first five to ten years. It would appear that the Central American negotiators of CAFTA were not willing to impose shock treatment on their producers of these sensitive commodities. But it is also clear that over the long run, the reductions in tariffs for these commodities are considerable. Domestic producers are given a fairly long time to adopt new crops or new and more efficient production techniques, but in the long run they will have to adjust to a far lower level of protection, particularly in rice, beans, poultry and dairy.

The table also makes clear the high level of protection afforded to domestic producers of sensitive products, particularly dairy, poultry and rice. This pattern may, at least to some extent reflect the desire by the Central American governments to protect their producers from subsidized exports from the United States. A recent study estimated that subsidies in the US amounted to 41% of the value of production of rice, 50% for milk and 32% for corn. [8]

[8] Monge and others (2004).

Table 4

TARIFF REDUCTIONS OVER TIME FOR SELECTED SENSITIVE PRODUCTS a/

	Weighted average tariff							
	Yellow corn	White corn	Rice	Beans	Beef	Pork	Poultry	Dairy
Costa Rica								
Initial	0.010	0.150	0.360	0.150	0.150	0.470	0.791	0.528
Year one	0.000	0.140	0.360	0.138	0.140	0.470	0.536	0.515
Year five	0.000	0.000	0.360	0.090	0.000	0.470	0.391	0.472
Year ten	0.000	0.000	0.360	0.025	0.000	0.000	0.187	0.417
Year fifteen	0.000	0.000	0.216	0.000	0.000	0.000	0.112	0.184
Year twenty	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
El Salvador								
Initial	0.150	0.200	0.400	0.150	0.150	0.400	0.370	0.002
Year one	0.150	0.200	0.400	0.120	0.000	0.400	0.306	0.002
Year five	0.150	0.200	0.400	0.000	0.000	0.400	0.253	0.002
Year ten	0.102	0.200	0.400	0.000	0.000	0.272	0.228	0.002
Year fifteen	0.000	0.200	0.213	0.000	0.000	0.000	0.121	0.001
Year twenty	0.000	0.200	0.000	0.000	0.000	0.000	0.000	0.000
Guatemala								
Initial	0.350	0.200	0.292	0.200	0.150	0.150	0.897	0.136
Year one	0.315	0.200	0.292	0.185	0.140	0.140	0.860	0.134
Year five	0.175	0.200	0.292	0.125	0.103	0.103	0.822	0.132
Year ten	0.000	0.200	0.292	0.020	0.050	0.050	0.822	0.130
Year fifteen	0.000	0.200	0.155	0.000	0.000	0.000	0.460	0.063
Year twenty	0.000	0.200	0.000	0.000	0.000	0.000	0.000	0.000
Honduras								
Initial	0.450	0.450	0.450	0.150	0.150	0.150	0.549	0.121
Year one	0.450	0.450	0.450	0.140	0.120	0.150	0.520	0.118
Year five	0.450	0.450	0.450	0.103	0.000	0.150	0.455	0.116
Year ten	0.302	0.450	0.450	0.050	0.000	0.090	0.411	0.113
Year fifteen	0.000	0.450	0.252	0.000	0.000	0.000	0.230	0.055
Year twenty	0.000	0.450	0.000	0.000	0.000	0.000	0.000	0.000
Nicaragua								
Initial	0.150	0.100	0.620	0.225	0.250	0.150	0.698	0.338
Year one	0.150	0.100	0.620	0.200	0.125	0.140	0.668	0.324
Year five	0.150	0.100	0.620	0.103	0.072	0.100	0.548	0.317
Year ten	0.101	0.067	0.620	0.050	0.030	0.050	0.548	0.310
Year fifteen	0.000	0.000	0.347	0.000	0.000	0.000	0.307	0.151
Year twenty	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: ECLAC tariff worksheets and CAFTA treaty.

a/ Our estimate of protection for poultry is heavily affected by very high tariff rates on chicken legs, which are intended to offset US willingness to sell this commodity at a very low cost because it is less desirable in the US market.

II. THE TREATMENT OF QUOTA COMMODITIES

There are three types of commodities where CAFTA potentially could have a large and immediate impact, namely those in categories A and B where pre-CAFTA protection falls rapidly to zero, and the special quota commodities for which a certain quantity of imports will be permitted to enter free of tariffs under CAFTA. These are the products with the highest average tariff levels and comprise between 10% and 25% of total imports in the four countries. As we have already indicated, the A and B category imports are primarily those which do not compete with local producers. We now look more closely at the special subclass of commodities which were granted tariff-free import quotas.

Certain commodities of particular importance to the poor, either as consumers or producers, were given special treatment under CAFTA. Tariffs for these commodities were typically quite high prior to CAFTA, and the rate of tariff reduction under CAFTA in most cases will be slow as shown in tables three and four. But CAFTA also established on many of these commodities tariff-rate quotas (TRQs), making possible faster liberalization than is apparent from the tariff category in which these commodities were placed. These are the commodities in which CAFTA could have a significant effect in the short run in that it permits tariff-free imports up to a certain quantitative limit as soon as the treaty is implemented (or in the case of chicken legs, in year three). We now look at the most important of these commodities and then ask what the impact of the TRQs is likely to be in practice.

A summary of the CAFTA TRQs and safeguards is displayed in Table 5. Note that for dairy products and meat there are separate quotas for many different commodities. We show only the totals in the table. For most products the TRQs grow over time and imports above the TRQ limit are subject to a tariff that falls over time according to the tariff category in which the commodity was placed. There are also safeguards for most of the commodities, even those without quotas.

For our purposes we are interested in the effect of quotas on domestic prices and producers. It is easy to show that quotas only have an effect on domestic prices and output levels if they are greater than the amount previously imported (see Morley, 2006). If they are smaller, they are effectively a transfer of tariff revenue to the importer. For rice in El Salvador, for example, there is a fairly large quota but it is less than the current level of imports which means that the marginal rice import will pay the tariff, and the quota will therefore have no effect on the equilibrium price. In other cases either the level of production is small or the quota is small relative to the level of production. In the cases of Honduras and El Salvador for example yellow corn is a product where the initial quota is larger than the level of imports. But there is no yellow corn production in either country. For pork and chicken legs in Honduras the quota is approximately equal to the level of imports, but both are quite small relative to the level of production which means that if there is a price effect it must be small. For white corn in El Salvador the quota is quite large relative to imports, but it amounts to less than 5% of the level of domestic production which implies that the price effects should be quite small. The general

conclusion that one gets from making similar comparisons for the other quota products is that the effect of quotas on prices and production is likely to be small.

Table 5

TARIFF CATEGORIES AND TARIFF RATE QUOTAS BY COMMODITY AND COUNTRY UNDER CAFTA

Commodity	Tariff category	Initial quota (metric t)	Growth in quota	Safeguard % of quota	Initial tariff (%)
Costa Rica					
Dairy	F	1 050	5% per year	130%	15-66
Rice unmilled	V	51 000	1 000 m annually	110%	36
Rice milled	V	5 250	250 m annually	110%	36
Chicken leg quarters	U	330	+90 m annually	130%	151
Pork	R	1 100	100 m per year for first 5 years, then 150 m per year for next 10 years	140%	47
Potatoes	B, H	2 931	5% per year	50 m	47
Onions	H	600	2% per year		47
Black beans	D	---	---	1 200 m	47
White beans	D	---	---		11
Red beans	D	---	---		47
El Salvador					
Dairy	F	1 070	5%	130%	15-40
Rice unmilled	P	62 220	2%	---	20
Rice milled	P	5 625	2%	110%	40
Yellow corn	O	367 500	5%	---	15
White corn	H	35 700	2% per year to year 15, then 700 m per year		20
Chicken leg quarters	P	464 m starting in year three	+434 m per year after year three	130%	164.4
Pork	O	1 650 m	10%	130%	40
Beef	D	105 m	5%	---	15
Sorghum	D	263 m	5%	110%	15
Black beans	D	---	---	60 m	20
White beans	N	---	---		20
Red beans	D	---	---		15

/Continued

Table 5 (Concluded)

Commodity	Tariff category	Initial quota (metric t)	Growth in quota	Safeguard % of quota	Initial tariff (%)
Honduras					
Dairy	F	2 202	5%	130%	15
Rice unmilled	P	91 800	2%	110%	45
Rice milled	P	8 925	5%	110%	45
Yellow corn	E	190 509	5%	---	45
White corn	H	23 460	460 m	---	45
Chicken leg quarters	P	534 starting in third year	+534 m per year	130%	164.4
Pork	O	2 150	7%	130%	15
Black beans	D	---	---	---	15
White beans	B	---	---	---	15
Red beans	D	---	---	---	15
Nicaragua					
Dairy	F	1 425	5%	130%	15-40
Ice cream	F	72 815 ltr	5%	130%	40
Rice unmilled	P	92 700	3%	110%	45
Rice milled	P	13 650	5%	110%	62
Yellow corn	E	68 250	5%	115%	15
White corn	H	5 100	100 m per year	---	10
Chicken leg quarters	P	317 m starting in third year	+317 m per year	130%	164.4
Pork	D	1 100	100 m per year	---	15
Black beans	D	---	---	700 m	30
White beans	D	---	---		10
Red beans	D	---	---		30

Source: CAFTA agreement.

Lifting quotas in the United States

We now turn to the other side of the story: liberalization in the United States under CAFTA. There are very few commodities for which CAFTA grants increased access to the US market for the simple reason that the CAFTA countries already have tariff free access for most products under the CBI and the CBTPA. But there are some, the most important of which are sugar, beef, peanuts, dairy and textiles. We report the treatment of these commodities under CAFTA in Table 6. Note that the quota for sugar is technically a TRQ, but since the out-of-quota tariff is prohibitive (over 100%), and since this tariff will not be reduced the quotas shown in the table are in effect an absolute limit on the amount that can be exported from each of the Central American countries. How important will liberalized treatment of CAFTA exports to the United States be to producers of these commodities in Central America?

Table 6

QUOTAS AND TRQS IN THE UNITED STATES FOR CAFTA EXPORTS

Commodity	Beneficiary country	Tariff category	WTO quota (m)	Add CAFTA quota m	Growth in quota	Initial tariff
Beef	Costa Rica	D		10 536		26.4%
Beef	El Salvador	D		105		26.4%
Beef	Honduras	D		525		26.4%
Beef	Nicaragua	D		10 500		26.4%
Sugar	Costa Rica	H	15 796	11 000		>100%
Sugar	El Salvador	H	27 379	24 000		>100%
Sugar	Honduras	H	10 530	8 000		>100%
Sugar	Nicaragua	H	22 114	22 000		>100%
Peanuts	El Salvador	E		500		131-164%
Peanuts	Nicaragua	E		10 000		131-164%
Peanuts	Rest of CA	E		---		na
Milk	Costa Rica	F		407 461 ltr	5%	77 cents/ltr
Milk	El Salvador	F		366 715 ltr	5%	77 cents/ltr
Milk	Honduras	F		560 259 ltr	5%	77 cents/ltr
Milk	Nicaragua	F		254 663 ltr	5%	77 cents/ltr
Ice Cream	Costa Rica	F		67 087 ltr	5%	50 cents/kg + 17%
Ice Cream	El Salvador	F		77 670 ltr	5%	50 cents/kg + 17%
Ice Cream	Honduras	F		48 544 ltr	5%	50 cents/kg + 17%
Ice Cream	Nicaragua	F		266 989 ltr	5%	50 cents/kg + 17%
Other Dairy	Costa Rica	F		550	5%	Various
Cheese	El Salvador	F		630	5%	Various
Butter	Honduras	F		450	5%	Various
Powdered Milk	Nicaragua	F		725	5%	Various

Source: CAFTA agreement and US Trade Representative Fact Sheets.

In addition to the quotas shown in Table 5, under CAFTA the US will eliminate tariffs on tobacco over 15 years, except where current duty treatment under the CBI grants duty-free access. For those products the tariff will be set to zero immediately. For ethanol, duty-free access into the US market under CBI will not change. In addition, El Salvador was granted a share of the non-local stock TRQ not to exceed 10% of the total TRQ and Costa Rica was granted a fixed share of the non-local stock TRQ of 31,000 gallons (15% of the regional TRQ) with no growth.

a) Sugar

Sugar is one of the most highly protected and highly subsidized products grown in the United States. Each Central American country had a TRQ prior to CAFTA. Imports above the TRQ are stopped by a prohibitive out-of-quota tariff of 33 to 35 cents per kilo, which is higher than the market price of sugar. CAFTA approximately doubles the TRQ for each of the countries (see Table 7). This expansion of quotas is undoubtedly valuable for Central America. At the current price of sugar (about US$240 per ton) the new quotas are worth about US$24 million to the region. But when one compares the additional quotas with the level of current production of sugar in the region, it is clear that they will not have much of an effect on producers since they amount to less than 1% of total supply in each of the five countries. CAFTA does not significantly expand the US market for Central American sugar.

Table 7

SUGAR PRODUCTION AND SUGAR QUOTAS UNDER CAFTA

(Metric tons)

	1990	1995	1997	1999
Tariff levels				
Costa Rica	16.4	11.2	9.9	3.3
El Salvador	16.0	10.2	10.2	5.7
Honduras	41.9	9.7	9.7	8.1
Nicaragua	8.0	10.7	6.9	10.9
Tariff dispersion				
Costa Rica	8.8	8.5	5.5	7.8
El Salvador	8.6	7.6	5.7	3.4
Honduras	21.8	7.6	5.4	7.8
Nicaragua	4.6	7.4	4.8	7.3

Source: CAFTA agreement for quotas and Todd and others for production.

b) Beef

The United States' 26% out-of-quota tariff on beef will be phased out over a 15-year period. TRQ access will be established for the following countries:

i) Costa Rica: TRQ of 10,340 MT, growing at 5 percent per year

ii) El Salvador: TRQ of 100 MT, growing at 5% per year

iii) Honduras: TRQ of 500 MT, growing at 5% per year

iv) Nicaragua: TRQ of 10,000 MT, growing at 5% per year

The CAFTA TRQ will open only if the existing WTO TRQ is filled.

At the end of 15 years there will be unlimited access and no tariff on imports. At present Costa Rica and Nicaragua are the only two countries with significant meat exports to the United States and these averaged US$22-24 million per year between 1998 and 2002. For both of these countries the increase in TRQs appears to be significant. According to the FAO, between 2000 and 2003 annual production of beef was around 75,000 metric tons in Costa Rica and 58,000 metric tons in Nicaragua (Todd and others p. 7). Thus the new TRQs amount to an expansion of between 13% and 16% of the domestic market. Since both countries now export to the US, it should be possible to expand production to take advantage of this market opening, particularly since the TRQs will be expanding relatively rapidly at the same time that the 26% tariff is falling at about two percentage points per year.

As in the import case, expanded quotas in the US only affect domestic pricing and production for products on which the CAFTA quotas are larger than the current level of exports. For Honduras, this is true of sugar, beef and some dairy products. The value of the additional quota is equal to the US tariff times the international price times the quantity of imports permitted into the US market tariff-free. In addition there is a change in the market-clearing domestic price of these commodities where the size of the change depends on the size of the liberalized quota compared to the initial level of production. However, other than beef quotas in Nicaragua and Costa Rica, when one makes the comparison of quotas and domestic production one finds that the change in the domestic price of other quota commodities is virtually zero. [9]

[9] See Morley (2006) for details.

III. THE RECURSIVE DYNAMIC CGE MODELS OF THE IMPACT OF CAFTA

Having described in fairly specific terms the changes which will take place under DR-CAFTA we are now ready to consider how to model the impact of those changes on employment, output and poverty. To that end recursive dynamic economy-wide CGE models have been constructed for four of the Central American economies. The studies for Honduras and El Salvador were done by the authors, the Nicaragua study was done by Rob Vos and Marco Sánchez, and the Costa Rica study was done by Marco Sánchez. All the studies use the same recursive dynamic methodology to derive impact estimates of trade liberalization under CAFTA on sectoral production, employment, poverty and the distribution of income. All of these studies built dynamic economy-wide CGE models based on work done for a previous UNDP project on the impact of trade liberalization in Latin America using static single country models (Ganuza and others 2006). In this section we briefly describe the logic of these dynamic models and discuss the differences between the models for Honduras and El Salvador and those for Nicaragua and Costa Rica. We then summarize and compare where possible the predictions of the four models on how CAFTA will affect the growth rates of key macro variables as well as employment and poverty in the four countries.

1. The model

To get a recursive dynamic general equilibrium solution the model is solved in two stages. The first is to find a solution for a one-year equilibrium using a static CGE model. The models used for the four countries used a variant of the standard model developed at IFPRI (see Lofgren, Harris and Robinson). In the second stage, a model between periods is used to handle the dynamic linkages that update the variables that drive growth. The intertemporal equations provide all the exogenous variables needed for the next period by the CGE model which is then solved for a new equilibrium. The model is solved forward in a dynamically recursive fashion with each static solution depending only on current and past variables. The model does not incorporate future expectations; instead the behavior of its agents is based on adaptive expectations as the model is solved one period at a time. The variables and parameters used as linkages between periods are the aggregate capital stock (which is updated endogenously, given previous investment and depreciation), the population, the domestic labor force, factor productivity, export and import prices, export demand, tariff rates and transfers to and from the rest of the world (all of which are modified exogenously). The dynamic model used in this research follows the models developed by the International Food Policy Research Institute (IFPRI). [10]

[10] Lofgren and others (2001) and Thurlow (2004).

2. First step: the single period solution

The static CGE model used in this part of the research is based on the standard model used by IFPRI (see Lofgren and others, 2001), which follows the neoclassical-structuralist tradition originally presented in Dervis and others (1982). Basic data for CGE models are obtained from a Social Accounting Matrix (SAM). A SAM is a comprehensive, economy-wide data framework typically representing the economy of a country.

The CGE model has three components. The first shows the payments that are registered in the SAM following the same disaggregation of factors, activities, commodities and institutions shown in the matrix. The second has the equations that represent the behavior of the different institutions present. The third has the system of constraints that have to be satisfied by the whole system covering the factor and goods markets, the balances for savings-investment, the government and the current account of the rest of the world.

Each producer maximizes profits under constant returns to scale and perfect competition. There are two factors of production: labor (differentiated by skill) and capital. Production is related to factor inputs in a constant elasticity of substitution production function (CES) that allows the producers to substitute these two inputs until they reach the point where the marginal revenue of each factor equals the factor price (wage or rent). The second choice the producers make is the amount of intermediate inputs they will use. This specification is made assuming fixed shares that specify the appropriate amount of intermediate inputs per unit of output and labor/capital (value added). Finally, output prices depend on the value added (cost of L and K), intermediate inputs and any relevant taxes and subsidies.

In this model there are four institutions –households, enterprises, government and the rest of the world– that do three things: a) produce, b) consume, and c) accumulate capital. Households save a constant fraction of their disposable income and buy consumption goods. They have ownership of the enterprises and they work in those enterprises. As a result, household income is the sum of salaries, profits and both government and rest-of-the-world transfers. Household consumption of goods and services is determined by a linear expenditure system (LES). Firms buy intermediate goods, hire factors of production, produce commodities and services, and sell them in the market. Government receives taxes, consumes goods and services, and makes transfers to households. The capital account collects the savings from the households, firms, government, and the rest of the world, and buys capital goods (investment).

3. Second step: between periods

In the second step of the recursive model the linkages between periods are introduced. This is done by solving the static model for one specific year and then updating the capital stock, population, domestic labor force, factor productivity, export and import prices, and export demand parameters. The updated model is then solved again for the following year and so on.

The model used in this research is based on Dervis and others (1982) and Thurlow (2004). In all but the FDI scenario total capital accumulation is endogenous since it is equal to total saving which is endogenous. By definition it is equal to the last period's capital stock plus total

investment minus depreciation. The allocation of new capital across sectors is done by adjusting the proportion of each sector's share in aggregate investment as a function of the relative profit rate of each sector compared to the average profit rate of the economy as a whole. Sectors with higher (lower) average profit rates will get higher (lower) shares of the available investment. Over time sector profit rates should converge.

The reader should note that this version of dynamic behavior may well understate or overstate the full reaction of an economy to changes in policies or conditions. In these models total investment is determined by total saving and is therefore endogenous, but neither the saving nor the investment decision is modeled directly. The possible effect on total capital formation of a rise in the overall profit rate in response to CAFTA, for example, or a rise in total saving in response to a rise in the interest rate is not incorporated. This limited characteristic of this version of the dynamic reaction to changes in CAFTA should be kept in mind in interpreting the results we will be presenting.

4. Closures and assumptions on factor supplies

The closures are the mechanisms which determine how various macro constraints are satisfied. In the CGE models there are four macroeconomic closures that we need to look at: a) external balance; b) government closure; c) factor markets; d) saving-investment closure. The differences between the assumptions taken for the mechanism in which these closures or identities are satisfied are very important at the time of interpreting the results.

a) External balance

For the Honduras model we assumed a flexible exchange rate, meaning that foreign saving is fixed. Since El Salvador is dollarized we assume that foreign saving is endogenous. Nicaragua uses a system of pre-programmed mini devaluations of the exchange rate. The authors ran the experiments with a fixed real exchange rate to capture this characteristic of the economy but the results they obtained were not very realistic as they contained major fluctuations in foreign savings, so instead they assumed a flexible exchange rate and fixed foreign savings. For Costa Rica a flexible nominal exchange rate was used.

b) Government closure

For the government, income taxes are fixed across simulations and the level of consumption maintains the same proportion of total absorption from the base level.

c) Savings-investment closure

In equilibrium total saving must equal total investment. There are various ways to guarantee this. In all of the countries a saving-driven closure was used with the exception of the FDI simulation for Honduras and El Salvador where we imposed as a constraint that the addition

to FDI be devoted entirely to fixed investment. Therefore in this simulation for those two countries total saving is investment driven.

To avoid sudden changes in the macro aggregates, in all of the countries with the exception of the FDI simulation for Honduras and El Salvador a balanced closure was used. In that closure changes in total absorption are distributed, according to the initial shares of each of its components, private consumption, investment and government consumption

d) Factor markets closure

Capital is fully employed and sector specific, which means that profit rates are free to vary across sectors at least in the short run. In the long run investment from the previous year is transformed into capital for the current year and is assigned to the sectors with higher profits. Capital is no longer fixed and rent becomes the equilibrating variable.

Turning to the supply of labor by skill, there are several important differences in treatment between the two sets of models. For skilled labor in Honduras and El Salvador we assumed an upward sloping supply curve with an elasticity of either +2 or +5 with respect to the real wage shifting rightward by a certain amount per year. We did not distinguish between those who are in the labor force but unemployed, and those who are not in the labor force. Formally, therefore, the model does not determine open unemployment. However, when utilizing evidence from the household surveys we found that there is a large pool of well-educated but inactive labor, especially among women. We assume that growth in this group will be high enough until 2020 to supply the amount of skilled labor called for in the sequence of short run solutions. For unskilled labor in Honduras and El Salvador we assumed that there is an excess supply of labor at a constant real wage, [11] which means that the supply curve is assumed to be flat. For all skills in Costa Rica and Nicaragua the labor force was assumed to be constant in the short run but growing over time. For each type of labor in the short run the real wage was fixed, which determines the level of employment and the unemployment rate. Over time the nominal wage adjusts by the amount of inflation in the previous period. [12] The assumptions underlying these two models of the labor market appear to be quite different and in fact may help to explain the differences in results which we will discuss further in the next section of the paper.

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[11] For the labor markets of Honduras and El Salvador it was assumed that there is an excess supply of unskilled and semi skilled labor and a fixed real wage rate and that in each period labor is mobile across sectors, which means that real wages are equal across sectors for these two types of labor. However, for skilled labor a supply curve was added making wages as well as quantities endogenous to the model.

[12] For Costa Rica the initial level of unemployment stays the same, leaving the possibility of having differences or movements between activities. It was assumed that the formal sector has a fixed real wage and the nominal wage is flexible while for the informal sector the nominal wages are fixed. For Nicaragua, there is a distinction in the labor market for mining and fishery, for which the labor supply is fixed and the nominal wages are the equilibrating variable, and all other activities, for which the nominal wage is fixed and quantities vary. They also included a discussion about minimum wages assuming the updating by the level of inflation for unskilled labor in the formal sector and skilled labor occupied in the public and services sectors.

Finally, productivity growth, real government consumption and transfers, world price of exports and current account balances are set exogenously based on observed trends.

To summarize, in the dynamic version of the model:

i) Variables which are exogenous in the short run are updated. These include labor force growth, productivity changes, capital stock growth and population growth.

ii) Variables are updated by economic behavior (distribution of investment by sector, distribution of labor force by sector and category or FDI as result of implementation of CAFTA.

iii) Variables are updated by changes in policy such as tariffs, import quotas or tax rates.

With the resulting dynamic model a forward simulation to 2020 (or 2026 in the case of Costa Rica) was done in order to create what we call a base run in which there are no CAFTA-related changes in exogenous variables. The models are then run with various different CAFTA policy alternatives and the results are compared with the base run. Because important aspects of dynamic behavior may not be completely captured by the models or because of misspecifications in the models themselves, we put less weight on the absolute values of our projections than we do in the comparison of our base run with the various CAFTA alternatives. All of the results will be reported here in terms of percentage-point changes in growth relative to the base run because we are less confident in the absolute growth or employment forecasts of our base run or CAFTA alternatives than we are in the difference between that base run and the CAFTA alternatives. This also makes it easier to make our results for Honduras and El Salvador comparable with those of Vos and Sánchez for Nicaragua and Sánchez for Costa Rica.

IV. THE IMPACT OF CAFTA ON PRODUCTION AND EMPLOYMENT

Table 8 displays the results of macro-simulations based on national level CGE models that we did for El Salvador and Honduras that Sánchez and Vos did for Nicaragua, and that Sánchez did for Costa Rica for various component parts of the CAFTA agreement. [13] In the first column we show the shares of key macro variables in GDP at either market prices or factor costs in the base year for which the SAM was built. The second column shows the baseline growth rate predicted by the models in the absence of CAFTA. This is what the model predicts the growth rate of the economy will be with the current tariff structure, current rates of investment and current rates of labor force growth. The Honduras model, for example, predicts an average rate of growth of 3.05% per year between 2000 and 2020 and a rate of 5.5% per year between 2007 and 2026 for Costa Rica.

In the column labeled CAFTA we show the changes in the annual growth rate that are predicted to follow from the CAFTA tariff reductions considered separately from the other elements of the agreement. These numbers are expressed as percentage-point differences from the baseline growth rates. Thus for Honduras, the table tells us that the tariff reductions under CAFTA raise the overall growth rate of the economy by 0.135 percentage points or in other words from 3.05% to 3.19% (per year). The next two columns show the impact on the growth rate of quotas and maquila for Honduras and El Salvador where those two aspects of the CAFTA agreements have been the subject of separate macro-simulations with the CGE model. In the next column (ALLCAFTA) we show the combined effect on the growth rate of the economy of tariff reductions, maquila and the special tariff free quotas granted by both the Central American countries and the United States as part of the agreement.

We should note here a significant difference in the treatment of tariff changes in the simulations for Honduras and El Salvador and those in Costa Rica and Nicaragua. The tariff reductions in the CAFTA agreements apply only to products imported by each Central American country from the United States. To be strictly accurate one should adjust each sectoral tariff reduction by the fraction of total imports coming from the United States. We did not make that adjustment for Honduras and El Salvador, but it was made for Nicaragua and Costa Rica, which means that in Honduras and El Salvador we may have overestimated the effect of tariff reductions. But as we shall see, those effects are very small, which will only serve to strengthen our main point that the effects of CAFTA do not come from general trade liberalization but rather from its specific treatment of maquila and from the possible stimulus it gives to foreign investment and productivity growth.

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[13] Note that these results were not derived from one single model. They are presented here because in our opinion the differences between the models described in Section Three do not affect the general comparability of the results or the conclusions that can be drawn from the evidence.

Table 8

THE IMPACT OF CAFTA ON GROWTH RATE OF MACRO VARIABLES

	Initial share	Base annual growth rate	Percentage point change from base growth rate (1997-2020)				
			CAFTA	Maquila	Quotas	All CAFTA	FDI
Honduras	1997	2000-2020					
Absorption		3.350	0.120	1.268	0.004	1.368	2.000
Private consumption	0.724	3.331	0.111	1.399	0.004	1.487	1.911
Fixed investment	0.226	3.667	0.141	1.022	0.004	1.147	3.175
Government Consumption	0.077	3.422	0.162	0.969	0.005	1.119	-3.422
Exports	0.400	2.395	0.241	1.009	0.001	1.200	2.645
Imports	0.456	3.222	0.176	0.754	0.004	0.904	2.063
GDP (market price)		3.055	0.135	1.408	0.003	1.517	2.203
El Salvador	2000	2000-2020					
Absorption		4.214	0.279	0.372		0.659	1.289
Private consumption	0.778	4.213	0.278	0.304		0.589	1.226
Fixed investment	0.167	4.354	0.316	0.608		0.932	1.557
Government consumption	0.081	4.065	0.230	0.519		0.756	1.346
Exports	0.298	5.012	0.089	0.583		0.675	0.467
Imports	0.329	4.182	0.418	0.393		0.817	1.355
GDP (market price)		4.475	0.173	0.437		0.615	1.010
							CAFTA plus prod shock
Nicaragua	2000						
Absorption			-0.005		0.158	0.630	0.786
Private consumption							
Fixed investment	0.293		-0.007		0.104	0.532	0.761
Government consumption	0.159		-0.007		0.104	0.506	0.735
Exports	0.326		-0.002		0.143	1.411	1.482
Imports	0.629		0.000		0.194	1.192	1.238
GDP at factor cost			-0.005		0.189	0.834	1.012
							CAFTA plus prod shock
Costa Rica	2002	2007-2026					
Absorption		3.404	0.024			0.031	0.109
Private consumption	0.750	2.289	-0.004			-0.002	0.098
Fixed investment	0.209	6.417	0.071			0.086	0.157
Government consumption	0.164	0.286	-0.062			-0.060	-0.069
Exports	0.469	6.835	0.154			0.157	0.141
Imports	0.527	2.178	0.066			0.081	0.130
GDP at factor cost		5.506	0.088			0.091	0.122

Source: For Nicaragua, Vos and Sánchez (2006), for Costa Rica, Sánchez, (2007), for Honduras and El Salvador, authors' worksheets.

The last two columns in the table are more speculative. The column labeled maquila is only shown for Honduras and El Salvador where we did separate maquila simulations. We will defer a discussion of the meaning of these simulations for the moment. For FDI in Honduras and El Salvador we have simulated the effect of an increase in foreign direct investment, all of which is assumed to be devoted to an increase in the rate of capital formation. For Nicaragua and Costa Rica the Sánchez-Vos simulation is the ALLCAFTA scenario plus an increase in productivity growth. That is assumed to follow from an increase in foreign direct investment in response to the more favorable treatment of FDI contained in the CAFTA agreement. [14]

What do we learn from these simulation exercises? The first result is that CAFTA has a positive effect on growth, but unless it has a major impact on productivity or the rate of investment that effect is small. In none of the four countries we studied did trade liberalization alone raise the growth rate by more than 0.2 percentage points per year. To put that number in perspective, after twenty years at that differential growth rate, total GDP may be as much as 4% higher with CAFTA than it would be without it. Trade liberalization does make these economies more open. Exports and imports both grow faster with CAFTA than without. But the impact is relatively small mainly because the levels of protection were so low to start with in Central America and because the US already permits tariff-free access to most commodities from Central America or where it did not, CAFTA did not significantly change the situation. Thus one should not expect CAFTA to be the magic bullet that increases the Central American growth rate unless it significantly raises the rate of growth of investment or productivity.

Separate simulations for tariff-free quotas under CAFTA were run in three of our four countries. They do have a significant positive effect on growth in Nicaragua, but virtually no effect anywhere else. That is because in almost all cases the quotas are either less than the current level of imports in which case they have no effect on prices, or because they are small relative to the current level of production.

Maquila is a different story both in the modeling and in the results. For Honduras and El Salvador the maquila simulation consisted in making permanent the favorable but temporary rules of origin granted under the CBTPA in year 2000. In other words the baseline simulation without maquila is the projection of the growth rate for these two economies assuming that the favorable temporary treatment of the maquila sector was allowed to lapse as it was slated to do, had CAFTA not been approved. For Costa Rica and Nicaragua the maquila simulation projected forward a rapid rate of growth of maquila exports from the current base. Those two approaches are very different yet the implications of the two simulations are quite similar. In Honduras maquila by itself raises the growth rate by 1.4 percentage points per year. [15] The impact is

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[14] For Nicaragua factor productivity is assumed to grow by an additional 1% in export activities and direct foreign investment by an additional 2% per year. For Costa Rica, the assumption is that the CAFTA agreement will bring a 1% increase in productivity (it is seen as an increase in the efficiency parameter in the demand for factors equation). Sánchez also assumed for that simulation that there is a 50% increase of FDI from the US starting three years after the implementation of the CAFTA agreement.

[15] Note that for Honduras and El Salvador this growth rate effect is the increase relative to the base run, not relative to the current observed average growth rate. To put this another way, you could say that without CAFTA the growth rate in Honduras could be expected to be 1.4% less per year than it currently is.

somewhat smaller in El Salvador, but it is still substantial. In the Costa Rica and Nicaragua studies, maquila was not reported separately. Instead the impact of maquila, *zona franca*, quotas and tariff reductions were simulated together and are displayed in the ALLCAFTA column of the table. In Nicaragua, since there is a separate simulation for tariff reduction and for tariff reduction plus quotas, a fairly good estimate of the effect of maquila alone is the difference between the ALLCAFTA and the sum of the QUOTAS and CAFTA columns. Altogether the three add about one percentage point to the growth rate. Quotas alone add 0.19 pp while tariffs alone have virtually no effect. That suggests that maquila alone adds about 0.6 percentage points to the growth rate. Thus, except for Costa Rica, the table suggests that maquila comprises 80-90% of the total positive impact of CAFTA on production. [16]

There is an important lesson to be learned from these maquila simulations. Honduras, El Salvador and Nicaragua are all economies with an excess of unskilled labor. To increase the growth rate one has to find a growth strategy which increases the demand for this factor, or makes unskilled labor more productive. Trade liberalization does that to a limited extent, but the effect is small because the ex-ante tariff rates were low. But granting the maquila industry more generous rules of origin opened up a big potential demand for inputs which could be made by unskilled labor or in Nicaragua and increase in the potential growth rate of exports. That has a large impact on the prospects and growth rates of these three labor-surplus economies. That in turn is because an expansion of the maquila sector increases the demand for previously under employed or unemployed unskilled labor. As we will see in a moment, in all three countries there is a quite dramatic increase in the growth rate of employment in the maquila simulation.

In Costa Rica the maquila effect is much small than in the other three countries. Indeed the additional growth in the ALLCAFTA scenario is only 0.015 percentage points higher than for tariff reductions alone. According to Sánchez, that is because the export industries in Costa Rica are already highly diversified, and tied as much to East Asia as they are to the US market. Even in the absence of CAFTA the model forecasts very robust export growth of 6.8% per year, with only marginal increases to be expected from CAFTA.

In the right hand column of Table 8 we show the impact of two positive exogenous shocks which could follow from the CAFTA agreement. For Honduras and El Salvador we assumed that there was an increase in the flow of foreign direct investment due to the more favorable treatment of FDI under CAFTA. We assumed that this additional FDI is all devoted to capital formation and that it significantly increases the capital stock available to the economy. For Nicaragua, the authors link productivity change to export sectors as is implied in a good deal of recent empirical work on the relationship between exports and improvements in productivity. Overall this increased the rate of growth of exports by 1.5 percentage points per year.

In Costa Rica, the productivity experiment is handled differently. First, the over all growth rate of productivity was chosen to produce an overall growth rate of 5.5% per year. But

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[16] There are significant differences between the ways the maquila effect is estimated in these four country models. In El Salvador and Honduras, the effect is estimated as the impact of the more favorable rules of origin for inputs to the maquila industry, which we simulated by reducing the import share of intermediate inputs after year 2000. For Nicaragua, the simulation assumed an increase in the growth rate of exports from the maquila industry starting in 2007. See Sánchez and Vos, figure three.

more to the point here, the increases in productivity due to CAFTA were assumed to be much smaller as one can see by comparing the aggregate growth rates in Table 8. This does not mean that productivity growth, or foreign direct investment in response to CAFTA will not be as important in Costa Rica as it is elsewhere, but rather that we do not yet know enough to predict how much additional foreign investment there will be, or what sectors it will go to. Obviously the experience of Costa Rica with Intel is a real demonstration of the positive impact of FDI on productivity, growth and export competitiveness.

For Costa Rica and Nicaragua Vos and Sánchez assumed a positive productivity shock presumably due to the increased openness of the economy. In both cases the impact on the growth rate is large, far and away larger than any of the direct effects of trade liberalization or maquila. But note that these positive results are a good deal more hypothetical than those of the other CAFTA simulations because we have no behavioral or econometric basis for the favorable change in exogenous conditions that cause the results. What all this tells us is that in order to increase the growth rate it is not enough to simply lower tariffs. There has to be an increase in capital formation and productivity as well.

Table 9 displays the changes in the growth rate by sector and scenario that correspond to the aggregate growth rates listed in Table 8. In both tables we report percentage-point changes in the growth rate relative to the baseline growth rate. For example, we find that CAFTA reduces the region-wide growth rate of the agricultural sector by 0.015 percentage points whereas it raises the growth rate of that sector in Honduras by 0.11 percent (i.e. from 3.26% in the baseline to 3.37% in the CAFTA simulation). For Nicaragua and Costa Rica these baseline sectoral growth rates were not reported in the two country papers of Vos and Sánchez, and so are not shown. As we have already shown for the aggregate growth rates, tariff reductions alone have a relatively small and insignificant effect on sectoral growth rates. However in both Costa Rica and Nicaragua, the direct effect of the CAFTA tariff reductions is negative for agriculture. Indeed for Nicaragua, this negative impact, while small, is spread across most sectors of the economy. That is not the case for El Salvador and Honduras.

Maquila was not run separately in the case of Nicaragua and Costa Rica. However, since the all CAFTA scenarios included maquila, tariff reductions and tariffs, one can get a pretty clear idea of the importance of maquila by comparing the differential growth rates in the ALLCAFTA column of the table with the column for tariff changes or quotas. In agriculture and food processing in Nicaragua, changes in quotas are what really make a difference. They add about one percentage point to the growth rate of agriculture and 2.4 percentage points for food. Overall, according to Table 8, quotas added about 0.7 pp. to the baseline growth rate. But quotas plus maquila added over 3 percentage points. Here we can see why. Because of maquila driven exports, manufacturing as a whole grows almost seven percentage points faster in the ALLCAFTA scenario for Nicaragua. Over 80% of that increase comes from maquila.

Table 9

CHANGES IN SECTORAL GROWTH RATES

(Percentage point differences in annual growth rates)

	Initial share	Baseline	Changes in growth rates (in percentage points)				
			Tariff red	Maquila	Quotas	All CAFTA	FDI
Honduras	100.030						
Primary sector	43.210	3.260	0.110	1.310	0.000	1.400	2.020
Agricultural sector	43.180	3.260	0.110	1.310	0.000	1.400	2.020
Livestock	0.910	3.210	0.140	1.530	0.010	1.630	2.050
Mining	0.030	2.290	0.300	0.610	0.000	0.810	2.260
Manufacturing sector	13.190	2.880	0.170	1.160	0.000	1.300	1.910
Food Industry	4.880	3.140	0.160	1.290	0.000	1.430	1.970
Elec-water	1.720	2.930	0.170	1.160	0.000	1.300	2.060
Construction	4.810	3.630	0.150	1.050	0.000	1.180	2.090
Tertiary sector	37.070	2.963	0.142	0.983	0.001	1.102	2.455
El Salvador	100.000	4.581	0.176		0.478	0.658	1.065
Primary sector	6.490	4.610	0.170		0.370	0.550	1.150
Agricultural sector	6.150	4.600	0.170		0.370	0.550	1.150
Livestock	1.980	4.560	0.200		0.350	0.560	1.170
Mining	0.330	4.820	0.090		0.420	0.520	1.110
Manufacturing sector	32.460	4.930	0.100		0.640	0.750	1.010
Food Industry	8.450	4.320	0.190		0.320	0.520	1.070
Elec-water	1.920	4.707	0.175		0.321	0.175	0.309
Construction	4.520	4.530	0.320		0.610	0.940	1.240
Tertiary sector	54.610	4.370	0.210		0.390	0.610	1.100
Nicaragua							
Primary sector	0.213		-0.046	1.022		0.754	1.764
Agricultural sector	0.180		-0.050	0.997		0.950	2.027
Livestock	0.060		0.037	2.877		3.160	4.183
Mining	0.008		0.073	-1.140		-5.633	-5.550
Manufacturing sector	0.155		-0.014	0.814		6.967	8.061
Food Industry	0.060		-0.019	2.375		2.675	5.176
Elec-water	0.022		-0.037	0.407		2.021	3.094
Construction	0.078		-0.080	0.687		3.210	3.710
Tertiary sector	0.523		-0.034	0.599		2.853	3.675
Costa Rica							
Primary sector	8.700		-0.013			-0.016	-0.011
Agricultural sector	5.700		-0.015			-0.020	-0.010
Livestock	2.800		-0.015			-0.015	-0.025
Mining	0.200		0.090			0.085	0.150
Manufacturing sector	21.800		0.090			0.111	0.178
Food Industry	6.200		0.070			0.120	0.260
Elec-water	2.700		0.045			0.050	0.105
Construction	4.700		0.135			0.160	0.315
Tertiary sector	62.200		0.067			0.067	0.108

Source: For Nicaragua, Vos and Sánchez (2006), for Costa Rica, Sánchez, (2007), for Honduras and El Salvador, authors' worksheets.

The maquila effect, although still dominant in Nicaragua and El Salvador is much smaller than it is in Honduras, a disparity that may well be by construction. In El Salvador and Honduras the maquila effect was simulated by comparing production prior to 2000, when the more generous rules of origin were temporarily increased by CBTPA, with production after that year. Since we had data on intermediate imports to the maquila industry by year, we were able to simulate directly the impact of the reduction in required inputs of intermediate material imported from the US. Said reduction is equivalent to a one-time drop in input costs, which leads to investment and employment growth in the sector that is spread out over time. In Nicaragua the simulation used a projection from the government that exports from the *zona franca* would quadruple between 2007 and 2011 and then grow at the same rate as assumed in the baseline (Vos-Sánchez p. 16). This turns out to be a much larger effect than the one-time change in imported input requirements that were used in the other two countries, which explains the very large growth rate effects in the ALLCAFTA simulations for Nicaragua. We should point out that the Salvador and Honduras simulations ignore the possible increase in intraregional trade in intermediate inputs between CAFTA countries that could be reflected in the increased growth rate of maquila exports as portrayed in the Nicaragua scenario. Such an increase could consist either of finished goods to the US or of intermediate inputs to other Central American countries. In either case, it is clear that the results of maquila are larger than the direct effects of tariff reductions or quotas, a conclusion that is consistent with the forecasts of Jaramillo and Lederman (2006). Whether or not these optimistic forecasts of the CGE models will be realized or not, it is clear that what happens to maquila is central to the net impact of CAFTA in Honduras, El Salvador and Nicaragua.

Costa Rica is clearly different. First of all, as the aggregate table shows, CAFTA has very little effect on sectoral growth rates, whether through tariff reduction, quotas or maquila. Tariff reductions reduce the growth rate of agriculture by a small amount, but that is more than offset by a small expansionary effect elsewhere. A comparison of the various columns indicates that any positive effect comes almost entirely from the tariff-reduction component of the agreement.

In the right hand column of Table 9 we show how the simulated changes in foreign direct investment and/or changes in productivity affect each sector in each country. In Honduras and El Salvador, the effects of an increase in FDI are large and are spread fairly evenly across different sectors. That follows from the experiment we ran in which we assumed that the increase in FDI was entirely applied to an increase in the overall rate of capital formation with no distinction between sectors. If one had evidence on the destination of likely foreign investment, one could sharpen these estimates.

In Nicaragua, as noted above, productivity increases were assumed to be linked to export performance or export growth. That is one of the reasons why exports grew so rapidly in Table 9, or why we show a greater than 8 pp in the rate of manufacturing export growth relative to the baseline. Most of that is due to the rapid growth of maquila, but productivity also plays a significant part. Once again Costa Rica appears to be different. But that is probably by construction. Overall productivity in the absence of CAFTA was assumed to grow fast enough to give an aggregate growth rate of 5.5%. It would appear from these simulations that very little additional productivity was assumed to be reachable under CAFTA, partly because the big export sectors in Costa Rica are apparently not particularly sensitive to the CAFTA agreement.

1. Employment creation under CAFTA

The impacts of CAFTA on employment and capital formation in the four countries follow closely the output patterns we have discussed in previous sections. As before, we have chosen to compare the growth rate of employment relative to the baseline growth rate. Table 10, shows the employment projections across comparable scenarios in the four countries. Wherever the data are available we show the absolute baseline growth rate of employment by skill level and gender and then the changes in the growth rate expressed as absolute percentage point changes from the baseline growth trajectory. In Honduras, for example, male unskilled employment is projected to grow by 2.98% per year in the baseline and 0.17 percentage points faster with tariff reductions. [17] In Nicaragua we report only the changes in the growth rate of employment between 2006 and 2012 as the baseline growth rates were not available to us.

Trade liberalization by itself has very little impact on employment growth in any of the four countries. It is slightly contractionary in Nicaragua and slightly expansionary in the other three countries. What does make a difference is maquila and to a lesser extent, quotas. Together the two expand the growth rate by close to a percentage point in Nicaragua and El Salvador, and by over 1.7 percentage points in Honduras. In Costa Rica, the employment effects of CAFTA are much smaller in all the simulations than they are in the other three countries, adding at most 0.11 percentage points to the growth rate in the productivity change scenario.

2. Changes in poverty and the distribution of income

The dynamic CGE model gives an estimate of the effect that CAFTA will have on employment, production and income. The question is what implications those changes have for poverty and the distribution of income. To answer those questions a way has to be found to translate the labor market outcomes of the CGE into a distribution of income across households. The difficulty is that the CGE tells us about employment creation and wages for individuals, but for distributional and poverty purposes those individuals must be treated as members of households. Thus if the CGE tells us that a certain number of additional jobs have been created, we need a way of deciding which formerly unemployed individuals will get those jobs, and which families they come from. Exactly the same sort of question arises if we are interested in the effect of a change in the skill composition of the labor force. The CGE solution, for example, may tell us that there is an increase in the fraction of the labor force that is skilled. We then need some way of deciding which members of which families are upgraded.

In all four countries a microsimulation methodology was followed that was developed earlier by Vos and Paes de Barros. [18] In this procedure a household survey as close as possible to the base year of the CGE is used to obtain a base period distribution of the labor force across the households represented in the survey. Then in the first step the labor force is divided among the

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[17] That is, unskilled male employment grows at 3.14% per year in the tariff reduction scenario.

[18] See their description of the method in Vos and others (2002).

Table 10

EMPLOYMENT GROWTH UNDER CAFTA

	Employment	Baseline growth	Percentage point changes in the growth rate 2020-2000				
			Tarcut 1	Maquila	Quota	All CAFTA	FDI
Honduras	Base year 1997						
Male unskilled	32 751	2 980	0.169	1.563	0.004	1.701	2.656
Female unskilled	5 224	2 948	0.213	1.812	0.004	1.984	2.663
Skilled-male	6 148	2 863	0.226	1.333	0.003	1.518	2.356
Skilled-female	1 812	2 843	0.179	1.315	0.003	1.467	2.473
Total							
Unskilled	37 975	2 975	0.174	1.596	0.004	1.739	2.657
Skilled	7 96	2 858	0.215	1.329	0.003	1.506	2.383
El Salvador	Base year 2005						
Male	1 533 296	4 606	0.233	0.508	n.a.	0.747	1.104
Unskilled	1 362 485	4 800	0.241	0.527	n.a.	0.773	1.137
Skilled	170 811	2 846	0.152	0.316	n.a.	0.472	0.755
Female	1 100 662	5 315	0.164	0.684	n.a.	0.847	0.733
Unskilled	935 830	5 656	0.169	0.719	n.a.	0.885	0.739
Skilled	164 832	3 012	0.132	0.403	n.a.	0.536	0.683
Total	2 633 958	4 911	0.203	0.586	n.a.	0.791	0.942
Unskilled	2 298 315	5 161	0.209	0.611	n.a.	0.822	0.967
Skilled	335 643	2 928	0.142	0.359	n.a.	0.504	0.719
Costa Rica	Base year 2002						Prod. chg.
Unskilled self employed-male	235 163	2,400	-0.005			0.000	0.046
Unskilled, self employed female	97 255	0,500	-0.040			-0.005	-0.061
Unskilled salaried male	397 826	2,800	0.137			0.152	0.207
Unskilled, salaried, female	158 580	0,300	0.099			0.104	0.104
Skilled self-employed males	105 924	2,200	-0.010			-0.010	0.015
Skilled self employed female	62 479	0,800	-0.040			-0.046	-0.056
Skilled salaried-male	294 185	2,000	0.126			0.131	0.141
Skilled salaried female	229 506	-0,200	0.099			0.104	0.109
Total employment	1 580 918	1,800	0.076			0.086	0.111
Nicaragua	Base year 2000						Prod. chg.
Unskilled workers-male	216 506		-0.005		0.103	0.768	0.837
Unskilled workers-female	226 648		-0.005		0.131	2.571	2.657
Skilled workers-male	203 057		-0.003		0.178	1.191	0.619
Skilled workers-female	169 782		-0.002		0.075	0.955	1.016
Self employed-unskilled male	385 602		-0.003		0.085	0.164	0.192
Self employed-unskilled female	177 665		-0.002		0.111	0.370	0.419
Self employed-skilled-male	288 771		-0.003		0.141	0.268	0.296
Self employed-skilled-female	45 165		-0.003		0.133	0.352	0.399
Total employment	1 713 196		-0.003		0.194	0.903	0.979
Capital	63 172 821		0.000		0.291	1.134	1.246

Source: For Nicaragua, Vos and Sánchez (2006), for Costa Rica, Sánchez, 2007, for Honduras and El Salvador, authors' worksheets.
Note: For Honduras, these are normalized units of employment, not the number of jobs.

various skills represented in the CGE model, and rates of unemployment for each are calculated. Then random numbers are assigned to the group which will shrink in size and that group is ranked according to the random numbers. Thus if the model calls for an increase in employment, random numbers are assigned to the unemployed. Then the procedure moves down the ranked list of the unemployed until a sufficient number have been found to reach the amount of employment given by the CGE solution. Then, working with the new simulated labor force by type, one repeats the procedure to change the skill or sectoral composition of that labor force. At a final stage, the wage of the new labor force with the composition determined by the CGE solution is changed in accordance with the CGE solution. At this point the new labor force with the new wage structure is reassembled into the households from the base period survey and new levels of household income per capita as well as poverty and income distribution statistics are calculated.

There are two things to note about this procedure. First the selection of individuals to move from one labor category to another is entirely random and not based on any behavioral model. This is not very satisfactory from a theoretical point of view. To remedy that defect the procedure is duplicated a large number of times and the statistical results tabulated [19] in order to test the validity or sensitivity of the results to the particular choice of individuals who are moved from a contracting to an expanding group. We can then report not only the mean of the various trials, but also the standard errors and confidence intervals. In the Honduras case we repeated these simulations 100 times. The second thing to note is that the solution we are proposing is sequential. We start with unemployment and adjust it to get the new labor force determined by the CGE model then change the sector and skill level of that new labor force, and lastly the wage. This would seem to be the correct order, but it is possible that the solution would be different if we had chosen a different sequence of changes.

Table 11 shows the simulated effects of the various CAFTA scenarios on poverty and the distribution of income. In the table we report the results that we obtained for Honduras and El Salvador as well as the comparable results reported in Sánchez-Vos for Nicaragua and in Sánchez for Costa Rica. Unlike in previous tables, and in order to avoid confusion, here we show the projected levels of poverty and distribution statistics rather than percentage-point variations in the average rate of change as the variables are percentages with relatively small annual rates of change. Note that for each country we show either the level of each variable in the terminal year or the average of the terminal year of the simulation in order to capture as much as possible the long-run effect of CAFTA-related policy changes. The reader should note that since Nicaragua has a much shorter time period than any of the other three countries, and since the deviations between the scenarios and the baseline tend to expand over time, our procedure will make it appear that CAFTA has a smaller effect in Nicaragua than in the other countries.

[19] In Honduras and El Salvador we repeated the procedure 100 times. Vos and Sánchez use the same procedure but do not report the number of iterations.

Table 11

THE IMPACT OF CAFTA ON POVERTY AND INCOME DISTRIBUTION

	Base year	Baseline	Tariff cut	Maquila	All CAFTA	FDI
El Salvador						
National	2005	Average levels in 2020				
Poverty incidence	0.402	0.236	0.215	0.199	0.185	0.177
Ext poverty incidence	0.155	0.071	0.063	0.056	0.051	0.048
Gini-per capita HH income	0.504	0.461	0.454	0.450	0.447	0.447
Rural						
Poverty incidence	0.444	0.233	0.208	0.189	0.174	0.165
Ext poverty incidence	0.186	0.078	0.068	0.059	0.054	0.050
Gini-per capita HH income	0.468	0.426	0.418	0.413	0.408	0.407
Urban						
Poverty incidence	0.375	0.238	0.220	0.205	0.193	0.185
Ext poverty incidence	0.135	0.067	0.059	0.054	0.049	0.046
Gini-per capita HH income	0.472	0.444	0.438	0.436	0.433	0.434
Nicaragua		Average levels in 2010-2012				
National						
Poverty incidence		55.500	55.600	55.200	54.500	54.870
Ext poverty incidence		27.000	27.500	26.400	26.000	25.700
Gini-per capita HH income		0.553	0.554	0.552	0.551	0.551
Rural						
Poverty incidence		71.200	71.300	71.300	70.400	70.600
Ext poverty incidence		40.400	40.900	40.700	39.300	39.100
Gini-per capita HH income		0.493	0.493	0.491	0.490	0.490
Urban						
Poverty incidence		44.300	44.300	43.400	43.100	43.500
Ext poverty incidence		17.600	18.200	15.500	16.700	16.400
Gini-per capita HH income		0.547	0.548	0.546	0.545	0.545
Honduras						
National	2004	Average levels in 2020				
Poverty incidence	0.701	0.664	0.653	0.591	0.580	0.508
Ext poverty incidence	0.453	0.409	0.397	0.326	0.315	0.255
Gini-per capita HH income	0.651	0.648	0.645	0.625	0.623	0.628
Rural						
Poverty incidence	0.795	0.759	0.749	0.681	0.668	0.592
Ext poverty incidence	0.595	0.542	0.529	0.441	0.427	0.351
Gini-per capita HH income	0.634	0.622	0.618	0.589	0.586	0.587
Urban						
Poverty incidence	0.599	0.562	0.551	0.495	0.485	0.419
Ext poverty incidence	0.299	0.266	0.256	0.203	0.195	0.151
Gini-per capita HH income	0.596	0.599	0.597	0.584	0.583	0.594

/Continued

Table 11 (Concluded)

	Base year	Baseline	Tariff cut	Maquila	All CAFTA	FDI
Costa Rica						
National	2002	Average levels in 2022-2026				
Poverty incidence	20.600	19.500	18.701		18.701	18.642
Ext poverty incidence	5.700	5.000	4.730		4.720	4.680
Gini-per capita HH income	0.432	0.443	0.443		0.443	0.443
Rural						
Poverty incidence	25.400	23.200	22.550		22.527	22.458
Ext poverty incidence	8.800	7.200	6.912		6.934	6.926
Gini-per capita HH income	n.a.					
Urban						
Poverty incidence	17.300	16.700	15.798		15.798	15.748
Ext poverty incidence	3.500	3.300	3.036		3.000	2.937
Gini-per capita HH income	n.a.					

Source: For Nicaragua, Vos and Sánchez (2006), for Costa Rica, Sánchez, 2007, for Honduras and El Salvador, authors' worksheets.

Overall the table tells us that CAFTA unambiguously reduces poverty. Compare the ALLCAFTA column in the table with the baseline. In every country the poverty level, both rural and urban is lower with CAFTA than it would have been without it. When we look more closely, we find that the bulk of the positive effect is coming from the maquila and quota component of the agreement, not trade liberalization per se. Trade liberalization alone reduces poverty in El Salvador, Honduras and Costa Rica, but the effect is small. In Nicaragua, Sánchez and Vos report that reducing tariffs increases poverty slightly in the rural areas and at the national level. That slight increase does not happen in any of the other three countries, but it is only thanks to the impact of maquila and quotas on employment creation in Nicaragua that poverty falls under CAFTA.

As the reader can see, poverty and income distribution in Costa Rica appear to be far less sensitive to CAFTA than they are in the other three countries. When tariff reductions, quotas and maquila are combined together, poverty at the national level only falls from 19.5% to 18.7%, a favorable effect but a small one. This reflects the smaller size of the maquila industry and the importance of other export sectors in the Costa Rican economy. One can see this in the estimates of the effect of CAFTA on employment and growth displayed in Tables 8 and 10.

The impact of the maquila industry is particularly large and favorable in Honduras and El Salvador. In Honduras for example compare the MAQUILA column for 2020 in the table with either the baseline or CAFTA. At the national level poverty falls by a remarkable seven percentage points relative to the baseline and six percentage points relative to tariff cuts. Even though the maquila industry is mainly an urban activity poverty actually falls further in the rural sector than it does in the urban as the additional employment and income generated in this sector increases demand for agricultural commodities produced by the poor just as much as for things produced in the cities.

The progressive impact of this industry on the Honduran economy can also be seen in what happens to the distribution of household income in the maquila scenario. The distribution of labor income does not change very much because rising skill differentials for the skilled in the urban sector just about offset gains by the unskilled in the rural sector. But when we look at the change in distribution of family income, the picture is entirely different. The additional income generated by job growth, particularly for the unskilled, drives the national Gini down from 0.65 to 0.62 and the Theil from 1.02 to 0.94. Both changes are statistically significant and as one can see from taking a closer look at the urban and rural distribution data, the favorable impact of maquila is actually greater in the rural sphere than in the urban.

We find the same favorable maquila effect in El Salvador, particularly for the urban sector although the absolute magnitude is smaller. A very substantial increase in demand for female unskilled labor raises the growth rate by 0.68 percentage points per year relative to the baseline. Because of demand-side linkages the boom in this sector spreads out and increases demand and employment throughout the economy. Rural and urban poverty both decline, the former by an even greater amount than the latter. This merely underlines two features of poverty reduction in El Salvador. The first is the critical sensitivity of poverty to employment growth, particularly for the unskilled. Any development strategy which successfully creates employment for this group will have a very large and favorable impact on poverty. The second feature is the linkage between the rural and the urban spheres. If the economy creates urban employment that pulls unemployed or inactive workers out of the countryside at the same time that the increase in urban employment and income expands urban-household demand for agricultural production, poverty will fall throughout the economy. Maquila represents the rare case of a growth and employment trajectory which is led by unskilled labor. All of this underlines the general point that the most effective way to reduce poverty is through job creation. If the leading sectors are themselves major employers of the unskilled, as is maquila, the result will be all the more favorable for the poor.

There are several things to note about this optimistic maquila scenario. First, there is a perception problem with respect to maquila. CAFTA does not actually change current conditions for the domestic textile industry. Rather it makes permanent the liberalized rules of origin enjoyed by the industry since 2000. In the popular mind that may not seem like much of a benefit since the country already enjoys it. But without CAFTA the temporary benefits granted by CBTPA in 2000 will expire. Our simulations say that this would have a major negative impact on employment and growth, but these are not positive incremental effects in relation to the current situation. Note however that because CAFTA does permit intermediate inputs from any CAFTA country unlike the CBTPA, it may have a separate positive impact which the simulations in Honduras and El Salvador do not capture. At the same time our simulations do not take into account possible changes in external conditions due to the end of the multifiber agreement in 2005. The increased competition with Chinese and other Asian exporters could shrink demand for maquila exports from Central America.

The right hand columns in each country table shows the poverty and income distribution impact of either an increase in foreign direct investment in the cases of Honduras and El Salvador, or an exogenous increase in the rate of growth of productivity in the cases of Costa Rica and Nicaragua. As discussed above, the idea of this simulation is to demonstrate the critical importance of capital formation and/or increases in productivity to growth and poverty reduction. In our previous three impact tables we confirm the strong effect on growth and

employment of these positive shocks. Here we show the poverty and distributional impacts. They too are positive. Capital formation in particular has a very powerful impact, one that is greater than all the effects of CAFTA including maquila. In Honduras our simulation increases the rate of capital growth by around 2.5%, sparking a demand for labor that raises the growth rate of total employment by 2.5% per year and which in turn causes a very large reduction in poverty both rural and urban. Since this simulation also records a widening of the wage differential there is also a slight expansion of income inequality. In El Salvador the direction of the changes in poverty and distribution is similar to that of Honduras, but the size of the changes is much smaller. This disparity is not because the Salvadorian economy is less sensitive to capital formation, but rather because of the smaller scale of the investment stimulus. As we can see in Table 8, investment only grows by an additional 1.5% in El Salvador compared to over 3% in Honduras, which implies far less additional employment in El Salvador than Honduras, and by extension far less poverty reduction.

The results for Nicaragua and Costa Rica combine an inflow of foreign direct investment with a hypothetical increase in productivity in the export sectors which are assumed to receive the additional investment. In both countries the differential effect of this change is much smaller than for Honduras and El Salvador mainly because the size of the investment stimulus is smaller. Note that the incremental effect of the change in FDI and productivity is the difference between the ALLCAFTA and the productivity-change columns in the table. For example, we see that this change only increases the growth rate of capital formation in Nicaragua by 0.23 percentage points per year (0.761-0.532), with an even smaller differential effect in Costa Rica. We find the same pattern when we look at the changes in employment from this simulation in Table 10 or in poverty and distribution in Table 11. Foreign investment and poverty improvements do create employment and reduce poverty, but the effect is small. In fact, in Costa Rica and Nicaragua trade liberalization, quotas and maquila explain much more of the total change in poverty than do growth in foreign investment and productivity. The same cannot be said of the results for Honduras and El Salvador, but we cannot be sure if this disparity is simply a result of our having assumed a far greater increase in capital formation than Vos and Sánchez did for Nicaragua and Costa Rica.

As the reader can see, none of the CAFTA scenarios have a significant impact on the distribution of household income. For the most part, the changes are slightly progressive, but all are small. In all four countries there is a significant rise in the skill differential in favor of the better educated because we all assumed that the supply curve for the skilled is less elastic than for the unskilled. In all cases including the baseline there is an increase in demand for labor both skilled and unskilled. For the skilled a large part of that expansion of demand is choked off by rising wages; for the unskilled, most (or all) is satisfied by an increase in employment. In Honduras, for example, we assumed an excess supply of unskilled labor willing to work at the base-period real wage. In the ALLCAFTA simulation, therefore, there is an increase of about 40% in the employment of unskilled males and of 49% for unskilled females, all at constant real wages. For skilled labor there is a smaller increase in employment and a bigger increase in real wages. When these two effects are combined the increased number of jobs for the unskilled at the bottom of the income pyramid more than compensates for the rise in wage inequality, with the result that there is a slight improvement in the overall distribution of household income.

V. CONCLUSIONS

In Central America there has been a vigorous and somewhat polemical debate on the expected impact of the CAFTA agreement on the economies of the region and on small holders facing reductions in tariff protection for sensitive products such as corn, rice and beans that they produce. In this paper we report the results of country papers for El Salvador, Honduras, Nicaragua and Costa Rica based on recursive dynamic CGE models, each of which uses a recent social accounting matrix and behavioral parameters in a dynamic general equilibrium framework. These models were used to simulate the effects of changes brought about by CAFTA. They all contain a fairly extensive disaggregation of the agricultural sector so that the direct general equilibrium impact of the agreement on smallholders can be calculated. The models also permit us to trace and quantify the general equilibrium impacts of the agreement on other sectors of the economy, in particular maquila and non-traded goods. All of the models are dynamic which allows them to capture the adjustment of the economies to the reduction in tariff protection that takes place over time.

What the models for all four countries tell us is that the overall impact of CAFTA on output, employment and poverty is positive, but small, particularly if one excludes maquila. In all four countries, when one combines trade liberalization, quotas and maquila, growth in both output and employment is higher and poverty is lower with CAFTA than they would have been without it. This is an important result. It says that the opponents of CAFTA have missed the fact that even though the direct impact of tariff reduction may be harmful to smallholders in some countries, that result is more than offset by the indirect general equilibrium effects of export expansion and employment creation elsewhere. But the result also reminds us that while the impact of CAFTA is positive, it is modest. CAFTA is not a magic bullet capable of bringing much higher growth rates to the region unless coupled with a complementary development strategy that takes advantage of export opportunities made possible by the agreement. [20]

In fact, our simulations for the three countries other than Costa Rica tell us that most of the positive impact of CAFTA comes from maquila, not the expansion of agricultural exports. In Honduras, for example, maquila accounts for more than 90% of the 1.5 percentage-point addition to the growth rate and trade liberalization a mere 8%. In Nicaragua it is only because of maquila with a bit of help from the quota-based expansion of exports that CAFTA has a positive impact on growth.

There are two reasons that this distinction between maquila and everything else is important. First, the maquila simulations hold external market conditions constant. In particular they ignore the rising competition of Asian clothing exports following the expiration of the Multifiber Agreement. If the end to that agreement changes conditions for Central American

[20] This conclusion quite strongly supports the policy conclusions in Jaramillo and Lederman. They too say that CAFTA is not a magic bullet and that complementary actions by both the government and the private sector will be necessary to take full advantage of potential trading opportunities under the agreement.

exporters, it will have a major impact on the net overall benefits of CAFTA to the Central American economies.

The second reason why the distinction is important at least for Honduras and El Salvador is because the treatment effect of CAFTA is different for maquila than it is for all other sectors. CAFTA changes current levels of protection or offers new access quotas for exports in the case of non maquila sectors. It changes current arrangements. But for maquila CAFTA simply makes permanent the more generous rules of origin granted in 2000 by the Caribbean Trade Preference Act. [21] It is clearly beneficial for the Central American countries to lock in those rules of origin, but it won't necessarily *feel* beneficial because the economies are already enjoying those benefits. We modeled this for Honduras and El Salvador by using as CAFTA's effect the reduced level of intermediate imports registered after 2000 thanks to CBTPA. We showed that the effect is positive and large, but one should understand that this effect is not in relation to current levels of production and employment but rather from what they would have been without CBTPA. The treatment of maquila in Nicaragua and Costa Rica looks not at the past reduction in imported intermediates as was done in Honduras and El Salvador, but rather at the future expected growth in maquila exports. In either case what is important is the change in the expected growth rate due to maquila, and in both cases the change is substantial.

These results illustrate a key point for the design of any development strategy for Honduras, El Salvador and Nicaragua. These are economies with an excess of unskilled labor. To succeed any strategy for creating job growth and reducing poverty will have to be centered on increasing demand for things that can be produced by unskilled labor. Maquila is exactly that sort of activity. Each of the maquila simulations shows just how significant this effect can be in this sort economy. A maquila-led growth strategy changes skill intensity in the economy in a very progressive way without increasing overall capital requirements.

Among the four countries in the study, Costa Rica is the least affected by the CAFTA agreement because its economy is less dependent on agriculture and on maquila than the other three economies. Honduras is the most affected. Even without considering the possible effects of foreign direct investment, CAFTA increases the 20-year growth rate of the Honduras economy by 1.5 percentage points per year and its employment by an even faster 2.4 percentage points per year, all of which reduces poverty in the year 2020 by 7 percentage points relative to what it would have been without CAFTA and CBTPA.

Finally, the foreign direct investment and productivity simulations show the central role of increased capital formation to increasing growth rates and poverty reduction in Central America. Unfortunately there is no guarantee that foreign investors will respond to CAFTA. Even if they do, complementary policies that make agriculture more productive, eliminate

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[21] As noted above, CAFTA does make one important new change for maquila in that it allows for the use of intermediate goods produced in any of the CAFTA countries. In this way it could cause a rise in intraregional trade in intermediates. For Nicaragua Vos and Sánchez assumed a large one-time jump in the rate of export growth to reflect this possibility. The Honduras and El Salvador simulations do not make this assumption, but instead assumed that the increase in intermediate production is within the country. In both cases the increase in employment and output is large.

bottlenecks and develop markets and that encourage higher rates of domestic saving and investment are also going to be needed.

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